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Sent: Tuesday, July 29, 2014 4:19 PM
To: bdcp.comments@noaa.gov
Subject: Comment Letter on BDCP - July 20, 2014
Attachments: Friant Comment Ltr - Attachment A Modeling Review.pdf; Friant Comment Ltr - Attachment B Friant Issues Analysis .pdf; Friant - Comment Letter on BCDP July 29 2014.pdf

Dear Mr. Wulff, please find attached comments on the Bay Delta Conservation Plan and draft EIR/EIS on behalf of Friant Water Authority.

Please confirm receipt.

Thank you.

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July 29, 2014

VIA ELECTRONIC AND FIRST CLASS MAIL
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Mr. Ryan Wulff, Senior Policy Advisor
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Southwest Regional Office
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Re: Friant Water Authority's comments on the Bay Delta Conservation Plan and EIR/EIS.

Dear Mr. Wulff:

Friant Water Authority ("Friant") appreciates the opportunity to comment on the proposed Bay Delta Conservation Plan ("BDCP" or "Project" or "Plan") and the draft BDCP Environmental Impact Report/Environmental Impact Statement ("EIR/EIS").

I. Introduction

Friant recognizes the need to increase water supply reliability in California, and the need for a comprehensive plan to manage and restore the Delta ecosystem. However, the BDCP contains serious flaws that undermine its ability to achieve either of these objectives and render it invalid as a Habitat Conservation Plan ("HCP") or Natural Communities Conservation Plan ("NCCP"). The project's EIR/EIS propagates these underlying deficiencies, resulting in environmental review documents that are so misleading as to preclude any meaningful public review, thus violating the California Environmental Quality Act ("CEQA") and the National Environmental Policy Act ("NEPA").

The BDCP is being prepared in order for the Bureau of Reclamation ("Reclamation") and the California Department of Water Resources ("DWR") to obtain incidental take permits under the California and Federal Endangered Species Acts (collectively, "C/ESA"). To implement the BDCP's stated "coequal goals" of increasing water supply reliability and restoring the Delta ecosystem, the BDCP requires take coverage for its "covered activities." (BDCP, Sec. 4.2.) Chief among these is a "conservation measure" that involves the construction of massive new water conveyances in the form of 35-mile long tunnels under the Delta and ancillary infrastructure. (BDCP, Sec. 3.4.1.1.)

The EIR/EIS intends to provide both project- and program-level review of the BDCP, including, ostensibly, 35 miles of tunnels and related infrastructure. However, for reasons discussed in greater detail below, this mixed review fails on both levels. The EIR/EIS's evaluation of the Plan at the program level is insufficient, and worse, the Plan's inadequate conservation measures are then utilized to serve as mitigation measures for the tunnels at the project level. Furthermore, the environmental effects of many of the components of the tunnels are not discussed in sufficient project-level detail.

The purposes of an EIR/EIS are to describe the proposed project, its physical features, and the significant impacts those proposed physical changes will have on the environment, and then to analyze the alternatives to the proposed project or mitigation measures that could lessen those impacts. The strange structure chosen for the project and the EIR/EIS – couching an enormous infrastructure development project in the guise of a conservation plan – deviates from and violates the legal requirements under NEPA and CEQA.

The mischaracterization of the project is compounded by clear errors in the modeling on which it relies. Friant and other stakeholders have hired an independent company to assess the modeling which forms the foundation of the BDCP and its environmental review. This independent assessment revealed numerous flaws in the model which lead to a skewed and inaccurate representation of the BDCP's projected environmental impacts as well as the future "no project" effects. These significant flaws, combined with an EIR/EIS that serves to obscure rather than inform the true nature of the "project", make it difficult to discern fundamental elements of the project, such as where, when, and how the water will be diverted, and the impacts to the environment in those areas of sources of water that are proposed to travel through the tunnels. Some of these flaws stem from using an outdated 2010 model, even though DWR itself uses an updated 2013 model in its 2013 State Water Project ("SWP") Water Delivery Reliability Report.[1] Other flaws are based on erroneous operating parameters or unrealistic assumptions. These problems should be addressed, and the BDCP and EIR/EIS revised and recirculated for further public review.

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[1] See *Report on Review of Bay Delta Conservation Program Modeling ("Modeling Review")*, by Daniel B. Steiner, Consulting Engineer and MBK Engineers (the "Reviewers"), included here as Attachment A.

Finally, as Friant has outlined to Reclamation at length in the past, the BDCP violates California water rights laws, and Friant's water rights priority in particular, as it has been interpreted by the courts.[2] In so doing, the BDCP not only undermines its stated purpose of improving water supply reliability, but it is simply illegal and cannot proceed as written.

We therefore respectfully ask you to revisit those documents to ensure that they provide enough information for not only our members, but also the public generally, to determine whether the BDCP can contribute to meet the pressing needs of the state's communities, farms and environment. Furthermore, both the BDCP (including its proposed Implementing Agreement) and the EIR/EIS must be revised to address the comments raised by Friant and the numerous other commenters in order to correct errors, disclose all significant impacts, and allow the consideration of feasible mitigation measures or project alternatives to reduce or avoid these impacts.

II. The BDCP Violates Water Rights Law.

Friant has raised this issue to the DWR before, but restates it here for the record. The BDCP's conservation measures, most notably the construction of the tunnels (referred to as "CM1" in the documents), also incorporates complex changes to water flow and diversions by making changes to the operations of the Central Valley Project ("CVP") and SWP. The BDCP's depiction of the operation of the CVP and SWP contains numerous technical errors and incorrect assumptions as discussed in greater detail throughout this letter. With respect to water rights, however, the tunnel construction component is premised on impermissible CVP and SWP operations, which effectively retroactively reallocate established water rights belonging to Friant and other water rights holders. However, the law grants DWR no authority to do this. As discussed in greater detail in section III of this letter, the proposed illegal alteration of water rights infects the entire analysis of the BDCP itself and the EIR/EIS, and for this reason alone, the Plan and the EIR/EIS must be revised.

California water law is based on the priority system of state water rights. The appropriative right was developed under the early mining-law principles, which favored the scarce resource allocation policy of first in time having the highest priority to put water to use. (See, e.g., *Pleasant Valley Canal Co. v. Borror*, 61 Cal. App. 4th 742 (1998).) Accordingly, when water shortages occur, they are addressed by implementing the water rights priority system. The BDCP cannot simply invent new water law by "balancing" (EIR/EIS, p. 5B-9), or, more accurately, "re-balancing" – it must apply the priority rights and analyze the impacts accordingly.

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[2] See Memorandum to Donald R. Glaser (Reclamation) from Jennifer Buckman, Esq. (Friant), re BDCP Issues and Concerns, dated November 30, 2012 (the "Friant Issues Analysis"), included here as Attachment B.

The EIR/EIS notes, in general terms, the State Water Resources Control Board's ("SWRCB") primary regulatory authority over public trust resources, and the SWRCB's authority under the California constitution to prevent waste of these resources by ensuring that they are reasonably and beneficially used. (EIR/EIS, p. 8-117.) The EIR/EIS alludes to the SWRCB's ability to regulate permits and water rights in furtherance of this trust management, and seems to suggest that the public trust doctrine will allow reprioritization of water rights. (*Id.*) Not so. The public trust doctrine will not apply to retroactively reallocate established priority water rights in this instance. In *National Audubon Soc'y v. Superior Court*, 33 Cal.3d 419 (1983), the court rejected the argument that "the public trust is antecedent to and thus limits all appropriative water rights … ." (*Id.* at 445).

Nor does the public trust doctrine allow the alteration of established water rights and priorities (Friant's, in particular) in order to address the needs of Delta fisheries. As Friant stated previously in its 2012 Issues Analysis, "*El Dorado Irrig. Dist. v. State Water Resources Control Bd.*, 142 Cal. App. 4th 937 (2006) confirms that the public trust doctrine only authorizes the disregard of water rights priorities in specific, limited circumstances, such as when adherence to existing priorities would itself violate the public trust. In contrast, where, as here, the best available evidence suggests that the needs of the fish can be met by curtailing the diversions of the junior water users, that is the result compelled by California law." (Friant Issues Analysis, p. 9).

Friant reiterates all of the issues and concerns it previously brought to the lead agencies' attention in its Issues Analysis, and incorporates the Issues Analysis by reference.

III. The EIR/EIS is Inadequate under CEQA and NEPA.

The project is a proposed major federal action and must comply with NEPA regulations and guidelines. (42 U.S.C. Section 4332.) Section 102(2) of NEPA requires the preparation of an environmental impact statement for any major federal action significantly affecting the quality of the human environment. An EIS must provide a full and fair discussion of a project's significant environmental impacts and must inform decision makers and the public of the reasonable alternatives to a project that would avoid or minimize adverse impacts or enhance the quality of the human environment. (40 C.F.R. Part 1502.1.)

An EIS that does not provide a full and fair discussion of the significant environmental impacts of a proposed action and precludes a meaningful analysis of the significant environmental impacts of a project and the reasonable alternatives to the project is inadequate to meet the requirements of NEPA. (40 C.F.R. Part 1502.9.) An inadequate EIS, or portion thereof, must be revised to comply with the requirements of NEPA and recirculated to allow for proper public comment. (40 C.F.R Part 1502.9.)

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Likewise, under CEQA, an EIR is an informational document designed to provide public agencies and the public with detailed information about the impacts that a proposed project is likely to have on the environment, analyze the ways in which the significant effects of a project might be minimized; and identify alternatives to the project. (Pub. Resources Code §§21002, 21002.1(a), 21061; 14 Cal Code Regs §15362; see also Pub. Resources Code §§21100, 21150.) If an EIR is "so fundamentally and basically inadequate and conclusory in nature" that public comment on the draft is essentially meaningless, or if significant new information is added to an EIR, it must be recirculated for further public review. (*Laurel Heights Improvement Ass'n v Regents of Univ. of Cal.*, 6 Cal.4th 1112 (1993); 14 Cal Code Regs §15088.5(a).)

Here, the EIS/EIR for the project fails to meet the requirements of both NEPA and CEQA for the reasons set out below.

1) Threshold Requirements of the EIR/EIS are Not Met and the Review is Premature.

a. Project Description is Missing and Where Referenced, Incomplete and Inconsistent.

i. The Project Description is Vague, Inaccurate and Ill-Defined.

The EIR/EIS fails to accurately describe the project.

"An accurate, stable and finite project description is the *sine qua non* of an informative and legally sufficient EIR." (*County of Inyo v. City of Los Angeles*, 71 Cal. App. 3d 185, 192 (1977).) The proposed BDCP and draft BDCP EIR/EIS do not meet this standard. Because of the enormous data gaps in the definition of the project, the BDCP's environmental analysis does not accurately evaluate the BDCP. Even though the environmental document are voluminous, the project is so ill-defined that the analysis is not useful or relevant. Before the draft BDCP and its EIR/EIS can be legitimately released for public review, the proponents need to describe in sufficient detail what the elements of the project are and how they will work.

Without an accurate project description, there can be no meaningful review of environmental impacts. Here, the project description is so inadequate as to actively mislead the public. The project is described as a habitat conservation plan, which cloaks as a "covered activity" a massive infrastructure project that would involve over 35 miles of tunnels and conveyance structures occupying thousands of acres and pumping massive amounts of water from locations that are not identified. (EIR/EIS, p. 3-27.) The tunnels and associated conveyance structures are the driving force behind this project and must be presented as such.

An EIR/EIS is an informational document that must inform the public of the potential impacts resulting from the proposed project and the reasonable ways to avoid or mitigate those impacts. At the outset, an EIR/EIS must have a clear table of contents and executive summary. (14 Cal. Code Regs. §§ 15122, 15123.) The BDCP EIR/EIS fails to provide an adequate summary of the proposed actions and their consequences. It is difficult to discover from reading the Executive Summary of this "Conservation Plan" EIR/EIS what physical changes to the environment are actually proposed. Rather, the Executive Summary makes numerous references to "covered activities and associated federal actions" as follows:

> *The BDCP includes covered activities and associated federal actions. Covered activities are those actions that are carried out by nonfederal entities, such as DWR, and that are expected to be covered by regulatory authorizations under ESA and NCCPA. The covered activities consist of activities in the Plan Area associated with the conveyance and export of water supplies from the SWP's Delta facilities and with implementation of the BDCP conservation strategy. Each of these activities falls into one of six categories: (1) new water conveyance facilities construction, operation, and maintenance; (2) operation and maintenance of SWP facilities; (3) nonproject diversions; (4) habitat protection, restoration, creation, enhancement, and management; (5) monitoring activities; and (6) research.*
>
> *Associated federal actions are those activities that are carried out, funded, or authorized by Reclamation within the Plan Area and that would receive appropriate ESA coverage through Section 7. These actions would be (1) operation of existing CVP Delta facilities to convey and export water in coordinated operation with the SWP after the BDCP is approved and implemented, (2) associated maintenance and monitoring activities, and (3) the creation of habitat. The federal actions by Reclamation would not be covered activities for the purposes of the ESA Section 10(a)(1)(B) permit. These federal actions are actions that occur within the Delta that would be coordinated with DWR to support DWR's compliance with the ESA Section 10 permit. Reclamation's activities are subject to ESA Section 7.*
> (EIR/EIS, P. ES 1-16 to 1-17)

Apparently, the 35 miles of tunnels and associated conveyance structures would be subsumed under the category of "new water conveyance facilities" but the project description should not function as a guessing game – the precise project should be described. Furthermore, listing "new water conveyance facilities" as one of several categories, along with activities such as "research," fails to provide sufficient weight and attention to this massive infrastructure project.

An EIR must be "prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes account of environmental consequences." (*Dry Creek Citizens Coalition v. County of Tulare*, 70 Cal. App.4th 20, 26 (1999).) The executive summary fails to provide a succinct, clear statement of the project, and the remainder of the EIR/EIS does not improve on this absence.

Similarly, NEPA requires a description of "the underlying purpose and need" to which the project responds. (40 C.F.R. §1502.13). From the above project description, it is not at all clear that the construction of enormous conveyance systems actually responds to the stated purpose and need for the BDCP.

ii. The Description of the Project as a Conservation Project is Misleading and Hinders Analysis.

The project description purports to describe the entire BDCP, which itself purports to be a conservation plan. It is not readily apparent from the executive summary project description that the BDCP actually involves the construction of massive water conveyance infrastructure. The EIR/EIS lacks a section entitled "Project Description" where one would hope to find the proposed physical changes in the environment described. (14 Cal. Code Regs. § 15124.) Moreover, the EIR/EIS purports to be a program-level analysis of most aspects of the BDCP, but then purports to give project-level and site-specific analysis of the proposed tunnel locations. There is minimal description about the actual design of the massive infrastructure projects proposed, in chart format. (See EIR/EIS, Appendix 3C.). Although this might be acceptable for certain types of projects, it is inappropriate for a construction project of this magnitude.[3] At this scale, such significant and unavoidable impacts will occur that the EIR/EIS warrants an accurate and detailed project description of the tunnels and related infrastructure. This is particularly so where technical design elements could have a lasting and detrimental effect on endangered species such as the salmonids discussed below.

[3] See, e.g., comments on the administrative draft EIR/EIS from the United States Environmental Protection Agency ("EPA") and the United States Fish and Wildlife Service ("USFWS"), published on July 18, 2013 and are available at this link: http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library/Federal_Agency_Comments_on_Consultant_Administrative_Draft_EIR-EIS_7-18-13.sflb.ashx (last accessed July 28, 2014.)

The project description barely acknowledges the potential impacts on long-held water rights. Although adjusting the way these water rights are fulfilled may seem abstract, it is within the scope of the project and has very real environmental impacts, aside from any issues of legal feasibility as discussed below. A complete project description is necessary to ensure that all of the project's environmental impacts are considered. (*City of Santee v. County of San Diego*, 214 Cal.App.3d 1438, 1450 (1989).) Here, the EIR/EIS alludes to water rights in various sections,[4] but it does not address the impact from less reliable water, as discussed in more detail in the Water Supply/Reliability section below.

iii. The Project Description is Still Evolving Given the Uncertainties Present in the Draft Implementing Agreement.

An important component of the Plan is the draft Implementing Agreement which sets forth how the 22 conservation measures comprising the Plan will actually be implemented. As discussed in greater detail below (section III.2.a of this letter), this is crucial information for environmental analysis because 21 out of the 22 conservation measures at the heart of the Plan are only reviewed at the program level, even though they are critical to mitigating the effects of the tunnel construction. The EIR/EIS recognizes that in order to realize the conservation measures, there must be "substantial coordination and cooperation" by all involved in the project. (EIR/EIS, p. 7-2.)

Additionally, the draft Implementing Agreement is required under the C/ESA, and as such it should have been part of the project and undergone simultaneous environmental review. (Cal. Pub. Resources Code §21082.2(c).) Instead, the draft Implementing Agreement was released on May 30, 2014, well after publication of the Draft EIR/EIS, and therefore the EIR/EIS could not have analyzed it as part of the "whole project" as required under CEQA. (14 Cal. Code Regs. § 15378(a).) The EIR/EIS states only that "[t]he release of the draft BDCP and Implementing Agreement concurrent with the publication of the draft EIR/EIS satisfies" the requirements of an HCP under the ESA. (EIR/EIS, p. 32-9). Whether or not this late release satisfies the ESA, it does not satisfy the CEQA and NEPA requirements that the environmental documents include a clear project description prior to their release for public review.

The draft Implementing Agreement does not actually describe how the project will be implemented. Instead, it echoes the EIR/EIS's vague framework for making future decisions through the use of a "decision tree" process. (Draft Implementing Agreement, p. 24; EIR/EIS, Appendix 3A, Sec. 3A.10.6.) The decision tree would allow parties to the Implementing Agreement to make certain decisions about water flows,

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[4] See, e.g., EIR/EIS, pp. 6-4 to 6-7; pp. 6-37 to 6-38; p. 6-155; pp. 1C.2-10 to 1C.2-12; 1C.4-38; and Appendix 1E generally.

diversions, adaptive management, and changes to conservation measures based on future occurences. In short, the future outcomes of the decision tree ultimately become so vague and include so many potential scenarios that the process thwarts any meaningful analysis. Instead, the decision tree process, left largely undefined in the draft Implementing Agreement, appears to allow for a much wider range of scenarios than were actually analyzed in the EIR/EIS. Moreover, parties to the agreement have not allocated responsibilities outlined in the Agreement. This open-endedness allows for a constantly shifting interpretation and application, defying the requirement for a "stable" project description. In other words, this EIR/EIS not only defers required mitigation – which cannot be accurately identified given the shifting project description – it also defers the *actual analysis of the proposed project*.

Finally, the late release of the Implementing Agreement, a crucial component of the project, constitutes piecemeal review prohibited by CEQA and NEPA. (40 C.F.R. §1502.25.) The fact that the comment period was extended to allow for public review of the draft Implementing Agreement does not address the fundamental problems of vagueness and uncertainty that are present in the documents, nor does it correct the failure to include the components of the Implementing Agreement in the project description for purposes of the EIR/S.

b. The Proposed Project is Legally and Otherwise Infeasible and Thus the DWR and Reclamation Lack Authority to Proceed.

The project proposes to illegally alter water rights, and thus at its core the project is legally infeasible. The illegal rearranging and reprioritizing of these water rights is at the heart of the project, which renders the entire project legally infeasible. The Bureau of Land Management ("BLM") and Reclamation have no authority to conduct illegal activity. (*Marin Mun. Water Dist. v KG Land Cal. Corp.*, 235 Cal.App. 3d 1652, 1666, (1991) [legal uncertainty about ability to implement alternative justified determination of infeasibility].) An alternative also may be found legally infeasible if its adoption is beyond the powers conferred by law on the agency. (See *Kenneth Mebane Ranches v Superior Court*, 10 Cal.App. 4th 276, 291(1992).)

Furthermore, as discussed in more detail in section II of this letter (Water Rights), the DWR may not appropriate water in a way that harms the interests protected by the public trust doctrine. (*Audubon Society v. Superior Court*, 33 Cal.3d 419 (1983).)

The proposed project is also infeasible because Alternative 4 relies on water transfers of 1.3 million acre-feet to generate sufficient water to supply all the needs identified by the project. This level of water transfers has never been attained, even in severely dry years such as the current one. There is no basis for speculating that this volume of water could or would be transferred in the future. Since the proposed project relies on this unrealistic level of water transfers, it is infeasible.

Finally, the proposed project is economically infeasible because the Governor has indicated his intent not to include bond funding for many of the conservation projects that the BDCP contemplates. It is not affordable for the local public agency sponsors to cover the massive costs of these projects, which are expected to exceed $25 billion. There is no evidence that this amount of state or federal money will be appropriated to cover these expenses, and it is not legal for the federal government to assign costs to its contractors unless they are receiving commensurate benefits from the project. Consequently, the BDCP is without adequate funding sources, and as currently envisioned it appears to be financially infeasible.

c. The Project Model does not Identify the Proposed Project's Effects

The BDCP EIR/EIS relies heavily on modeling of future conditions for most of its impact analyses, including the analysis for how water supply and reservoir operations are modified by the BDCP, and how water quality, water levels, temperature, Delta flows, and fish response are subsequently affected. The BDCP uses a 2010 version of the CalSim II model, even though an updated 2013 version of the CalSim II model has been used by other agencies (including DWR) for other projects. (*Modeling Review, p. 3.*). In order to better understand the foundation on which the entire BDCP analysis rests, Friant and other stakeholders commissioned an independent analysis of the BDCP's model. The Reviewers found that "The BDCP Model contained erroneous assumptions, errors, and outdated tools, which resulted in impractical or unrealistic CVP and SWP operations. The unrealistic operations, in turn, do not accurately depict the potentially real effects of the BDCP." (*Modeling Review,* p. 1).

First, the Reviewers identified that the 2010 version of the CalSim II model used in the BDCP analysis contains significant errors and bugs that were subsequently corrected in the 2013 update to the model. (*Modeling Review*, p. 3). For example, the 2010 model uses an incorrect parameter for the Sacramento River flow requirement for Delta inflow. (*Id.*) Additionally, the 2013 version of the model contains updates that reflect regulatory changes which, in turn, affect the modeling of water operations. Inexplicably, BDCP analysis did not re-run the model using the updated and corrected 2013 version, and thus at the outset the foundation for the environmental analysis is flawed, and the various layers which build upon that foundation are suspect and likewise flawed. The updated 2013 model has been utilized by DWR for other projects, including DWR's 2013 State Water Project Water Delivery Reliability Report, and it is unclear why the EIR/EIS does not based its analysis using the 2013 model.

Additionally, the Reviewers further refined the 2013 model to incorporate additional assumptions and updates in an effort to attain a more accurate analysis than the unmodified 2013 model would produce. (*Modeling Review*, p. 21.) The Reviewers' efforts in refining the 2013 model were sufficiently successful that both DWR and Reclamation have since incorporated the modified 2013 model into their own analyses.

(*Modeling Review*, p. 20). The Reviewers then used the modified 2013 model to conduct a more accurate analysis of the BDCP's anticipated impacts and effects.

As described in great detail in the *Modeling Review* (pp. 10-13), the 2010 model used by the BDCP applied incorrect climate change assumptions, which yielded nonsensical results. For example, in the Upper San Joaquin River basin, inflow to Millerton Lake is expected to *decrease* under future climate scenarios. However, an error in the BDCP Model causes the amount of stored water in Millerton Lake to *increase* by inappropriately reducing water deliveries to the Friant Division. The Reviewers note that the BDCP erroneously overestimates Millerton Lake storage, which causes an overestimation of reservoir releases and available water downstream. Because overall CVP operations and the San Joaquin River are interconnected, this error causes problems throughout the CVP system. With the coordinated operations of the CVP and SWP, this error can affect the SWP system. (*Id.* at 11.) The result is an incorrect model, which should be re-run with the modified 2013 CalSim II model.

Additionally, the BDCP model fails to consider that in the event of worsened drought conditions, public agencies would likely cope by putting in place adaptation measures. Types of adaptation measures could include (1) updating operational rules regarding water releases for flood protection; (2) calling for mandatory conservation and/or relaxation of regulatory criteria in emergency drought declarations; and (3) revisiting rules by which the CVP and SWP allocate water during shortages and operate more conservatively in wetter years. (*Modeling Review,* p. 4). These types of measures are reasonable, foreseeable, and could have been modeled in order to provide a more realistic assessment of future conditions under climate change both with and without the project. For example, during this severely dry year, for the first time ever, Reclamation changed several of its historic policies and procedures related to the delivery of the vested priority obligation owed to the Exchange Contractors. Likewise, this spring, DWR and Reclamation submitted multiple joint petitions to the SWRCB for several "temporary urgency change petitions" to modify the water quality regulations that would otherwise be in place, and the SWRCB granted each of these petitions. However, even though the BDCP proposes fundamental changes to the way in which the State Water Project and the Central Valley Project are operated, the BDCP modeling of the no project/no action scenario analyzed only the predicted changes in precipitation and temperature, without any other changes due to foreseeable regulatory reactions. The result is that the BDCP model predicts dire water shortages, which, in turn, provides an unrealistic doomsday future no project/no action scenario against which the future project is then favorably compared. This is fundamentally misleading to the public, and additional modeling should be performed (with the modified 2013 CalSim II model) which considers more realistic future no project/no action scenarios.

The effects of the errors present in the BDCP model are pervasive, as described in greater detail elsewhere in this letter, (see, e.g., sections III.2.c on baseline and IV.1.a regarding the HCP/NCCP). Friant urges the lead agencies to take the necessary time to update and correct the foundational modeling performed, as well as all the modeling analyses which build on that foundation. Because the BDCP itself relies so heavily on complex modeling, the EIR/EIS cannot adequately assess the environmental impacts until these errors and assumptions are corrected. By extension, if the underlying project is mischaracterized because of modeling errors, and the EIR/EIS does not consider and address these errors, the EIR/EIS violates CEQA and NEPA mandates to provide an informational document for the public's consideration. Accordingly, once the BDCP is revised to correct the numerous fundamental errors, the EIR/EIS should be revised and recirculated to allow sufficient time for public review and comment.

2) The EIR/EIS is Fundamentally Flawed and Misleading in Nearly Every Category.

a. The Project- and Program-Level Review of Project Components is Inadequate and Misleading.

The EIR/EIS couches a massive infrastructure project as being merely a "covered activity" that is incidental to a conservation plan. However, only the massive infrastructure project receives a project-level analysis (albeit with deficiencies described below). (EIR/EIS, p. 4-2). Although mixing project- and program-level review can be appropriate under some circumstances, the mixed level review is improper the way it is conducted in the BDCP EIR/EIS.

Here, the mixed program- and project-level obscures analysis of the mitigation for the tunnels, which is evaluated at the project level. Of conservation measures 2 through 22, the EIR/EIS states that "more detailed, site-specific analysis and site-specific environmental documents will be prepared later, prior to implementation of specific projects, as the BDCP is implemented over time, as appropriate." (DEIR/EIS, p. 3-2.) This is troublesome because the 21 other conservation measures would appear to comprise the heart of the Bay Delta Conservation Plan. Notably, the tunnel is one of the covered activities which requires take authorization under the C/ESA; the 21 other conservation measures are also required as part of this take authorization. However, because those 21 conservation measures only receive general program-level review, it is impossible to tell what environmental impacts the tunnels will have on those conservation efforts.

For example, the tunnel construction (under the preferred alternative 4) requires the conversion of agricultural land to habitat restoration under conservation measure 22 (CM22). This has the potential to significantly impact water quality because converting agricultural land can "increase accumulation of organic sediments that are known to enhance methylmercury bioaccumulation in biota in the restored habitat." (EIR/EIS, p. 8-447.) In addressing this impact, the EIR/EIS recognizes that another conservation measure, CM12, has potential to mitigate these water quality impacts, but states that "the uncertainties related to site specific restoration conditions ... result in this potential impact being considered significant. No mitigation measures would be available until specific restoration actions are proposed. Therefore this programmatic impact is considered significant and unavoidable." (*Id.*) Stated differently, the tunnel construction requires conversion of agricultural land to restored habitat, a process which could adversely impact water quality. This impact could be mitigated, but site-specific analysis of the proposed restoration has not been undertaken because the restoration was only considered at a program level. Thus, the use of a combination project- and program-level review, in this case, effectively results in piecemeal project analysis and deferral of mitigation.

A program-level review is appropriate to consider broad issues for related actions in the early stage of planning process. (14 Cal. Code Regs. §15168(b)(1)-(4).) Under NEPA, a programmatic EIS requires "sufficient detail to foster informed decision-making." (*Pacific Rivers Council v. U.S. Forest Service*, 668 F.3d 609, 622-623 (9th Cir. 2012).) Here, however, the conservation measures receiving program-level review are either poorly defined, require future environmental analysis, or are otherwise uncertain.

For example, conservation measure 2 (CM2) is the Yolo Fisheries Bypass Enhancement Plan ("Yolo Bypass Plan"), for which a separate EIR/EIS will be completed. (BDCP, p. 3.4-48). Over the next several years, the Yolo Bypass Plan "will further refine CM2 and the component projects that will be evaluated. … During their development, the component projects will be evaluated, individually or grouped as alternatives, to ensure that they will provide the greatest biological benefit to the covered fish species, consistent with the goals of this measure and the biological goals and objectives of the Plan." (*Id.*) However, because this conservation measure remains so undefined, it is impossible to understand how the Yolo Fisheries Bypass Enhancement Plan would impact the species being affected by the new diversions created by the tunnels. Likewise, it is impossible to know whether the Yolo Bypass Plan's goals of "providing the greatest biological benefit to the covered fish species" will be achieved at all in light of the vague program level review, nor can it be ascertained how the Bypass operations would affect SWP and CVP operations in terms of timing, volume, and delivery of water.

Additionally, while the EIR/EIS purports to conduct a more detailed project-level review of the tunnels, it nonetheless lacks site-specific information necessary for assessing more localized environmental impacts. For example, site-specific assessment of ground settling impacts from construction of the tunnels has yet to be assessed. (EIR/EIS, p. 9-182.) Likewise, the siting of power supply infrastructure to meet the significant anticipated energy need, particularly during the construction phase, has not yet been determined. (BDCP, Appendix 5.J.C, Table 1.)

Even two lead agencies, the EPA and the USFWS, have commented on the lack of specificity regarding CM1, the tunnel construction conservation measure. In its comments on the administrative draft EIR/EIS, the EPA stated that "[t]he level of

BDCP1722

engineering detail provided for the tunnels, however, is not commensurate with the level of site-specific information typically provided in an EIS for a project that will require federal permits." (EPA comments, Sec. V). Similarly, the USFWS commented that the EIR/EIS "will need a clear and concise project-level description of the water conveyance facilities …, including a description of the physical, chemical, and biological changes resulting from CM1." (USFWS comments "2.3 Incomplete Project Description", p.5).[5] Despite receiving these comments on the administrative draft, the EIR/EIS still lacks adequate project-level review of the apparent primary "project" of the BDCP – the construction of the tunnels. Although combining project- and program-level reviews is sometimes appropriate, the way it is done in the BDCP EIR/EIS violates CEQA and NEPA.

b. The Alternatives Presented are Inadequate.

The BDCP EIR/EIS purports to discuss an array of alternatives in Chapter 3. These alternatives include the no action alternative, the preferred alternative (Alternative 4), and 15 other alternatives proposing construction of large-scale water conveyance infrastructure with varying configurations, capacities, operational criteria, and accompanying conservation measures. Although lengthy, this discussion is inadequate because there is little informative comparative analysis, and *every alternative* (except the no action/no project alternative) includes the construction of enormous water conveyance systems that have the potential to cause serious harm to species and result in significant problems of deferred mitigation, among other issues discussed in this letter. The alternatives analysis should have included consideration of actual alternatives to the construction of tunnels, not merely variations of the same massive infrastructure project with slightly different operating scenarios. Because CEQA and NEPA impose different requirements for the alternatives, this letter addresses them separately below.

i. The Document Does Not Consider a Reasonable Range of Alternatives Under CEQA.

Under CEQA, an EIR must describe a reasonable range of alternatives to the proposed project, or to its location, that would feasibly attain most of the project's basic objectives while reducing or avoiding any of its significant effects, and must evaluate the comparative merits of those alternatives. (14 Cal. Code Regs. §15126.6(a).) The alternatives analysis has been described as "the core of an EIR." (*Citizens of Goleta Valley v Board of Supervisors,* 52 Cal.3d 553, 564 (1990).)

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[5] EPA and USFWS comments, published July 18, 2013, available at: http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library/Federal_Agency_Comments_on_Consultant_Administrative_Draft_EIR-EIS_7-18-13.sflb.ashx (last accessed July 28, 2014.)

An EIR's analysis of alternatives and mitigation measures must focus on those alternatives with the potential to avoid or lessen a project's significant environmental effects. (Pub. Resources Code §21002; 14 Cal. Code Regs. §15126.6(a)-(b).) The alternatives discussed in an EIR should be ones that offer substantial environmental advantages over the proposed project. (*Citizens of Goleta Valley v. Board of Supervisors, supra*, 52 Cal.3d at 566.)

Here, the alternatives presented in Chapter 3 all include various forms of massive conveyances with varying operational scenarios. Although these various infrastructure alternatives are presented with a great amount of information regarding operations assumptions and locational differences, there is little comparative analysis that evaluates their relative merits. Because of the complexity of these different infrastructure alternatives, the EIR/EIS should have included a comprehensive comparison of the effects of each. Moreover, none of the alternatives consider that the contemplated changes to SWP and CVP operations may be prohibited by existing water rights, as outlined in the Friant Issues Analysis. None of them analyze reduced amounts of water diverted upstream of or within the Delta. And, none of them (except the required no project alternative) consider a more moderate approach to addressing the objectives of habitat restoration and water reliability, or any other alternative approach for that matter.

The stated purpose of the EIR/EIS is "to restore and protect ecosystem health, water supply reliability, and water quality within a stable regulatory framework." (EIR/EIS, Chapter 2, p. 2-1.) Had the EIR/EIS stated that the purpose of the project was to construct tunnels, then one can imagine that all the alternatives would be variations on building tunnels. However, given the stated purpose is a habitat conservation plan with the co-equal goals, then the EIR/EIS must analyze true alternatives to achieve those project objectives. At a minimum, a more reasonable range of alternatives should have included at least one that does not include the implementation of a $25 billion, decade long construction project with significant potential to disrupt habitat. Other alternatives might include, for example, increasing the size of existing reservoirs, construction of additional dams and reservoirs, desalination plants to supply some of the water needs south of the Tehachapi mountain ranges, or programs to increase urban stormwater capture and reuse.

In the EIR/EIS, the alternatives discuss improved management of biological resources in connection with the construction of the conveyance system alternatives. A reasonable range of alternatives would discuss some of these same resource management practices without the construction of the conveyances. This is particularly true where one of the co-equal goals of the project is ecosystem restoration. The California Supreme Court has previously invalidated an EIR for failing to consider an alternative that would avoid or reduce harm to an endangered species. (*Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova*, 40 Cal.4th 412, 449 (2007), "Especially given the sensitivity and listed status of the resident salmon species, the County's failure to address loss of Cosumnes River stream flows in the Draft EIR 'deprived the public . . . of meaningful participation' [citation] in the CEQA discussion. (See CEQA Guidelines, Cal. Code Regs., tit. 14, § 15065, subd. (a)(1)[potential substantial impact on endangered, rare or threatened species is per se significant].).") Toward this end, the EIR/EIS should have considered an alternative which replaces the fifty-year old fish screens on the existing SWP and CVP pumping facilities with modern fish screens in order to reduce fish mortality. As currently written, the alternatives propose replacing and adding modern screens *only in conjunction* with construction of the massive new conveyances.

Also, improvements to existing levees should have been considered in a non-BDCP tunnel/canal alternative. One of the stated reasons for the project is the need to ensure water reliability in the event of a seismic event causing catastrophic failures of the aging levees in the Bay Delta. However, the EIR/EIS failed to consider seismic upgrades to existing levees without also requiring construction of the tunnels and canals proposed in every alternative. In fact, the *Economic Sustainability Plan for the Sacramento-San Joaquin Delta* ("*Sustainability Plan*"),[6] developed by Delta Protection Commission pursuant to Public Resources Code section 29759 and adopted on October 25, 2011, states that levee upgrades not only further the co-equal goals of the Delta Plan Act of 2009, but that they are economically preferable to construction of new conveyance systems. In discussion the justification for levee upgrades, the *Sustainability Plan* states:

> The primary economic justification for this additional upgrade is that it is a cost-effective and more financially feasible alternative to other proposals that address the coequal goals of water supply reliability and ecosystem restoration. **A robust, seismically-resistant levee system would make a large improvement to water supply reliability. According to this study, $1-2 billion would be sufficient to achieve this higher standard** with costs potentially increasing to $4 billion to allow for program management costs and ecosystem enhancement. This is much less expensive than the $12 billion cost estimate of isolated or dual conveyance, although dual conveyance would result in somewhat higher water exports. ... Not only are upgraded levees less costly, but they provide a much broader set of benefits.
>
> (*Sustainability Plan,* October 10, 2011, p. 90, emphasis added.)

Accordingly, a reasonable range of alternatives should have considered several alternatives, or at least one alternative, that did not include construction of tunnels or canals but that incorporated improvements to existing levees, modernization of existing fish screens, and inclusion of all non-tunnel/canal conservation measures discussed in connection with the project. The range of alternatives should have also included an

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[6] The final *Sustainability Plan* can be accessed online at this link: http://www.delta.ca.gov/res/docs/ESP/ESP_Final.pdf (last accessed July 20, 2014).

analysis of the only legally feasible project: one which does not "rebalance" or otherwise reprioritize long-held water rights.

The lead agency has the flexibility to approve an alternative to the proposed project if that alternative better addresses the agency's environmental concerns. (*Sierra Club v. City of Orange,* 163 Cal.App. 4th 523, 533 (2008).) An EIR's failure to analyze an adequate range of alternatives deprives the lead agency of the ability to provide this sort of meaningful review and selection.

Recirculation of a new Draft EIR/EIS will be required by CEQA Guidelines section 15088.5 because the current EIR/EIS has not considered alternatives that have not been previously analyzed but must be analyzed as part of a reasonable range of alternatives.

ii. The Alternatives are Inadequate under NEPA.

The BDCP EIR/EIS alternatives analysis fails to comply with NEPA because it presents only a limited range of similarly massive project alternatives and fails to even consider a more moderate and realistic approach to achieving the project's stated goals.

An EIS must rigorously explore and objectively evaluate all reasonable alternatives to a project and devote substantial treatment to each alternative in detail so that reviewers may evaluate their comparative merits. (40 C.F.R. Part 1502.14.) The comparison of the project alternatives must be based on the discussion of the significance of each alternative's direct and indirect impacts and any conflicts with corresponding jurisdictional controls. (40 C.F.R. Part 1502.16(c).)

The analysis of project alternatives is the "heart of the environmental impact statement." (40 C.F.R. Part 1502.14.) An EIS must consider every reasonable alternative and is rendered inadequate by the existence of a viable but unexamined alternative. (*Resources Ltd. v. Robertson*, 35 F.3d 1300, 1307 (9th Cir. 1993).) An EIS must look to the core goals of the project to define reasonable alternatives and cannot exclude reasonable simply because an applicant desires a project to have certain features. (*Sierra Club v. Marsh*, 714 F. Supp. 539, 577-78 (D. Me. 1989).)

In determining the scope of alternatives to be considered, the emphasis must be on what is "reasonable" rather than on what the project proponent prefers. Reasonable alternatives include those that are practical or feasible from a technical and economic standpoint, and must not be limited to what is simply desirable from the standpoint of the project proponent.

As described above, the alternatives presented in the EIR/EIS present the lead agencies with no real meaningful assessment of what are truly alternatives to the project. Each alternative proposes similarly large-scale infrastructure development, even though a significantly reduced scale project may well have a better ability to achieve project objectives. Because one of the "coequal goals" of the project is ecosystem restoration, the EIR/EIS should have considered a reduced-scale project, which might lessen the proposed project's adverse impacts. (See, e.g., the numerous comment letters submitted by other stakeholders who have thoroughly examined the impacts to fisheries and endangered species.[7])

Western Watersheds Project v. Abbey, 719 F.3d 1035, (9th Cir June 7, 2013), amended sub nomine *Mont. Wilderness Ass'n v. Connell*, 725 F.3d 988, (9th Cir. Mont. 2013), concerned a challenge to a resource management plan for a national monument, the programmatic EIS for that plan, and an Environmental Assessment ("EA") for a renewal of a permit to graze cattle on a portion of the monument. In its analysis, the court had analyzed the EIS and found it to be sufficient for its program-level analysis. However, the court found that the EA for the grazing permit did not comply with NEPA because it did not take a hard and careful look at a reduced- or no-grazing alternative, and modification of grazing practices had also not been considered at a programmatic level for the full area in question. The court ultimately ordered the BLM to either prepare an EIS or remedy the alternatives deficiencies in the EA. Under NEPA, an alternatives analysis in an EIS must necessarily be more rigorous than under an EA. Accordingly, the BDCP EIR/EIS must analyze a reduced project alternative (one that does not involve the years-long construction of conveyance infrastructure) in order to comply with NEPA.

In addition to failing to explore all reasonable alternatives, the alternatives that are considered suffer from the same flaws as the project description: the alternatives are vague and legally infeasible in light of the constraints imposed by the existing water rights. Where, as here, the information in the initial EIS is incomplete or misleading such that the decision maker and the public could not make an informed comparison of the alternatives, revision of the EIS is necessary to provide a reasonable, good faith, and objective presentation of the subjects required by NEPA. (*National Resources Defense Council v. United States Forest Serv.*, 421 F.3d 797, 811 (9th Cir. Alaska 2005).)

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[7] These letters include, but are not limited to, the California Advisory Committee on Salmon and Steelhead Trout letter dated February 26, 2014; the Cardno ENTRIX study included as an attachment to the letter from the American River Water Agencies submitted July 21, 2014; the letters from Friends of the River (with attachments) dated January 14, 2014, March 6, 2014; and the comments on the species-related impacts in the letter from the Environmental Water Caucus dated June 11, 2014. Friant appreciates the effort these organizations have made to undertake technical studies necessary for a meaningful review.

iii. Erroneous Climate Change Assumptions Create an Illusory No Project/No Action Scenario.

Further problems with BDCP's alternatives analysis under both CEQA and NEPA are revealed by independent verification of the underling BDCP model. As described briefly above and in great detail in the independent *Modeling Review*, there is a technical – but very material – error present in all of BDCP's modeling scenarios which consider climate change analysis in the early long term or late long term conditions. This error in baseline and future modeling can have a pervasive effect, skewing the EIR/EIS analysis of future operations and related impacts. The result is that the no action alternative, when projected into the future using the BDCP model, is incorrect. The effect of the error is that the future no action scenario looks far more dire than it would realistically be. This, in turn skews the analysis of the proposed project when compared to the no action alternative, and precludes meaningful analysis and comparison of the project impacts. Friant respectfully requests that the numerous errors in the BDCP model be corrected, and the model be re-run using the updated 2013 CalSim II model. The EIR/EIS should be revised to incorporate this updated analysis, and recirculated to provide the public an opportunity to better understand the complex but crucial modeling which supports the impact analyses.

c. The Baseline is Inadequate.

Not only does the BDCP fail to adequately describe the project, it neglects to identify a definitive baseline against which the public can adequately assess potential environmental impacts.

Pursuant to CEQA Guideline section 15125, subdivision (a), an EIR must include a description of the physical environmental conditions in the vicinity of the project as they exist at the time the Notice of Preparation is published or, if no notice is published, at the time environmental analysis is commenced. This environmental setting will normally constitute the baseline physical conditions by which a lead agency determines whether an impact is significant. (CEQA Guidelines, § 15125(a).) Similarly, under NEPA, the project's impacts are measured against the no action alternative (discussed in greater detail here in section III.2.b, Alternatives). Here, the required description of a baseline is missing and where referenced suffers from the same problem of vagueness – to the point of being misleading – as the missing project description. The EIR must describe the physical environmental conditions in the vicinity of the project. In this case, although the EIR purports to conduct project-level analysis, the baseline discussion is so sparsely described and so woefully inadequate that is difficult and in some cases impossible to determine where is the "vicinity," much less understand its physical conditions and how the proposed project might change them.

BDCP1722

The BDCP relied on the outdated 2010 model which incorporated numerous errors and assumptions that do not represent the actual existing conditions. For example, the baseline used to analyze water quality is erroneous and misleading because it relies on a flawed model. As described in more detail the independent *Modeling Review* commissioned by Friant and other stakeholders, the BDCP model contains significant errors that affect both the baseline water quality and the subsequent analysis. First, the BDCP model contains an artificial constraint that prevents the North Delta diversion facilities from taking water as described in the BDCP project description. Second, the model does not reflect the summer season operations of the South Delta diversions that are described in the EIR/EIS as a feature of the BDCP project intended to prevent water quality degradation in the south Delta. In other words, the BDCP's analysis does not match up with the project as described in the documents. The net effect of these two errors is that the BDCP model significantly underestimates the amount of water diverted from the North Delta diversion facilities and overestimates the amount of water diverted from the South Delta diversions, completely skewing any resulting analysis of the water quality – the very feature that the latter diversions are intended to protect. The model should be corrected and re-run in order to provide the public with an accurate assessment of the BDCP's anticipated effect on existing conditions. Additionally, the outdated model used in the BDCP fails to include parameters that capture existing regulatory requirements, which ultimately affects the impacts analysis. For example, in baseline and future "no project" scenarios, the 2010 model does not incorporate habitat restoration requirements set forth in the 2008 FWS Biological Opinion ("BO") and the 2009 National Marine Fisheries Service ("NMFS") BO – even though these requirements are in effect whether or not the project proceeds. However, the BDCP model only incorporates these habitat restoration requirements when analyzing the future "with project" scenarios. (*Modeling Review,* p. 14.) Instead, the future "with project" scenario should have been compared with a baseline that incorporates the BOs in order to accurately assess how much habitat restoration would be attributed to the project, versus how much is actually part of the baseline pre-project conditions.

Moreover, the independent *Modeling Review* of the baseline reveals further inaccuracies simply because the BDCP model uses the outdated and incorrect 2010 model. For example, Reviewers found errors in the BDCP's modeling of its no action alternative "early long term" scenario, further calling into question the baseline. The BDCP's flawed model estimates that, under the early long term no action alternative, the total average annual exports for CVP and SWP combined are estimated to be 4.73 million acre feet ("MAF"). However, in the independent modeling undertaken with the updated 2013 CalSim II model and corrected assumptions, the combined exports for the future no action alternative are 5.61 MAF. When these numbers are compared against the tunnel construction project component (Alternative 4), the BDCP will lead to a projected average annual increase in exports of approximately 540 thousand acre feet ("TAF"), whereas the independent model projects an increase of approximately 750 TAF. (*Modeling Review*, p. 27). Aside from the substantive implications of such conflicting results ostensibly from the same BDCP, the discrepancy in these basic numbers calls into question the soundness of the BDCP model and the existing and future conditions it purports to represent. The absence of any meaningful baseline analysis renders the EIR/EIS defective.

d. Mitigation is Improperly Deferred.

The EIR/EIS violates CEQA by deferring mitigation until future studies have been undertaken. (14 Cal Code Regs §15126.4(a)(1)(B).) "Impermissible deferral of mitigation measures occurs when an EIR puts off analysis or orders a report without either setting standards or demonstrating how the impact can be mitigated in the manner described in the EIR." (*City of Long Beach v Los Angeles Unified Sch. Dist.*, 176 Cal.App.4th 889, 915 (2009).)

The EIR/EIS largely substitutes promises of future environmental studies and mitigation programs for the identification and consideration of project impacts for public review and comment. Given that the Plan's conservation measures purport to function as mitigation for the tunnels, the EIR/EIS provides only an improper program-level review of mitigation for the tunnels, effectively deferring analysis of mitigation until a future EIR/EIS. Conservation measures 2 through 22 are key components of the BDCP, and they are purely ecosystem restoration efforts that serve to mitigate the destructive impacts of the gigantic tunnel construction. However, because those measures are only reviewed at the program level, it is impossible to assess whether they are even feasible. An environmental document cannot defer the analysis of one of its elements to a pending environmental document that will be completed in the future. (*Vineyard Area Citizens for Responsible Growth v. City of Rancho Cordova*, 40 Cal.4th 412, 440-441 (2007).) Because the tunnel construction is reviewed at the project level, the key project elements which mitigate the tunnels' impacts should likewise be reviewed at the project level. Under a program analysis, they are deferred mitigation which may or may not ever be implemented.

The EIR/EIS also improperly defers mitigation of potential water quality impacts. For example, mitigation measure WQlla (p. 8-427) proposes to conduct additional evaluation and modeling of increased salinity levels only after the isolated tunnels are constructed and operating. This is particularly worrisome in light of the fact that the BDCP model is already replete with errors and incorrect assumptions, as discussed elsewhere in this letter and in the *Modeling Review*.

Appendix 3B of the EIR/EIS contains a list and summary of the "environmental commitments" that the project purports to incorporate, stating that "DWR will also include these commitments in the Mitigation Monitoring and Reporting Plan for the BDCP to ensure implementation of the commitments during project construction and operation." (EIR/EIS, p. 3B-1). However, many of the commitments referenced are actually additional plans which have yet to be developed. For example, the "performance measures" to be implemented in connection with barge operations will developed based on future biological monitoring reports. (EIR/EIS, p. 3B-21). Yet barge activity required for the construction, with its associated impacts to biological resources, should be assessed now, not at some future time.

An EIR cannot defer analysis of impacts to biological resources by proposing a plan to mitigate potential impacts based on future studies, unless the mitigation measures and mitigation performance standards are actually identified. (*San Joaquin Raptor Rescue Ctr. v County of Merced*, 149 Cal. App.4th 645, 671 (2007) [mitigation measure required preparation of land management plan for burrowing owl preserve; EIR set forth no criteria or standards of performance for achieving this measure and thus improperly deferred the mitigation].) The "environmental commitments" in the EIR/EIS do not rise to the level of the "*specific performance criteria*" required to justify deferring mitigation to a later date. (*POET, LLC v. State Air Resources Bd.*, 218 Cal. App. 4th 681, 738, (2013), emphasis in original [in promulgating its low carbon fuel standard regulations, CARB's generalized goal that it would commit to future rulemaking to ensure that there was no increase in NOx was insufficient to ensure future mitigation of potential NOx impacts].) The EIR/EIS's "environmental commitments" are not specific performance standards and therefore cannot substitute for actual and enforceable mitigation measures because they "leave[] the reader in the dark about what land management steps will be taken, or what specific criteria or performance standard will be met, ..." and impede a full discussion about the project impacts and potential mitigation. (*San Joaquin Raptor Rescue Ctr. v County of Merced*, *supra*, 149 Cal. App.4th at 670.)

Similarly, inaccurate economic information can defeat the purpose of an environmental impact statement by "impairing the agency's consideration of the adverse environmental effects and by skewing the public's evaluation of the proposed agency action. (See *National Resources Defense Council v. United States Forest Serv.*, 421 F.3d 797, 811 (9th Cir. Alaska 2005) [EIS failed to comply with NEPA by misstating market demand statistics in comparing alternatives for lumber project]; see also *Hughes River Watershed Conservancy v. Glickman,* 81 F.3d 437, 446-48 (4th Cir. 1996) [EIS failed to comply with NEPA by inflating the economic benefits of the proposed action].) Where the information in the initial EIS is incomplete or misleading such that the decision maker and the public could not make an informed comparison of the alternatives, revision of the EIS is necessary to provide a reasonable, good faith, and objective presentation of the subjects required by NEPA. (*National Resources Defense Council v. United States Forest Serv.*, *supra*, 421 F.3d at 811.) DWR and Reclamation need to address the critical issues surrounding the BDCP's costs and how the project proponents actually propose for them to be met, and then revise the EIR/EIS accordingly in order to provide the public an opportunity for meaningful review and comment.

The document's error in failing to establish the actual environmental setting for the project is compounded by failing to provide standards for mitigation or, in some cases, by identifying mitigation measures without knowledge of the actual conditions to be mitigated. The information presented is insufficient to permit an evaluation of potential impacts of the project or measures to mitigate such impacts. By deferring study of these issues, the public is denied the opportunity to provide informed comments, and decision makers are denied the information necessary to arrive at a reasoned choice among alternatives – deficient as they are - supported by a factual record.

e. Water Supply and Reliability is Inaccurate and Misleading.

i. The BDCP Increases the Likelihood of Water Shortages to Certain Contractors.

The project consists of a delivery and diversion system and some associated habitat restoration features. As such, the project will not increase water supplies, though it has the potential to increase the amount of water that can be captured, depending on how the SWP and CVP are operated under the future with-project conditions. Unfortunately, as noted above, the BDCP documents are wholly devoid of operational plans and the description of future operations is so vague that it cannot be used to assess meaningfully the likely impacts of the project. Moreover, with respect to water supply reliability, the faulty BDCP model results in skewed and inaccurate analyses.

As shown by the *Modeling Review*, the BDCP contains questionable operational assumptions that lead to unrealistic results in the water supply analysis. For example, the model uses "artificial criteria" – meant to simulate expert human judgment rather than depict actual regulatory or operational constraints – in selecting a target storage level for the San Luis Reservoir ("SLR"). (*Modeling Review*, p. 16.) In modeling the Alternative 4 project, this artificial target for the reservoir level sets storage to "dead pool" in the late fall and early winter. This artificially frequent "dead pool" level target – which has never been attained with this frequency in real life operations – creates annual shortages to south of Delta water users under the BDCP model and thus presents an inaccurate portrayal of water supply impacts.

Furthermore, the modeling on which the EIR/EIS shows that the BDCP would adversely impact water supply reliability as to Friant. Under the new diversions proposed by the BDCP, there is the strong likelihood that during dry years, the CVP would be unable to deliver its full contract amount. This, in turn, would increase the likelihood that Reclamation would be unable to fulfill its commitment to those to whom it owes a "vested priority obligation," such as the "Exchange Contractors." Under ordinary pre-project conditions, Reclamation would provide the Exchange Contractors with a substitute supply of water, and Friant would be entitled to water from the San Joaquin River. The BDCP's proposed operations thereby *decrease* the reliability of Friant's water supply as compared to current conditions. (Friant Issues Analysis, pp. 10-11.) This means that the BDCP project will cause a water supply impact to Friant Division contractors. The BDCP has failed to analyze or mitigate for this hydrological impact. This result is unacceptable to Friant.

The project's impact on Friant's existing water users is also illegal. California Water Code section 1702 provides, in pertinent part, "Before permission to make [a change in the point of diversion] is granted the petitioner shall establish, to the satisfaction of the board, and it shall find, that the change will not operate to the injury of any legal user of the water involved." (See also Cal. Water Code §§ 1701.2(d), 1701.3(b)(1).) Friant has continuously expressed its concern regarding these impacts, and our review of this portion of the EIR/EIS only reinforces our views that the BDCP should be substantially revised to present a project that does not assume changes to operations that would violate water rights and injure existing legal users of water.

Chapter 5, Water Supply, gives short shrift to the governing authority of the water rights implicated in the project's proposed diversions. *Increasing* water supply reliability is one of the BDCP's two goals, but the project will cause the opposite to occur for Friant's water users. Given the numerous errors in the BDCP model, as well as the failure of the BDCP and EIR/EIS to analyze the operational constraints imposed by recognizing existing water rights, priorities, and uses, including Friant's, the BDCP and EIR/EIS should be revised and recirculated.

ii. Modeling and Data Limitations Highlight the Unreliability of the Plan.

The basis for the environmental analysis in the BDCP EIR/EIS is flawed and misleading computer modeling. As Friant has stated in the past and noted above, BDCP's modeling demonstrates that the project *reduces* Friant's water supply reliability as compared to existing conditions. The modeling also shows that BDCP provides no significant water quality improvement to CVP agricultural water users such as Friant. Even worse, the artificial and incorrect analysis presented in the EIR/EIS denies the public and public agencies the information necessary to understand how the project will be developed and to comment on the most critical potential environmental impacts of the project.

The independent *Modeling Review* commissioned by Friant and other stakeholders concludes that the BDCP Model, which serves as the basis for the environmental analysis contained in the BDCP EIR/EIS, provides very limited useful information to understand the effects of the BDCP. The BDCP Model contained erroneous assumptions, errors, and outdated tools, which resulted in impractical or unrealistic CVP and SWP operations. The unrealistic operations, in turn, do not accurately depict the potentially real effects of the BDCP.

iii. The BDCP Cannot Meet Its Project Objective of Fulfilling Water Contracts.

As noted above, there is insufficient water available to meet the BDCP's stated objectives of fulfilling water contracts and providing the volume of water for aquatic species that the lead agencies are advocating. Simply assuming a level of transfers that has never previously been attained, or performing an illegal rebalancing of water rights priorities, will not rectify this flaw: there just is not enough water to meet all of these demands.

The EIR "must assume that all phases of the project will eventually be built and will need water, and must analyze, to the extent reasonably possible, the impacts of providing water to the entire proposed project." (*Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova*, 40 Cal.4th 412, 431 (2007).) Also, "the future water supplies identified and analyzed must bear a likelihood of actually proving available; speculative sources and unrealistic allocations ('paper water') are insufficient bases for decision-making under CEQA." (*Id.* at 432.)

iv. The BDCP Conflicts with Applicable Water Rights Law.

As discussed in Section II of this letter (Water Rights), an integral component of this project is the stated ability to adjust water flows that are part of the CVP which, in turn, affects water rights and priorities. The EIR/EIS fails to recognize this conflict with jurisdictional controls, and is therefore inadequate in this regard. Moreover, as described in section III.1.b of this letter (regarding legal infeasibility), this defect in the EIR/EIS cannot be cured without revising that component of the BDCP which involves these water rights.

f. The Plan's Significant Adverse Biological Impacts Undermine Project Objectives.

Under NEPA, an EIS must fulfill and satisfy to the fullest extent possible the discussion of the significant environmental impacts of a project. (40 C.F.R. Part 1502.9.) Likewise, under CEQA, a project may have a significant effect on the environment if it will result in "a substantial, or potentially substantial, adverse change in the environment." (Pub. Resources Code §21068.) Section IV of this letter addresses the HCP/NCCP aspects of the BDCP itself and demonstrates how the BDCP actually harms biological resources and thus undermines the BDCP's coequal goal of ecosystem restoration. The EIR/EIS fails to recognize this harm, particularly as set forth in section IV of this letter, and thus does not analyze it, which precludes meaningful public review of the project. Accordingly, the EIR/EIS should be revised to assess the additional impacts to biological resources that are currently either ignored by the BDCP or obscured by incorrect modeling.

BDCP1722

g. Agricultural Impacts are Not Addressed.

The EIR/EIS does not address the adverse impacts the BDCP will have on farmland. Although it may benefit a select few large growers, it will harm many others. The BDCP Statewide Economic Impact Analysis notes that $2 million worth of agricultural land will be lost due to an increase in salinity. Given the numerous errors discovered in the BDCP model, including with regards to salinity modeling, the actual impact to farmland from increased salinity may be greater. The BDCP should incorporate a full modeling analysis of potential salinity intrusion to farmland using an updated and corrected 2013 CalSim II model. The EIR/EIS should be revised to include an analysis of the results, and should be recirculated to give members of the public a chance to meaningfully review the implications.

h. The Water Quality Analysis is Deficient.

The BDCP relies on complex hydrological modeling to assess numerous and significant changes to flow amounts, rates and timing. These changes necessarily effect water quality, including temperature, turbidity, and salinity. These water quality changes, in turn, can affect agriculture and fisheries and other aquatic resources, including sensitive endangered species and designated critical habitat. In order to understand the impacts that the BDCP will have on all of these resources, it is critical that the BDCP's foundational modeling be correct.

Again, independent modeling analysis reveals that the errors present in the BDCP model extend to impacts on water quality. Independent modeling with the updated and corrected 2013 CalSim II model shows that Delta outflow would be approximately 200 TAF/yr lower than the quantity indicated in the EIR/EIS. This lower outflow has the potential to significantly and adversely impact water quality and supply as they relate to biological resources and in-Delta beneficial uses. Because these impacts are not revealed by the underlying flawed model, they are not discussed in the EIR/EIS. To determine the potential effects of the reduced amount of Delta outflow, additional modeling is needed, which will require revisions to the EIR/EIS. (*Modeling Review,* p. 27).

The BDCP model also incorrectly models the location of the diversions that the SWP and CVP will make from the Delta. When the locational errors in the BDCP model were corrected in the Modeling Review, it was revealed that the North Delta Diversions could divert approximately 680 TAF/yr more than the amount indicated by the BDCP EIR/EIS. Conversely, the quantity of water diverted through the existing South Delta Diversions would be approximately 460 TAF/yr less than what is projected in the BDCP EIR/EIS. This difference in the location of diversions has the potential to impact water quality in the Central and South Delta. (*Modeling Review,* p. 6). Like the other impacts revealed by correcting the flawed BDCP, these adverse impacts were not identified by or considered in the EIR/EIS. The BDCP model should be corrected, updated and re-run, and the EIR/EIS should analyze and address these impacts.

i. Seismic Impact Analysis is Flawed.

The BDCP's analysis of seismic impacts of the project is flawed because it misleads the public about the adequacy of the existing levee system in order to justify the need for the project, and it fails to assess the potential for failure of the new conveyance system due to a seismic event during construction.

The EIR/EIS claims that Delta's levees are fragile and vulnerable to catastrophic seismic failure. However, the levee system held during the massive Loma Prieta earthquake of 1989. As discussed in the Alternatives section of this letter, bringing all Delta levees up to modern seismic standards would cost less than $4 billion – far less than the $25 billion to $60 billion required for the new conveyance structures. As discussed in more detail under the alternatives section, the EIR/EIS should have considered an alternative that includes improving seismic stability of existing levees without the construction of the conveyances. Because it failed to consider this alternative, the EIR/EIS assessment of seismic impacts is inadequate.

IV. Comments on the BDCP Under the Federal and California ESAs

Aside from the significant deficiencies in the EIR/EIS for the BDCP, the BDCP itself is fundamentally flawed in two ways: 1) it violates the C/ESA by harming listed species, and 2) it lacks the funding required by the HCP and NCCP statutes.

The Sacramento-San Joaquin Delta Reform Act ("Delta Reform Act") of 2009 sets forth the state's two "coequal goals" of providing more water supply reliability and restoring the Delta ecosystem. (Pub. Resources Code § 29702(a); Water Code §85054.) The stated purpose driving the BDCP is achievement of those "co-equal" goals. However, as discussed in greater detail under sections III.2.e of this letter (regarding water reliability) and III (ESA comments), the BDCP hinders its own objectives.

The BDCP and its plan to construct large scale water conveyance infrastructure have the potential to "take"[8] threatened and endangered species as defined under the C/ESA. Section 10 of the federal ESA (16 USC §1539) and its implementing regulations set forth the procedure for obtaining a permit allowing an incidental take of a listed species. The California ESA may provide for take authorization in connection with a NCCP. The BDCP seeks to become a HCP under the ESA and a NCCP under the CESA, which would purportedly guide water exports and habitat management for the next 50 years. However, for reasons set forth below, the BDCP does not meet requirements for either a HCP or a NCCP.

[8] The ESA broadly defines "taking" of a listed species to include harassment, harm, pursuit, hunting, shooting, wounding, killing, trapping, capturing, or attempting to engage in any such conduct. (16 USC §1532(19).) CESA's definition of "take" is to "hunt, pursue, capture, or kill." (Cal. Fish & Game Code §86).

1) <u>The BDCP is Not a Valid HCP or NCCP.</u>

The BDCP cannot qualify as a HCP because it does not actually ensure the continued existence of the relevant endangered species. (50 C.F.R. § 17.) The ESA only allows for incidental take when the overall purpose of the authorized action is to "enhance the propagation or survival of the affected species." (15 U.S.C. § 1539 (a)(1)(A).) The BDCP will actually harm several threatened Delta species.

California's Natural Community Conservation Planning Act (Fish & Game Code §§2800-2835) provides for multispecies habitat planning and management. Its goal is to provide a broader framework for species and habitat management by preserving larger habitat systems. (See generally *Chaparral Greens v City of Chula Vista*, 50 Cal.App. 4th 1134, (1996).) In order for the California Department of Conservation to approve a NCCP, it must make numerous findings, supported by substantial evidence, as set forth in California Fish and Game Code section 2820.

a. The BDCP Fails to Meet Mandatory Statutory Criteria of a HCP and NCCP.

Under the ESA, an incidental take permit based on the HCP will only be issued if the Secretary of the Interior finds that (1) the taking will be incidental; (2) the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of the taking; (3) the applicant will ensure that adequate funding for the plan will be provided; and (4) the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild. (16 USC §1539(a)(2)(B).) The BDCP cannot meet all of these criteria.

i. The HCP/NCCP Violates C/ESA Mandates Because it Harms Species.

The tunnels will be detrimental to endangered species, in violation of the C/ESAs. "[A]n agency may not take action that will tip a species from a state of precarious survival into a state of likely extinction. Likewise, even where baseline conditions already jeopardize a species, an agency may not take action, that deepens the jeopardy by causing additional harm." (*National Wildlife Federation v. National Marine Fisheries Service*, 524 F.3d 917, 930 (9th Cir. 2007).) Federal agencies have a duty to ensure that their authorization of a project will not jeopardize the survival of listed fish or adversely modify the species' critical habitat. (*Center for Biological Diversity v. U.S. Bureau of Land Management, 698 F.3d 1101, 1127-8* (9th Cir. 2012).) Here, the tunnels and related diversions affect designated critical habitat for certain listed species of salmonids. (See, e.g., the numerous comment letters submitted by other stakeholders who have thoroughly examined the impacts to fisheries and endangered species.[9])

The model used to analyze the effects of the BDCP is replete with errors and unrealistic assumptions, as discussed above and in the *Modeling Review.* Aside from calling into question the soundness of the BDCP analysis in general, the *Modeling Review* also reveals that the errors in the model effectively obscure harmful impacts to aquatic species, in violation of C/ESA requirements for a valid HCP/NCCP.

The BDCP model does not accurately reflect reasonably foreseeable conditions and changes in CVP and SWP operations due to the BDCP. BDCP's "High Outflow Scenario" ("HOS") is not sufficiently defined for analysis. The HOS requires additional water (Delta outflow) during certain periods in the spring. Analyses using the HOS are present throughout the BDCP itself, including the Fish Life Cycle modeling (Appendix 5G), Critical Habitat and Essential Fish Habitat analysis (Appendix 5I); Flow Passage Salinity and Turbidity (Appendix 5C), to name just a few of the analyses critical to understanding the BDCP's effect on biological resources, including sensitive aquatic species.

The BDCP assumes that it will primarily be the SWP that meets the new, additional outflow requirement (the HOS). However, it is not clear that this will be the case because Reclamation and DWR have historically defaulted to the Coordinated Operations Agreement ("COA") and balanced water accounting under the COA – even when in situations when the COA does not apply. Therefore, if the SWP must provide new outflow under the HOS, DWR could seek a water allocation adjustment from the CVP under the COA. Absent any agreement by the SWP to undertake these new outflow obligations or to amend the terms of the COA, the BDCP Model is relying on a faulty counter-factual assumption about project operations. As a result, it overstates the impacts of increased Delta outflow on the SWP and understates the effects on the CVP and its contractors, such as Friant's members.

Furthermore, as described in detail in the Modeling Review, there is no apparent source of CVP or SWP water to satisfy both the increased Delta outflow requirements and perform the water balancing required under the COA without substantially depleting upstream water storage. In the *Modeling Review,* the Reviewers note that "[i]t appears, through recent public discussions regarding the High Outflow Scenario, that BDCP anticipates additional water to satisfy the increased Delta outflow requirement and to prevent the depletion of cold water pools will be acquired through water transfers from upstream water. However, this approach is unrealistic. During most of the spring, when BDCP proposes that Delta outflow be increased, agricultural water users are not irrigating. This means that there is not sufficient transfer water available to meet the

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[9] See the letters previously referenced in Footnote 7 of this letter.

increased Delta outflow requirements without releasing stored water from the reservoirs. Releasing stored water to meet the increased Delta outflow requirements could potentially impact salmonids on the Sacramento and American River systems." (*Modeling Review*, p.18.)

The independent analysis of the BDCP model also reveals that the BDCP makes incorrect assumptions that overestimate the BDCP's benefits to the endangered Delta Smelt. For example, in projecting October outflow from the Delta Cross Channel ("DCC"), the BDCP model assumes that the DCC will remain open. In reality, however, operational practices are to close the DCC when south Delta exports are low, as they often are in October. The effect of this modeling assumption is that October outflows are overstated, and the BDCP projects illusory improvement of conditions for Delta smelt. (*Modeling Review*, p. 17-18.)

Excessive water diversions already stress the Delta. The independent modeling of the BDCP's future affects demonstrates that the BDCP would export even more water than is considered in the EIR/EIS (which relies on the faulty assumptions in BDCP model). This will irreparably harm numerous commercial and sport fisheries and have adverse impacts on Chinook salmon and Dungeness crab.

i. The Project Lacks Adequate Funding in Violation of C/ESA.

California Fish and Game Code, section 2081(b)(4), requires applicants for take authorization to "ensure adequate funding to implement [mitigation and other] measures …, and for monitoring compliance with, and effectiveness of, those measures." Likewise, under the federal ESA, the applicant for take authorization must ensure that "sufficient funding will be provided." (16 U.S.C. 1539(a)(2)(B)(iii).) The NCCP Act of 2003 echoes these requirements. (Cal. Fish & Game Code 2820(a)(10).)

The EIR/EIS does not meet these legal standards. It is at best vague and at worst misleading when it purports to assure the reader that "[f]unding from a variety of state and federal sources will be available to pay for the majority of the conservation measures that will provide the substantial public benefits of the BDCP." (BDCP, p. 1-2). The project, estimated to cost at least $25 billion, depends not only on funding from the current proposed bond – which the Governor recently has indicated he will not support. Moreover, bonds are subject to amendment and must be approved by a vote of the public, neither of which can be assumed. On top of this, the BDCP also relies on a second, as-yet undefined bond, and undefined federal funding. It is not clear who will pay what amount

BDCP1722

to fund the project. This type of critical information must be worked out before the documents can undergo meaningful public review.[10]

The NCCP Act contains similar requirements to those set forth in the ESA for HCPs. It follows, then, that the BDCP is deficient as a NCCP for the reasons it fails as a HCP. For example, section 2820(b)(3)(A) requires adequate funding for the plan. As explained above in connection with the HCP, the BDCP cannot demonstrate that adequate funding is in place. Rather, the funding for BDCP is uncertain and dependent on factors that are impossible to count on, such as the inclusion of BDCP components in two future water bonds and the passage of both of these bonds by California voters. The NCCP Act states that failure to provide funding can result in revocation of the take permit. Extrapolating from this, if the BDCP fails to secure or retain funding for its ambitious project, including the NCCP component, then it cannot secure a take permit and cannot proceed with the project. Given the likelihood of funding problems over the project decade-long construction period, this scenario is a distinct possibility. With no funding and no permit, a partially constructed large scale infrastructure project would be more detrimental to the ecosystem than if construction had never started.

With tenuous and illusory funding plans, the BDCP cannot provide assurances for other required components of the NCCP and HCP.

b. The Vague Project Description Cannot Form the Basis for Incidental Take Authorization.

Applicants seeking an incidental take permit must provide "a complete description of the activity sought to be authorized." (50 CFR § 17.22(b)(1)(i); § 222.307(b)(4)("detailed description").) As explained in detail in section III of this letter (CEQA/NEPA comments), the project description is so vague as to be misleading. It would be inappropriate to rely on this vague description as the basis for authorizing take of candidate, threatened or endangered species.

c. The Alternatives to Take are Inadequate.

Chapter 9 of the BDCP purports to consider alternatives to take as required by the C/ESA. Like the deficient alternatives analysis in the EIR/EIS, the BDCP's alternatives to take are not true alternatives at all but merely variations of the same action as the proposed project: ten out of the eleven alternatives to take would involve the same type of large-scale construction and water diversions as the proposed project.

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[10] Indeed, the Legislative Analyst's Office notes that "If bond funds are not available in the near future and no additional funding sources are identified, some ecosystem restoration may not be funded, including the restoration actions needed before the tunnels begin operation." (Legislative Analyst's Office, *Report on Financing the Bay Delta Conservation Plan*, Feb. 12, 2014, p. 7.)

2) The BDCP Cannot Issue "No Surprises" Assurances to Federal Agencies or Federal Water Contractors.

The draft BDCP, in Chapter 6, improperly attempts to provide "no surprises" assurances to federal agencies *and federal contractors and permittees*. In general, permits under HCPs and NCCP may have provisions that protect permittees from having to provide additional mitigation because of "surprises" such as changed or unforeseen circumstances that occur after issuance of the permit. In connection with a permit under the HCP, the BDCP states:

> *Under the No Surprises rule (63 FR 8859, Feb. 23, 1998), once an incidental take permit has been issued pursuant to an HCP, and its terms and conditions are being fully implemented, the federal government will not require additional conservation or mitigation measures, including land, water (including quantity and timing of delivery), money, or restrictions on the use of those resources (63 FR 8868). If the status of a species addressed under an HCP unexpectedly declines, the primary obligation for undertaking additional conservation measures rests with the federal government, other government agencies, or other nonfederal landowners who have not yet developed HCPs.*
> (BDCP, p. 6-28)

Similarly, in connection with the permit under the NCCP Act, the BDCP states:

> *Under the NCCPA, CDFW provides assurances to the Permittees (those Plan participants, excluding Reclamation, that receive permits from CDFW pursuant to Section 2835 of the NCCPA) commensurate with the long-term conservation assurances and associated implementation measures of the BDCP.*
> (BDCP, p. 6-29).

Such assurances cannot be provided to federal agencies because federal agencies owe a higher and enduring duty of care to listed species than non-federal entities. (See, 50 CFR Sec. 17.22(b)(5) [stating that "no surprises" assurances "cannot be provided to Federal agencies."].) The BDCP acknowledges, in connection with the NCCP, that the Reclamation is not eligible for the "no surprises" assurance (although it does not explain the statutory prohibition on this.). Yet the BDCP curiously does not exclude Reclamation from the section discussing "no surprises" under the HCP. And because the purpose of the take permits is to allow for operation, by various contractors, of a federal water project (including most of the Central Valley Project) that is subject to Section 7 consultation, it is likewise improper to extend "no surprises" assurances to the federal water contractors. The practical effect of giving these federal contractors Section 10 assurances and not extending it to the other federal contractors would be to put all of the other water contractors' water supplies at risk of being reallocated to species, since Reclamation's obligations under the ESA cannot be capped and the only water left available to Reclamation would be the project yield it owed to other contractors. Obviously, this result fundamentally conflicts with the law of California water rights, which requires that the project cause "no injury" to existing legal users of water. Also, providing "no surprises" assurances to federal water contractors who are relying on the operations of a federal water project – if it were even legal – would only serve to make it more difficult to put in place necessary measures for species protection.

V. Conclusion

Friant appreciates this opportunity to comment on the documents prepared for the BDCP. While Friant supports projects to increase reliable water supplies to south-of-Delta water users, Friant continues to have grave concerns about the BDCP as currently proposed. It is critically important that the BDCP not solve the water supply problems of one group of water users by thrusting those impacts onto others.

The foundation of the BDCP's environmental analysis is an outdated model whose many errors have been clearly identified in the independent *Modeling Review*. The independent analysis performed makes it clear that there remains much work to do on the BDCP, and the project is not ripe for review in an EIR/EIS. The premature environmental review is evidenced by the ill-defined project description, the lack of a reasonable range of alternatives, and the failure to recognize that a fundamental component of the project – the reallocation of established water rights – is legally infeasible. Moreover, BDCP's own modeling suggests that this project will *decrease* the reliability of Friant's water supplies and thereby cause water supply impacts to Friant. For obvious reasons, this result is unacceptable to Friant, and Friant therefore cannot support the project as it is currently depicted.

BDCP also fails to meet the requirements for approval as a HCP/NCCP, since it identifies no secure methods of funding the cost of the project estimated to be between $25 - $60 billion. It has been suggested that this cost be spread amongst all CVP contractors, regardless of the benefit – or, in Friant's case, injury – they receive from the project. Consequently, Friant cannot support BDCP while this funding question remains outstanding.

BDCP1722

To the extent that the BDCP redirects impacts to the Friant water users, Friant is, regrettably, unable to support the project. Friant respectfully requests that the agencies take the necessary time to reevaluate and significantly revise the BDCP and its EIR/EIS so that we can continue to work productively and cooperatively towards improving water supplies for users who are dependent upon water diverted at the Delta.

Sincerely,

Maureen F. Gorsen
ALSTON & BIRD LLP

cc: Jennifer Buckman, General Counsel, Friant Water Authority (via email)
Hon. Sally Jewell, Secretary, United States Department of the Interior (via email)
Hon. John Laird, Secretary, California Natural Resources Agency (via email)

Attachments

Attachment A: *Report on Review of Bay Delta Conservation Program Modeling ("Modeling Review")*, by Daniel B. Steiner, Consulting Engineer and MBK Engineers.

Attachment B: Memorandum to Donald R. Glaser (Reclamation) from Jennifer Buckman, Esq. (Friant), re BDCP Issues and Concerns, dated November 30, 2012 (the "Friant Issues Analysis").

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Report on Review of Bay Delta Conservation Program Modeling

Foreword

Since December 2012, MBK Engineers and Dan Steiner (collectively "Reviewers") have assisted various parties in evaluating the operations modeling that was performed for the Bay Delta Conservation Plan (BDCP). To assist in understanding BDCP and the potential implications, stakeholders[1] requested that the Reviewers review the CalSim II modeling studies performed as part of the BDCP (hereafter "BDCP Studies" or "BDCP Model").

An initial review led the Reviewers to conclude that the BDCP Model, which serves as the basis for the environmental analysis contained in the BDCP Environmental Impact Report/Statement (EIR/S), provides very limited useful information to understand the effects of the BDCP. The BDCP Model contains erroneous assumptions, errors, and outdated tools, which result in impractical or unrealistic Central Valley Project (CVP) and State Water Project (SWP) operations. The unrealistic operations, in turn, do not accurately depict the effects of the BDCP.

The Reviewers revised the BDCP Model to depict a more accurate, consistent version of current and future benchmark hydrology so that the effects of the BDCP could be ascertained. The BDCP Model was also revised to depict more realistic CVP and SWP operations upon which to contrast the various BDCP alternatives. The Reviewers made significant efforts to coordinate with and inform the U.S. Bureau of Reclamation (Reclamation) and the California Department of Water Resources (DWR) managers and modelers, and CVP and SWP operators of the Reviewers' modifications, assumptions, and findings. Where appropriate, the Reviewers also used Reclamation and DWR's guidance and direction to refine the Reviewers' analysis.

This Report summarizes: (1) the Reviewers' independent analysis and review of the BDCP Model, publicly released for the BDCP's Draft EIR/S in December 2013, (2) the Reviewers' updates and corrections made to the BDCP Model, and (3) comparisons between the original BDCP Model and the independent Model as revised by the Reviewers.

[1] The entities who funded this report are Contra Costa Water District, East Bay Municipal Utility District, Friant Water Authority, Northern California Water Association, North Delta Water Agency, San Joaquin River Exchange Contractors Water Authority, San Joaquin Tributaries Authority, and Tehama Colusa Canal Authority.

BDCP1722

Contents

BDCP1722

1 EXECUTIVE SUMMARY

Purpose of this Report

The CalSim II model is the foundational model for analysis of the BDCP, including the effects analysis in the Draft BDCP and the impacts evaluation in the Draft BDCP Environmental Impact Report/Statement (EIR/S). Results from CalSim II are used to examine how water supply and reservoir operations are modified by the BDCP. The results are also used by subsequent models to determine physical and biological effects, such as water quality, water levels, temperature, Delta flows, and fish response. Any errors and inconsistencies identified in the underlying CalSim II model are therefore present in subsequent models and adversely affect the results of later analyses based on those subsequent models.

The purpose of this Report is to examine the underlying CalSim II model used in support of the BDCP EIR/EIS and to analyze proposed operational scenarios contained in the BDCP. In undertaking the analysis for this Report, the Reviewers examined the model used in support of BDCP, the 2010 version of the CalSim II Model (BDCP Model), as well as the information contained in the Public Review Draft BDCP, released in December 2013. There are three basic reasons why the BDCP Model cannot be used to determine the effects of the BDCP: 1) the no action alternatives do not depict reasonable operations due to climate change assumptions, 2) operating criteria used in the BDCP Alternative 4 result in unrealistic operations, and 3) updates to CalSim II since the BDCP modeling was performed almost 4 years ago alter model results.

Given that it was not possible to determine how the BDCP may affect CVP and SWP operations or water system flows and conditions using the BDCP Model, independent modeling was performed to assess the potential effects of the BDCP. The first phase of this independent modeling effort was development of an updated without project baseline, which is similar to the no action alternative but with current, improved assumptions. The 2010 version of the CalSim II Model was used as the basis for the BDCP Model. The most recent version of CalSim II is the 2013 version used by DWR in its 2013 State Water Project Water Delivery Reliability Report (2013 CalSim II Model), and has undergone significant revision to not only correct errors in the 2010 model, but also to reflect regulatory changes that adversely affect the accuracy and dependability of the 2010 CalSim II Model. The BDCP was developed and analyzed using the 2010 CalSim II Model, and the changes and improvements reflected in the 2013 CalSim II Model were not used for the BDCP. For the purpose of the Reviewers' analysis and this Report, the 2013 CalSim II Model was further modified to incorporate additional updates, assumptions, and fixes. Some of these most recent Reviewer modifications have been accepted by both DWR and Reclamation, and are now incorporated into the CalSim II models that DWR and Reclamation use in conducting their own analyses. The second phase of the independent modeling effort (described in Section 4.2) incorporated the facilities and operations for the BDCP described as Alternative 4 H3 in the Draft EIR/EIS.

The manner in which the CVP and SWP are operated in the "With Project" and "Without Project" modeling scenarios significantly influences the BDCP "effects analysis". Modeling scenarios must depict how the actual system operates or how it might operate so that realistic effects can be determined. Modeling results from CalSim II are used to examine the effects of BDCP on water supply and reservoir operations, and the modeling results are also used by subsequent models to determine physical and biological effects, such as water quality, water levels, temperature, Delta flows, and fish response. If CalSim II modeling does not appropriately characterize operations in both the "With Project" and "Without Project" scenarios, the effects based on CalSim II will also not be appropriately characterized. The independent model provides a more accurate platform to assess the operations of the BDCP and isolates the effects of the BDCP from climate change. Comparing the results of the independent model to those of the BDCP model reveals significant differences in water operations and potential environmental impacts.

BDCP1722

Key Conclusions

Assumptions, errors, and outdated tools used in the BDCP Model results in impractical or unrealistic CVP and SWP operations. Therefore, the BDCP Model provides very limited useful information to illustrate the effects of the BDCP.

Methodology used to incorporate climate change contains errors and does not incorporate reasonably foreseeable adaptation measures:

<u>Climate change assumptions were incorrectly applied, yielding non-sensible results.</u>

Climate change hydrology in the Upper San Joaquin River basin was incorporated incorrectly into the BDCP Model. Although inflow to Millerton Lake is expected to *decrease* under future climate scenarios, the error in the BDCP Model causes the amount of stored water in Millerton Lake to *increase* by inappropriately reducing water deliveries to the Friant Division. BDCP erroneously overestimates Millerton Lake storage, which causes an overestimation of reservoir releases and available water downstream. Because overall CVP operations and the San Joaquin River are interconnected, this error causes problems throughout the CVP system. With the coordinated operations of the CVP and SWP, this error can affect the SWP system.

<u>Incorporation of climate change ignores reasonably foreseeable adaptation measures.</u>

The BDCP Model uses assumed future climate conditions that obscure the effects of implementing the BDCP. The future conditions assumed in the BDCP model include changes in precipitation, temperature, and sea level rise. The result of this evaluation is that the modeled changes in water project operations and subsequent environmental impacts are caused by three different factors: (1) sea level rise; (2) climate change; and (3) implementation of the alternative that is being studied.

Including climate change, without adaptation measures, results in insufficient water needed to meet all regulatory objectives and user demands. For example, the BDCP Model results that include climate change indicate that during droughts, water in reservoirs is reduced to the minimum capacity possible. Reservoirs have not been operated like this in the past during extreme droughts and the current drought also provides evidence that adaptation measures are called for long in advanced to avoid draining the reservoirs. In this aspect, the BDCP Model simply does not reflect a real future condition. Foreseeable adaptations that the CVP and SWP could make in response to climate change include: (1) updating operational rules regarding water releases from reservoirs for flood protection; (2) during severe droughts, emergency drought declarations could call for mandatory conservation and changes in some regulatory criteria similar to what has been experienced in the current and previous droughts; and (3) if droughts become more frequent, the CVP and SWP would likely revisit the rules by which they allocate water during shortages and operate more conservatively in wetter years. The modifications to CVP and SWP operations made during the winter and spring of 2014 in response to the drought supports the likelihood of future adaptations. The BDCP Model is, however, useful in that it reveals that difficult decisions must be made in response to climate change. But, in the absence of making those decisions, the BDCP Model results themselves are not informative, particularly during drought conditions. With future conditions projected to be so dire without the BDCP, the effects of the BDCP appear positive simply because it appears that conditions cannot get any worse (i.e., storage cannot be reduced below its minimum level). However, in reality, the future condition will not be as depicted in the BDCP Model. The Reviewers recommend that Reclamation and DWR develop more realistic operating rules for the hydrologic conditions expected over the next half-century and incorporate those operating rules into any CalSim II Model that includes climate change.

BDCP1722

The BDCP Model does not accurately reflect reasonably foreseeable conditions and changes in CVP and SWP operations due to the BDCP:

<u>BDCP's "High Outflow Scenario" is not sufficiently defined for analysis.</u>

The effects of many critical elements of the BDCP cannot be analyzed because those elements are not well-defined. The Reviewers recommend that the BDCP be better defined and a clear and concise operating plan be developed so that the updated CalSim II model can be used to assess effects of the BDCP.

The High Outflow Scenario (HOS) requires additional water (Delta outflow) during certain periods in the spring. The BDCP Model places most of the responsibility for meeting this new additional outflow requirement on the SWP. However, the SWP may not actually be responsible for meeting this new additional outflow requirement. This is because the Coordinated Operations Agreement ("the COA") would require a water allocation adjustment that would keep the SWP whole. Where one project (CVP or SWP) releases water to meet a regulatory requirement, the COA requires a water balancing to ensure the burden does not fall on only one of the projects. The BDCP Model is misleading because it fails to adjust project operations, as required by the COA, to "pay back" the water "debt" to the SWP due to these additional Delta outflow requirements. Unless there is a significant revision to COA, the BDCP Model overstates the impacts of increased Delta outflow on the SWP and understates the effects on the CVP.

Furthermore, after consulting with DWR and Reclamation project operators and managers, the Reviewers conclude that there is no apparent source of CVP or SWP water to satisfy both the increased Delta outflow requirements and pay back the COA "debt" to the SWP without substantially depleting upstream water storage. It appears, through recent public discussions regarding the HOS, that BDCP anticipates additional water to satisfy the increased Delta outflow requirement and to prevent the depletion of cold water pools will be acquired through water transfers from upstream water users. However, this approach is unrealistic. During most of the spring, when BDCP proposes that Delta outflow be increased, agricultural water users are not irrigating. This means that there is not sufficient transfer water available to meet the increased Delta outflow requirements and therefore, additional release of stored water from the reservoirs would be required. Releasing stored water to meet the increased Delta outflow requirements could potentially impact salmonids on the Sacramento and American River systems due to reductions in the available cold water pool.

<u>Simulated operation of BDCP's dual conveyance, coordinating proposed North Delta diversion facilities with existing south Delta diversion facilities, is inconsistent with the project description.</u>

The Draft BDCP and associated Draft EIR/EIS specify criteria for how much flow can be diverted by the new North Delta Diversion (NDD) facilities and specify when to preferentially use either the NDD facilities or the existing South Delta diversion (SDD) facilities. However, the BDCP Model contains an artificial constraint that prevents the NDD facilities from taking water as described in the BDCP project description. In addition to affecting diversions from the NDD, this artificial constraint contains errors that affect the No Action Alternative (NAA) operation. This error has been fixed by DWR and Reclamation in the more recent 2013 CalSim II Model; however, the error remains in the BDCP Model. Additionally, the BDCP Model does not reflect the summer operations of the SDD that are described in the Draft EIR/EIS as a feature of the BDCP project intended to prevent water quality degradation in the south Delta. The net effect of these two errors is that the BDCP Model significantly underestimates the amount of water diverted from the NDD facilities and overestimates the amount of water diverted from the SDD. The further decrease in flows through the Delta, in comparison to what is presented in the BDCP Draft EIR/EIS, would likely result in even greater degradation in Delta water quality than reported.

The BDCP Model contains numerous coding and data issues that significantly skew the analysis and conflict with actual real-time operational objectives and constraints

Operating rules used in the BDCP Model, specifically regarding Alternative 4, result in impractical or unrealistic CVP and SWP operations. Reservoir balancing rules cause significant drawdown of upstream reservoirs during spring and summer months while targeting dead pool level in San Luis from September through December resulting in artificially low Delta exports and water shortages. CVP allocation rules are set to artificially reduce south of Delta allocations during wetter years resulting in underestimates of diversions at the NDD and the SDD. Operating rules for the Delta Cross Channel Gate do not reflect how the gates may be operated in "With Project" conditions.

Operational logic is coded into the CalSim II model to simulate how DWR and Reclamation would operate the system under circumstances for which there are no regulatory or other definitive rules. This attempt to specify (i.e., code) the logic sequence and relative weighting so that a computer can simulate "expert judgment" of the human operators is a critical element to the CalSim II model. In the BDCP version of the CalSim II model, some of the operational criteria for water supply allocations and existing facilities such as the Delta Cross Channel and San Luis Reservoir are inconsistent with real-world conditions.

The BDCP Model, as modified by the Reviewers, corrected some of the inconsistencies between the operational criteria in the BDCP Model and real-world conditions, and confirmed these changes with CVP and SWP operators. By correcting the operational criteria, the modified BDCP model (Independent Model) output is more accurate and consistent with real-world operational objectives and constraints.

Independent modeling of the BDCP revealed differences in CVP and SWP operations and water deliveries from the analysis disclosed for the Draft EIR/EIS.

The independent model provides a more accurate platform to assess the operations of the BDCP and isolates the effects of the BDCP from climate change. Comparing the results of the independent model to those of the BDCP model reveals significant differences in water operations and potential environmental impacts. The independent model "Without Project" baseline was compared to the independent model's version of Alternative 4 H3-ELT of the BDCP. The updated changes in water operations from the independent model are compared to changes in operations reported in the BDCP Draft EIR/EIS for the equivalent alternatives. The difference between the updated independent model results and those reported in the BDCP Draft EIR/EIS are presented below.

- The amount of water exported (diverted from the Delta) may be approximately 200 Thousand Acre-Feet (TAF) per year *higher* than the amount disclosed in the Draft EIR/S. This total represents:
  - approximately 40 TAF/yr more water diverted and delivered to the SWP south of Delta contractors, and
  - approximately 160 TAF/yr more water diverted and delivered to the CVP south of Delta contractors.
- The BDCP Model estimates that, under the No Action Alternative at the Early Long Term (NAA – ELT) (without the BDCP), total average annual exports for CVP and SWP combined are estimated to be 4.73 million acre-feet (MAF) and in the Independent Model Future No Action (FNA) combined exports are 5.61 MAF. The BDCP Model indicates an increase in exports of approximately 540 TAF and the Independent Model shows an increase of approximately 750 TAF in Alt 4.

- Delta outflow would decrease by approximately 200 TAF/yr compared to the quantity indicated in the Draft EIR/S.
    - This lesser amount of Delta outflow has the potential to cause more significant water quality and supply impacts for in-Delta beneficial uses and additional adverse effects on species. To determine the potential effects of the reduced amount of Delta outflow, additional modeling is needed using tools such as DSM2.
- The BDCP Model does not accurately reflect the location of the diversions that the SWP and CVP will make from the Delta.
    - When the errors in the BDCP Model are corrected, the Independent Model reveals that the NDD could divert approximately 680 TAF/yr more than what is disclosed in the BDCP Draft EIR/S.
    - Conversely, the quantity of water diverted through the existing SDD would be approximately 460 TAF/yr less than what is projected in the BDCP Draft EIR/S.
    - This difference in the location of diversions has the potential to reduce water quality in the Central and South Delta in ways that were not analyzed in the BDCP Draft EIR/S

Additional Observations and Recommendations

This review identified and remedied several modeling deficiencies that should be used by others as the BDCP and other projects move forward. However, the work done to date by the Reviewers does not capture all of the improvements necessary to depict the effects of the BDCP accurately. There are many operational uncertainties in the BDCP that require attention and must be addressed. The Reviewers offer several recommendations so that future CalSim II modeling of the BDCP will yield more meaningful results.

1. Ensure model operations of existing facilities are consistent with contemporary real world operations to the extent possible.
    a. Ensure reservoirs are not routinely drawn down to dead pool as part of 'normal' operations.
2. Given the expected changes in hydrologic conditions over the next half century, realistic operating rules for all CVP and SWP facilities, including the BDCP, must be developed.
    a. Develop a 'drought' operations plan that includes adaptations.
    b. Alter reservoir flood release operations to match the assumed shift in precipitation patterns.
    c. Perform a sensitivity analysis using a range of possible future climates.
3. BDCP operations must be defined in a clear and concise manner.
    a. Transfer water required to make an alternative feasible should be identified so the effects of that transfer can be determined.
    b. Adaptive management limits and targets must be better defined
    c. Changes to the existing COA to accommodate the BDCP must be defined.
    d. Modeled export operations spilt between the north and south intakes must be consistent with the project description.
    e. Changes in the DCC operations should be defined.
    f. Refined reservoir balancing rules

The BDCP Model must be revised prior to drawing conclusions regarding the environmental effects of the BDCP. The BDCP Model is an outdated version of the CalSim II model, which contains known errors. Only by incorporating the changes made to date by the Reviewers, incorporating the additional recommended changes above, and potential additional refinements can the effects of the BDCP be determined. Reasonable conclusions can only be drawn once these changes are made to the BDCP Model; therefore, the Reviewers recommend that Reclamation and DWR make these changes.

BDCP1722

2 INTRODUCTION

The Public Draft BDCP has been prepared by DWR, with assistance and input from Reclamation and various entities that receive water from the SWP and CVP. The BDCP is being prepared to comply with the federal Endangered Species Act, and certain other federal and state mandates. The BDCP proposes a number of Conservation Measures that, if implemented, are believed to provide some benefit to various species covered by the BDCP in the Delta. The Conservation Measures proposed in the Public Draft BDCP include new conveyance facilities and modified operations of the SWP and CVP, as well as other Conservation Measures addressing water quality, predation, and other habitat-related measures. The BDCP has been in development for several years. DWR also has prepared a Public Draft EIR/EIS in an attempt to satisfy CEQA and NEPA. Both the Public Draft BDCP and the Public Draft EIR/EIS were released for public review and comment in December 2013. This Report analyzes the BDCP as proposed and analyzed in the documents released in December 2013.

The Public Draft EIR/EIS considered several water facility and operational configurations, ultimately identifying "Alternative 4" as the preferred alternative under CEQA. (Public Draft EIR/EIS, Section 3.1.1) In addition to identifying physical facilities, the Public Draft EIR/EIS identifies an operational scenario (Alternative 4, Operation Scenario H) as the proposed operation regime for the new and existing facilities. (Public Draft EIR/EIS, Section 3.1.1, Section 5.3.3.9.) Alternative 4, Operational Scenario H is further divided into four sub-operational scenarios, which vary depending on Fall and Spring Delta outflow requirements. Those sub-scenarios are: Alternative 4 Operational Scenario H1 (Alternative 4 H1); Alternative 4 Operational Scenario H2 (Alternative 4 H2); Alternative 4 Operational Scenario H3 (Alternative 4 H3); and Alternative 4 Operational Scenario H4 (Alternative 4 H4). (Public Draft EIR/EIS, section 5.3.3.9.)

In general the differences between the various operational sub-scenarios are as follows. Alternative 4 H1 does not include enhanced spring outflow requirements or Fall X2 requirements. Alternative 4 H2 includes enhanced spring outflow requirements but not Fall X2 requirements. Alternative 4 H3 does not include enhanced spring outflow requirements but includes Fall X2 requirements. Alternative 4 H4 includes both enhanced spring outflow requirements and Fall X2 requirements. (Public Draft EIR/EIS, section 5.3.3.9.) This Report focuses on Alternative 4 H4 and Alternative 4 H3.

The task of the Reviewers was to review the CalSim II modeling which provides the foundational analysis of the BDCP. Results from CalSim II are used to examine how water supply and reservoir operations are modified by the BDCP, and the results are also used by subsequent models to determine physical and biological effects, such as water quality, water levels, temperature, Delta flows, and fish response. Any errors and inconsistencies identified in the underlying CalSim II model are therefore present in subsequent models and adversely affect the results of later analyses based on those subsequent models.

The model used in support of BDCP is the 2010 version of the CalSim II Model (BDCP Model), as well as the information contained in the Public Review Draft BDCP, released in December 2013. Since its development in 2010, the 2010 version of the CalSim II Model has undergone significant revision to not only correct errors in the model, but also to reflect regulatory changes that adversely affect the accuracy and dependability of the 2010 CalSim II Model. The updated version of CalSim II is the model used by DWR in its 2013 State Water Project Water Delivery Reliability Report (2013 CalSim II Model). The BDCP was developed and analyzed using the 2010 CalSim II Model; the changes and improvements reflected in the 2013 CalSim II Model were not used for the BDCP.

The initial review conducted by the Reviewers led to the conclusion that the BDCP Model provides very limited useful information to illustrate the effects of the BDCP. Assumptions, errors, and outdated tools used in the BDCP Model result in impractical or unrealistic CVP and SWP operations. Because of the unrealistic operations included in the BDCP Model, the Reviewers revised the BDCP Model to depict a more accurate, consistent version of current and future benchmark hydrology. The BDCP Model was also revised to depict more realistic CVP and SWP operations upon which to contrast the various BDCP alternatives. The Reviewers made significant efforts to coordinate with or inform Reclamation and DWR managers and modelers, and CVP and SWP operators of the Reviewers' modifications, assumptions, and findings. Where appropriate, the Reviewers also used Reclamation's and DWR's guidance and direction to refine the Reviewers' analysis. Although there are many models used to evaluate various effects of BDCP, this analysis and review focused on water operations analysis using the BDCP Model (CalSim II).

Purpose and Use of the CalSim II Model

The CalSim II model is a computer program jointly developed by DWR and Reclamation. CalSim II presents a comprehensive simulation of SWP and CVP operations, and it is used by DWR as a planning tool to predict future availability of SWP water. CalSim II is widely recognized as the most prominent water management model in California, and it is generally accepted as a useful and appropriate tool for assessing the water delivery capability of the SWP and the CVP.

Broadly speaking, the model estimates, for various times of the year, how much water will be diverted, will serve as instream flows (e.g., flow in the rivers at various locations, such as Delta outflow), and will remain in the reservoirs. Within the context of the BDCP, the CalSim II model is also used to estimate the amount of water that will be diverted from BDCP's proposed NDD facilities. Thus, for BDCP, the CalSim II model estimates how much water will be diverted at the NDD facilities, how much flow will remain in the Sacramento River below Hood (the approximate location of the NDD facilities), how much water will be diverted through the existing SDD facilities at Tracy, how much flow will leave the Delta by flowing out to the Bay, and how much water will remain in storage in the reservoirs. The location and timing of the diversion and the amount of water remaining instream are significant because they can cause impacts on species, water quality degradation, and the like.

The coding and assumptions included in the CalSim II model drive the results it yields. Data and assumptions, such as the amount of precipitation runoff at a certain measuring station over time or the demand for water by specific water users over time, are input into the model. The criteria that are used to operate the CVP and the SWP (including current regulatory requirements) are included in the model as assumptions; because of the volume of water associated with the CVP and the SWP, these operational criteria significantly influence the model's results. Additionally, operational logic is coded into the CalSim II model to simulate how DWR and Reclamation would operate the system under circumstances for which there are no regulatory or otherwise definitive rules (e.g., when to move water from upstream storage to south of Delta storage). This attempt to specify (i.e., code) the logic sequence and relative weighting that humans will use as part of their "expert judgment" is a critical element to the CalSim II model.

The model's ability to reliably predict the effects of a proposed action depends on the accuracy of its coding and its representation of operations criteria. In other words, the model's results will be only as good as its data, coding, assumptions, and judgment and knowledge of the modelers. For this reason, a detailed operating plan of existing facilities and the proposed facility is essential to create an accurate model of how a proposed action will change – i.e., affect – existing water operations. In reviewing the BDCP Model it became apparent that coding errors and operating assumptions are inconsistent with the actual purposes and objectives of the CVP and SWP, thus limiting the utility and accuracy of the results. Through collaboration and verification with CVP and SWP operators, the BDCP Model flaws were corrected in the revised BDCP Model (Independent Model) and the potential effects of the BDCP were re-analyzed.

BDCP1722

3 REVIEW OF BDCP CALSIM II MODELING

The CalSim II model is the foundational model for analysis of the BDCP, including the effects analysis in the Draft BDCP and the impacts evaluation in the Draft EIR/EIS. Results from CalSim II are used to examine how water supply and reservoir operations are modified by the BDCP, and the results are also used by subsequent models to determine physical and biological effects, such as water quality, water levels, temperature, Delta flows, and fish response. Any errors and inconsistencies identified in the underlying CalSim II model are therefore present in subsequent models and adversely affect the results of later analyses based on those subsequent models.

The Reviewers' analysis of the BDCP Model is summarized in three categories: (3.1) assessment of climate change assumptions, implementation, and effects; (3.2) assessment of general assumptions and operations; and (3.3) assessment of the assumptions and operational criteria for inclusion of the new BDCP facilities. The issues discussed in (3.1) and (3.2) are relevant for all modeling scenarios, both baseline scenarios that do not include BDCP and with project scenarios that evaluate BDCP or the Alternatives. The issues discussed in (3.3) are specific to the inclusion of the BDCP as defined in the Draft Plan and identified as Alternative 4 in the Draft EIR/EIS.

3.1 Climate Change

Implementation of Climate Change

The analysis presented in the BDCP Documents attempts to incorporate the effects of climate change at two future climate periods: the early long term (ELT) at approximately the year 2025; and the late long term (LLT) at approximately 2060. As described in the BDCP documents[2], other analytical tools were used to determine anticipated changes to precipitation and air temperature that is expected to occur under ELT and LLT conditions. Projected precipitation and temperature was then used to estimate runoff into from the watersheds over an 82-year period of variable hydrology; these time series were then used as inputs into the BDCP Model. A second aspect of climate change, the anticipated amount of sea level rise, is incorporated into the BDCP CalSim II model by modifying flow-salinity relationships that estimate salinity within the Delta based on sea level and flows within Delta channels.

This Report does not evaluate the analytical processes by which reservoir inflows and runoff were developed, nor does it evaluate the modified flow-salinity relationships that are assumed due to sea level rise; those items could be the focus of another independent review. This Report is limited to evaluating how the modified flows were incorporated into the BDCP Model and whether the operation of the CVP and SWP water system in response to the modified flows and the modified flow-salinity relationship is reasonable for the ELT and LLT conditions. This work reviews the assumed underlying hydrology and simulated operation of the CVP/SWP, assumed regulatory requirements, and the resultant water delivery reliability.

Assessment of Climate Change Assumptions and Implementation

To assess climate change, the three Without Project (or "baseline" or "no action") modeling scenarios were reviewed: No Action Alternative (NAA)[3], No Action Alternative at the Early Long Term (NAA – ELT), and No Action Alternative at the Late Long Term (NAA –LLT). Assumptions for NAA, NAA-ELT, and NAA-LLT are provided in the Draft BDCP EIR/EIS Appendix 5A, Section B, Table B-8. The only difference between these scenarios is the climate-related changes made for the ELT and LLT conditions (Table 1).

[2] BDCP EIR/EIS Appendix 5A, Section A and BDCP HCP/NCCP Appendix 5.A.2

[3] NAA is also called the Existing Biological Conditions number 2 (EBC-2) in the Draft Plan.

Table 1. Scenarios used to evaluate climate change

	Climate Change Assumptions	
Scenario	**Hydrology**	**Sea Level Rise**
No Action Alternative (NAA)	None	None
No Action Alternative at Early Long Term (NAA-ELT)	Modified reservoir inflows and runoff for expected conditions at 2025	15 cm
No Action Alternative at Early Long Term (NAA-LLT)	Modified reservoir inflows and runoff for expected conditions at 2060	45 cm

The differences between the NAA and NAA-ELT reveal the effects of the climate change assumptions under ELT conditions; similarly, the differences between the NAA and NAA-LLT reveal the effects of the climate change assumptions under LLT conditions. Numerous comparisons between NAA, NAA-ELT, and NAA-LLT are discussed in the Technical Appendix of this report; issues that shaped our conclusions are discussed below.

Climate change implementation is incorrect, yielding non-sensible results.

Climate change hydrology in the Upper San Joaquin River basin (above Friant Dam) was incorporated incorrectly into the BDCP Model, resulting in non-sensible results. Because overall CVP operations and the San Joaquin River are interconnected, this error causes problems throughout the CVP system. With the coordinated operations of the CVP and SWP, this error can affect the SWP system.

Specifically, under climate change, inflow to Millerton Lake is expected to decrease (BDCP DEIR/S, Appendix 29B). However, when climate change was implemented into the BDCP Model, it was done incorrectly such that: (1) the inflow into Millerton Lake *was not adjusted* for climate change and is thus overestimated, and yet (2) the flood control operations and water allocation decisions for Millerton Lake *were adjusted* for climate change as if the inflow was reduced. The net effect is that storage in Millerton Lake is overestimated; in fact, the BDCP model indicates that the amount of water stored in Millerton Lake will actually be increased as a result of climate change even though the inflow to the lake is projected to be reduced (i.e., non-sensible). This error results in the overestimation of Millerton Lake storage causing an overestimation of reservoir releases for flood control purposes and available water downstream at the Mendota Pool; these unreasonably high flood releases are then diverted by CVP exchange contractors in lieu of taking CVP Delta water, which means that either CVP Delta exports are reduced or the water is backed up into San Luis Reservoir (SLR), overestimating SLR storage. Furthermore, any excess water from the Millerton Lake that is not diverted at Mendota Pool would continue downstream and ultimately increase Vernalis flow, which subsequently affects Delta exports. Ultimately, changes in exports have the potential to affect upstream reservoir releases (i.e., from Lake Shasta) as well.

This is a situation where one seemingly minor error cascades through the entire system. This error exists in all BDCP Model scenarios (baselines and project alternatives) that have climate change incorporated at either ELT or LLT conditions. In other words, all model results reported in the BDCP and associated Draft EIR/S contain this error, with the only exception of the Existing Biological Conditions baselines numbers 1 and 2 (EBC1 and EBC2), which are evaluated in the BDCP.

Effects of climate change create unrealistic operations.

Review of the BDCP Model output for the Without Project condition with climate change assumptions for the ELT or LLT (NAA-ELT and NAA-LLT, respectively) reveal that the model is operated beyond its usable range. The purpose of CalSim II is to simulate how the CVP and SWP systems would be operated in order to meet regulatory requirements and water delivery objectives based on a certain amount of precipitation and runoff. When the precipitation patterns and resultant runoff were changed in the BDCP Model for climate change, the logic regarding how the system is operated to meet the regulatory and water delivery objectives was not changed. The net effect is that neither the regulatory criteria nor the delivery objectives are met.

With rising temperatures and shifting precipitation patterns with less snow, temperature criteria on the Sacramento River will become increasingly more difficult to meet. For instance, the BDCP Model includes an assumption that equilibrium temperatures in the Sacramento River between Shasta and Gerber will increase on an average annual basis by 1.6°F by 2025 (ELT) by 3.3°F by 2060 (LLT). NMFS 2009 Biological Opinion specifies temperature targets of 56°F in the Sacramento River between Balls Ferry and Bend Bridge for the protection of salmon. Because of lower storage conditions in Shasta Lake and the magnitude of temperature increase in the assumptions is so large, the BDCP Model shows that the probability of exceeding the mortality threshold in the Sacramento River at Bend Bridge in August and September increases from approximately 80% in the No Action Alternative to 90% to 95% by 2025 (under ELT conditions) and to 95% to 100% by 2060 (under LLT conditions). This significant difference shows the overwhelming influence that the climate change assumptions have on the BDCP Model results.

Reservoir Storage: Under the climate change scenarios, reservoir storage (particularly in the CVP system) is operated very aggressively so that the reservoirs are drawn down to an extremely low level (termed "dead pool") in approximately 1 of every 10 years, even without the BDCP. At dead pool level, little or no water can be released from the reservoir – not for fish, not for drinking water, not for agriculture. For example, since Folsom Reservoir became operational in 1955, the storage has never been drawn down to reach dead pool (which is approximately 100,000 acre-feet); the lowest storage level on record was 147,000 acre-feet at the end of September 1977. However, the BDCP Model predicts that, under climate change, the reservoir will be about 100,000 acre-feet or about 30% lower than its historical low in 10% of years. Some municipalities, such as the city of Folsom, are entirely dependent on reservoir releases for drinking water. Reaching dead pool would cut municipal deliveries below the level required to maintain public health and safety. In reality, and to avoid such dire circumstances, the CVP and SWP would likely request that regulatory agencies modify standards to conserve storage and would likely mandate conservation (or rationing) by water users. Similar steps were taken in early in 2014 to reduce water diversions and reservoir releases for fishery needs and Delta requirements. Emergency measures such as these are not simulated in the model, so the BDCP Model does not reflect reasonable future operations with climate change.

With the predicted changes in precipitation and temperature implemented in the BDCP Model, there is simply not enough water available to meet all regulatory objectives and water user demands. Yet the BDCP Model continues its normal routine and thus fails to meet its objectives. In this aspect, the BDCP Model simply does not simulate reality. For instance, if the ELT and LLT conditions actually occur, the CVP and SWP would likely adapt to protect water supplies and the environment. Examples of reactions to climate change would likely include: (1) updating operational rules regarding water releases for flood protection; (2) during severe droughts, emergency drought declarations could call for mandatory conservation and changes in some regulatory criteria similar to what has been experienced in the current and previous droughts ; and (3) if droughts become more frequent, the CVP and SWP would likely revisit the rules by which they allocate water during shortages and operate more conservatively in wetter years. The likelihood of an appropriate operational response to climate change is supported by the many modifications to CVP and SWP operations made during the winter and spring of 2014 to respond to the current drought. The BDCP Model is, however, useful in that it reveals that difficult decisions must be made.

Conclusions Regarding Climate Change Assumptions and Implementation

Water Code section 85320, subdivision (b)(2)(C) requires consideration of, among other things, the "potential effects of climate change, possible sea level rise up to 55 inches, and possible changes in total precipitation and runoff patterns on the conveyance alternatives and habitat restoration activities considered in the environmental

BDCP1722

impact report". In examining the possible effects of climate change, it is not appropriate to assume that current project operations will remain static and not respond to climate change. The BDCP's simplistic approach of assuming a linear operation of the CVP and SWP produces results that are not useful for dealing with the complex problem of climate change because it does not reflect the way in which the CVP and the SWP would actually operate whether or not the BDCP is implemented. The Reviewers recommend a sensitivity analysis be conducted to develop a better understanding of the range of possible responses to climate change by the CVP and SWP, and the regulatory structures that dictate certain project operations.

Including climate change, without adaptation measures, results in insufficient water needed to meet all regulatory objectives and user demands. For example, the BDCP Model results that include climate change indicate that during droughts, water in reservoirs is reduced to the minimum capacity possible. Reservoirs have not been operated like this in the past during extreme droughts and the current drought also provides evidence that adaptation measures are called for long in advanced to avoid draining the reservoirs. In this aspect, the BDCP Model simply does not reflect a real future condition. Foreseeable adaptations that the CVP and SWP could make in response to climate change include: (1) updating operational rules regarding water releases for flood protection; (2) during severe droughts, emergency drought declarations could call for mandatory conservation; and (3) if droughts become more frequent, the CVP and SWP would likely revisit the rules by which they allocate water during shortages and operate more conservatively in wetter years. The modifications to CVP and SWP operations made during the winter and spring of 2014 in response to the drought supports the likelihood of future adaptations. The BDCP Model is, however, useful in that it reveals that difficult decisions must be made in response to climate change. But, in the absence of making those decisions, the BDCP Model results themselves are not informative, particularly during drought conditions. With future conditions projected to be so dire without the BDCP, the effects of the BDCP appear positive simply because it appears that conditions cannot get any worse (i.e., storage cannot be reduced below its minimum level). However, in reality, the future condition will not be as depicted in the BDCP Model. The Reviewers recommend that Reclamation and DWR develop more realistic operating rules for the hydrologic conditions expected over the next half-century and incorporate those operating rules into the any CalSim II Model that includes climate change.

3.2 General Assumptions and Operations

BDCP CalSim II Assumptions

The assumptions for these runs are defined in the December 2013 Draft BDCP[4] and associated Draft EIR/S.

Each of the no action alternatives assumes the same regulatory requirements, generally representing the existing regulatory environment at the time of study formulation (February 2009), including Stanislaus ROP the National Marine Fisheries Services (NMFS) Biological Opinion (BO) (June 2009) Actions III.1.2 and III.1.3, Trinity Preferred EIS Alternative, NMFS 2004 Winter-run BO, NMFS BO (June 2009) Action I.2.1, SWRCB WR90-5, CVPIA (b)(2) flows, NMFS BO (June 2009) Action I.2.2, ARFM NMFS BO (June 2009) Action II.1, no SJRRP flow modeled, Vernalis SWRCB D1641 Vernalis flow and WQ and NMFS BO (June 2009) Action IV.2.1, Delta D1641 and NMFS Delta Actions including Fall X2 Fish & Wildlife Service (FWS) BO (December 2008) Action 4, Export restrictions including NMFS BO (June 2009) Action IV.11.2v Phase II, OMR FWS BO (December 2008) Actions 1-3 and NMFS BO (June 2009) Action IV.2.3v.

The modeling protocols for the recent USFWS BO (2008) and NMFS BO (2009) have been cited as being cooperatively developed by Reclamation, NMFS, U.S. Fish and Wildlife Service (USF&WS), California Department of Fish and Wildlife (CDF&W), and DWR.

[4] BDCP EIR/EIS Appendix 5A

Each of the BDCP no action alternatives (NAA, NAA-ELT, and NAA-LLT) uses the same New Melones Reservoir and other San Joaquin River operations. At the time of these studies' formulation, the NMFS BO (June 2009) had been recently released. Also, the San Joaquin River Agreement (SJRA), including the Vernalis Adaptive Management Program (VAMP) and its incorporation into D1641 for Vernalis flow requirements were either still in force or being discussed for extension. As a component of study assumptions, the protocols of the SJRA and an implementation of the NMFS BO for San Joaquin River operations (including New Melones Reservoir operations) are included in the studies. These protocols, in particular the inclusion of VAMP which has now expired, are not appropriate as an assumption within either the No Action or Alternative Scenarios within a full disclosure of BDCP impacts. Although appropriate within the identification of actions, programs and protocols present at the time of the NOI/NOP, they are not representative of current or reasonably foreseeable operations. Also, the BDCP Model assumes no San Joaquin River Restoration Program releases in the future operation of the Friant Division of the CVP. While assuming no difference in the current and future operation of the Friant Division avoids another difference in existing and projected future hydrology of the San Joaquin River, the assumption does not recognize the existence of the San Joaquin River Restoration Program. Results of CVP and SWP operations, in particular as affected by export constraints dependent on San Joaquin River flows and their effect on OMR, E/I and I/E diversion constraints, would be different with a different set of assumptions for San Joaquin River operations, in a manner similar to the cascading effect described above in connection with climate change.

Finally, the habitat restoration requirements in the 2008 FWS BO and the 2009 NMFS BO are not included in the NAA baselines. Although the restoration is required to be completed either with or without completion of the BDCP, the restoration was only analyzed as part of the with project scenarios.

Conclusions Regarding General Assumptions and Operations

<u>The benchmark study upon which the BDCP Model was built contains inaccuracies that affect the analysis.</u>

CalSim II is continuously being improved and refined. As the regulatory environment changes and operational and modeling staff work together to improve the model's capability to simulate actual operations, the model is continually updated. The BDCP Model relied upon a version of CalSim II that dates back to 2009, immediately after the new biological opinions (BiOps) from the NMFS and the United States Fish and Wildlife Service (USFWS) significantly altered the operational criteria of the CVP and SWP. In the last 4 to 5 years, DWR, Reclamation, and outside modeling experts have worked together to improve the model. Changes include better (more realistic) implementation of the new BiOps and numerous fixes to the code. Since CalSim II is undergoing continual improvements, there will always be "vintage" issues in that by the time a project report is released, the model is likely slightly out of date. However, in this case - with the major operational changes that have occurred in the new regulatory environment – many issues have been identified and fixed in the last 4 to 5 years that have a significant effect on model results. CalSim II modeling for the DWR 2013 Delivery Reliability Report contains numerous modeling updates and fixes that significantly alter results of the BDCP Model. A key modeling revision in the 2013 DWR modeling was fixing an error regarding artificial minimum instream flow requirements in the Sacramento River at Hood. An "artificial" minimum instream flow requirement had been specified; the requirement is artificial in that it does not represent a regulatory requirement, but rather is a modeling technique to force upstream releases to satisfy Delta needs.

3.3 Assumptions and Operational Criteria for inclusion of proposed BDCP facilities

To evaluate the assumptions and operations of the proposed BDCP facilities, the Reviewers analyzed the output from the BDCP Model and examined the internal workings of the models. This approach allows for evaluation of not only the possible effects of the BDCP, also but whether the assumptions and operational criteria are implemented appropriately to reflect the project description and reasonably foreseeable actions.

Assessment of Assumptions and Operations in coordination with new BDCP facilities

BDCP's Alternative 4 has four possible sets of operational criteria, termed the Decision Tree, that differ based on the "X2" standards[5] that they contemplate:

- Low Outflow Scenario (LOS), otherwise known as operational scenario H1, assumes existing spring X2 standard and the removal of the existing Fall X2 standard;
- High Outflow Scenario (HOS), otherwise known as H4, contemplates the existing Fall X2 standard and providing additional outflow during the spring;
- Evaluated Starting Operations (ESO), otherwise known as H3, assumes continuation of the existing X2 spring and fall standards;
- Enhanced spring outflow only (not evaluated in the December 2013 Draft BDCP), scenario H2, assumes additional spring outflow and no Fall X2 standards.

While it is not entirely clear how the Decision Tree would work in practice, the general concept is that prior to operation of the new facility, implementing authorities would select the appropriate Scenario (from amongst the four choices) based on their evaluation of targeted research and studies to be conducted during planning and construction of the facility.

For this analysis, the Reviewers analyzed the HOS (or H4) scenario because the BDCP[6] indicates that the initial permit will include HOS operations that may be later modified at the conclusion of the targeted research studies. The HOS includes the existing Fall X2 requirements but adds additional outflow requirements in the spring. The model code was reviewed and discussed with DWR and Reclamation, who acknowledged that although the SWP was bearing the majority of the responsibility for meeting the additional spring outflow in the modeling, the responsibility would need to be shared with the CVP[7]. In subsequent discussions, DWR and Reclamation have suggested that the additional water may be purchased from other water users. However, the actual source of water for the additional outflow has not been defined. While not how the projects would actually be operated, since the BDCP Model assumes that the SWP bears the majority of the responsibility for meeting the additional outflow, the Reviewers' analysis of the BDCP Model results for HOS is limited to the evaluation of how the SWP reservoir releases on the Feather River translate into changes in Delta outflow and exports.

Our remaining analysis examines the ESO (or H3) scenario (labeled Alt 4-ELT or Alt 4-LLT in this section) because it employs the same X2 standards as are implemented in NAA-ELT and NAA-LLT. This allowed the Reviewers to focus the analysis on the effects of the BDCP operations independent of the possible change in the X2 standard.

The differences between the without project scenario (NAA-ELT) and the corresponding with project scenario (Alt4 H3-ELT) should reveal the effects of the project under ELT conditions. However, as discussed above, implementation of climate change assumptions and the occurrence of unrealistic operations likely obfuscates the effects of the BDCP. Although the modeling approach may provide a relative comparison between equal foundational operations, the Reviewers are hesitant to place any confidence in the computed differences shown between the NAA-ELT and Alt4-ELT Scenarios. Numerous comparisons between NAA-ELT and Alt4 H3-ELT are discussed in the technical appendix of this report; issues that shaped our conclusions are discussed below.

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[5] X2 is a salinity standard that requires outflows sufficient to attain a certain level of salinity at designated locations in the Delta at certain times of year.

[6] Draft BDCP, Chapter 3, Section 3.4.1.4.4

[7] August 7, 2013 meeting with DWR, Reclamation, and CH2M HILL

Assumptions for the "High Outflow Scenario" are unrealistic.

The HOS is one branch of the BDCP Decision Tree, also identified as Alternative 4, operational scenario H4 in the DEIR/EIS. The HOS requires additional water (Delta outflow) during certain periods in the spring, in excess of the current regulatory requirements. The BDCP Model assumes that if the required additional Delta outflow cannot be met by reducing exports, this increased Delta outflow will be met by releases made by the SWP's Oroville Reservoir. The assumptions regarding how much water to release from Oroville to attempt to meet the proposed regulations and how much and when to refill Oroville are unrealistic.

According to the Draft EIR/EIS[8], the HOS will reduce SWP south of Delta water deliveries for municipal and industrial (M&I) water users 7% below the level that they would receive without the BDCP (on average). During dry and critical years, SWP south of Delta water deliveries for M&I and agricultural water users will drop 17% below the level that they would receive without the BDCP. In other words, according to the BDCP Model results SWP Contractors would get less water than they would otherwise get without BDCP.

CVP and SWP obligations for providing flow to satisfy Delta outflow requirements is described in the Coordinated Operations Agreement (COA). Because the CVP and SWP share responsibility for meeting required Delta outflow based on specific sharing in the agreement, it is not reasonable to conclude that CVP water supplies would increase an average of 70 TAF while SWP water supplies decrease on average of 100 TAF under the HOS. The manner in which this alternative is modeled is inconsistent with existing agreements and operating criteria. If the increases in outflow were met based on COA, there would likely be reductions in Shasta and Folsom storage that would likely cause adverse environmental impacts, which have not been modeled or analyzed in the BDCP EIR/S.

Furthermore, there is no apparent source of water to satisfy the increased outflow requirements and pay back the COA debt. It appears, through recent public discussions regarding the HOS that BDCP anticipates additional water to satisfy the increased Delta outflow requirement and to prevent the depletion of cold water pools will be acquired through water transfers from upstream water sources. However, this approach is unrealistic. During most of the spring, when BDCP proposes that Delta outflow be increased, agricultural water users are not irrigating. This means that there is not sufficient transfer water available to meet the increased Delta outflow requirements without releasing stored water from the reservoirs.

San Luis Reservoir operational assumptions produce results that are inconsistent with real world operations.

San Luis Reservoir (SLR) is an off-stream reservoir located south of the Delta and jointly owned and operated by CVP and SWP. The reservoir is used to store water that is exported from the Delta when available and used to deliver water to CVP and SWP Contractors when water demands exceed the amount of water that can be pumped from the Delta. The decision of when to move water that is stored in upstream reservoirs, such as Shasta, Folsom, or Oroville, through the Delta for export to fill SLR is based on the experience and expert judgment of the CVP and SWP operators.

CalSim II attempts to simulate the expert judgment of the operators by imposing artificial operating criteria; the criteria are artificial in the sense that they are not imposed by regulatory or operational constraints but rather imposed as a tool to simulate expert judgment. One such artificial operating criteria is the SLR target storage level: CalSim II attempts to balance upstream Sacramento Basin CVP and SWP reservoirs with storage in SLR by setting artificial target storage levels in SLR, such that the CVP and SWP will release water from upstream reservoirs to meet target levels in SLR. The artificial target storage will be met as long as there is ability to convey

[8] Draft EIR/EIS, Appendix 5A-C, Table C-13-20-2

water (under all regulatory and physical capacity limits) and as long as water is available in upstream reservoirs. SLR target storage criteria are also sometimes described in section 4.2 as the "San Luis rule-curve".

In the BDCP Model, CVP and SWP reservoir operating criteria for Alternative 4 H3 ELT differ from the corresponding without project scenario (e.g. NAA-ELT). The difference in criteria and result is primarily driven by changes to the artificial constraint used to determine when to fill SLR: the SLR target storage. In Alternative 4 H3 ELT, SLR target storage is set very high in the spring and early summer months, and then reduced in August and set to SLR dead pool from September through December. This change in SLR target storage relative to the no action alternative causes upstream reservoirs to be drawn down from June through August and then recuperate storage by cutting releases in September. This change to the artificial operating criteria SLR target storage causes changes in upstream cold water pool management and affects several resource areas.

In addition to changes in upstream storage conditions, changes in SLR target storage cause SLR storage to drop below a water supply concern level (300,000 acre-feet) in almost 6 out of every 10 years under ELT conditions and more than 7 out of every 10 years under LLT conditions for Alternative 4 H3. When storage in SLR drops below this 300,000 acre-foot level, algal blooms in the reservoir often cause water quality concerns for drinking water at Santa Clara Valley Water District. The change in SLR target storage also causes SLR levels to continue to drop and reach dead pool level for the SWP in 4 out of every 10 years and also dead pool level for the CVP in 1 out of every 10 years under the ELT conditions.

Reaching dead pool level in SLR creates shortages to water users south of the Delta. Although some delivery shortages are due to California Aqueduct capacity constraints, the largest annual delivery shortages are a result of inappropriately low SLR target storage. Average annual Table A shortages due to artificially low SLR storage levels increased from 3 TAF in the NAA-ELT scenario to 35 TAF in the Alt4-ELT scenario. Such shortages occurred in 2% of simulated years in the NAA-ELT scenario and 23% of years in the Alt4-ELT scenario. In addition to the inability to satisfy Table A allocations, low storage levels cause loss of SWP Contractors' Article 56 water stored in SLR. Average annual Article 56 shortages were 43 TAF in the Alt4-ELT scenario because of low San Luis storage and 5 TAF in the NAA-ELT scenario. Low San Luis storage causes Article 56 shortages in 27% of simulated years in the Alt4-ELT scenario as compared to 5% of simulated years in the NAA-ELT. Another consequence of low storage levels in SLR is a shift in water supply benefits from Article 21 to Table A.

In summary, the operational assumptions for SLR are unrealistic in Alternative 4 because they create problems in upstream storage reservoirs and create shortages for south of Delta water users that would not occur in the real world. In reaching this conclusion, the Reviewers met with operators from CVP and SWP to review the BDCP Model results and discussed real-time operations. The operators provided guidance in selection of superior assumptions, which results in more realistic operations in the independent model (see Section 4).

Delta Cross Channel operational assumptions overestimate October outflow

When south Delta exports are low due to regulatory limits, and upstream reservoirs are making releases to meet the instream flow objectives at Rio Vista, operators have the ability to close the Delta Cross Channel (DCC) in order to reduce the required reservoir releases (by closing the DCC a greater portion of water released from the reservoirs stays in the Sacramento River to meet the Rio Vista requirements). As long as the Delta salinity standards are met, operators have indicated that they would indeed close the DCC in this manner (as was done in October and November 2013). In the BDCP Model, the DCC is not closed in this manner. The net result is that the BDCP Model overestimates outflow under such circumstances typically occurring in October.

The overestimated outflow leads to incorrect conclusions regarding the effects of BDCP. For instance, an actual increase in fall outflow could be beneficial for the endangered fish species delta smelt (USFWS, 2008). Therefore, by overestimating outflow in October, the BDCP studies likely overestimate the benefit to delta smelt (Mount et al, 2013). Similarly, an actual increase in fall outflow would reduce salinity in the western Delta, which could be beneficial for in-Delta diverters; therefore, overestimating outflow in October artificially reduces salinity, incorrectly reducing the net impacts on in-Delta diverters.

Conclusions Regarding Assumptions and Operations in coordination with new BDCP facilities

BDCP's "High Outflow Scenario" is not sufficiently defined for analysis.

The HOS requires additional water (Delta outflow) during certain periods in the spring. The BDCP Model places most of the responsibility for meeting this new additional outflow requirement on the SWP. However, the SWP may not actually be responsible for meeting this new additional outflow requirement. This is because the COA, as it is currently being implemented, would require a water allocation adjustment that would keep the SWP whole. Where one project (CVP or SWP) releases water to meet a regulatory requirement, the COA requires a water balancing to ensure the burden does not fall inappropriately among the projects. The BDCP Model is misleading because it fails to adjust project operations, as required by the COA, to "pay back" the water "debt" to the SWP due to these additional Delta outflow requirements. Unless there is a significant revision to COA, the BDCP Model overstates the impacts of increased Delta outflow on the SWP and understates the effects on the CVP.

Furthermore, after consulting with DWR and Reclamation project operators and managers, the Reviewers conclude that there is no apparent source of CVP or SWP water to satisfy both the increased Delta outflow requirements and pay back the COA "debt" to the SWP without substantially depleting upstream water storage. It appears, through recent public discussions regarding the HOS, that BDCP anticipates additional water to satisfy the increased Delta outflow requirement and to prevent the depletion of cold water pools will be acquired through water transfers from upstream water users. However, this approach is unrealistic because during most of the spring, when BDCP proposes that Delta outflow be increased, agricultural water users are not typically irrigating. This means that there is not sufficient transfer water available to meet the increased Delta outflow requirements without releasing stored water from the reservoirs. Releasing stored water to meet the increased Delta outflow requirements could potentially impact salmonids on the Sacramento and American River systems.

Simulated operation of BDCP's dual conveyance, coordinating proposed North Delta diversion facilities with existing south Delta diversion facilities, is inconsistent with the project description.

The Draft BDCP and associated Draft EIR/EIS specify criteria for how much flow can be diverted by the new NDD facilities and specify when to preferentially use either the NDD facilities or the existing SDD facilities. However, the BDCP Model contains an artificial constraint that prevents the NDD facilities from taking water as described in the BDCP project description. In addition to affecting diversions from the NDD, this artificial constraint contains errors that affect the NAA operation. This error has been fixed by DWR and Reclamation in more recent versions of the model; however, the error remains in the BDCP Model. Additionally, the BDCP Model does not reflect the Summer operations of the SDD that are described in the Draft EIR/EIS as a feature of the BDCP project intended to prevent water quality degradation in the south Delta. The net effect of these two errors is that the BDCP Model significantly underestimates the amount of water diverted from the NDD facilities and overestimates the amount of water diverted from the SDD.

BDCP Model contains numerous coding and data issues that skew the analysis and conflict with actual real-time operational objectives and constraints

Operational logic is coded into the CalSim II model to simulate how DWR and Reclamation would operate the system under circumstances for which there are no regulatory or other definitive rules. This attempt to specify (i.e., code) the logic sequence and relative weighting so that a computer can simulate "expert judgment" of the

BDCP 1722

human operators is a critical element to the CalSim II model. In the BDCP Model, some of the operational criteria for water supply allocations and existing facilities such as the Delta Cross Channel and SLR are inconsistent with real-world conditions.

4 INDEPENDENT MODELING

The Independent Modeling effort originally stemmed from reviews of BDCP Model during which the Reviewers discovered that the BDCP Model did not provide adequate information to determine the effects of the BDCP. There are three basic reasons why the Reviewers cannot assess how the BDCP will affect water operations: 1) NAAs do not depict reasonable operations under the described climate change assumptions, 2) operating criteria used in the BDCP Alternative 4 result in unrealistic operations, and 3) updates to CalSim II since the BDCP modeling was performed almost 4 years ago will likely alter model results to a sufficient degree that conclusions based on the BDCP modeling will likely be different than those disclosed in the Draft EIR/EIS. Given that it is not possible to determine how BDCP may affect CVP and SWP operations or water system flows and conditions with the BDCP model, Independent Modeling was performed to assess potential effects due to the BDCP.

To revise the models, the Reviewers consulted with operators at DWR and Reclamation to improve the representation of operational assumptions. Additionally, the Reviewers consulted with modelers at DWR and Reclamation to share findings, to strategize on the proper way to incorporate the guidance received from the operators, and to present revised models to DWR and Reclamation for their review. This collaborative and iterative process differed considerably from a standard consulting contract where the work product is not shared beyond the client-consultant until a final version is complete. To the contrary, consultations with agency experts were conducted early and repeatedly to ensure the revisions would reflect reasonable operations and to provide an independent review.

The first phase of this Independent Modeling effort (described in Section 4.1) was development of an updated without project baseline (similar to the NAA but with current, improved assumptions). The Independent Modeling does not incorporate climate change because the climate change hydrological assumptions developed by BDCP cause unrealistic operation of the system absent commensurate changes to operating criteria.

After the baseline was complete and reviewed, the second phase of this effort (described in Section 4.2) incorporated the facilities and operations for the BDCP described as Alternative 4 H3 in the Draft EIR/EIS, and otherwise known as the Evaluated Starting Operations (ESO) scenarios in the BDCP. During this phase, the issues that were identified during the Reviewers' initial review were corrected (see Section 3.3) along with corrections made to resolve additional issues that were revealed as improvements were incorporated. Finally, results of the Independent Modeling and potential effects of the BDCP on water supply and instream flows are discussed in Section 4.3.

4.1 Improvements to CalSim II Assumptions

For this effort, the most up to date modeling tools were provided by DWR and Reclamation and further improvements were added to the CalSim II assumptions in coordination with DWR and Reclamation staff. Many of the improvements have since been incorporated into DWR and Reclamation's model and others are under review.

Revisions incorporated by DWR and Reclamation for the 2013 baseline

DWR and Reclamation provided CalSim II models used for the 2013 SWP Delivery Reliability Report (DRR) for use in this Independent Modeling effort. The 2013 SWP DRR, Technical Addendum, and associated models are now available on DWR's website[9]. Assumptions used for this Independent Modeling effort are consistent with the 2013 SWP DRR and are listed in Table 4 of the Technical Addendum.

[9] http://baydeltaoffice.water.ca.gov/swpreliability/

CalSim II is continuously being improved to better represent CVP and SWP operations and fix known problems. The Technical Addendum to the 2013 SWP DRR contains a list of updates and fixes that have occurred since the last SWP DRR was released in 2011. Among these changes and fixes are key items that directly affect operation of facilities proposed in the BDCP Alternative 4; these items are listed on pages 4-6 of the 2013 SWP DRR Technical Addendum.

A key component of this package of modeling revisions was fixing an error regarding artificial minimum instream flow requirements in the Sacramento River at Hood. An "artificial" minimum instream flow requirement had been specified; the requirement is artificial in that it does not represent a regulatory requirement, but rather is a modeling technique.

Additional Revisions to CalSim II Assumptions

As part of the Independent Modeling effort, a number of changes were made to the 2013 SWP DRR version of CalSim II to better represent the existing facilities, regulatory requirements, and water user demands. These revisions are described in the Technical Appendix and summarized here:

- San Joaquin River Restoration Program (SJRRP) was not incorporated. This modification was made to be consistent with the BDCP assumptions, but also allows the identification of the separate effect of the BDCP void of the combined effect with SJRRP flows. Although inclusion of the SJRRP is necessary in the documentation of BDCP, the Independent Modeling did not include it.
- VAMP operations were not incorporated because the VAMP program has expired and is no longer being implemented.
- Tuolumne River basin was updated.
- Folsom Reservoir operations for flood control were updated.
- Additional water demands on the Feather River were incorporated to represent existing agricultural diversions used for rice decomposition.
- Diversions by East Bay Municipal Utility District (EBMUD) from the Sacramento River at Freeport were modified to better represent the EBMUD CVP water service contract.
- Minimum flow requirements for Wilkins Slough and Red Bluff were corrected for September 1933.
- CVP M&I demands are updated to reflect current assumptions used by Reclamation.
- Modifications were made to more accurately reflect refilling of New Bullards Bar Reservoir in coordination with transfers made under the Yuba Accord.
- Los Vaqueros Reservoir capacity was updated to reflect a recent expansion of the reservoir that was completed in 2012.

4.2 Improvements to BDCP Operations

After the baseline was completed and reviewed (as summarized above in Section 4.1), the facilities and operations associated with BDCP Alternative 4 H3 in the Draft EIR/EIS, otherwise known as the Evaluated Starting Operations (ESO) scenarios in the Draft Plan, were incorporated into the model. During this phase, the issues that were identified during the Reviewers' initial review (see Section 3.3) were corrected along with correcting additional issues that were revealed as improvements were incorporated. These revisions are described in the Technical Appendix and summarized here:

- San Luis Reservoir operation
- Delta Cross Channel gate operation in October
- Delivery allocation adjustment for CVP SOD contractors

- Folsom/Shasta balance
- North Delta Diversion bypass criteria
- Wilkins Slough minimum flow requirement

In the Independent Modeling, San Luis rule-curve logic was refined for both SWP and CVP operations. San Luis rule-curve is used to maintain an appropriate balance between San Luis Reservoir (SLR) storage and North of Delta reservoirs. The key considerations in formulating rule-curve are 1) ensuring that sufficient water is available in SLR to meet contract allocations when exports alone are insufficient due to various operational constraints and 2) minimize SLR carryover storage to low point criteria (both CVP and SWP) and Article 56 carryover (only SWP). The basic premise is to maintain SLR storage no higher than necessary to satisfy south of Delta obligations to avoid excessive drawdown of upstream storage.

In the BDCP NAA and the Independent Modeling FNA, the model has a priority to release excess stored water that will likely be released for flood control purposes from Shasta and Folsom storage for export at Jones Pumping Plant to storage in SLR in the late summer and early fall months. The purpose was to get a head start on filling SLR for the coming water year if there is a high likelihood of Shasta or Folsom spilling. This was an assumed CVP/SWP adaptation to the export reductions in the winter and spring months due to the salmon and smelt biological opinions. However, with the NDD facility in Alt 4, winter and spring export restrictions impact CVP exports much less and there is no longer a reason to impose this risk on upstream storage. As such, the weights, or prioritizations, of storage in Shasta and Folsom were raised so that excess water would not be released specifically to increase CVP San Luis storage Reservoir above rule-curve. This was changed in Alt 4 and not the FNA to better reflect how the system may operate under these different conditions.

The BDCP Alt 4 results in significantly more October surplus Delta outflow as compared to the baseline. The cause of this Delta surplus at a time when the Delta is frequently in balance is a combination of proposed through-Delta export constraints Old and Middle River (OMR) flow criteria and no through-Delta exports during the San Joaquin River October pulse period), Rio Vista flow requirements, and DCC gate operations. In DWR's BDCP studies, it was assumed that the DCC gates would be open for the entire month of October thereby requiring much higher Sacramento River flows at Hood in order to meet the Rio Vista flow requirement than if the DCC gates were closed. Whereas in the Independent Modeling of the BDCP it was assumed that the DCC gates were closed for a number of days during the month such that the 7,000 cfs NDD bypass criteria would be sufficient to meet the weekly average Rio Vista flow requirements. The intent was to minimize surplus Delta outflow while meeting Delta salinity standards and maintaining enough bypass flow to use the NDD facility for SDD. This is an approximation of what is likely to occur in real-time operations under similar circumstances. Further gate closures may be possible as salinity standards allow if operators decide to preserve upstream storage at the expense of NDD diversions. This type of operation would require additional model refinements.

CVP SOD Ag service and M&I allocations are limited by both system wide water supply (storage plus inflow forecasts) and Delta export constraints; whereas similar CVP NOD allocations are dependent solely on water supply. This frequently results in SOD water service contractors receiving a lower contract year allocation than NOD water service contractors, especially under the Biological Opinion export restrictions. However, with the NDD facility operations as proposed under Alt 4 H3, the CVP can largely bypass these Delta export restrictions and the export capacity constraint on CVP SOD allocations was determined to be overly conservative. Therefore, the export capacity component of CVP SOD allocations was removed in the BDCP Alternative and both SOD and NOD CVP allocations are equal and based only on water supply.

For the Independent Modeling, CVP operations were refined in the BDCP Alternative to provide maximum water supply benefits to CVP contractors while protecting Trinity, Shasta, and Folsom carryover storage in the drier years. As a whole, this was accomplished with refinements to allocation logic and San Luis rule-curve. However, in the initial study runs, an imbalance between Folsom and Shasta was created; while there was a total positive impact to upstream storage in dry years, there was a negative impact to Folsom storage. This was resolved by inserting Folsom protections in the Shasta-Folsom balancing logic. With these protections, the positive carryover impacts were distributed to Trinity, Shasta, and Folsom.

The daily disaggregation method for implementing NDD bypass criteria as implemented in DWR's BDCP model was left mostly intact for the Independent Modeling. However, to properly fit the bypass criteria implementation within the latest CalSim operations formulation certain modifications were made. Modifications are as follows:

1. No NDD operations occur in cycles 6 through 9 so that Delta operations and constraints can be fully assessed without NDD interference.
2. Cycles 10 and 11 (Daily 1 and Daily 2 respectively) were added to determine NDD operations given various operational constraints including the NDD bypass criteria.
3. From July to October, bypass criteria are based on monthly average operations (no daily disaggregation). Given the controlled reservoir releases at this time and the constant bypass criteria (5,000 cfs from July to September and 7,000 cfs in October), this was determined to be a reasonable assumption. This also simplified coordination of DCC gate operations with NDD in October which will be discussed later.
4. When warranted by conditions in cycle Daily 1 (cycle 10), the bypass criteria in May and June were allowed to be modeled on a monthly average basis in cycle Daily 2 (cycle 11). This allowed a reduction in the number of cycles necessary to determine the fully allowed diversion under the bypass criteria when the Delta was in balance and additional upstream releases were made to support diversions from the North Delta.

Currently in CalSim II, relaxation of the Wilkins Slough minimum flow requirement is tied to CVP NOD Ag Service Contractor allocations. This does not reflect actual operations criteria where relaxation of the flow requirement is dependent solely on storage conditions at Shasta. From the comparative analysis perspective of our CalSim planning studies, this introduces a potential problem: changes in CVP NOD Ag Service allocations can result in unrealistic changes in required flow at Wilkins Slough, and such changes in Wilkins Slough required flow can result in unrealistic impacts to Shasta storage. To bypass this problem, we assumed that the required flow at Wilkins Slough in the alternative was equal to the baseline.

4.3 Independent Modeling output and analysis of BDCP Effects

Analysis for this effort was focused on BDCP Alt 4 with existing spring and Fall X2 requirements, which corresponds to "Alternative 4 H3" in the Decisions Tree. This modeling is performed without climate change, and includes refined operating criteria for the NDD, CVP and SWP reservoirs, DCC gate closures, and water supply allocations. This modeling includes all Project features that are included in Alt 4 in the BDCP Model. The key Project features incorporated into BDCP are displayed in Figure 1 and summarized as:

- North Delta Diversion capacity of 9,000 cfs
- NDD bypass flow requirements
- 25,000 acres of additional tidal habitat
- Notched Fremont Weir to allow more flow into Yolo Bypass
- Additional positive Old and Middle River flow requirements
- Removal of the San Joaquin River I/E ratio (NMFS 2009)
- Changed location for Emmaton water quality standard in SWRCB D-1641
- Additional Sacramento River flow requirement at Rio Vista

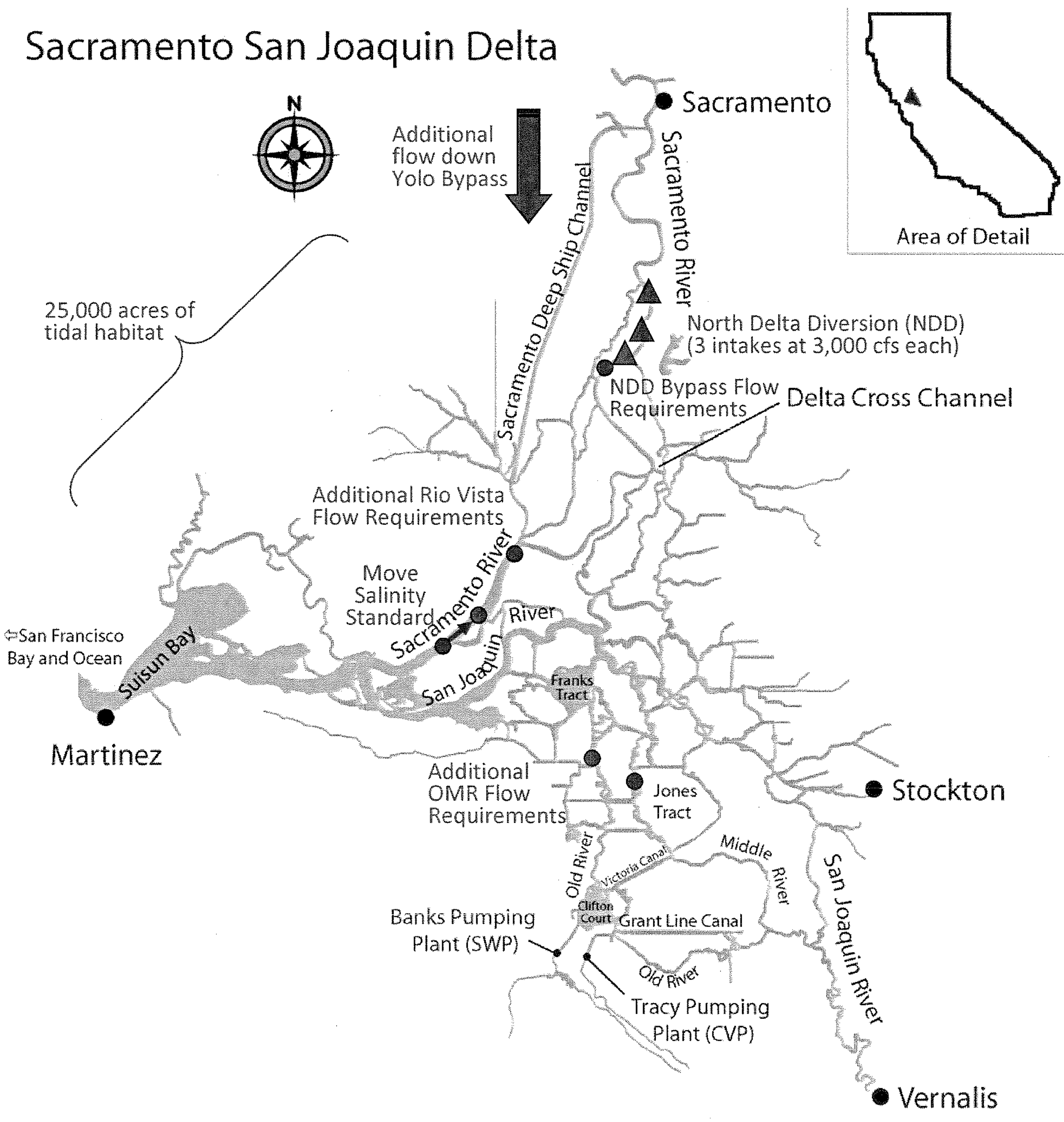


Figure 1. Map of Delta with location of key BDCP facilities and regulatory changes

Annual maximum and minimum storage in San Luis for the (a) CVP and (b) SWP under ELT conditions for the no action alternative (NAA_ELT) and BDCP Alternative 4 H3 (Alt4_ELT).

For the purpose of describing results of the Independent Modeling, the revised baseline scenario without climate change, originally termed No Action Alternative (NAA) in the BDCP Draft EIR/EIS, is referred to as the Future No Action (FNA) in this discussion. Additionally, in the Independent Modeling, Alternative 4 operational scenario H3 without climate change is simply referred to as "Alt 4". The results for the Independent Modeling are illustrated in the Technical Attachment. Key results are presented below.

The change in conditions between FNA and Alt 4 is indicative of the effects of the BDCP on water supply and Delta flows. An effect of the BDCP is an anticipated increase in Delta export and corresponding decrease in Delta Outflow. Table 2 illustrates the estimated change in Delta Outflow by year type, amounting to an average annual 0.76 MAF. Table 3 illustrates the corresponding change in exports by year type, and also illustrates the estimated change in geographical source of export water. With the BDCP it is anticipated that exports from the South Delta (via through Delta conveyance) will decrease by 2.53 MAF. Exports derived from the North Delta (via the tunnels) will amount to 3.28 MAF.

Table 2. Change in Delta outflow due to the BDCP (Alt 4 minus FNA) (Million Acre-Feet)
Reduction in the quantity of water that leaves the Delta by flowing west into San Francisco Bay by water year type.

Water Year Type	FNA Delta Outflow	Change in Delta Outflow
Wet	28.6	-1.2
Above Normal	17.1	-1.0
Below Normal	9.9	-0.68
Dry	7.3	-0.39
Critical	5.1	-0.13
Average	15.6	**-0.76**

Table 3. Change in quantity of water exported due to the BDCP (Alt 4 minus FNA) (Million Acre-Feet)
Reduction in the quantity of water exported from the existing South Delta export facilities and corresponding increase in the quantity exported from the proposed facilities in the North Delta, by water year type.

Water year Type	FNA Total Delta Export	Change in South Delta Exports (through Delta)	Change in North Delta Exports (through tunnels)	Change in Total Exports
Wet	6.0	-3.8	5.0	1.2
Above Normal	5.2	-2.9	4.4	1.5
Below Normal	5.1	-2.4	3.2	0.8
Dry	4.2	-1.8	1.8	0.07
Critical	2.8	-0.7	0.7	0.02
Average	**4.9**	**-2.53**	**3.28**	**0.75**

Table 4. Change in quantity of CVP water exported by SWP facilities (Alt 4 minus FNA) (Thousand Acre-Feet)
Quantity of water exported at Banks Pumping Plant for later use by CVP contractors is increased in all water year types except the driest years (critical designation).

Water Year Type	FNA CVP water exported by SWP	Change in CVP water exported by SWP
Wet	58	229
Above Normal	44	208
Below Normal	66	117
Dry	86	7
Critical	38	-9
Average	60	**123**

The Independent Modeling shows that implementation of the BDCP could shift a portion of the SWP exports from summer to winter and spring because the proposed NDD facilities can export water at times when the existing SDD facilities are constrained due to fishery concerns. As a result of this shift in timing, capacity is available at the SWP facilities during the summer months. The BDCP Model assumes that CVP could utilize the SWP facilities (Table 4) at any time when the CVP facilities are fully utilized; this sharing of diversion facilities is termed "joint point of diversion" or JPOD. Additional criteria to meet specific water quality and water level objectives are defined in response plans required by the State Water Board's water right decision D-1641. BDCP Model assumes that these additional criteria are met; the Independent Modeling continues this assumption without making any judgment as to whether the criteria would be met. An evaluation of this would require additional hydrodynamic modeling.

The Independent Modeling shows higher average annual CVP carryover (end of September) storage than the NAA by about 28 TAF. During dryer years when upstream storage is lower there is an increase in carryover and during wetter years when storage is higher there are storage decreases (Table 5). Upstream SWP storage, Table 6, behaves in a similar manner as CVP storage, there are decreases in wetter years and increased in dryer years.

CVP San Luis Reservoir fills in about 40% of years in Alt 4 compared to about 20% in the FNA. CVP San Luis reaches dead pool in about 25% of years in both the FNA and Alt 4. SWP San Luis Reservoir fills in about 43% of years in Alt 4 compared to about 18% in the FNA. SWP San Luis reaches dead pool in about 25% of years in Alt 4 and about 30% of years in the FNA.

Table 5. Change in CVP upstream carryover storage (Alt 4 minus FNA) (Thousand Acre-Feet)
CVP carryover (end of September) storage decreases in wetter years when FNA storage is highest and increases in dryer years when FNA storage is lowest

Water Year Type	FNA CVP Upstream Storage	Change in CVP Upstream Storage
Wet	5578	-8
Above Normal	5200	-150
Below Normal	4717	-1
Dry	4049	66
Critical	2285	258
Average	4558	**28**

Table 6. Change in SWP upstream carryover storage (Alt 4 minus FNA) (Thousand Acre-Feet)
SWP carryover (end of September) storage decreases in wetter years when FNA storage is highest and increases in dryer years when FNA storage is lowest

Water Year Type	FNA SWP Upstream Storage	Change in SWP Upstream Storage
Wet	2407	33
Above Normal	1934	-150
Below Normal	1517	14
Dry	1194	157
Critical	968	127
Average	1709	**44**

BDCP1722

5 COMPARING INDEPENDENT MODELING AND BDCP MODEL

The Independent Modeling effort originally stemmed from reviews of DWR's BDCP Model where the Reviewers through their independent analysis found that BDCP Model does not provide adequate information to determine how BDCP may affect the system. Based on the premise that the Independent Modeling portrays a more accurate characterization of how the CVP/SWP system may operate under Alt 4, this comparison is meant to demonstrate the differences between results of a more accurate and realistic analysis and the BDCP Model. Differences in results between these modeling efforts are believed to provide insight regarding how effects that BDCP will have on the actual CVP/SWP system differ from modeling used to support the Draft EIR/S.

Although thorough comparisons of modeling were performed, only key differences are illustrated for the purpose of this comparison.

Conclusions regarding BDCP effects

Based on the Independent Modeling, the amount of water exported (diverted from the Delta) may be approximately 200 thousand acre-feet (TAF) per year higher than the amount disclosed in the Draft EIR/S. This total represents

- approximately 40 TAF/yr more water diverted and delivered to the SWP south of Delta contractors, and
- approximately 160 TAF/yr more water diverted and delivered to the CVP south of Delta contractors.

The BDCP Model estimates that, under the NAA ELT (without the BDCP), total average annual exports for CVP and SWP combined are estimated to be 4.73 million acre feet (MAF) and in the Independent Modeling FNA combined exports are 5.61 MAF. The BDCP Model indicates an increase in exports of approximately 540 TAF and the Independent Modeling shows an increase of approximately 750 TAF in Alt 4.

The Independent Modeling suggests that Delta outflow would decrease by approximately 200 TAF/yr compared to the amount indicated in the Draft EIR/S.

- This lesser amount of Delta outflow has the potential to cause greater water quality and supply impacts for in-Delta beneficial uses and additional adverse effects on species. To determine the potential effects of the reduced amount of outflow, additional modeling is needed using tools such as DSM2.

The BDCP Model does not accurately reflect the location of the diversions that the SWP and CVP will make from the Delta.

- When the errors in the model are corrected, it reveals that the North Delta intakes could divert approximately 680 TAF/yr more than what was disclosed in the BDCP Draft EIR/S, and
- the amount of water diverted at the existing South Delta facilities would be approximately 460 TAF/yr less than what is projected in the BDCP Draft EIR/S.

Hydrologic modeling of BDCP alternatives using CalSim II has not been refined enough to understand how BDCP may affect CVP and SWP operations and changes in Delta flow dynamics. Better defined operating criteria for project alternatives is needed along with adequate modeling rules to analyze how BDCP may affect water operations. Without a clear understanding of how BDCP may change operations, affects analysis based on this modeling may not produce reliable results and should be revised as improved modeling is developed.

BDCP1722

6 GLOSSARY

acre-foot The volume of water (about 325,900 gallons) that would cover an area of 1 acre to a depth of 1 foot. This is enough water to meet the annual needs of one to two households.

agricultural water supplier As defined by the California Water Code, a public or private supplier that provides water to 2,000 or more irrigated acres per year for agricultural purposes or serves 2,000 or more acres of agricultural land. This can be a water district that directly supplies water to farmers or a contractor that sells water to the water district.

annual Delta exports The total amount of water transferred ("exported") to areas south of the Delta through the Harvey O. Banks Pumping Plant (SWP) and the C. W. "Bill" Jones Pumping Plant (CVP) in 1 year.

appropriative water rights Rights allowing a user to divert surface water for beneficial use. The user must first have obtained a permit from the State Water Resources Control Board, unless the appropriative water right predates 1914.

Article 21 water Water that a contractor can receive in addition to its allocated Table A water. This water is only available if several conditions are met: (1) excess water is flowing through the Delta; (2) the contractor can use the surplus water or store it in the contractor's own system; and (3) delivering this water will not interfere with Table A allocations, other SWP deliveries, or SWP operations.

biological opinion A determination by the U.S. Fish and Wildlife Service or National Marine Fisheries Service on whether a proposed federal action is likely to jeopardize the continued existence of a threatened or endangered species or result in the destruction or adverse modification of designated "critical habitat." If jeopardy is determined, certain actions are required to be taken to protect the species of concern.

CalSim-II A computer model, jointly developed by DWR and the U.S. Bureau of Reclamation, that simulates existing and future operations of the SWP and CVP. The hydrology used by this model was developed by adjusting the historical flow record (1922–2003) to account for the influence of changes in land uses and regulation of upstream flows.

Central Valley Project (CVP) Operated by the U.S. Bureau of Reclamation, the CVP is a water storage and delivery system consisting of 20 dams and reservoirs (including Shasta, Folsom, and New Melones Reservoirs), 11 power plants, and 500 miles of major canals. CVP facilities reach some 400 miles from Redding to Bakersfield and deliver about 7 million acre-feet of water for agricultural, urban, and wildlife use.

cubic feet per second (cfs) A measure of the rate at which a river of stream is flowing. The flow is 1 cfs if a cubic foot (about 7.48 gallons) of water passes a specific point in 1 second. A flow of 1 cubic foot per second for a day is approximately 2 acre-feet.

Delta exports Water transferred ("exported") to areas south of the Delta through the Harvey O. Banks Pumping Plant (SWP) and the C. W. "Bill" Jones Pumping Plant (CVP).

Delta inflow The combined total of water flowing into the Delta from the Sacramento River, San Joaquin River, and other rivers and waterways.

exceedence plot For the SWP, a curve showing SWP delivery probability (especially for Table A water)—specifically, the likelihood that SWP Contractors will receive a certain volume of water under current or future conditions.

incidental take permit A permit issued by the U.S. Fish and Wildlife Service or National Marine Fisheries Service, under Section 10 of the federal Endangered Species Act, to private nonfederal entities undertaking otherwise lawful projects that might result in the "take" of an endangered or threatened species. In California, an additional permit is required and take may be authorized under Section 2081 of the California Fish and Game Code through issuance of either an incidental take permit or a consistency determination. The California Department of Fish and Wildlife is authorized to accept a federal biological opinion as the take authorization for a State-listed species when a species is listed under both the federal and California Endangered Species Acts.

riparian water rights Water rights that apply to lands traversed by or adjacent to a natural watercourse. No permit is required to use this water, which must be used on riparian land and cannot be stored for later use. Riparian rights attach only to the "natural" flow in the water course and do not apply to abandoned flows or stored water releases.

State Water Project (SWP) Operated by DWR, a water storage and delivery system of 33 storage facilities, about 700 miles of open canals and pipelines, four pumping-generating plants, five hydroelectric power plants, and 20 pumping plants that extends for more than 600 miles in California. Its main purpose is to store and distribute water to 29 urban and agricultural water suppliers in Northern California, the San Francisco Bay Area, the San Joaquin Valley, the Central Coast, and Southern California. The SWP provides supplemental water to 25 million Californians (almost two-thirds of California's population) and about 750,000 acres of irrigated farmland. Water deliveries have ranged from 1.4 million acre-feet in a dry year to more than 4.0 million acre-feet in a wet year.

SWP Contractors Twenty-nine entities that receive water for agricultural or municipal and industrial uses through the SWP. Each contractor has executed a long-term water supply contract with DWR. Also sometimes referred to as "State Water Contractors."

Table A water (Table A amounts) The maximum amount of SWP water that the State agreed to make available to an SWP Contractor for delivery during the year. Table A amounts determine the maximum water a contractor may request each year from DWR. The State and SWP Contractors also use Table A amounts to serve as a basis for allocation of some SWP costs among the contractors.

urban water supplier As defined by the California Water Code, a public or private supplier that provides water for municipal use directly or indirectly to more than 3,000 customers or supplies more than 3,000 acre-feet of water in a year. This can be a water district that provides the water to local residents for use at home or work, or a contractor that distributes or sells water to that water district.

Water Rights Decision 1641 (D-1641) A regulatory decision issued by the State Water Resources Control Board in 1999 (updated in 2000) to implement the 1995 Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta. D-1641 assigned primary responsibility for meeting many of the Delta's water quality objectives to the SWP and CVP, thus placing certain limits on SWP and CVP operations.

water year In reports on surface water supply, the period extending from October 1 through September 30 of the following calendar year. The water year refers to the September year. For example, October 1, 2010, through September 30, 2011 is the 2011 water year.

Review of Bay Delta Conservation Program Modeling

by MBK Engineers and Daniel B. Steiner, Consulting Engineer

Technical Appendix

Contents

Figures

BDCP1722

BDCP1722

Tables

BDCP1722

1 INTRODUCTION

Since December 2012, MBK Engineers and Dan Steiner (collectively "Reviewers") have assisted various parties in evaluating the operations modeling that was performed for the Bay Delta Conservation Plan (BDCP). To assist in understanding BDCP and the potential implications, stakeholders[1] requested that the Reviewers review the CalSim II modeling studies performed as part of the BDCP (hereafter "BDCP Studies" or "BDCP Model").

An initial review led the Reviewers to conclude that the BDCP Model, which serves as the basis for the environmental analysis contained in the BDCP Environmental Impact Report/Statement (EIR/S), provides very limited useful information to understand the effects of the BDCP. The BDCP Model contains erroneous assumptions, errors, and outdated tools, which result in impractical or unrealistic Central Valley Project (CVP) and State Water Project (SWP) operations. The unrealistic operations, in turn, do not accurately depict the effects of the BDCP.

The Reviewers revised the BDCP Model to depict a more accurate, consistent version of current and future benchmark hydrology so that the effects of the BDCP could be ascertained. The BDCP Model was also revised to depict more realistic CVP and SWP operations upon which to contrast the various BDCP alternatives. The Reviewers made significant efforts to coordinate with and inform the U.S. Bureau of Reclamation (Reclamation) and the California Department of Water Resources (DWR) managers and modelers, and CVP and SWP operators of the Reviewers' modifications, assumptions, and findings. Where appropriate, the Reviewers also used Reclamation and DWR's guidance and direction to refine the Reviewers' analysis.

This technical appendix summarizes: (1) the independent review of the CalSim II modeling publicly released for the BDCP's Draft Environmental Impact Report/Statement (EIRS), (2) the corrections and revisions made to the assumptions in the CalSim II model, and (3) comparisons between the BDCP and independent modeling results. The detailed information in this appendix is summarized in our main report.

[1] The entities who funded this report are Contra Costa Water District, East Bay Municipal Utility District, Friant Water Authority, Northern California Water Association, North Delta Water Agency, San Joaquin River Exchange Contractors Water Authority, San Joaquin Tributaries Authority, and Tehama Colusa Canal Authority.

BDCP1722

2 REVIEW OF BDCP CALSIM II MODELING

2.1 Climate Change

Implementation of Climate Change

The analysis presented in the BDCP Documents attempts to incorporate the effects of climate change at two future climate periods: the early long term (ELT) at approximately the year 2025; and the late long term (LLT) at approximately 2060. As described in the BDCP documents[2], other analytical tools were used to determine anticipated changes to precipitation and air temperature that is expected to occur under ELT and LLT conditions. Projected precipitation and temperature was then used to determine how much water is expected to flow into the upstream reservoirs and downstream accretions/depletions over an 82-year period of variable hydrology; these time series were then used as inputs into the CalSim II operations model. A second aspect of climate change, the anticipated amount of sea level rise, is incorporated into the CalSim II model by modifying a subroutine that determines salinity within the Delta based on flows within Delta channels. The effects of sea level rise will manifest as a need for additional outflow when water quality is controlling operations to prevent seawater intrusion.

This report does not review the analytical processes by which reservoir inflows and runoff were developed, nor does it evaluate the modified flow-salinity relationships that are assumed due to sea level rise; those items could be the focus of another independent review. This review is limited to evaluating how the modified flows were incorporated into CalSim II and whether the operation of the CVP and SWP water system in response to the modified flows and the modified flow-salinity relationship is reasonable for the ELT and LLT conditions. This work reviews the assumed underlying hydrology and simulated operation of the CVP/SWP, assumed regulatory requirements, and the resultant water delivery reliability.

CalSim II Assumptions

To assess climate change, the three without Project (or "baseline" or "no action") modeling scenarios were reviewed: No Action Alternative (NAA)[3], No Action Alternative at the Early Long Term (NAA – ELT), and No Action Alternative at the Late Long Term (NAA –LLT). Assumptions for NAA, NAA-ELT, and NAA-LLT are provided in the Draft EIR[4]. The only difference between these scenarios is the climate-related changes made for the ELT and LLT conditions (Table 1).

Table 1. Scenarios used to evaluate climate change

	Climate Change Assumptions	
Scenario	**Hydrology**	**Sea Level Rise**
No Action Alternative (NAA)	None	None
No Action Alternative at Early Long Term (NAA-ELT)	Modified reservoir inflows and runoff for expected conditions at 2025	15 cm
No Action Alternative at Early Long Term (NAA-LLT)	Modified reservoir inflows and runoff for expected conditions at 2060	45 cm

[2] BDCP EIR/EIS Appendix 5A, Section A and BDCP HCP/NCCP Appendix 5.A.2
[3] NAA is also called the Existing Biological Conditions number 2 (EBC-2) in the Draft Plan.
[4] BDCP EIR/EIS Appendix 5A, Section B, Table B-8

The differences between the NAA and NAA-ELT reveal the effects of the climate change assumptions under ELT conditions; similarly, the differences between the NAA and NAA-LLT reveal the effects of the climate change assumptions under LLT conditions.

Regulatory requirements

Each of the no action alternatives assumes the same regulatory requirements, generally representing the existing regulatory environment at the time of study formulation (February 2009), including Stanislaus ROP NMFS BO (June 2009) Actions III.1.2 and III.1.3, Trinity Preferred EIS Alternative, NMFS 2004 Winter-run BO, NMFS BO (June 2009) Action I.2.1, SWRCB WR90-5, CVPIA (b)(2) flows, NMFS BO (June 2009) Action I.2.2, ARFM NMFS BO (June 2009) Action II.1, no SJRRP flow modeled, Vernalis SWRCB D1641 Vernalis flow and WQ and NMFS BO (June 2009) Action IV.2.1, Delta D1641 and NMFS Delta Actions including Fall X2 FWS BO (December 2008) Action 4, Export restrictions including NMFS BO (June 2009) Action IV.11.2v Phase II, OMR FWS BO (December 2008) Actions 1-3 and NMFS BO (June 2009) Action IV.2.3v.

The modeling protocols for the recent USFWS BO (2008) and NMFS BO (2009) have been cited as being cooperatively developed by Reclamation, NMFS, U.S. Fish and Wildlife Service (USF&WS), California Department of Fish and Wildlife (CDF&W), and DWR.

Each of the BDCP no action alternatives (NAA, NAA-ELT, and NAA-LLT) uses the same New Melones Reservoir and other San Joaquin River operations. At the time of these studies' formulation, the National Marine Fisheries Services (NMFS) Biological Opinion (BO) (June 2009) had been recently released. Also, the San Joaquin River Agreement (SJRA, including the Vernalis Adaptive Management Program [VAMP]) and its incorporation into D1641 for Vernalis flow requirements were either still in force or being discussed for extension. As a component of study assumptions, the protocols of the SJRA and an implementation of the NMFS BO for San Joaquin River operations (including New Melones Reservoir operations) is included in the studies. These protocols, in particular the inclusion of VAMP which has now expired, is not appropriate as an assumption within either the No Action or Alternative Scenarios. Although appropriate within the identification of actions, programs and protocols present at the time of the NOI/NOP, they are not representative of current or reasonably foreseeable operations. Also, modeling of the future operation of the Friant Division of the CVP assumes no San Joaquin River Restoration Program releases. While assuming no difference in the current and future operation of the Friant Division avoids another difference in existing and projected future hydrology of the San Joaquin River, the assumption does not recognize the existence of the San Joaquin River Restoration Program. Results of CVP and SWP operations, in particular as affected by export constraints dependent on San Joaquin River flows and their effect on OMR, E/I and I/E diversion constraints, would be different with a different set of assumptions for San Joaquin River operations.

Finally, the habitat restoration requirements in the 2008 FWS BO and the 2009 NMFS BO are not included in the No Action Alternative baselines. Although the restoration is required to be completed either with or without completion of the BDCP, the restoration was only analyzed as part of the with project scenarios.

Model Results

Inflow and Reservoir Storage in the Sacramento River Basin

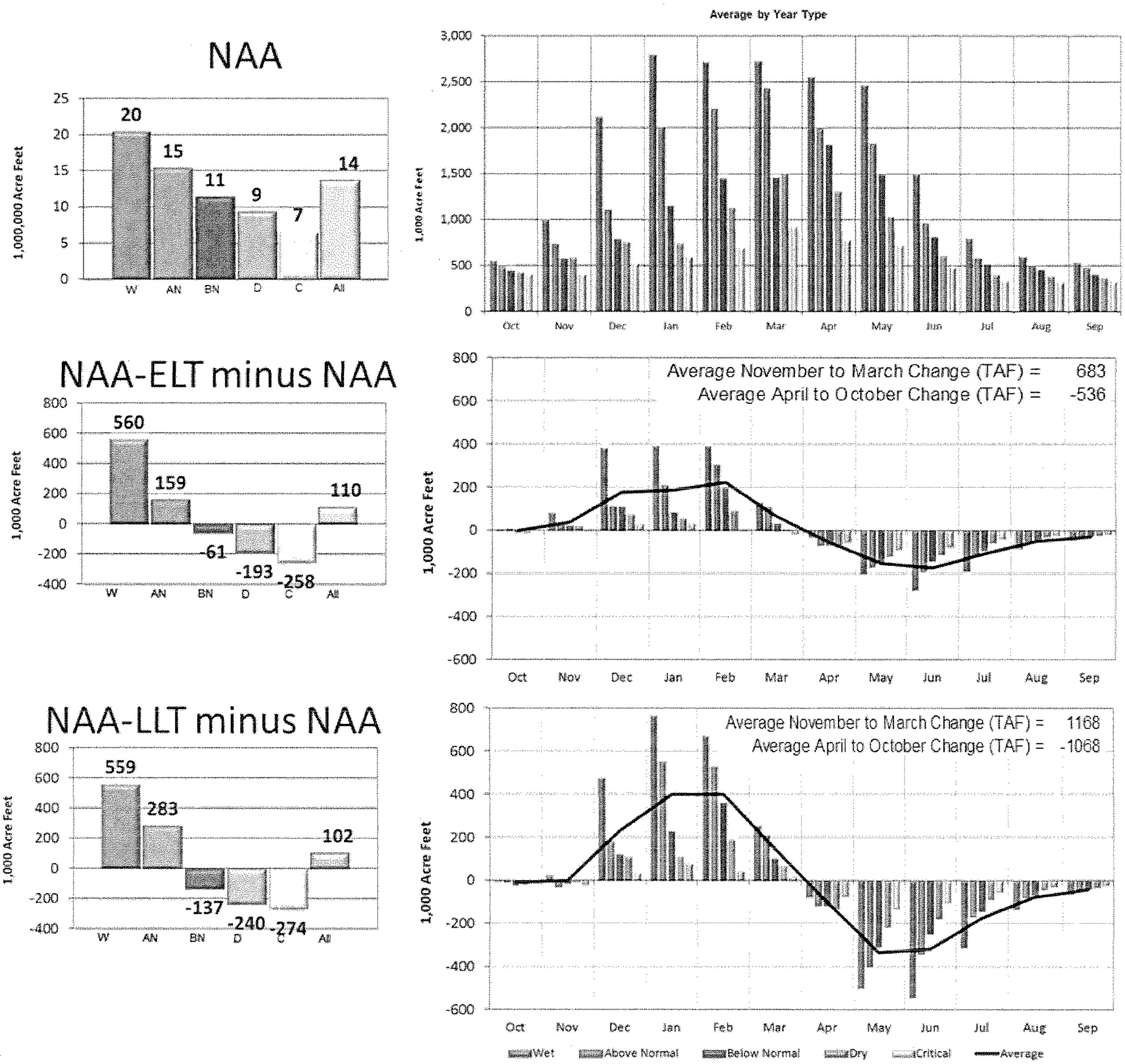
The significance of changed hydrology between the three without project baselines is illustrated in Figure 1 below. The figure illustrates the projected combined inflow of Trinity, Shasta, Oroville, and Folsom Reservoirs under the three NAA baselines. Numerous modeling projections for climate change have been developed, and in this BDCP group of Scenarios Trinity, Shasta, and Oroville inflow are projected to increase overall, but with a significant shift from spring runoff to winter runoff and increases in wetter years with decreases in dryer years. Folsom Reservoir inflow is projected to remain about the same at the time of the NAA-ELT Scenario but decreases by the time of the NAA-LLT Scenario. The spring to winter shift in runoff is also projected for Folsom Reservoir inflow.

If climate change resulted in such drastic inflow changes, there is argument that certain underlying operating criteria such as instream flow requirements and flood control diagrams would require change in recognition of the changed hydrology. Regarding current environmental flow requirements carried into the NAA Scenarios, we question an assumed operation that continues to attempt to meet temperature targets when flow releases are unlikely to meet the target and thus a sustainable operation plan is not possible. For example, the CVP and SWP are unlikely to draw reservoirs to dead pool as often as the models depict. The NAA-ELT and NAA-LLT model Scenarios show project reservoirs going to dead pool in 10% of years; such operation would result in cutting upstream urban area deliveries below what is needed for public health and safety in 10% of years and would lead to water temperature conditions that would likely not achieve the assumed objectives. Again in short, the Scenarios that include climate change do not provide a reasonable underlying CVP/SWP operation with a changed hydrology from which to impose a Project upon to understand how BDCP Alternatives will affect the water system and water users.

In our opinion, the CalSim II depicted operations that incorporate climate change are not reasonably foreseeable and do not represent a likely future operation of the CVP/SWP. Although an argument is typically made that these study baselines will be used in a comparison analysis with Project Alternatives tiering from these baselines, we believe that the depicted operations do not represent credible CVP/SWP operations and we have no confidence in the results and they are inappropriate as the foundation of a Project Alternative. As such, although the modeling approach may provide a relative comparison between equal foundational operations, we are apprehensive to place much confidence in the computed differences shown between the NAA and Project Alternative Scenarios.

BDCP1722

Figure 1. Projected Inflow to Trinity, Shasta, Oroville, and Folsom Reservoirs – NAA, NAA-ELT and NAA-LLT



Carryover Storage in the Sacramento River Basin

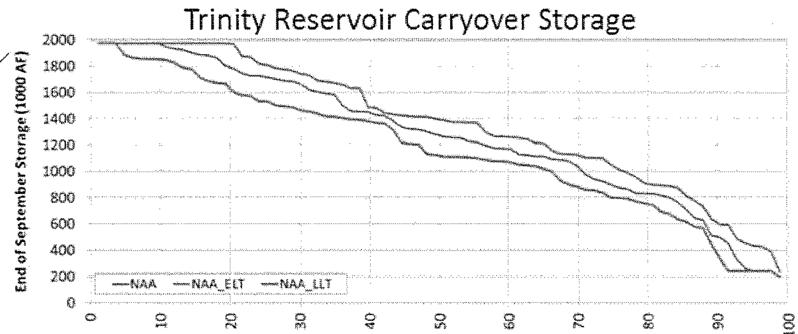
For upstream CVP and SWP reservoirs the assumed shift of inflows due to climate change (Figure 1) along with a continuing need to satisfy exports demands significantly affects carryover storage. The CVP and SWP simply cannot satisfy water demands and regulatory criteria imposed on them in the NAA-ELT and NAA-LLT modeling scenarios.

Figure 2 illustrates the typical change in carryover storage as shown for Trinity, Shasta, Oroville, and Folsom Reservoirs. The relatively high frequency (approximately 10% of time) of minimum storage occurring at CVP reservoirs illustrates our questioning of credible operations in the studies.

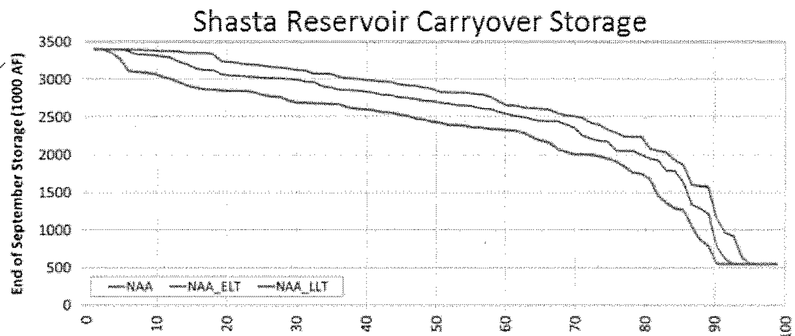
BDCP1722

Figure 2. Projected Shasta Reservoir Carryover Storage, NAA, NAA-ELT and NAA-LLT

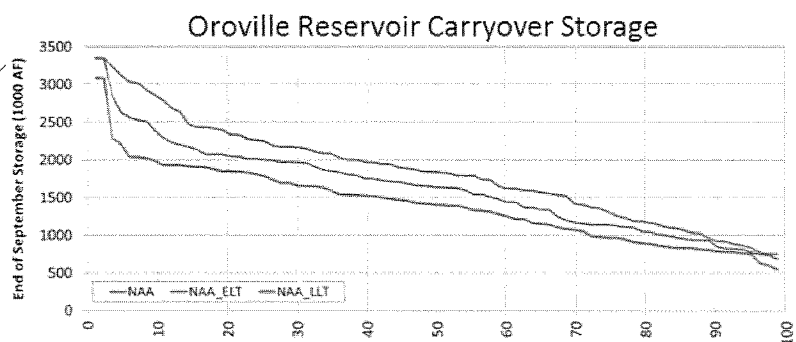
	Year Type	NAA_ELT minus NAA	NAA_LLT minus NAA
Trinity	W	-62	-187
	AN	-79	-198
	BN	-102	-170
	D	-138	-271
	C	-126	-216
	All	-97	-209



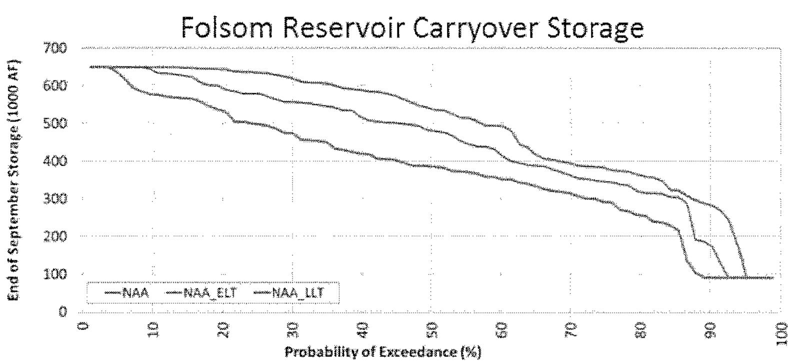
	Year Type	NAA_ELT minus NAA	NAA_LLT minus NAA
Shasta	W	-117	-331
	AN	-199	-452
	BN	-152	-340
	D	-154	-463
	C	-192	-377
	All	-154	-386



	Year Type	NAA_ELT minus NAA	NAA_LLT minus NAA
Oroville	W	-296	-588
	AN	-225	-460
	BN	-229	-513
	D	-180	-296
	C	-54	-159
	All	-213	-430



	Year Type	NAA_ELT minus NAA	NAA_LLT minus NAA
Folsom	W	-42	-115
	AN	-54	-128
	BN	-58	-136
	D	-43	-112
	C	-43	-68
	All	-47	-113

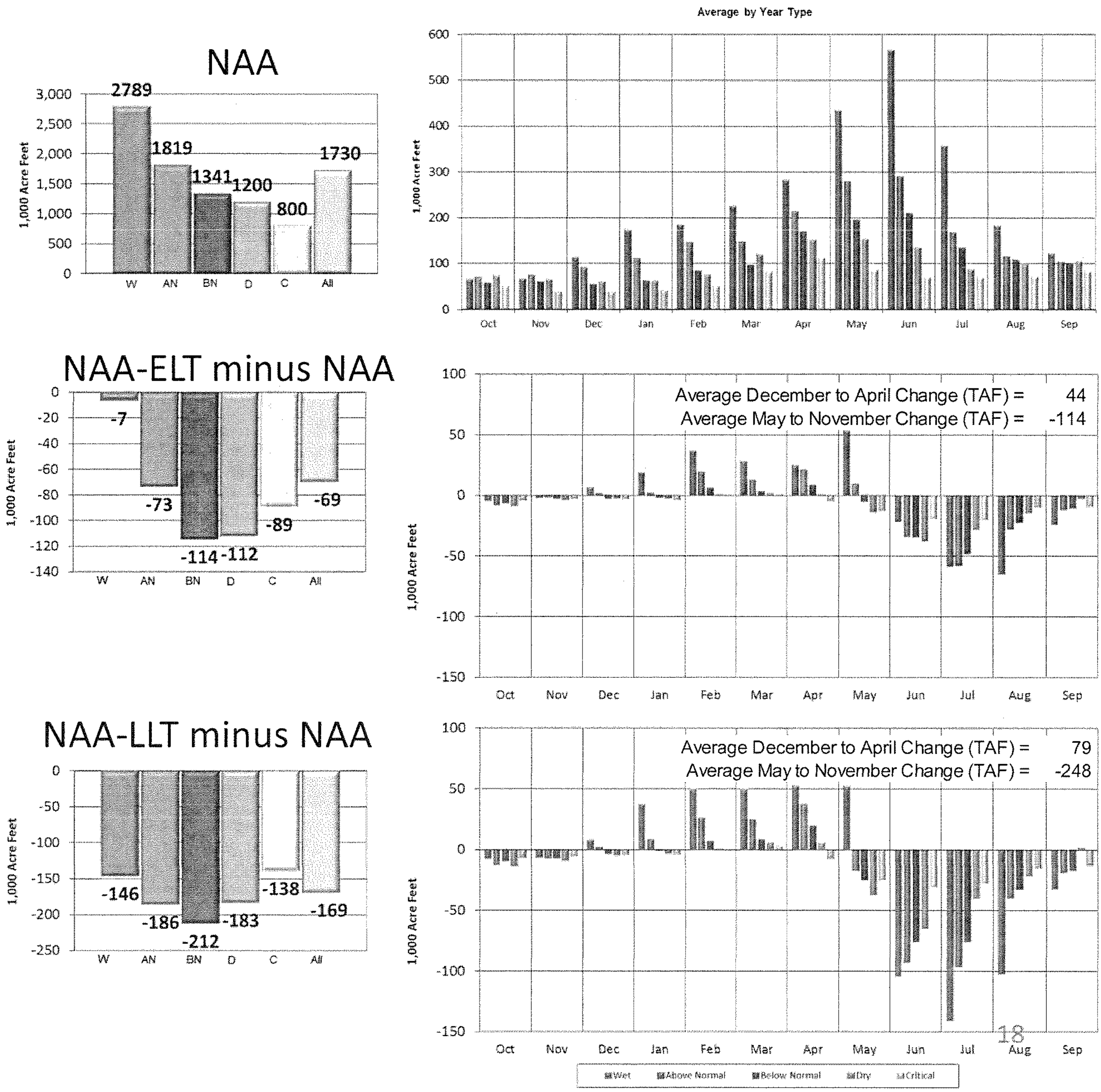


BDCP1722

Inflow and Carryover Storage in the San Joaquin River Basin

San Joaquin Valley reservoirs are depicted with an overall decrease in annual runoff with some shifting of runoff from spring to winter, but mostly just decreases in spring runoff due to a decline in snowmelt runoff during late spring[5]. Figure 3 illustrates the assumed effects of climate change upon inflow to Millerton Lake.

Figure 3. Projected Inflow to Millerton Lake –NAA, NAA-ELT and NAA-LLT



The hydrology differences imposed in the NAA Scenarios of the Friant Division are described above, and its appropriateness may be subject to additional debate and Alternative assumptions. However, our review found that implementation of Millerton Reservoir inflow as affected by climate change was improperly performed.

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[5] BDCP Appendix 5A.2

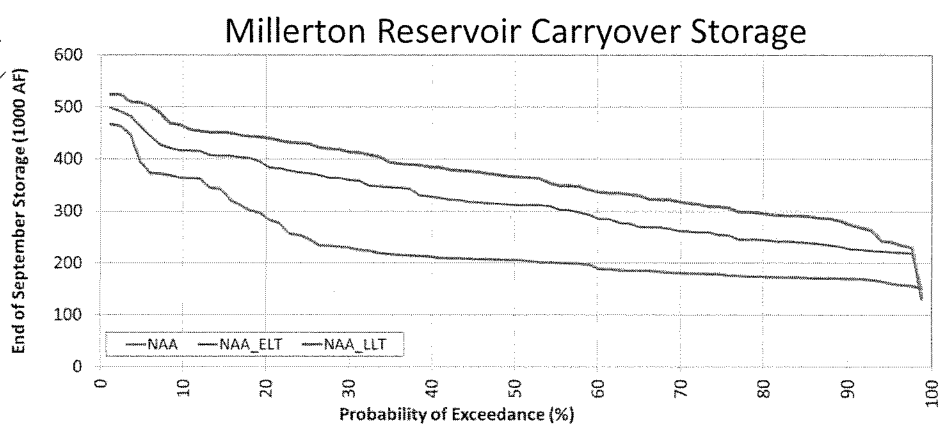
BDCP 1722

Inflow to Millerton Reservoir in this version of CalSim is input in three separate time series for purposes of depicting the hydrology of potential upper basin reservoirs. Climate change hydrology was inconsistently incorporated at Millerton Reservoir and misapplied to the water supply and flood control operations. The result is an unrealistic operation for river releases and canal diversions. Figure 3 illustrates the projected ELT and LLT changes in Millerton Reservoir inflow incorporated in these studies. On face value of the input data, regardless of Friant Dam river release assumptions the effect of climate change at Millerton Lake will affect water deliveries.

Evidence of the inconsistent inflow problem is shown in the result for the comparison of carryover storage of Millerton Reservoir under the NAA, NAA-ELT, and NAA-LLT Scenarios (Figure 4). Carryover storage is higher in the ELT and LLT Scenarios due to climate change effects to inflow incorporated in reservoir operations but not in the computation of water supply deliveries. Thus, water deliveries are suppressed and the reservoir ends the year with greater storage.

Figure 4. Millerton Reservoir Carryover Storage, NAA, NAA-ELT and NAA-LLT Scenarios

	Year Type	NAA_ELT minus NAA	NAA_LLT minus NAA
Millerton	W	56	103
	AN	82	137
	BN	99	161
	D	87	131
	C	131	166
	All	87	136



CVP Water Service Contractor's water allocations are based on available CVP supplies, Figure 5 contains exceedance probability plots of deliveries and allocation percentages to these contractors. Table 2 contains average annual allocation to these CVP Water Service Contractors. Water supplies to these contractors decrease in the ELT and LLT relative to NAA Conditions.

Table 2. CVP Water Service Contractor Allocation Summary

	NAA	NAA-ELT	NAA-LLT
North of Delta Agricultural Service Contractors	61%	53%	46%
South of Delta Agricultural Service Contractors	48%	44%	39%
North of Delta M&I Contractors	85%	81%	77%
South of Delta M&I Contractors	79%	77%	74%

CVP Sacramento River Settlement, San Joaquin River Exchange, and Refuge deliveries are based on Shasta Criteria and are 100% in most years and 75% in "Shasta critical" years[6]. Figure 6 contains exceedance probability charts for annual water deliveries to CVP contractors whose allocations are based on Shasta Criteria. In the NAA-ELT and NAA-LLT modeling scenarios, the Sacramento River Settlement and Refuge deliveries are reduced due to water shortages that occur more often under the climate change assumptions.

SWP Water Supply

Corresponding with the CVP operation is the projected operation of the SWP under No Action Conditions. These illustrations are shown to provide a comparison to SWP storage and exports, particularly during drought. A comparison of SWP exports to CVP SOD deliveries shows that each project exports about the same amount of water during drought.

Average annual SWP Table A water supply allocations are 62% for NAA, 61% for NAA-ELT, and 57% for NAA-LLT. Figure 7 contains an exceedance probability plot summary of SWP deliveries. SWP North of Delta deliveries to the Feather River Service Area in both the ELT and LLT are less than NAA during about 10% of the time.

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[6] A "Shasta critical" year is determined when the forecasted full natural inflow into Shasta Lake is equal to or less than 3.2 million acre-feet.

Figure 5. CVP Water Service Contractor Delivery Summary

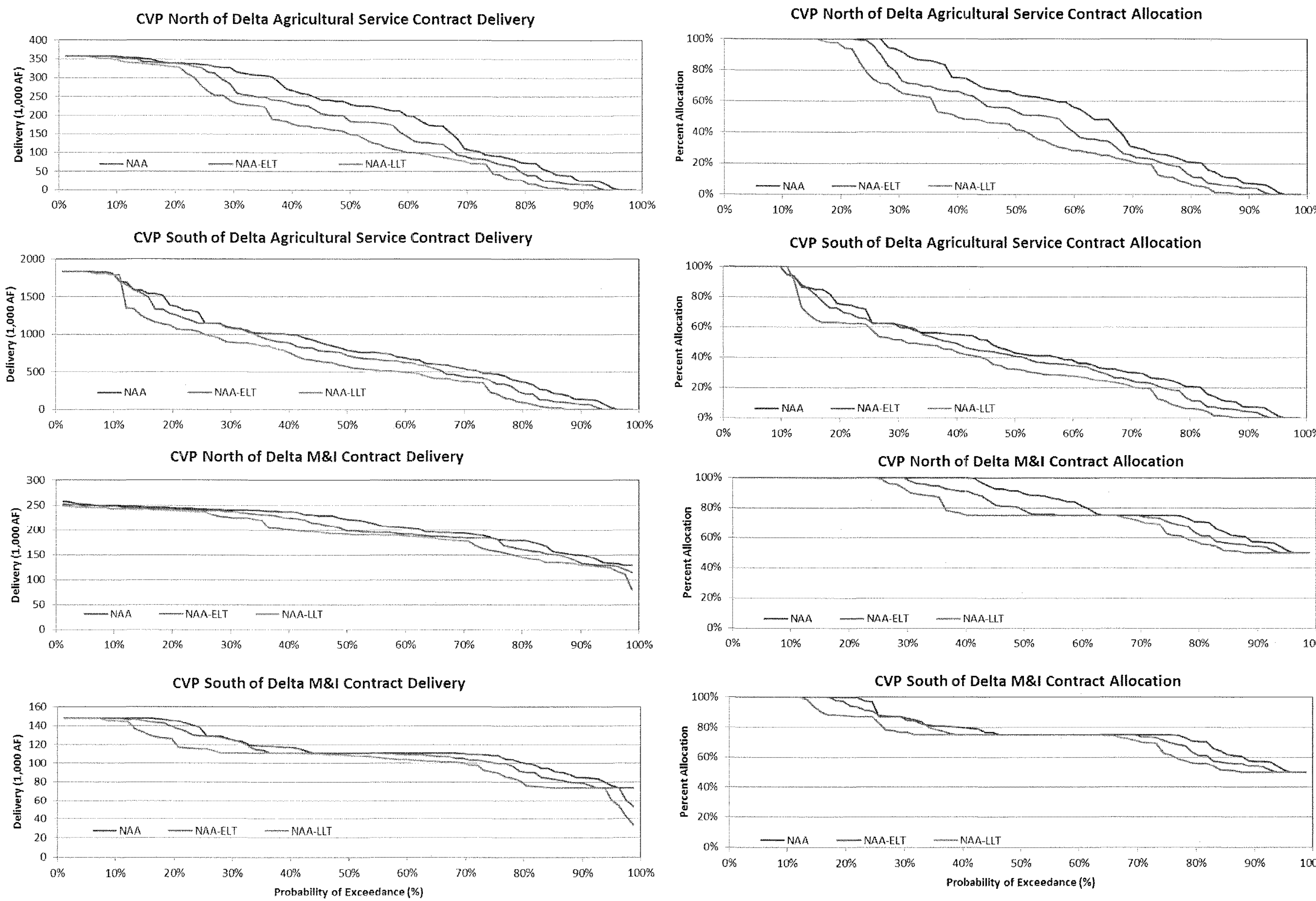

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Figure 6. CVP Contractor Delivery Summary for Contractors with Shasta Criteria Allocations

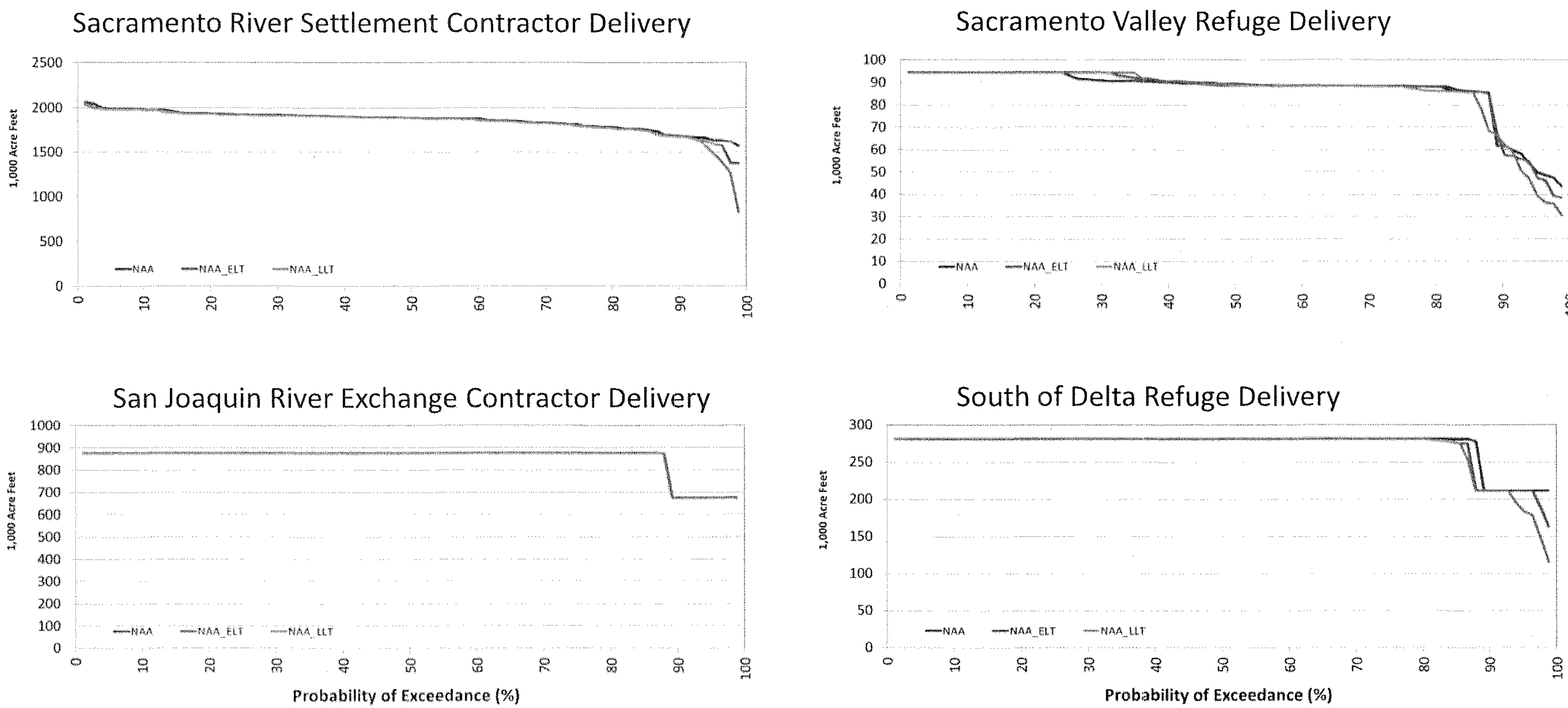

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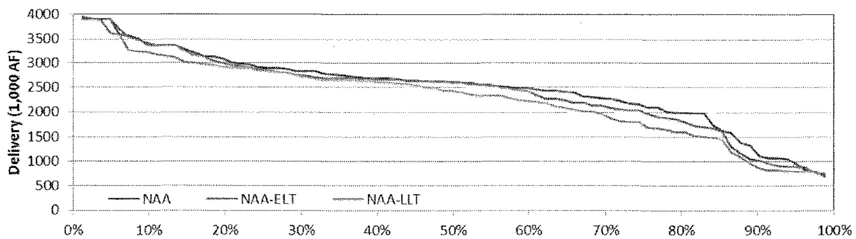
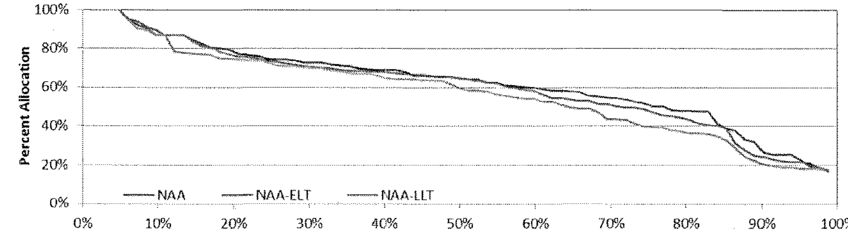
Figure 7. SWP Delta Delivery Summary

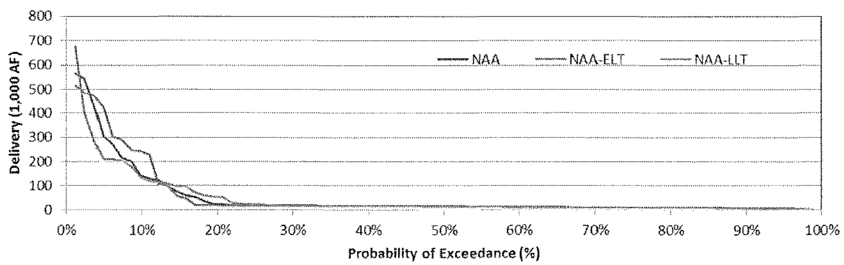
SWP Table A Delivery



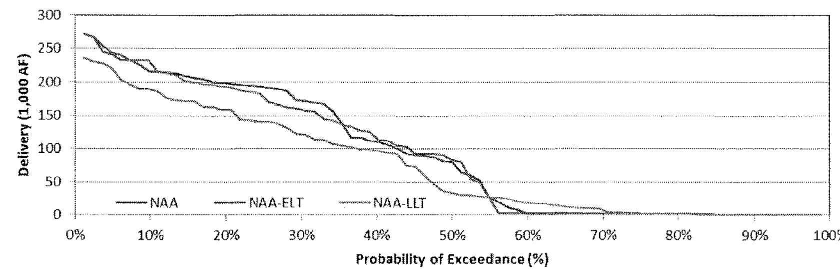
SWP Allocation



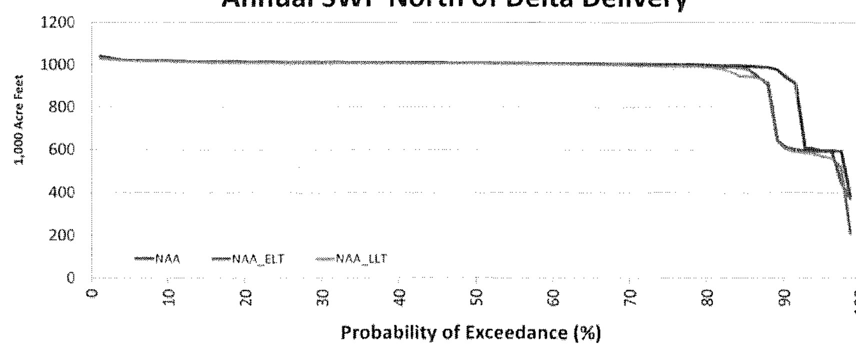
SWP Article 21 Delivery



SWP Article 56 Delivery



Annual SWP North of Delta Delivery



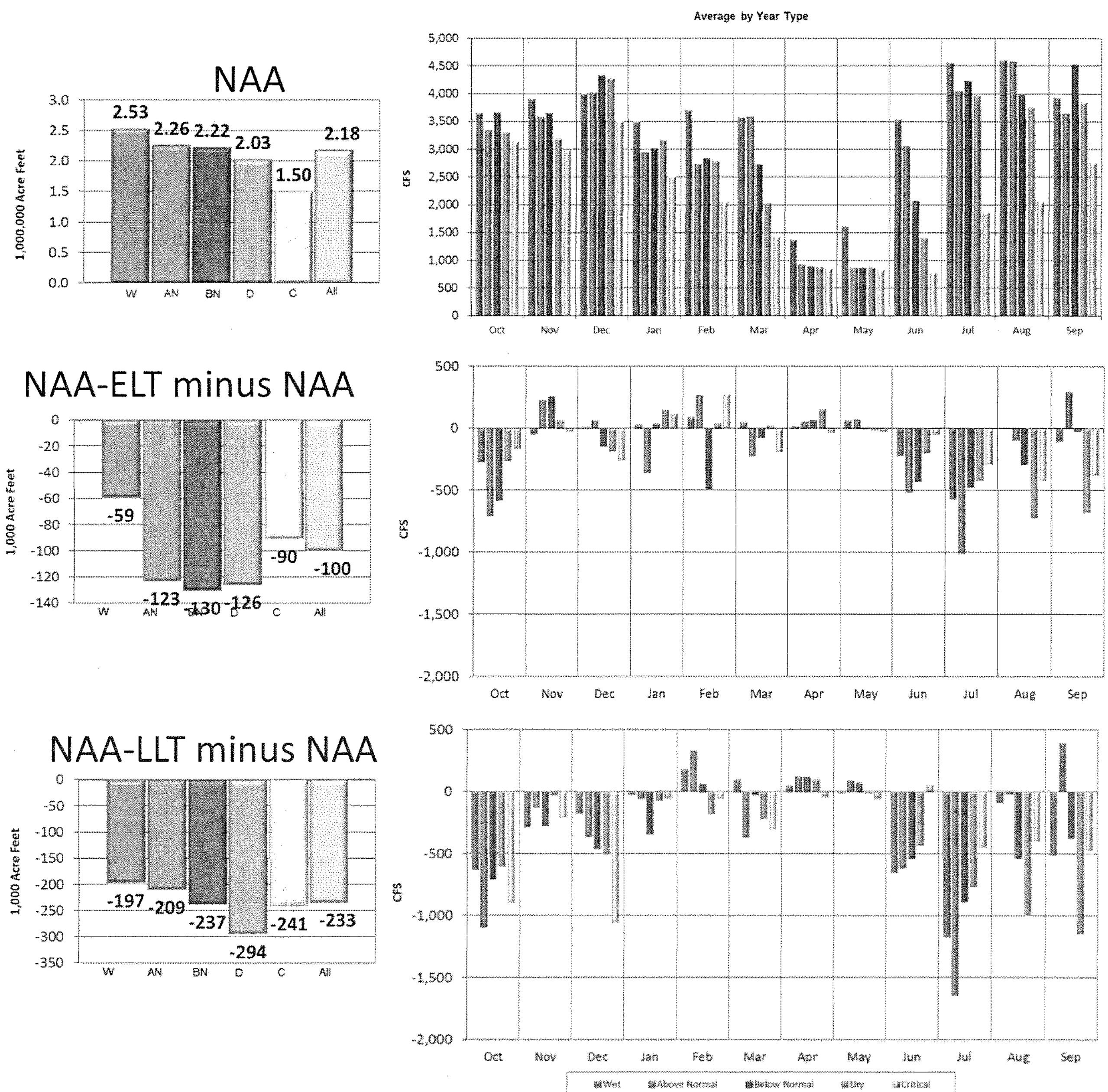
BDCP1722

BDCP1722

CVP/SWP Exports

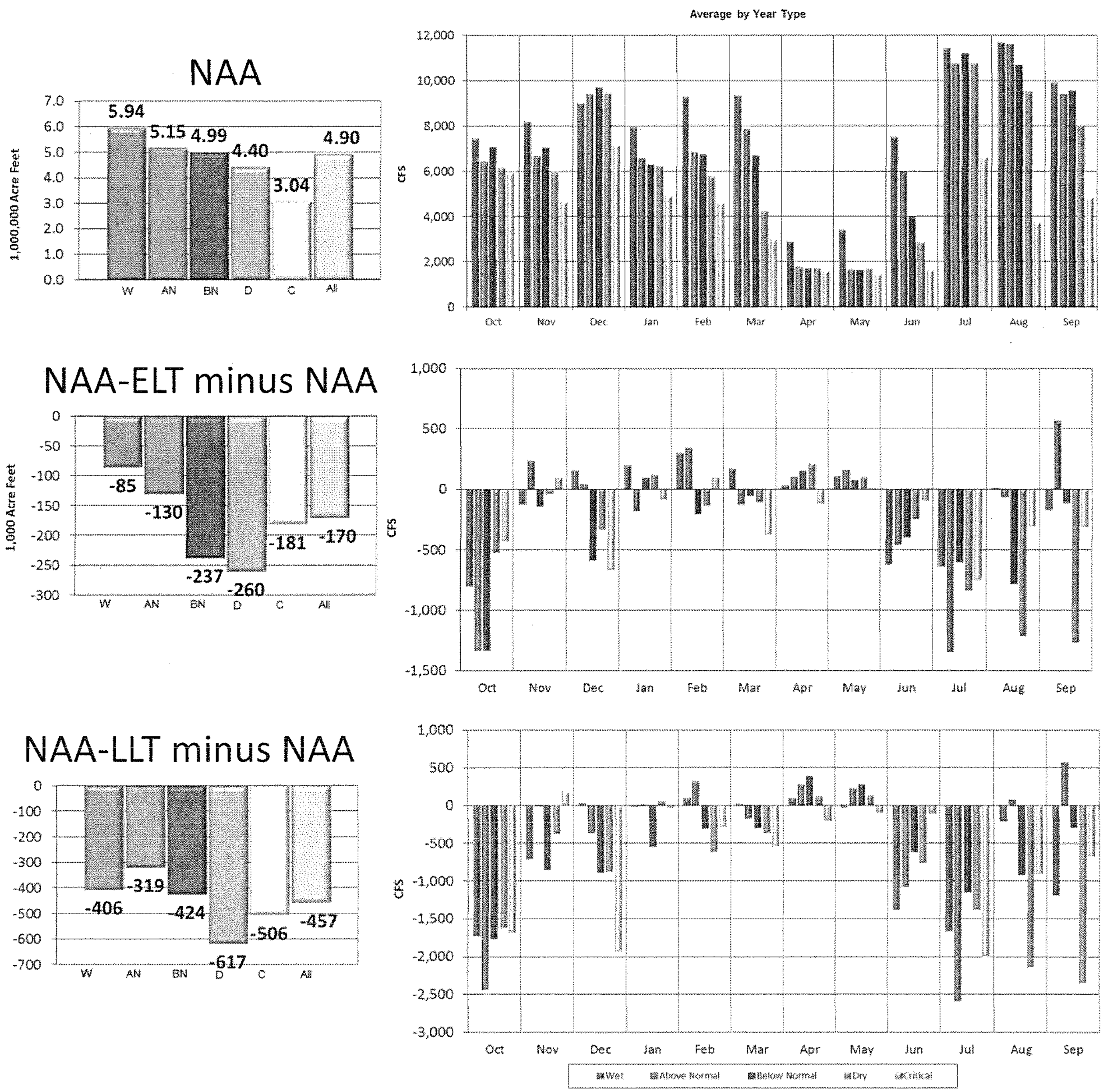
Exports of the CVP and SWP have been projected to change due to a combination of climate change effects on water availability (primary effect), flow requirements for salinity control (sea level rise), additional in-basin water demands, and to a small extent greater export potential (DMC-CA intertie). Figure 8 illustrates the simulation of CVP exports and combined CVP/SWP exports under NAA, NAA-ELT, and NAA-LLT Scenarios. Under NAA average annual CVP exports are about 2.24 MAF (2.18 at Jones PP) and are about 100 TAF less in the NAA-ELT Scenario and 230 TAF less in the NAA-LLT. Annual average SWP exports are about 2.61 MAF in the NAA and are 68 TAF less in the NAA-ELT and 212 TAF less in the NAA-LLT. Annual average combined CVP/SWP exports are about 4.9 MAF in the NAA modeling (Figure 9) and about 170 TAF and 460 TAF less in the NAA-ELT and NAA-LLT respectively.

Figure 8. CVP Exports at Jones PP, NAA, NAA-ELT and NAA-LLT



BDCP1722

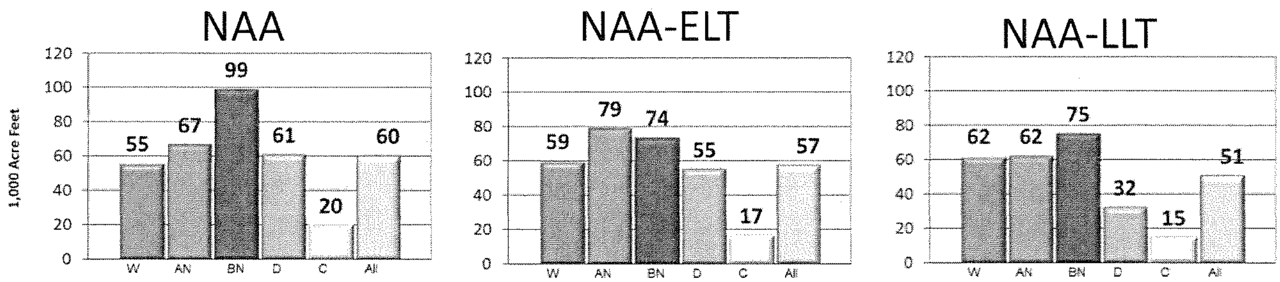
Figure 9. Total CVP/SWP Exports, NAA, NAA-ELT and NAA-LLT



Joint Point of Diversion

The NAA Alternatives do not make use of Joint Point of Diversion (JPOD), however CVP water is pumped at Banks to satisfy the Cross Valley Canal (CVC) contracts. **Figure** 10 shows annual Banks wheeling for CVC for the NAA, NAA-ELT and NAA-LLT.

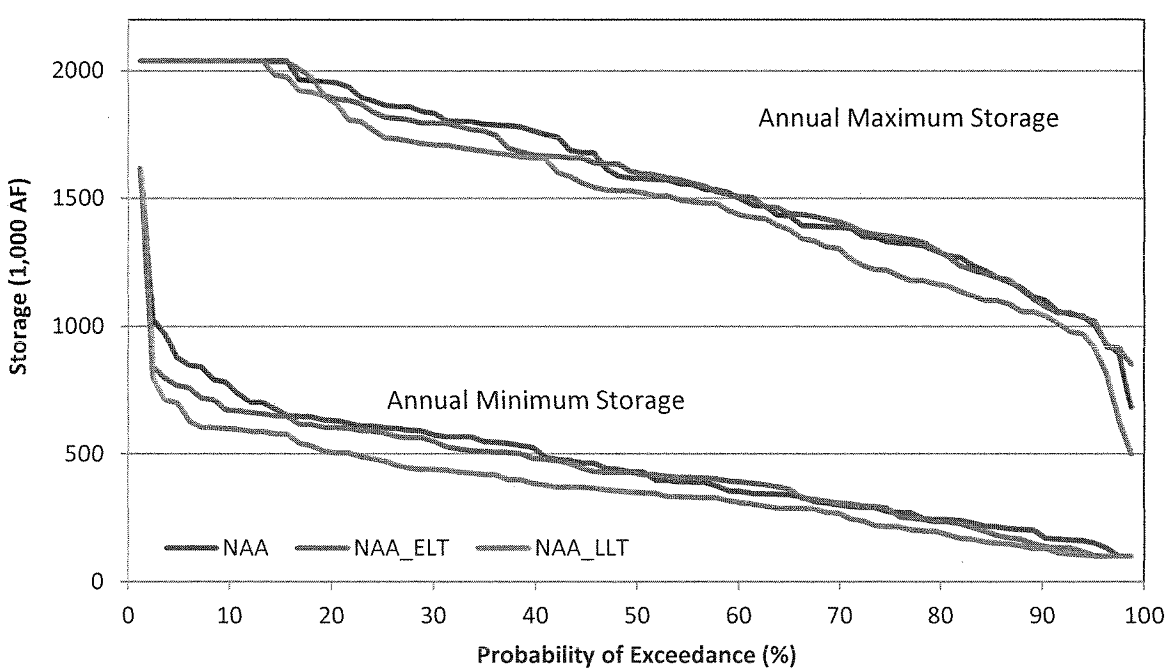
Figure 10. Cross Valley Canal Wheeling at Banks



San Luis Reservoir Operations

Modeling protocols will use San Luis Reservoir to store water when available and provide supply as exports are constrained by hydrology or regulatory constraints. Figure 11 illustrates the projected operation of San Luis Reservoir under the NAA, NAA-ELT, and NAA-LLT Scenarios. The annual maximum storage shows that the ability to fill San Luis Reservoir is somewhat similar for NAA and NAA-ELT but with less ability to fill in the NAA-LLT. The frequency of a low annual low point of San Luis Reservoir is exacerbated in the NAA-LLT Scenario. In all the Scenarios, San Luis Reservoir is heavily exercised. As currently projected, San Luis Reservoir will only fill as the result of very favorable hydrologic conditions including the availability of spill water from Friant or the Kings River system that offsets DMC water demands at the Mendota Pool.

Figure 11. San Luis Reservoir Storage – NAA, NAA-ELT and NAA-LLT



Sacramento River Temperature

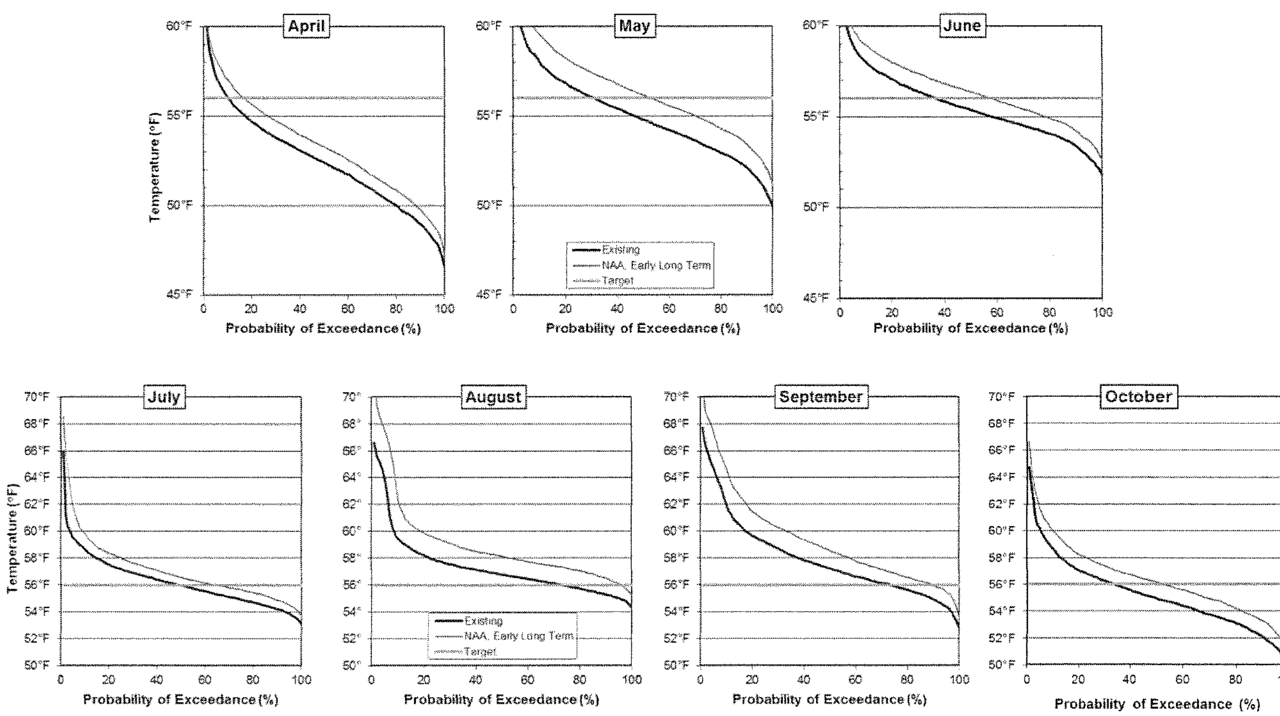
CalSim II results, along with meteorological data, are used in temperature models that simulate reservoir temperature and river temperature. The BDCP modeling provided by DWR for review included the Sacramento

BDCP1722

River temperature model and results for the No Action and Alternatives. Each BDCP Alternative used temperature target criteria for the upper Sacramento River as is used for the Existing Conditions modeling scenario. Equilibrium temperatures, a calculated model input that approximately depicts the effective air temperature for interaction with water temperature in the model, between Shasta and Gerber are increased by an annual average of 1.6°F for the ELT Scenarios and by 3.3°F for LLT Scenarios. Figure 12 contains monthly exceedance probability charts of temperature at Bend Bridge in the Sacramento River for April through October for the Existing Conditions and NAA-ELT Scenarios. There is about a 1 degree increase in average monthly temperature for the April through October period. Figure 13 contains similar information as Figure 12, but compares modeling results for the NAA-LLT and Existing Conditions Scenarios, there is often a 2°F increase in the NAA-LLT relative to Existing Conditions.

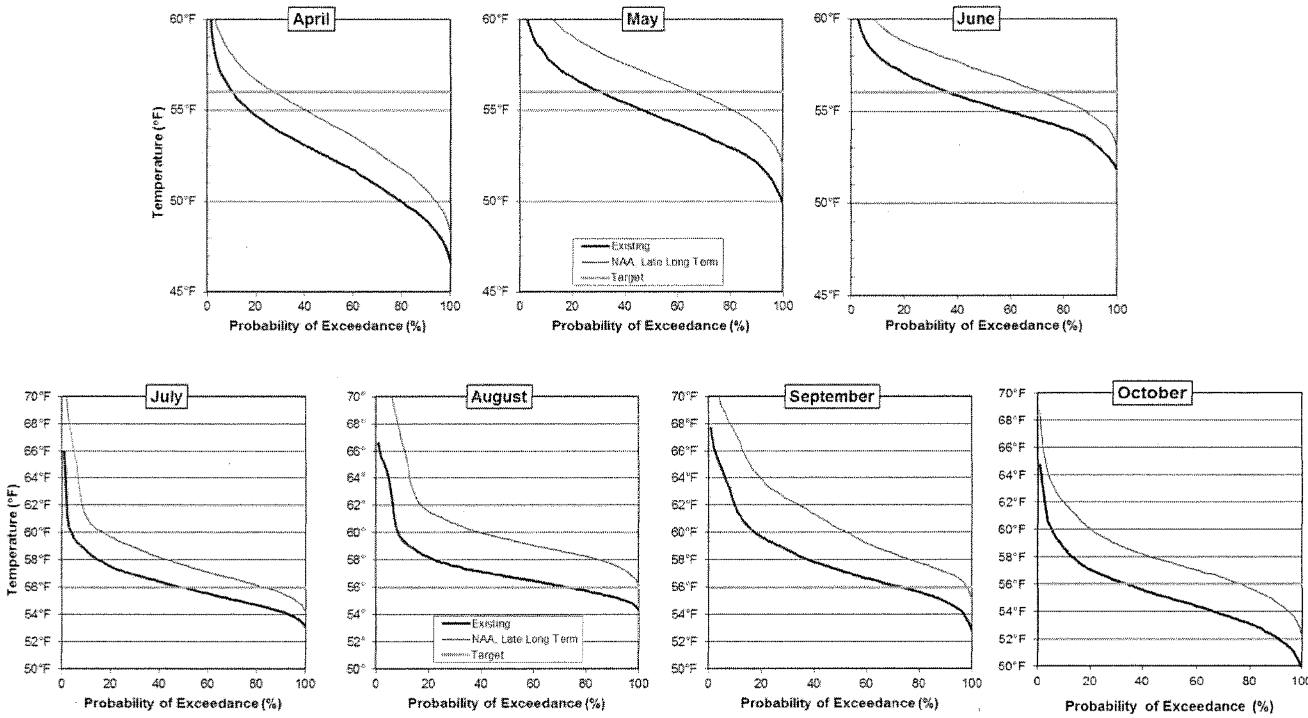
The increase in equilibrium temperatures combined with decreases in storage would lead to water temperature conditions that would likely not achieve the assumed objectives. Figure 12 and Figure 13 illustrate an increase in the probability that a water temperature target of 56°F would be exceeded at Bend Bridge under both the NAA-ELT and NAA-LLT Scenarios. The probability of exceedance increases approximately 5% to 20% depending on the month for the NAA-ELT Scenario and approximately 10% to 40% for the NAA-LLT Scenario.

Figure 12. Temperature Exceedance Sacramento River at Bend Bridge Existing, No Action Alternative, ELT



BDCP1722

Figure 13. Temperature Exceedance Sacramento River at Bend Bridge Existing, No Action Alternative, LLT



Conclusions regarding Climate Change Assumptions and Implementation

In examining the possible effects of climate change, it is not appropriate to assume that current project operations will remain static and not respond to climate change. The BDCP's simplistic approach of assuming a linear operation of the CVP and SWP produces results that are not useful for dealing with the complex problem of climate change because it does not reflect the way in which the CVP and the SWP would actually operate whether or not the BDCP is implemented. Reviewers recommend a sensitivity analysis be conducted to develop a better understanding of the range of possible responses to climate change by the CVP and SWP, and the regulatory structures that dictate certain project operations.

Including climate change, without adaptation measures, results in insufficient water needed to meet all regulatory objectives and user demands. For example, the BDCP Model results that include climate change indicate that during droughts, water in reservoirs is reduced to the minimum capacity possible. Reservoirs have not been operated like this in the past during extreme droughts and the current drought also provides evidence that adaptation measures are called for long in advanced to avoid draining the reservoirs. In this aspect, the BDCP Model simply does not reflect a real future condition. Foreseeable adaptations that the CVP and SWP could make in response to climate change include: (1) updating operational rules regarding water releases for flood protection; (2) during severe droughts, emergency drought declarations could call for mandatory conservation; and (3) if droughts become more frequent, the CVP and SWP would likely revisit the rules by which they allocate water during shortages and operate more conservatively in wetter years. The modifications to CVP and SWP operations made during the winter and spring of 2014 in response to the drought supports the likelihood of future adaptations. The BDCP Model is, however, useful in that it reveals that difficult decisions must be made in response to climate change. But, in the absence of making those decisions, the BDCP Model results themselves are not informative, particularly during drought conditions. With future conditions projected to be so dire without the BDCP, the effects of the BDCP appear positive simply because it appears that conditions cannot get any worse (i.e., storage cannot be reduced below its minimum level). However, in reality, the future condition will not be as depicted in the BDCP Model. The Reviewers recommend that Reclamation and DWR develop more realistic operating rules for the hydrologic conditions expected over the next half-century and incorporate those operating rules into the any CalSim II Model that includes climate change.

2.2 BDCP Operation

The next step of our analysis centered on reviewing BDCP modeling of the with project scenarios as described in the December 2013 Draft BDCP and described as Alternative 4 in the Draft EISR.

Description of the BDCP Project

At the time of review, this Alternative was coined Alt 4 and represented a dual conveyance facility. The two DWR analyses reviewed were identified as:

- Alt 4 (dual conveyance) – ELT

  The same system demands and facilities as described in the NAA-ELT with the following primary changes: three proposed North Delta Diversion (NDD) intakes of 3,000 cfs each; NDD bypass flow requirements; additional positive OMR flow requirements and elimination of the San Joaquin River I/E ratio and the export restrictions during VAMP; modification to the Freemont Weir to allow additional seasonal inundation and fish passage; modified Delta outflow requirements in the spring and/or fall (defined in the Decision Tree discussed below); movement of the Emmaton salinity standard; redefinition of the EI ratio; and removal of current permit limitations for the south Delta export facilities. Set within the ELT environment.
- Alt 4 (dual conveyance) – LLT

  The same as the previous Scenario except established in the LLT environment.

The BDCP contemplates a dual conveyance system that would move water through the Delta's interior or around the Delta through an isolated conveyance facility. The BDCP CalSim II files contained a set of studies evaluating the projected operation of a specific version of such a facility. The Alternative was imposed on two baselines: the NAA-ELT scenario and the NAA-LLT scenario.

The changes (benefits or impacts) of the operation due to Alt 4 are highly dependent upon the assumed operation of not only the BDCP facilities and the changed regulatory requirements associated with those facilities, but also by the assumed integrated operation of the CVP and SWP facilities. The modeling of the NAA Scenarios introduced a significant change in operating protocols suggested primarily for reaction to climate change. We consider the extent of the reaction not necessarily representing a likely outcome, and thus have little confidence that the NAA baselines are a "best" (or even valid) representation of a baseline from which to compare an action Alternative. However, a comparison review of the Alternative to the NAA baselines illuminates operational issues in the BDCP modeling and provides insight as to where benefits or impacts may occur as additional studies are provided.

Since the effects of climate changes are more severe in the LLT than in the ELT, this review focuses on the ELT modeling because the results are less skewed by the climate change assumptions and problems.

BDCP's Alternative 4 has four possible sets of operational criteria, termed the Decision Tree, that differ based on the "X2" standards[7] that they contemplate:

- Low Outflow Scenario (LOS), otherwise known as operational scenario H1, assumes existing spring X2 standard and the removal of the existing fall X2 standard;

[7] X2 is a salinity standard that requires outflows sufficient to attain a certain level of salinity at designated locations in the Delta at certain times of year.

BDCP1722

- High Outflow Scenario (HOS), otherwise known as H4, contemplates the existing fall X2 standard and providing additional outflow during the spring;
- Evaluated Starting Operations (ESO), otherwise known as H3, assumes continuation of the existing X2 spring and fall standards;
- Enhanced spring outflow only (not evaluated in the December 2013 Draft BDCP), scenario H2, assumes additional spring outflow and no fall X2 standards.

While it is not entirely clear how the Decision Tree would work in practice, the general concept is that the prior to operation of the new facility, implementing authorities would select the appropriate Scenario (from amongst the four choices) based on their evaluation of targeted research and studies to be conducted during planning and construction of the facility.

For our analysis, we reviewed the HOS (or H4) scenario because the BDCP[8] indicates that the initial permit will include HOS operations that may be later modified at the conclusion of the targeted research studies. The HOS includes the existing fall X2 requirements but adds additional outflow requirements in the spring. We reviewed the model code and discussed the operations with DWR and Reclamation, who acknowledged that although the SWP was bearing the majority of the responsibility for meeting the additional spring outflow in the modeling, the responsibility would need to be shared with the CVP[9]. In subsequent discussions, DWR and Reclamation have suggested that the additional water may be purchased from other water users. However, the actual source of water for the additional outflow has not been defined. Since the BDCP modeling assumes that SWP bears the majority of the responsibility for meeting the additional outflow, yet this is not how the project will be operated in reality, our review of the BDCP modeling results for HOS is limited to the evaluation of how the SWP reservoir releases on the Feather River translate into changes in Delta outflow and exports.

Our remaining analysis examines the ESO (or H3) scenario (labeled Alt 4-ELT or Alt 4-LLT in this section) because it employs the same X2 standards as are implemented in the No Action Alternatives NAA-ELT and NAA-LLT. This allows us to focus our analysis on the effects of the BDCP operations independent of the possible change in the X2 standard.

High Outflow Scenario (HOS or H4) Results

In Alt 4-ELT H4 Feather River flows during wetter years are increased more than 3,000 cfs in April and May and then decreased in most year types during July and August, while September flow is only decreased in wetter years. Figure 14 shows average monthly change in Feather River flow by water year type. Accompanying the changes in Feather River flow are changes in Oroville Reservoir storage levels, Figure 15 contains average monthly changes in Oroville storage. Alt4-ELT H4 end of June storage in Oroville during wetter years is about 480 TAF lower than the NAA-ELT while critical year storage is about 400 TAF higher. Counter to the reduction in Oroville storage, CVP average upstream carryover storage increases about 80 TAF and critical year increases by 380 TAF. Figure 16 contains average monthly changes in Delta outflow, increases in Feather River spring time flows are generally not used to increase Delta outflow, but are allowed to support increases in Delta exports.

Figure 17 displays changes in average monthly Delta exports, there are increases when diverting higher upstream spring releases in wetter years, while there are decreases during summer months in most years. Figure 18

[8] Draft BDCP, Chapter 3, Section 3.4.1.4.4

[9] August 7, 2013 meeting with DWR, Reclamation, and CH2M HILL

BDCP1722

contains an average annual summary of project deliveries, total CVP deliveries increase by about 70 TAF while SWP deliveries decrease by about 100 TAF. Dryer year SWP deliveries decrease by 250 to 400 TAF, while wet year deliveries increase by 200 TAF. Total CVP deliveries increase in wetter years by exporting increased releases from Oroville.

The overall effect of the HOS appears to be increases in Oroville releases that support both CVP and SWP exports in wetter years, with modest increases in Delta outflow. There is also a decrease in SWP reliability through large delivery reductions in dryer years accompanied by Oroville storage increases. In addition to increases in dry and critical year storage in Oroville, total CVP dry and critical year carryover increases by 100 TAF and 380 TAF respectively with negligible reductions in wetter years types.

CVP and SWP obligation for providing flow to satisfy Delta outflow requirements is described in the Coordinated Operations Agreement (COA). Because the CVP and SWP share responsibility for meeting required Delta outflow based on specific sharing agreement, it doesn't seem reasonable that CVP water supplies would increase while SWP water supplies decrease under this Alternative. The manner in which this alternative is modeled is inconsistent with existing agreements and operating criteria. If the increases in outflow were met based on COA, there would likely be reductions in Shasta and Folsom storage that may cause adverse environmental impacts.

Figure 14. Changes in Feather River Flow, Alt 4 H4 ELT minus NAA-ELT

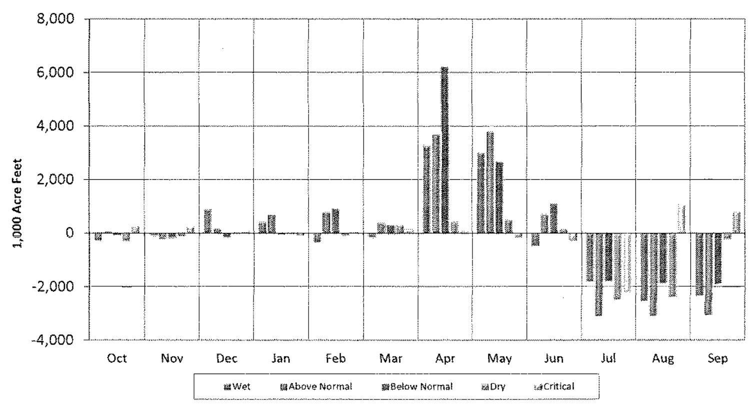
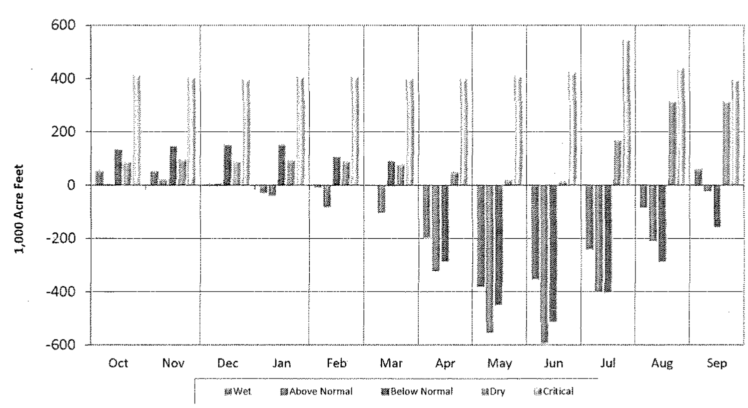


Figure 15. Changes in Oroville Storage, Alt 4 H4 ELT minus NAA-ELT



BDCP1722

Figure 16. Changes in Delta Outflow, Alt 4 H4 ELT minus NAA-ELT

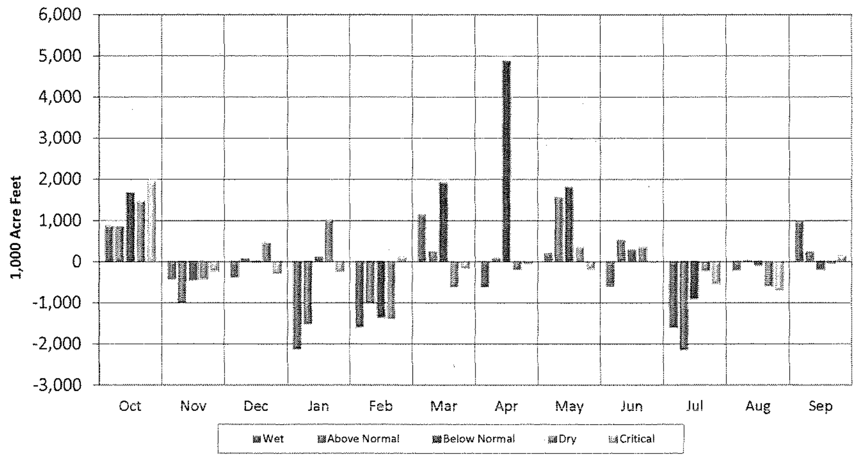


Figure 17. Changes in Delta Export, Alt 4 H4 ELT minus NAA-ELT

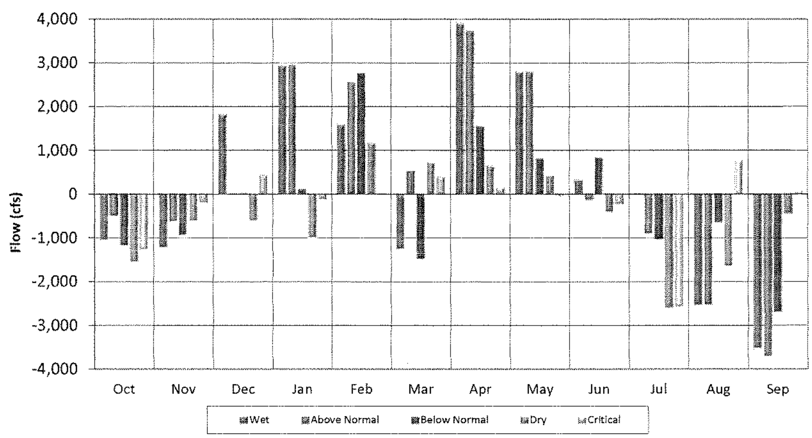
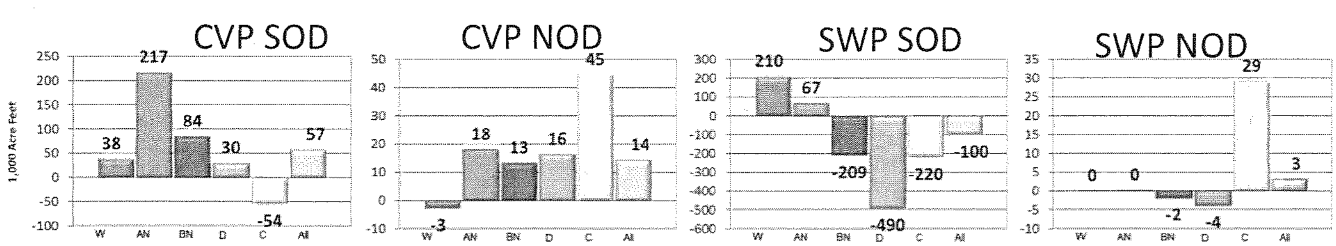


Figure 18. Changes in CVP and SWP Deliveries, Alt 4 H4 ELT minus NAA-ELT

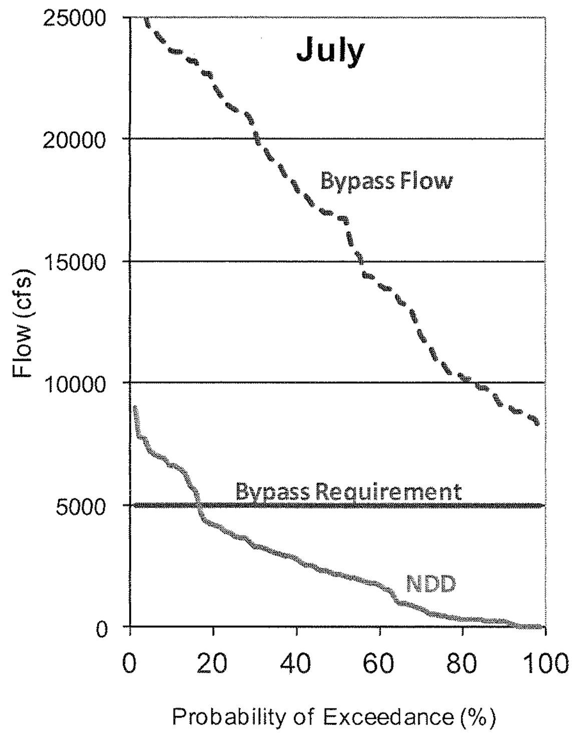


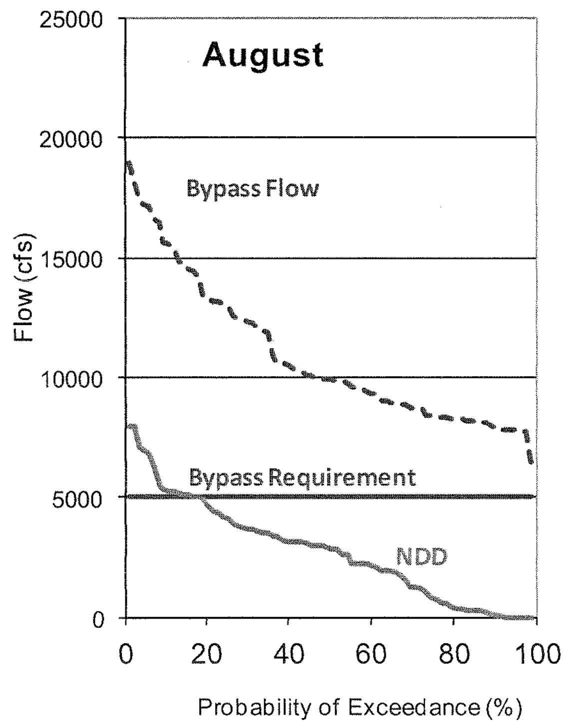
Evaluated Starting Operations (ESO or H3) Results

North Delta Diversion Intakes

Sacramento River flow below the North Delta Diversion (NDD) must be maintained above the specified bypass flow requirement, therefore the NDD rates are limited to the Sacramento River flow above the bypass requirement. Due to an error in CalSim II that specifies an unintended additional bypass requirement, modeling performed for the BDCP EIRS often bypasses more Sacramento River flow than is specified in the BDCP project description. This error has been fixed in the most recent public releases of CalSim II, but BDCP modeling has not been updated to reflect these fixes. Figure 19 contains exceedance probability plots showing the Sacramento River required bypass, Sacramento River bypass flow, NDD, and excess Sacramento River flow to the Delta as modeling for BDCP. As can be seen in Figure 19, the bypass flow is always above the bypass requirement in July and August. The BDCP version of CalSim sets a requirement for Sacramento River inflow to the Delta needed to satisfy all Delta flow, quality, and export requirements, this requirement should be removed when modeling the NDD.

Figure 19. NDD, Bypass Requirement, Bypass Flow, and Excess Sacramento R. flow for Alt 4-ELT



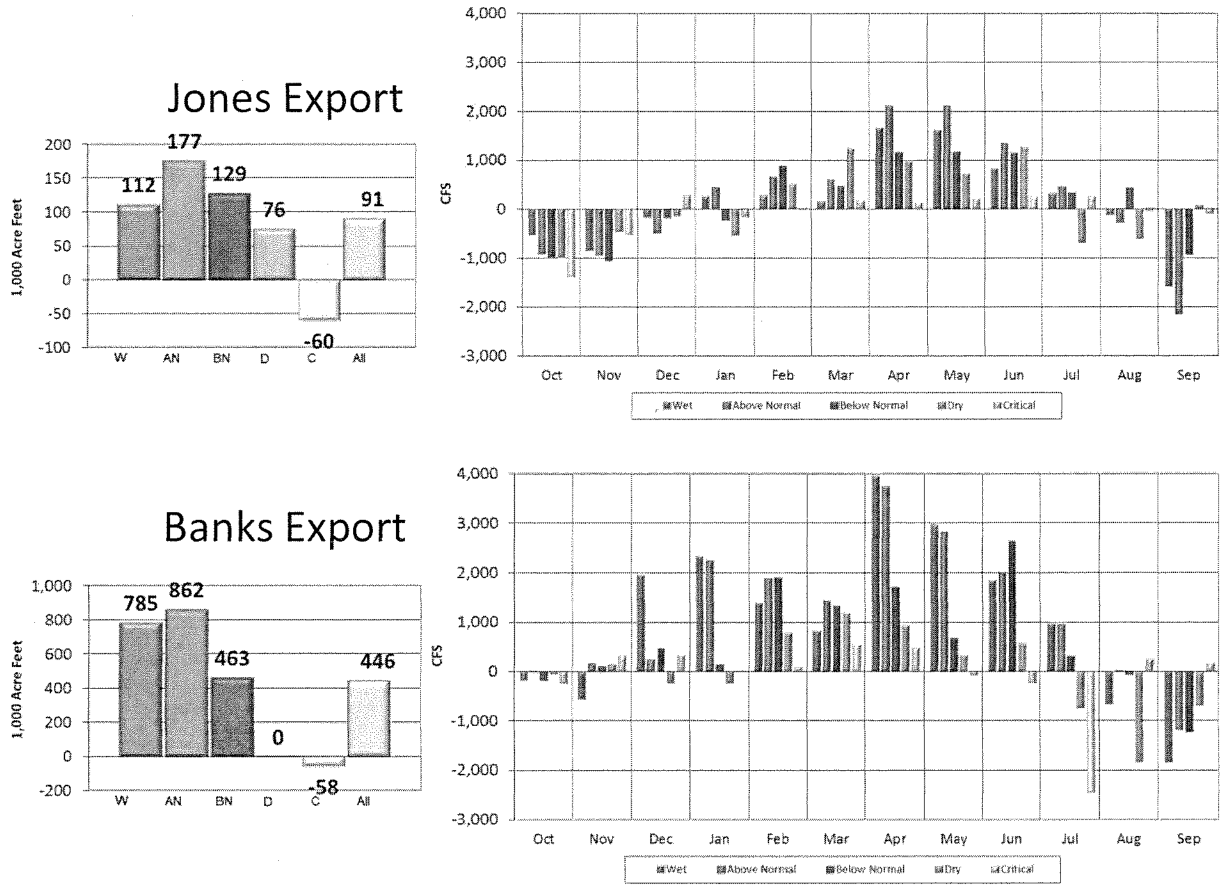


CVP/SWP Exports

Overall the Alt 4 will increase exports compared to the NAA-ELT, with the majority of the increased exports realized by the SWP. Figure 20 illustrates a comparison between the NAA-ELT and Alt 4-ELT of CVP and SWP exports. On average, total combined exports under Alt 4–ELT are projected to increase by 537 TAF from 4.73 MAF to 5.26 MAF compared to the NAA-ELT.

BDCP1722

Figure 20. Change in CVP (Jones) and SWP (Banks) Exports (Alt 4-ELT minus NAA-ELT)



With the addition of the North Delta Diversion facility, the water exported dramatically shifts from South Delta diversions to North Delta diversions. Figure 21 illustrates the change in routing of South of Delta exports under Alt 4 compared to the NAA-ELT. On average, export through the South Delta facility are projected to decrease by 2.1 MAF and the North Delta diversions will export 2.6 MAF which includes the 2.1 MAF shifted from the South Delta facility plus the additional 537 TAF of increased exports.

BDCP 1722

Figure 21. Change in Conveyance Source of Exports (Alt 4-ELT minus NAA-ELT)

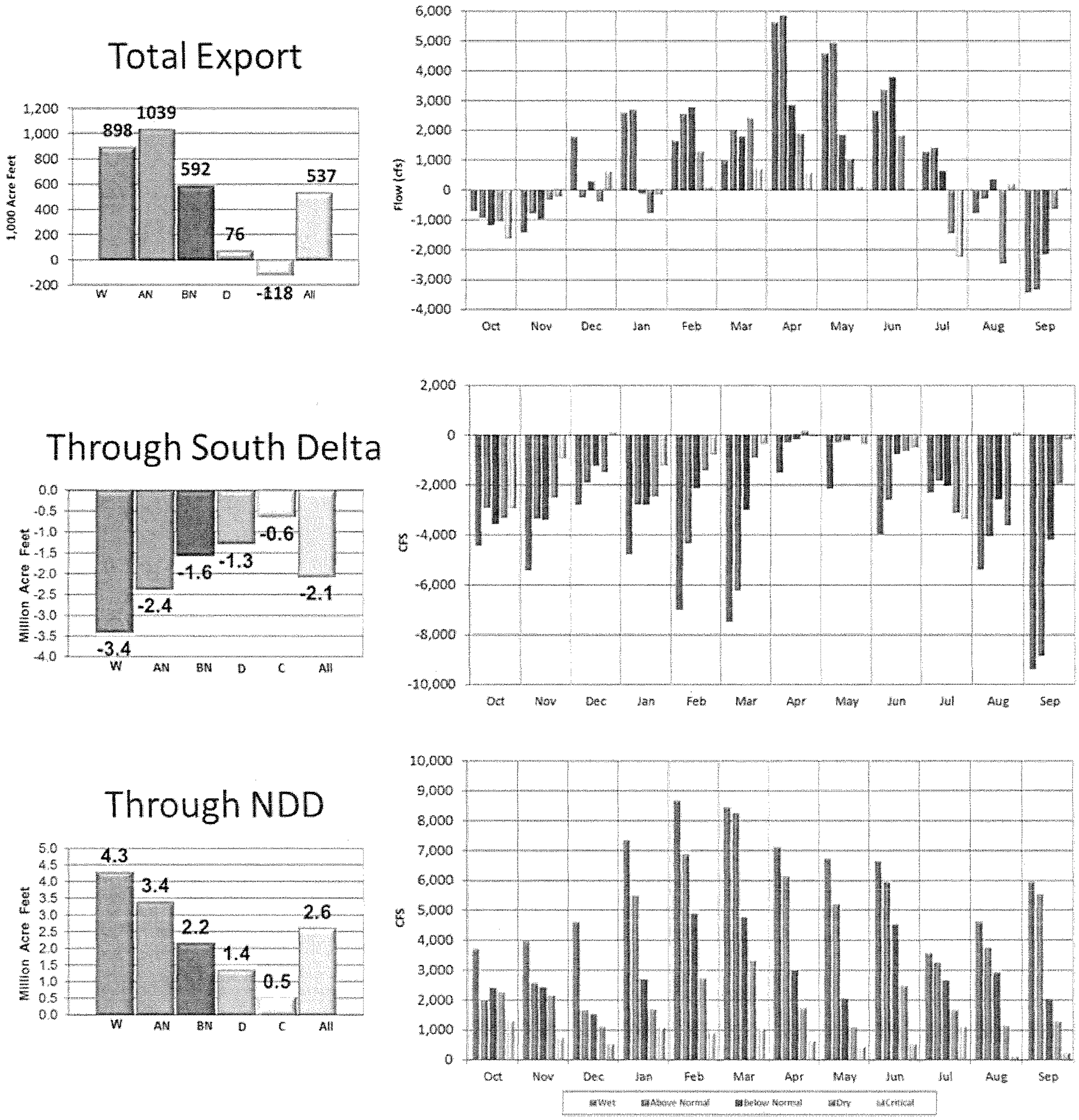
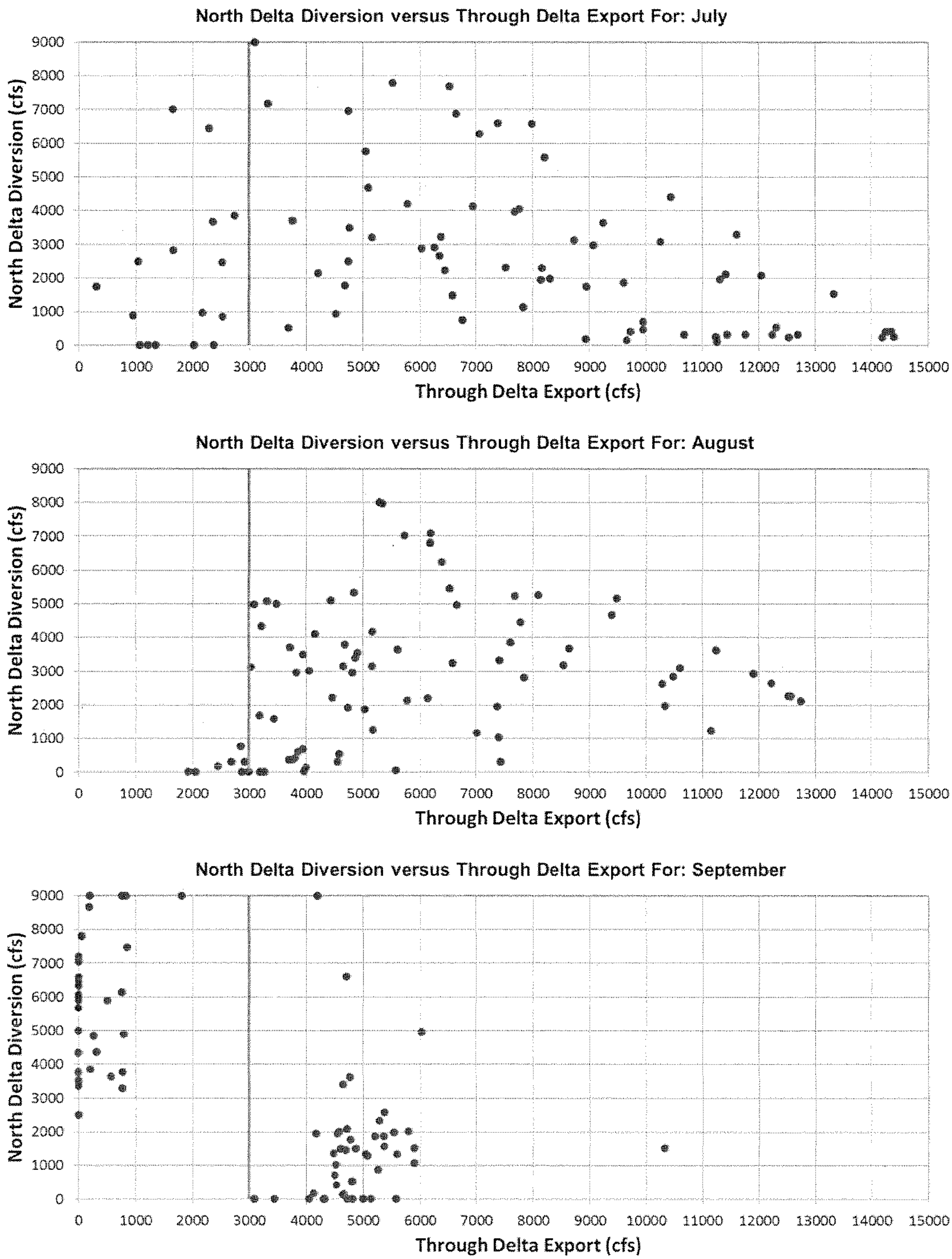


Figure 22 contains figures for July, August, and September for Alt 4-ELT that plot NDD against SDD. In the months of July to September SDD are occasionally very high, exceeding 14,000 cfs in July, with minimal NDD. This occurs due to outdated model code that imposes an instream flow requirement in Sacramento River flow below Hood in excess of the bypass criteria prescribed in the BDCP. There are numerous occurrences when bypass flows prescribed in the BDCP are exceeded and SDD are higher than expected. On the other hand, there are also many times when NDD are above minimum pumping levels and SDD are below the BDCP prescribed 3,000 cfs threshold indicated by the green line in Figure 22. For unknown reasons, the model code requiring SDD to be greater than 3,000 cfs before NDDs occur from July through September is deactivated in the BDCP modeling of this Alternative.

BDCP1722

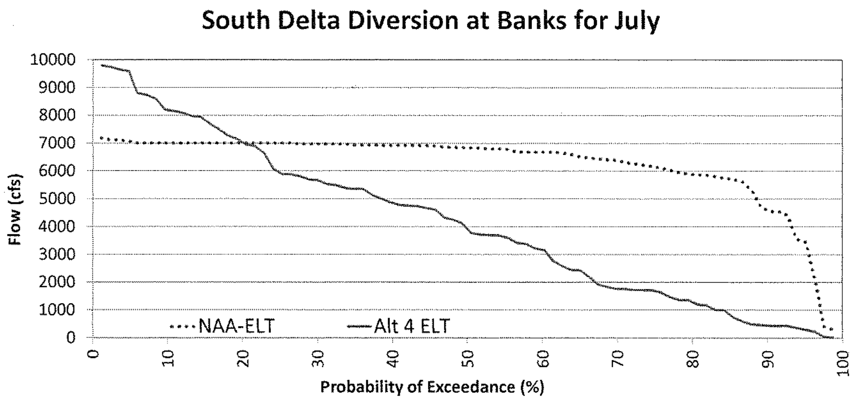
Figure 22. Alt 4-ELT North Delta Diversion Versus South Delta Diversion for July, August, and September

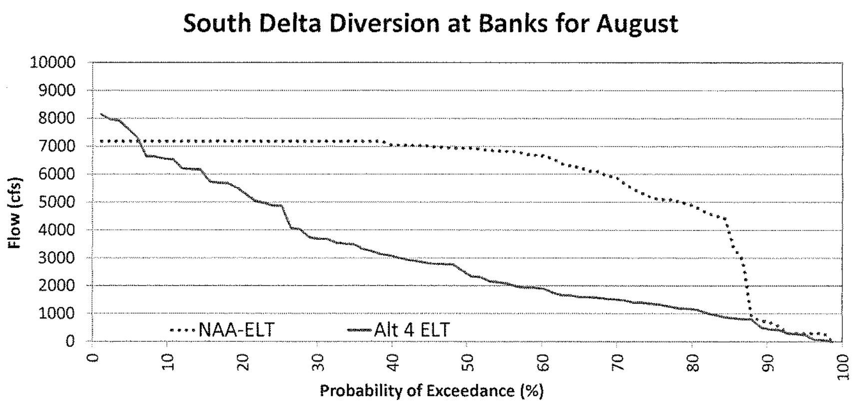


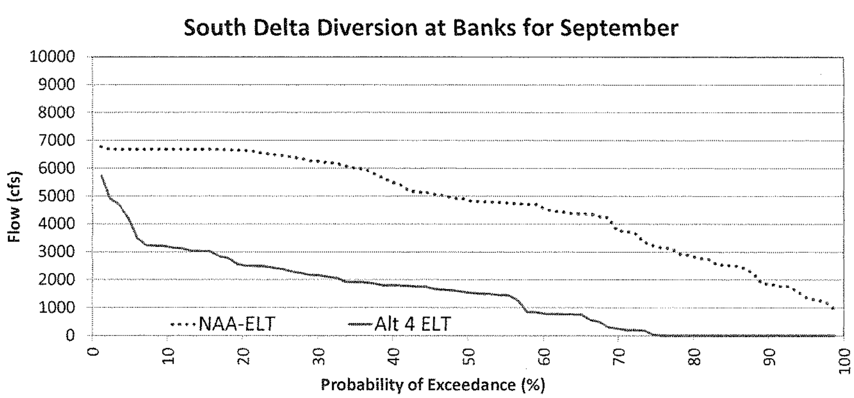
South Delta Diversion at Banks is not limited to existing permit capacity of 6,680 cfs and pumping may reach full capacity of 10,300 cfs in July, August, and September. Figure 23 contains exceedance probability charts of South Delta Diversion at Banks for July, August, and September. The chart for July shows SDD at Banks exceeding existing permit capacity 20% of years, in August this occurs in about 7% of years. There are South Delta diversions at Banks 25% of the time in September while diversions from the Sacramento River may range from 2,500 cfs to 7,500 cfs.

BDCP1722

Figure 23. South Delta Diversion at Banks







Generally exports increase during winter and spring months due to the ability to avoid fishery concerns by diverting at the North Delta rather than South Delta.

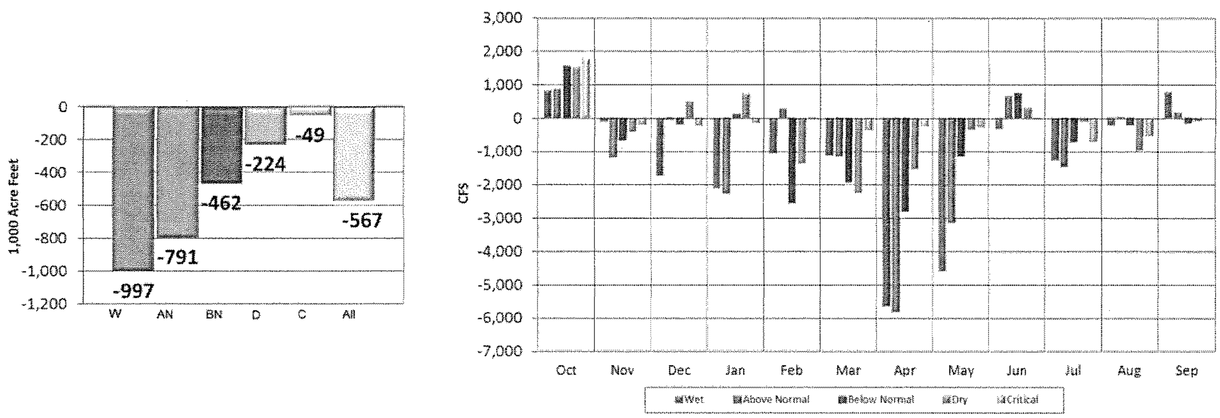
Delta Outflow

Figure 24 illustrates a comparison of Delta outflow between the NAA-ELT and Alt 4-ELT. Decreases in Delta outflow are the result of the CVP and SWP ability to increase Delta exports in Alt 4-ELT. The apparent increase in Delta outflow in October is partially due to additional export restrictions though Old and Middle River flow requirements. However, the increase in October Delta outflow is also due to an unrealistic operation of the Delta Cross Channel. The additional export restrictions cause the flow standards imposed at Rio Vista to be the controlling point in CVP and SWP operations; the water quality standards are all being met and do not require

BDCP1722

flows above the amount needed to satisfy the Rio Vista standard. Meeting the Rio Vista flow standards without closing the Delta Cross Channel gate results in releasing more water from upstream reservoirs than would otherwise be necessary. This occurs because a certain amount of the water released to meet the Rio Vista flow standards would flow into the Central Delta at location of the Delta Cross Channel gate. This water would not make it to Rio Vista and therefore would not be counted towards meeting the Rio Vista flow standards. However, due to the BDCP model's assumed restrictions on exports at this time, this water could not be pumped from the South Delta facilities and thus ends up as "extra" Delta outflow. By closing the Delta Cross Channel gate, the operators would assure that all of the water released to meet the Rio Vista flow standards would be counted towards those standards. The BDCP model's assumptions that the Delta Cross Channel gate would not be closed are not practical or a sensible operation as the operators confirmed they would close the gate during these conditions to avoid the unnecessary loss of water supplies (as was done in October and November 2013). The assumption in the BDCP model to maintain the gate in the open position causes it to overstate the amount of Delta outflow.

Figure 24. Delta Outflow Change (Alt 4-ELT minus NAA-ELT)



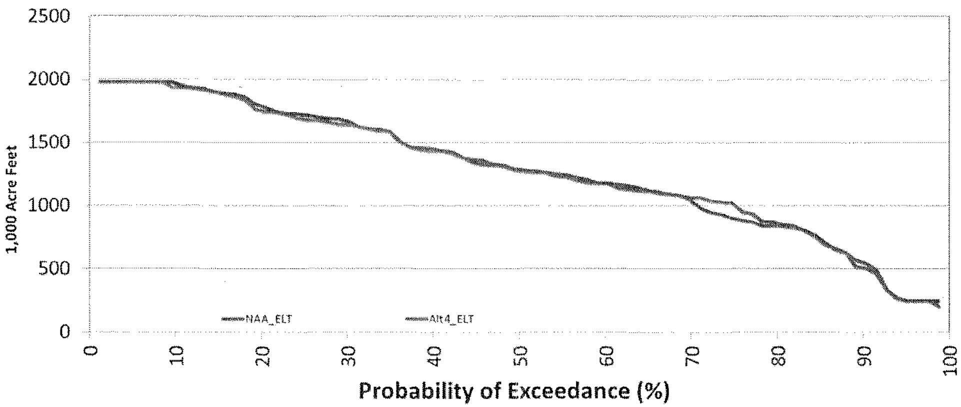
CVP/SWP Reservoir Carryover Storage

CVP/SWP reservoir operating criteria in the Alt4-ELT scenario differs from the NAA-ELT scenario. This difference is primarily driven by changes in both CVP and SWP San Luis Reservoir target storage. CalSim II balances upstream Sacramento Basin CVP and SWP reservoirs with storage in San Luis Reservoir by setting target storage levels in San Luis Reservoir. CalSim II will release water from upstream reservoirs to meet target levels in San Luis Reservoir and the target storage will be met as long as there is capacity to convey water and water is available in upstream reservoirs. In Alt 4 the San Luis Reservoir target storage is set very high in the spring and early summer months, and then reduced in August and set to San Luis Reservoir dead pool from September through December. This change in San Luis target storage relative to the NAA causes upstream reservoirs to be drawn down from June through August and then recuperate storage relative to the NAA by cutting releases in September; Alt 4 upstream storage then remains close to the NAA during fall months. These operational criteria cause changes in upstream cold water pool management and affect several resource areas. Figure 25, Figure 26, Figure 27, and Figure 28 contain exceedance charts for carryover storage and average monthly changes in storage by Sacramento Valley Water Year Type for North of Delta CVP and SWP reservoirs.

San Luis Reservoir Operations

In addition to changes in upstream storage conditions, changes in San Luis Reservoir target storage cause San Luis Reservoir storage to reach dead pool in many years with subsequent SOD delivery shortages. Although some delivery shortages are due to California Aqueduct capacity constraints, the largest annual delivery shortages are a result of inappropriately low target storage levels. Average annual Table A shortages due to artificially low San Luis reservoir storage levels increased from 3 TAF in the NAA-ELT scenario to 35 TAF in the Alt4-ELT scenario. (Shortages due only to a lack of South of Delta conveyance capacity were not included in these averages.) Such shortages occurred in 2% of simulated years in the NAA-ELT scenario and 23% of years in the Alt4-ELT scenario. In addition to the inability to satisfy Table A allocations, low storage levels cause loss of SWP contractors' Article 56 water stored in San Luis Reservoir. Average annual Article 56 shortages were 43 TAF in the Alt4-ELT scenario because of low San Luis storage and 5 TAF in the NAA-ELT scenario. Low San Luis storage causes Article 56 shortages in 27% of simulated years in the Alt4-ELT scenario as compared to 5% of simulated years in the NAA-ELT. Another consequence of low storage levels in San Luis Reservoir is a shift in water supply benefits from Article 21 to Table A. As seen in Figure 29 and Figure 30 San Luis Reservoir storage fills more regularly in the Alt 4-ELT scenario, but is exercised to a lower point more often.

Figure 25. Trinity Reservoir Carryover Storage and Average Monthly Changes (Alt 4-ELT minus NAA-ELT) in Storage by Water Year Type



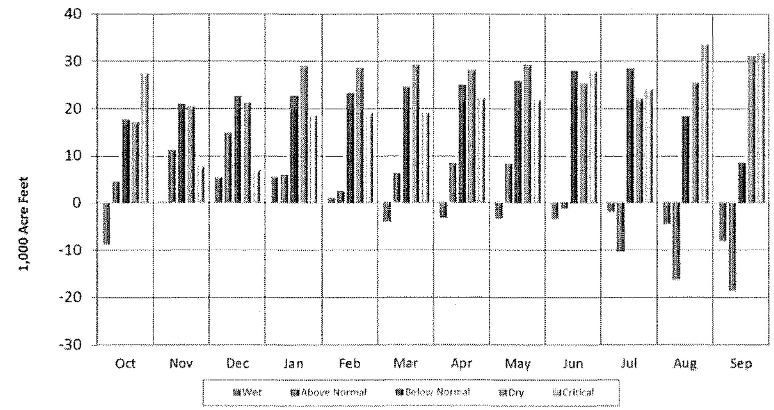
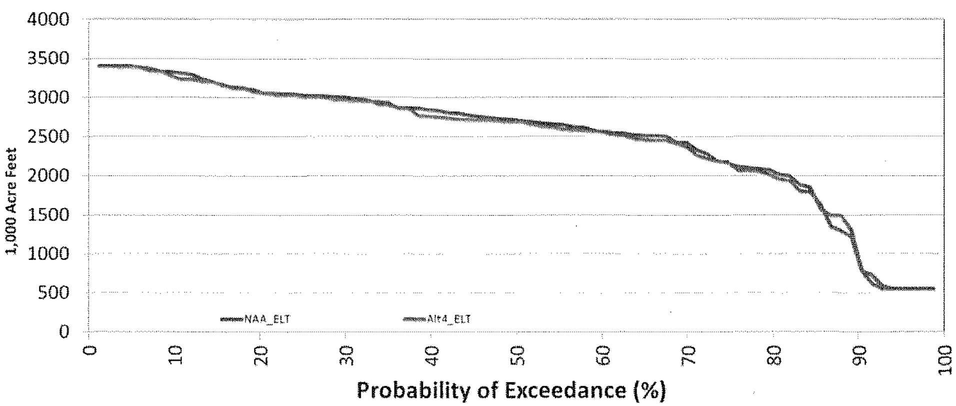
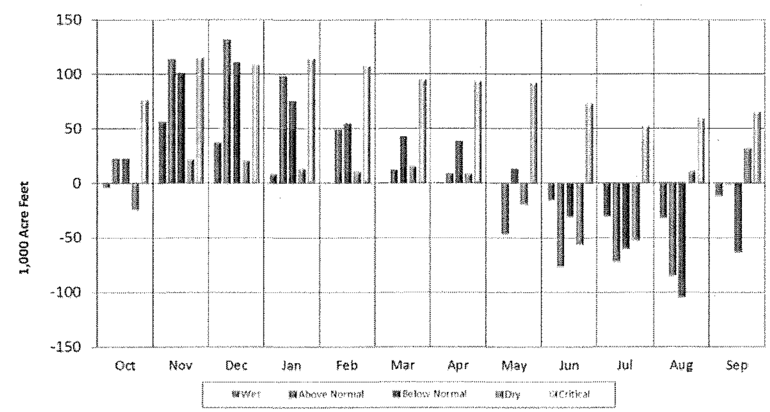


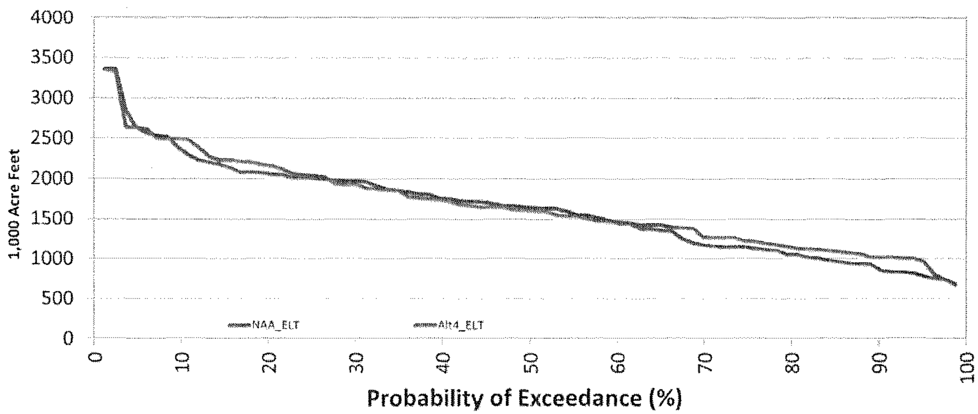
Figure 26. Shasta Reservoir Carryover Storage and Average Monthly Changes (Alt 4-ELT minus NAA-ELT) in Storage by Water Year Type





BDCP1722

Figure 27. Oroville Reservoir Carryover Storage and Average Monthly Changes (Alt 4-ELT minus NAA-ELT) in Storage by Water Year Type



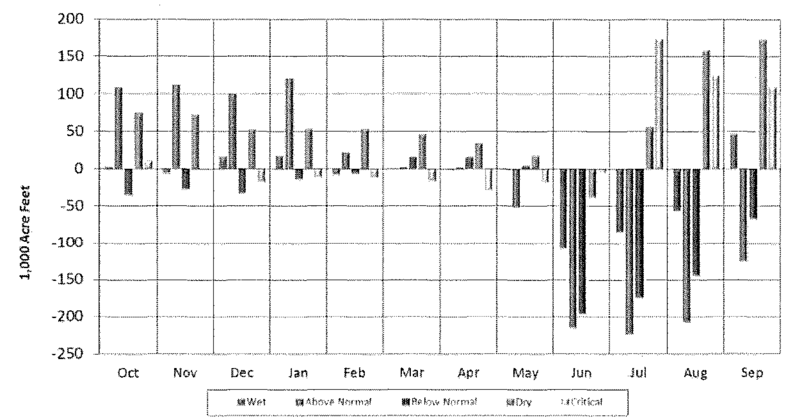
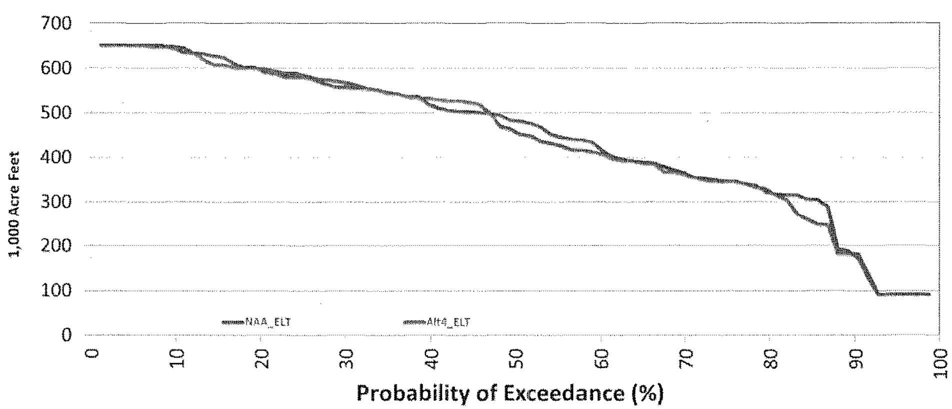
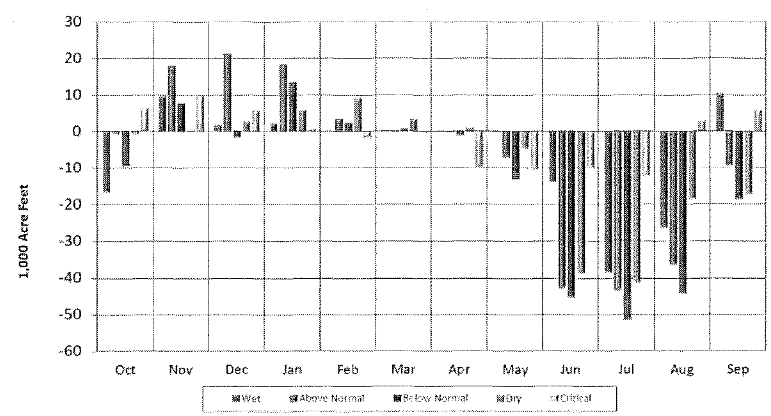


Figure 28. Folsom Reservoir Carryover Storage and Average Monthly Changes (Alt 4-ELT minus NAA-ELT) in Storage by Water Year Type





BDCP1722

Figure 29. Federal Share of San Luis Reservoir (Alt 4-ELT and NAA-ELT)

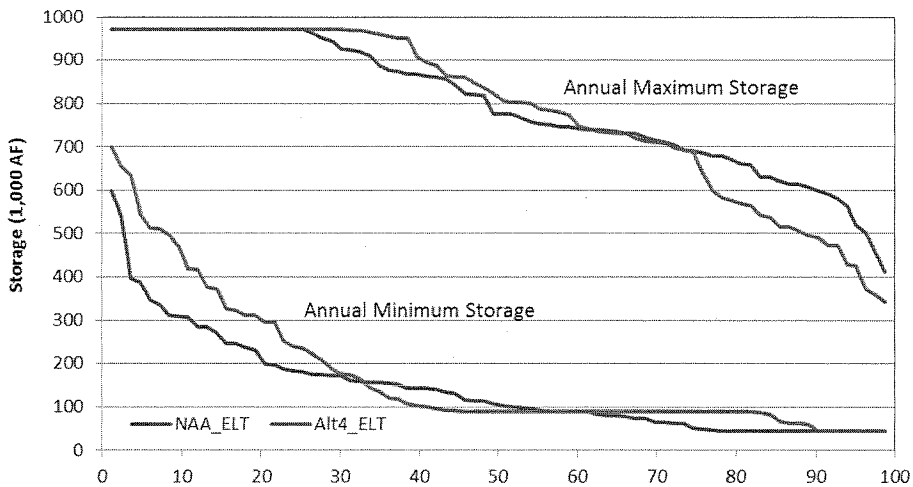
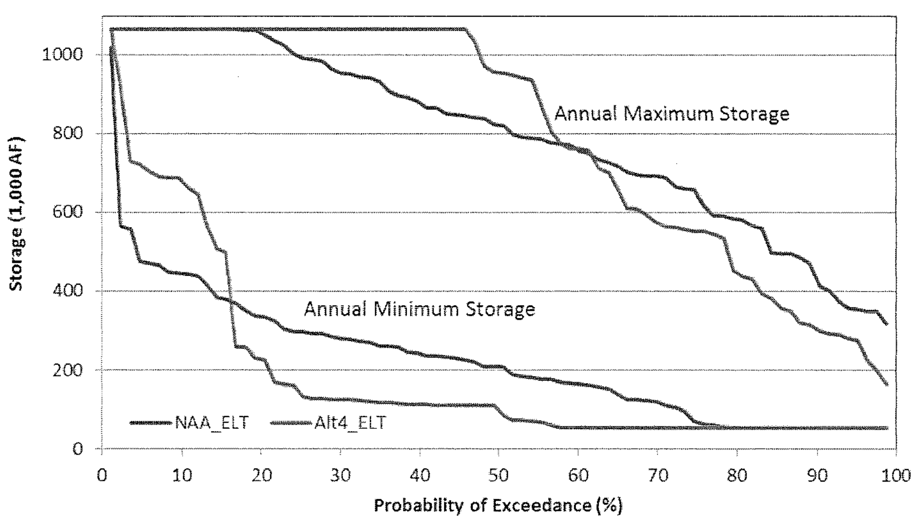


Figure 30. State Share of San Luis Reservoir (Alt 4-ELT and NAA-ELT)



CVP Water Supply

The changes in water supply to CVP customers, based on customer type and water year type is shown in Table 3. Alt 4-ELT shows an average increase of approximately 109,000 AF of delivery accruing to CVP customers with CVP SOD agricultural contractors receiving most of the benefit. Changes in Sacramento River Settlement contract deliveries are not an anticipated benefit of the BDCP, increases in these deliveries in Alt 4-ELT relative to the NAA-ELT are due to the shortages in the NAA-ELT from climate change that are reduced in Alt 4-ELT. Although the BDCP modeling demonstrates minor benefits to NOD CVP service contractors, this increase is not an anticipated benefit of the BDCP.

Consistent with modeling for the NAA-ELT Scenario, San Joaquin River Exchange Contractors receive full deliveries in accordance with contract provisions. Figure 31 compares CVP Service Contract delivery of Alt 4-ELT to the NAA-ELT Scenario. Increases in delivery generally occur in below and above normal years.

BDCP1722

Table 3. CVP Delivery Summary (Alt 4-ELT and NAA-ELT)

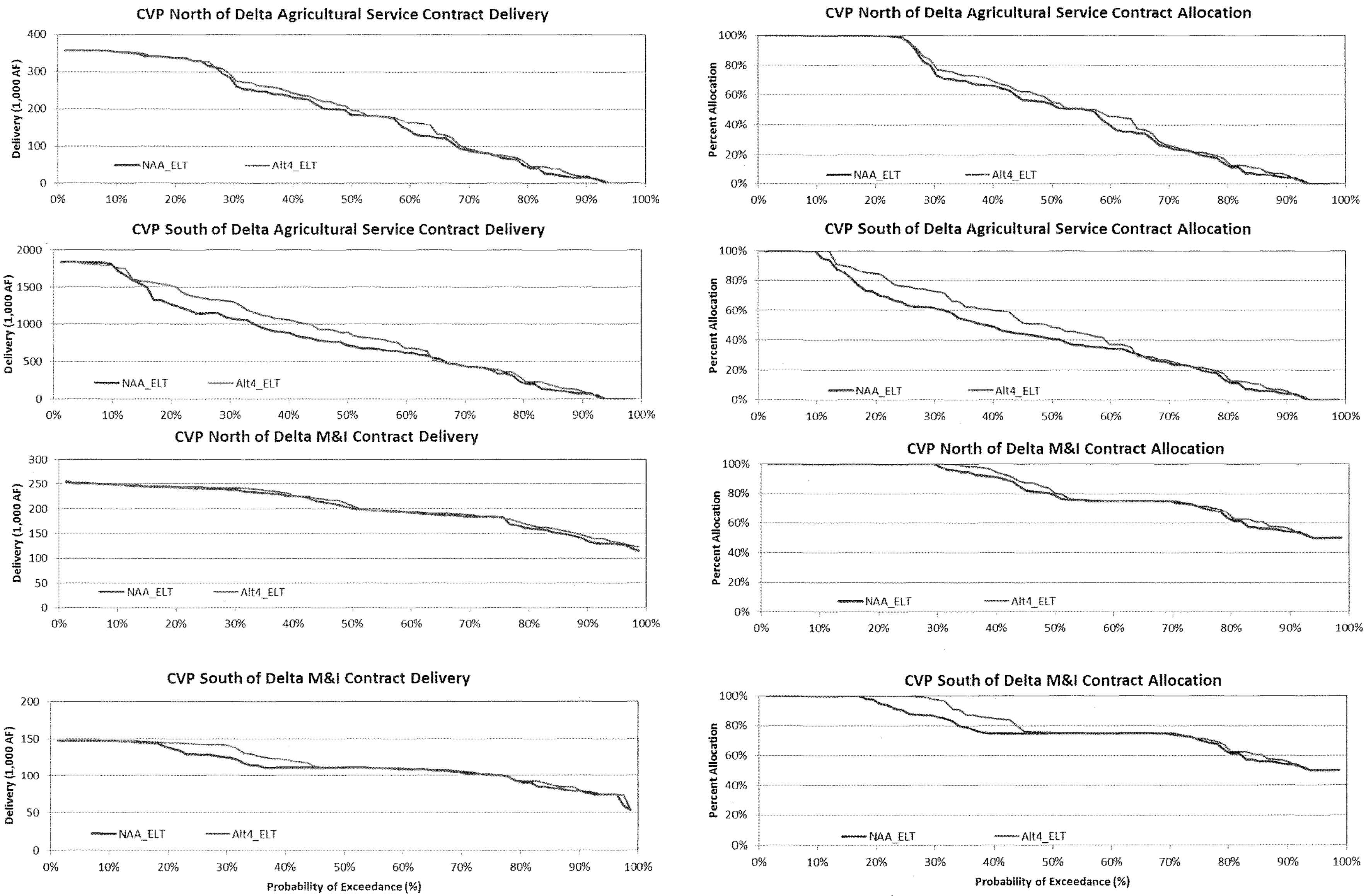
NAA-ELT (1,000 AF)

	AG NOD	AG SOD	Exchange	M&I NOD	M&I SOD	Refuge NOD	Refuge SOD	Sac. Setlmnt	CVP NOD Total	CVP SOD Total
All Years	**187**	**796**	**852**	**201**	**112**	**86**	**271**	**1846**	**2321**	**2215**
W	309	1364	875	236	134	90	281	1856	2491	2837
AN	246	908	802	214	110	83	257	1716	2258	2246
BN	146	596	875	198	108	92	281	1899	2335	2044
D	95	440	864	175	100	90	277	1890	2250	1864
C	29	152	741	140	79	64	223	1674	1908	1376

Difference: Alt4-ELT minus NAA-ELT (1,000 AF)

	AG NOD	AG SOD	Exchange	M&I NOD	M&I SOD	Refuge NOD	Refuge SOD	Sac. Setlmnt	CVP NOD Total	CVP SOD Total
All Years	8	90	0	4	4	1	0	3	15	94
W	1	68	0	1	3	2	1	-2	1	72
AN	14	199	0	3	12	1	0	-1	17	211
BN	17	153	0	5	4	0	0	0	22	158
D	10	48	0	5	2	1	-1	-1	15	49
C	3	6	0	5	2	-1	2	26	33	12

Figure 31. CVP Service Contract Deliveries (Alt 4-ELT and NAA-ELT)



BDCP1722

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SWP Water Supply

Similar in nature, but larger in magnitude are changes in SWP deliveries. Figure 32 and Table 4 illustrate the benefits of Alt 4-ELT in comparison to the NAA-ELT Scenario. These studies show an increase in average annual SWP SOD deliveries of approximately 408,000 AF, but a reduction in critical year deliveries of approximately 177,000 AF. There is an overall reduction in Article 56 deliveries. Typically in modeling and in actual SWP operations, increases in Table A correspond with increases in Article 56. The reason that Article 56 deliveries decrease overall is that insufficient quantities of water are carried over in San Luis and Article 56 contractors are subsequently shorted. SWP delivery increase is slightly less than increases in Banks export because there is increased wheeling for the Cross Valley Canal contractors with BDCP.

Table 4. SWP Delivery Summary (Alt 4-ELT and NAA-ELT)

NAA-ELT (1,000 AF)

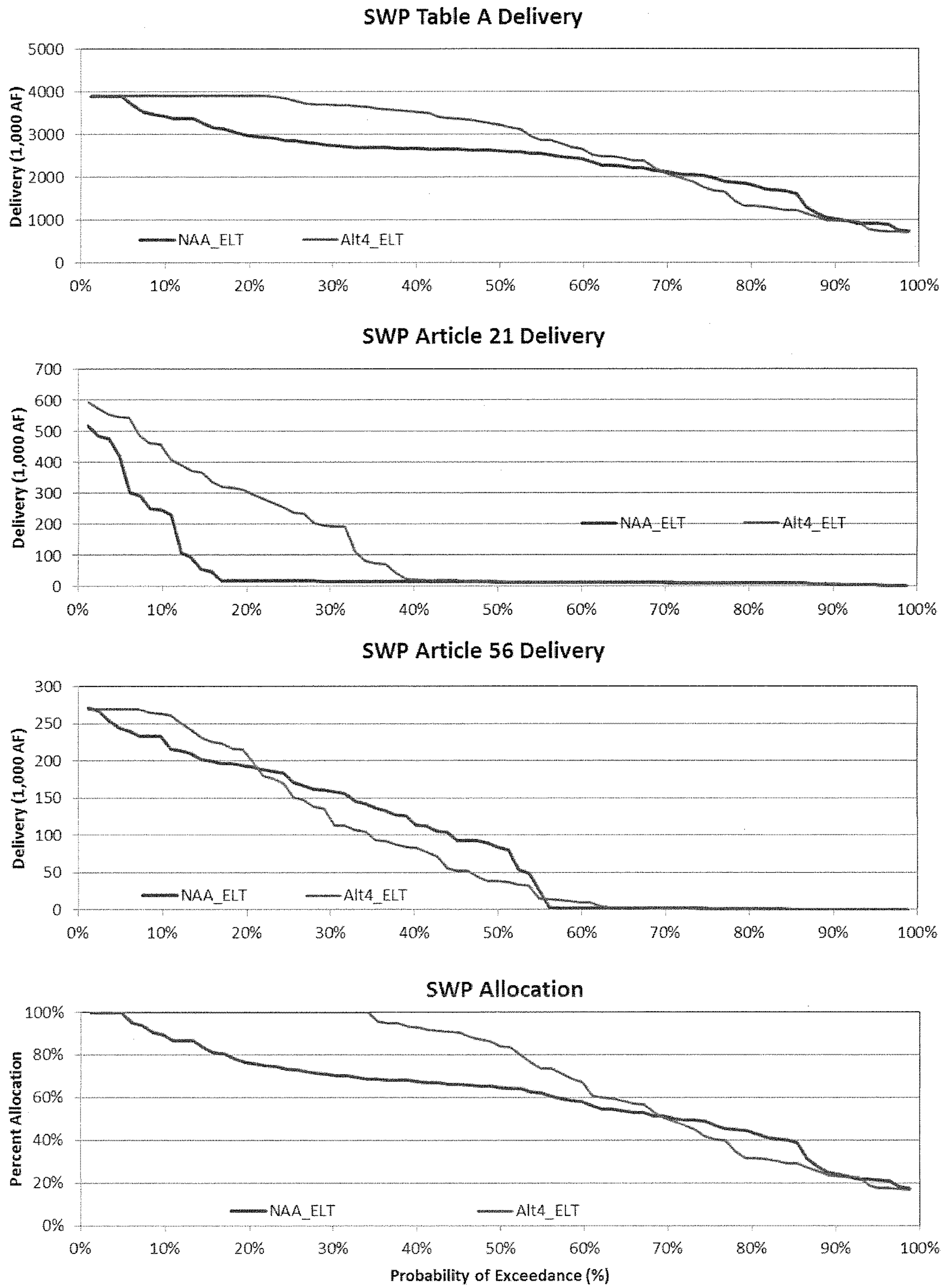
	Table A	Art. 21	Art. 56	Total
All Years	**2425**	**52**	**90**	**2567**
W	3112	79	112	3303
AN	2467	34	57	2559
BN	2515	48	109	2673
D	2033	43	88	2165
C	1172	28	47	1246

Difference: Alt4-ELT minus NAA ELT (1,000 AF)

	Table A	Art. 21	Art. 56	Total
All Years	339	75	-6	408
W	587	159	5	751
AN	728	99	-24	803
BN	525	44	2	571
D	-120	19	-10	-111
C	-146	-19	-12	-177

BDCP 1722

Figure 32. SWP Contract Deliveries (Alt 4-ELT and NAA-ELT)



BDCP1722

Freemont Weir Modifications and Yolo Bypass Inundation

A component of the BDCP Alternative 4 is a modification to the Freemont Weir to allow water to flow into the Yolo Bypass when the Sacramento River is at lower flow than is currently needed. Currently, the Sacramento River does not flow over the Freemont Weir until flow reaches about 56,000 cfs. With the proposed modification Sacramento River flow may enter the Yolo Bypass at much lower flow levels. Figure 33 and Figure 34 contains charts that compare Freemont Weir flow into the Yolo Bypass to Sacramento River flow at the weir, Figure 33 show this relationship for the NAA-ELT and Figure 34 shows this same relationship for Alt 4-ELT.

Although CalSim II is a monthly time-step model, it contains an algorithm that estimates daily flow. Therefore, average monthly flows displayed in Figure 33 shows Sacramento River entering the Yolo Bypass at flow levels less than 56,000 cfs, when this occurs water is flowing over the Freemont Weir for a portion of the month. There is a 100 cfs minimum flow diversion from the Sacramento River diversion to the Yolo Bypass from September through June in Alt 4-ELT.

Figure 35 and Figure 36 contains average monthly flow from the Sacramento River over the Freemont Weir to the Yolo Bypass for the NAA-ELT (Figure 35), average monthly difference between Alt 4-ELT and NAA-ELT (Figure 36), and the annual average difference between Alt 4-ELT and NAA-ELT (Figure 37). In the NAA-ELT scenario flow over the Freemont Weir generally occurs in wet years, this flow is extended to all year types and all months except July and August in Alt 4-ELT. The average annual increase in flow is about 430 TAF.

Figure 33. Fremont Weir vs. Sacramento River NAA-ELT

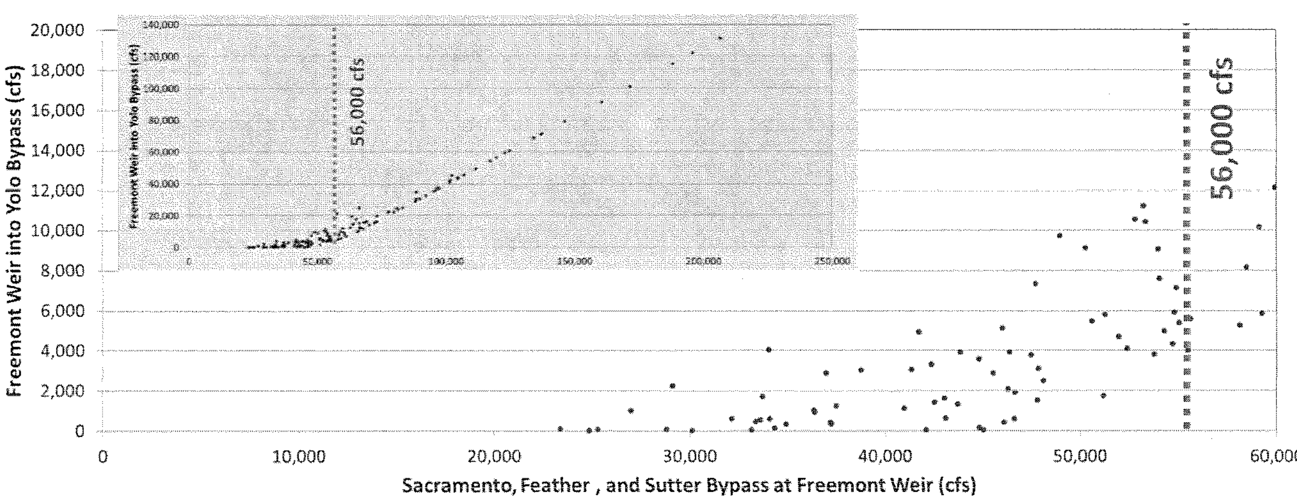


Figure 34. Fremont Weir vs. Sacramento River Alt 4-ELT

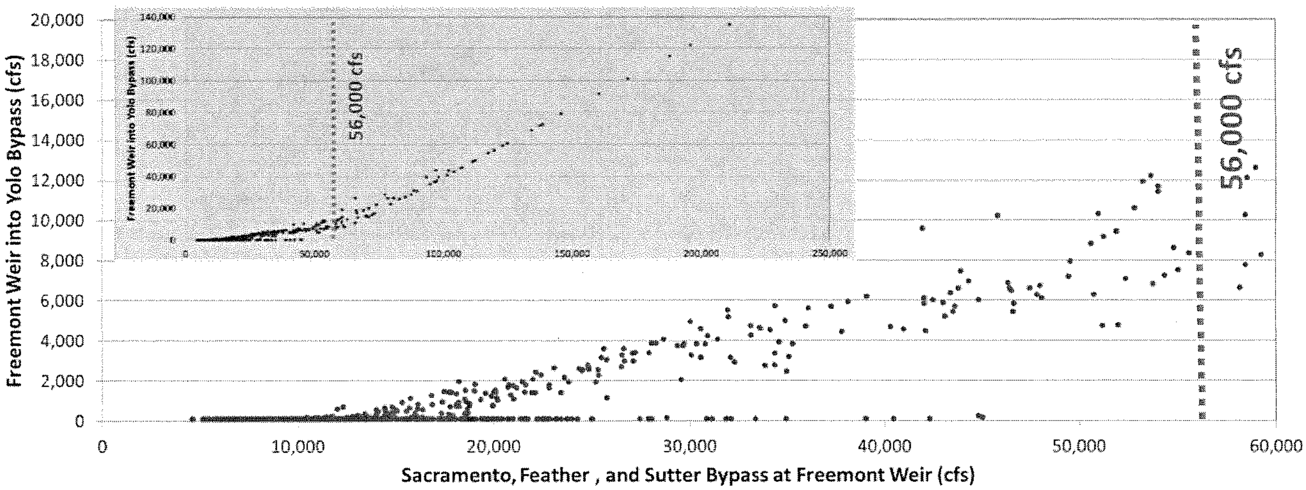


Figure 35. Average Fremont Weir Flow to Bypass by Water Year Type NAA-ELT

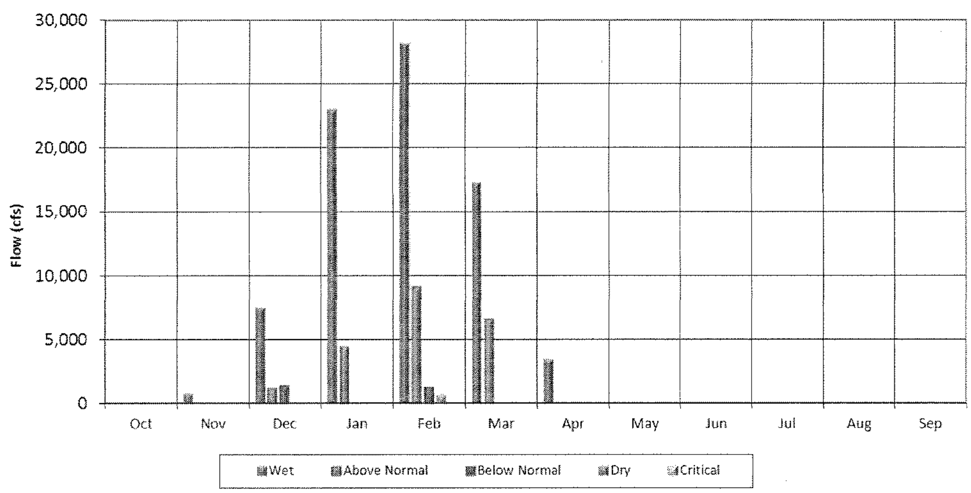
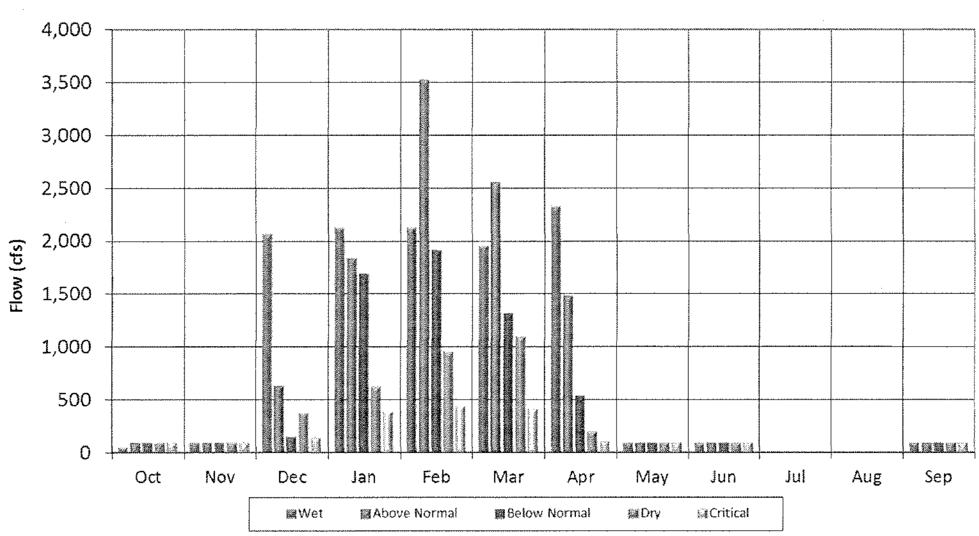
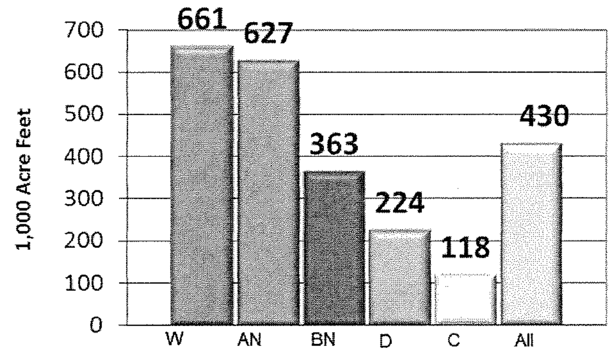


Figure 36. Average Fremont Weir Flow to Bypass by Water Year Alt 4 ELT minus NAA-ELT



BDCP1722

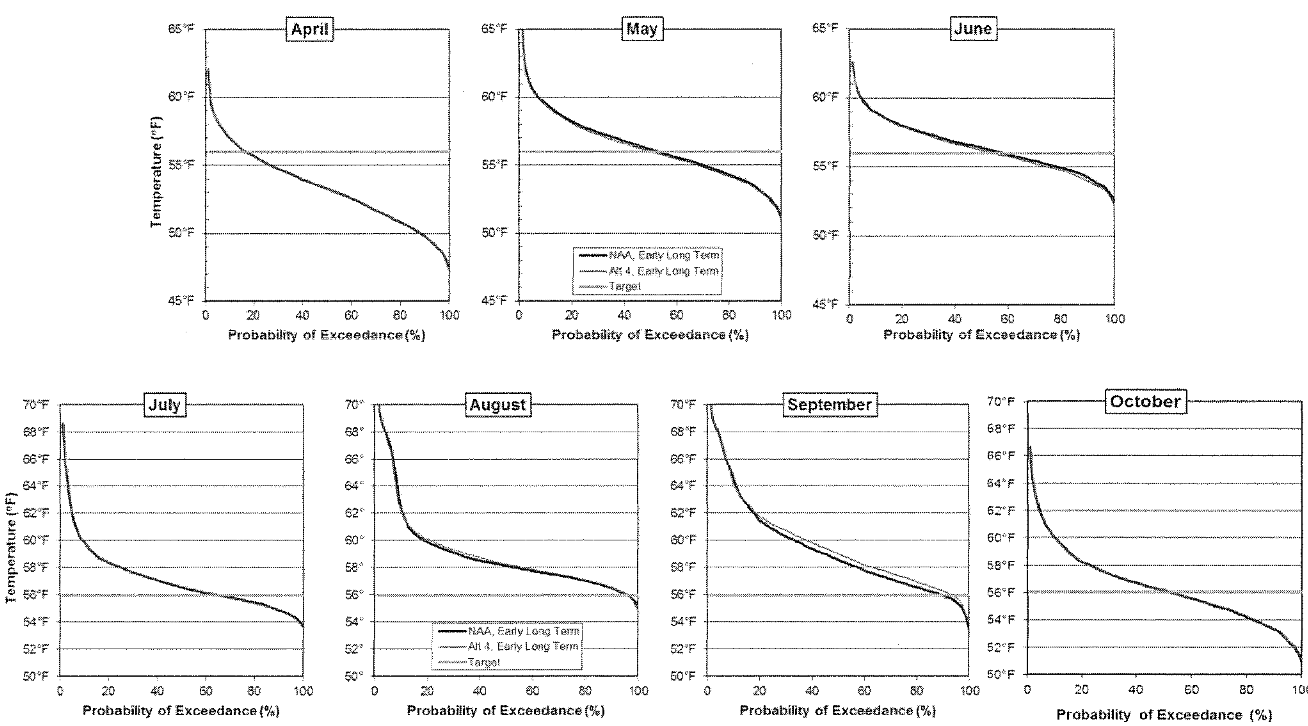
Figure 37. Annual Change in Fremont Weir Flow to Bypass Alt 4-ELT minus NAA-ELT



Sacramento River Temperature

Figure 38 contains exceedance probability plots of Sacramento River temperature at Bend Bridge for the NAA-ELT and Alt 4-ELT. For the months of April through July modeling shows few changes in upper Sacramento River water temperature. The Alt 4-ELT scenario shows temperature increases in August relative to the NAA-ELT. In about 75% of years modeling shows about 0.5°F increase in Alt 4-ELT relative to the NAA-ELT. The temperature models will meet inputted target temperatures until Shasta Lake cold water is depleted, this typically occurs in September. This is the likely reason temperature increases in modeling tend to occur in September.

Figure 38. Sacramento River Temperature at Bend Bridge NAA-ELT and Alt 4-ELT



Conclusions regarding CalSim II modeling of BDCP Alternative 4

BDCP's "High Outflow Scenario" is not sufficiently defined for analysis.
The High Outflow Scenario (HOS) requires additional water (Delta outflow) during certain periods in the spring. The BDCP Model places most of the responsibility for meeting this new additional outflow requirement on the SWP. However, the SWP may not actually be responsible for meeting this new additional outflow requirement. This is because the COA, as it is currently being implemented, would require a water allocation adjustment that would keep the SWP whole. Where one project (CVP or SWP) releases water to meet a regulatory requirement, the COA requires a water balancing to ensure the burden does not fall inappropriately among the projects. The BDCP Model is misleading because it fails to adjust project operations, as required by the COA, to "pay back" the water "debt" to the SWP due to these additional Delta outflow requirements. Unless there is a significant revision to COA, the BDCP Model overstates the impacts of increased Delta outflow on the SWP and understates the effects on the CVP.

Furthermore, after consulting with DWR and Reclamation project operators and managers, the Reviewers conclude that there is no apparent source of CVP or SWP water to satisfy both the increased Delta outflow requirements and pay back the COA "debt" to the SWP without substantially depleting upstream water storage. It appears, through recent public discussions regarding the HOS, that BDCP anticipates additional water to satisfy the increased Delta outflow requirement and to prevent the depletion of cold water pools will be acquired through water transfers from upstream water users. However, this approach is unrealistic because during most of the spring, when BDCP proposes that Delta outflow be increased, agricultural water users are not typically irrigating. This means that there is not sufficient transfer water available to meet the increased Delta outflow requirements without releasing stored water from the reservoirs. Releasing stored water to meet the increased Delta outflow requirements could potentially impact salmonids on the Sacramento and American River systems

Simulated operation of BDCP's dual conveyance, coordinating proposed North Delta diversion facilities with existing south Delta diversion facilities, is inconsistent with the project description.
The Draft BDCP and associated Draft EIR/EIS specify criteria for how much flow can be diverted by the new North Delta Diversion (NDD) facilities and specify when to preferentially use either the NDD facilities or the existing South Delta Diversion (SDD) facilities. However, the BDCP Model contains an artificial constraint that prevents the NDD facilities from taking water as described in the BDCP project description. In addition to affecting diversions from the NDD, this artificial constraint contains errors that affect the NAA operation. This error has been fixed by DWR and Reclamation in more recent versions of the model; however, the error remains in the BDCP Model. Additionally, the BDCP Model does not reflect the Summer operations of the SDD that are described in the Draft EIR/EIS as a feature of the BDCP project intended to prevent water quality degradation in the south Delta. The net effect of these two errors is that the BDCP Model significantly underestimates the amount of water diverted from the NDD facilities and overestimates the amount of water diverted from the SDD.

BDCP modeling contains numerous coding and data issues that skew the analysis and conflict with actual real-time operational objectives and constraints
logic is coded into the CalSim II model to simulate how DWR and Reclamation would operate the system under circumstances for which there are no regulatory or other definitive rules. This attempt to specify (i.e., code) the logic sequence and relative weighting so that a computer can simulate "expert judgment" of the human operators is a critical element to the CalSim II model. In the BDCP Model, some of the operational criteria for water supply allocations and existing facilities such as the Delta Cross Channel and San Luis Reservoir are inconsistent with real-world conditions.

3 INDEPENDENT MODELING

The Independent Modeling effort originally stemmed from reviews of BDCP Model during which the Reviewers discovered that the BDCP Model did not provide adequate information to determine the effects of the BDCP. There are three basic reasons why the Reviewers cannot assess how the BDCP will affect water operations: 1) NAAs do not depict reasonable operations under the described climate change assumptions, 2) operating criteria used in the BDCP Alternative 4 result in unrealistic operations, and 3) updates to CalSim II since the BDCP modeling was performed almost 4 years ago will likely alter model results to a sufficient degree that conclusions based on the BDCP modeling will likely be different than those disclosed in the Draft EIR/EIS. Given that it is not possible to determine how BDCP may affect CVP and SWP operations or water system flows and conditions with the BDCP model, Independent Modeling was performed to assess potential effects due to the BDCP.

To revise the models, the Reviewers consulted with operators at DWR and Reclamation to improve the representation of operational assumptions. Additionally, the Reviewers consulted with modelers at DWR and Reclamation to share findings, to strategize on the proper way to incorporate the guidance received from the operators, and to present revised models to DWR and Reclamation for their review. This collaborative and iterative process differed considerably from a standard consulting contract where the work product is not shared beyond the client-consultant until a final version is complete. To the contrary, consultations with agency experts were conducted early and repeatedly to ensure the revisions would reflect reasonable operations and to provide an independent review.

The first phase of this Independent Modeling effort was development of an updated without project baseline (similar to the NAA but with current, improved assumptions). The Independent Modeling does not incorporate climate change because the climate change hydrological assumptions developed by BDCP cause unrealistic operation of the system absent commensurate changes to operating criteria.

After the baseline was complete and reviewed, the second phase of this effort incorporated the facilities and operations for the BDCP described as Alternative 4 H3 in the Draft EIR/EIS, and otherwise known as the Evaluated Starting Operations (ESO) scenarios in the BDCP. During this phase, the issues that were identified during the Reviewers' initial review were corrected along with corrections made to resolve additional issues that were revealed as improvements were incorporated. Finally, results of the Independent Modeling and potential effects of the BDCP on water supply and instream flows are discussed.

3.1 Changes to CalSim II Assumptions

Revisions approved by DWR and Reclamation for the 2013 baseline

DWR and Reclamation provided CalSim II models used for the 2013 SWP Delivery Reliability Report (DRR) for use in this independent modeling effort. Changes to these models were made for this effort and provided to DWR and Reclamation, many of these changes have since been incorporated into DWR and Reclamation's model and others are under review.

The CalSim II model used for the 2013 SWP DRR is located on DWR's web site at: http://baydeltaoffice.water.ca.gov/modeling/hydrology/CalSim/Downloads/CalSimDownloads/CalSim-IIStudies/SWPReliability2013/index.cfm. Documentation for this model is described in the report titled: "*Draft Technical Addendum to the State Water Project Delivery Reliability Report 2013*", also located on DWR's web site at: http://baydeltaoffice.water.ca.gov/swpreliability/. Key modeling assumptions used for this effort are consistent with the 2013 SWP DRR and are listed in Table 4 of the Technical Addendum.

CalSim II is continuously being worked on and improved to better represent CVP and SWP operations and fix known problems. The Technical Addendum to the 2013 SWP DRR contains a description of updates and fixes that have occurred since modeling was performed for the BDCP Draft EIRS. Among these changes and fixes are key items that directly affect operation of facilities proposed in BDCP Alternative 4, these items are described on page 4 of 2013 SWP DRR Technical Addendum. Key among these fixes is the correction of the Sacramento River flow requirement for Delta inflow that causes NDD bypass to exceed requirements.

A key component of this independent modeling effort is the development of an acceptable CalSim II Future No-Action (FNA) model scenario. The purpose for developing the FNA Scenario is to produce an operational scenario that is realistic enough to understand how changes proposed in the BDCP will affect operations. The process of developing the FNA involved research and development of CalSim II model updates and several meetings with Reclamation and DWR modeling and operations staff. In addition to changes in the FNA Scenario, CalSim II was updated to better reflect operation of the NDD, CVP and SWP reservoir balancing, DCC gate operations, and CVP/SWP water supply allocations.

Additional Revisions to CalSim II Assumptions

The following changes were made to the 2013 SWP DRR version of CalSim II for this effort:

- San Joaquin River Basin
    - Turned off San Joaquin River Restoration Program (SJRRP) The SJRRP will cause a change to San Joaquin River inflow to the Delta not associated with the BDCP. To avoid adding complications to the identification of BDCP export benefits the SJRRP was not incorporated into the analysis.
    - Tuolumne: updated time-series, lookup tables, and wresl code
    - Turned off SJRA (VAMP) releases
- Updated Folsom flood diagram
- Rice decomposition demand diversions from Feather River
- Dynamic EBMUD diversion at Freeport
- SEP1933 correction to daily disaggregated minimum flow requirements at Wilkins Slough and Red Bluff
- CVP M&I demands are updated to reflect assumptions used by Reclamation
- Yuba Accord Transfer
- Los Vaqueros Reservoir capacity

<u>**San Joaquin River Basin**</u>

BDCP modeling depicted San Joaquin River Basin operations generally consistent with the actions, programs and protocols in place at the time of NOI/NOP issuance. Some of those conditions are now not representative of current development or operations. With the exception of the assumption for the SJRRP, the independent modeling has revised San Joaquin River Basin operations to reflect more contemporary LOD assumptions. In future level analyses the independent modeling similarly assumes no SJRRP, but only for analysis simplicity concerning BDCP export benefits. Additional analyses may be useful in understanding effects of collectively implementing the BDCP and SJRRP.

The San Joaquin River Basin (SJR) is depicted for current conditions, primarily affected by the operations of the Stanislaus, Tuolumne, Merced, and upper San Joaquin River tributaries. The upper San Joaquin River is currently modeled in a "pre-" SJRRP condition, consistent with the 2005 CalSim version. The FNA Scenario also models the upper San Joaquin River without the SJRRP. The SJR depicts near-term operations including SWRCB D-1641 flow and water quality requirements at Vernalis met when hydrologically possible with New Melones operations. The Vernalis flow objective is set by SWRCB D-1641 February-June base flow requirements. There are no pulse flow requirements during April and May, and there is no acquired flow such as VAMP or Merced water. D1641 Vernalis water quality requirements are set at 950/650 EC to provide an operational buffer for the requirement. New

Melones is operated to provide RPA Appendix 2E flows as fishery releases and maintains the DO objective in the Stanislaus River through a flow surrogate. Stanislaus River water right holders (OID/SSJID) are provided deliveries up to land use requirements as occasionally limited due to operation agreement (formula). CVP Stanislaus River contractors are provided allocations up to 155 TAF per year in accordance with proposed 3-level plan based on the New Melones Index (NMI). For modeling purposes during the worst drought sequence periods, CVP Stanislaus River contractors and OID/SSJID diversions are additionally cut to maintain New Melones Reservoir storage no lower than 80 TAF. Merced River is operated for Federal Energy Regulatory Commission (FERC) and Davis-Grunsky requirements, and provides October flows as a condition of Merced ID's water rights. The Tuolumne River is operated to its current FERC requirements and current water use needs and has been updated to recent conditions.

Folsom Lake Flood Control Diagram

During wetter years, inflow to Folsom Lake is sufficient to keep the reservoir full while satisfying all demands downstream. When this condition occurs in actual operations, operators increase releases during summer months to maintain higher instream flows and prevent large releases in the fall to evacuate Folsom to satisfy flood control storage requirements. To prevent the model from keeping the reservoir full going into the fall months and then making large releases to comply with flood control storage requirements, the maximum allowable storage during summer months is ramped from full storage in June to flood control levels in the fall. Although this is a common modeling tool, Folsom storage level for the end of September was set too low in the SWP DRR model causing unnecessary releases and resulting in Folsom storage being lower than desired. An adjustment was made to achieve a more realistic summer drawdown for Folsom.

Feather River Rice Decomposition Demand

Demand for rice straw decomposition (decomp) water from Thermalito Afterbay was added to the model and updated to reflect historical diversion from Thermalito in the October through January period. There are approximately 110,000 acres of rice in the Feather River Service Area irrigated primarily with water diverted from Thermalito Afterbay. Although decomp water demand for the Sacramento River has been included in CalSim II since about 2006, this demand has been absent for the Feather River. Inclusion of decomp demand in the version of CalSim II used for this effort results in an increase in Feather River diversion in fall months of about 160,000 AF.

Dynamic EBMUD Diversion at Freeport

Previously the EBMUD operation was pre-determined and input to CalSim II as a time-series. The below criteria was implemented in CalSim II model code to achieve a dynamic representation of EBMUD diversion from the Sacramento River at Freeport.

The EBMUD water service contract is unique. EBMUD's total system storage must be forecast to be below 500 TAF on October 1 for CVP water to be available under the EBMUD contract. In years when this occurs, we assume EBMUD will take the minimum of 65 TAF of CVP water or their CVP allocation (133 TAF * CVP M&I allocations) in the first and second years of any multi-year period when CVP water is available under their contract. In the third year, EBMUD would be limited to 35 TAF of CVP water (assuming diversion of 65 TAF in years one and two) because their contract limits cumulative CVP water over three consecutive years to 165 TAF. The 65, 65, 35 TAF annual diversion pattern then repeats if water is available for four or more consecutive years under the EBMUD contract.

Wilkins Slough Minimum Flow Requirement

Wilkins Slough minimum flow requirements, C129_MIF, includes an adjustment for daily operations based on work with the Sacramento River Daily Operations Model (SRDOM). The flow adjustment for daily flows for September 1933 in the state variable input file appeared unreasonable in the previous model. The flow adjustment in this month was approximately 1,860 cfs and was requiring release of approximately 100 TAF out of Shasta. Review of the entire time-series of daily adjustments showed the adjustment in this month was an order of magnitude greater than in any other September in the simulation period. The year 1933 is a critically dry year, and the third of four consecutive Shasta Critical years. Historical precipitation records from the consumptive use models for the Sacramento Valley, which serves as the basis of much of the CalSim hydrology, were reviewed to ensure there was no unusual precipitation in this month that may create variations in daily flows. It was determined that this daily adjustment is in error. The daily adjustment for this time-step was set to 10 cfs, the value for August 1933.

CVP M&I Demands

Reclamation M&I contractor demands upstream from the Delta have not been adequately represented in CalSim II until Reclamation updated the model in 2012. A more accurate representation of CVP M&I demands, developed in 2012, was incorporated into the model for this effort.

Yuba Accord Water Transfer

In CalSim, Yuba Accord Water Transfers are limited to releases from New Bullards Bar Reservoir. The release is picked up at Banks Pumping Plant or stored in Oroville and Shasta for later release. The additional release from New Bullards Bar is represented in CalSim through an inflow arc. The subsequent refill of New Bullards Bar is represented in CalSim through a diversion arc. In CalSim II, refill is assumed to always occur in the winter following the transfer. However, in the SWP DRR model, there were a few years in which no transfers took place but refill still occurred in the following winter. This was fixed in the updated baseline by capping refill to the previous summer's total transfer.

Los Vaqueros Reservoir

Expansion of Los Vaqueros Reservoir was completed in 2012. Storage capacity was increased from 103 TAF to 160 TAF. In DWR's BDCP studies, Los Vaqueros capacity was set to 103 TAF. The independent modeling increases Los Vaqueros capacity to 160 TAF.

3.2 Changes to BDCP Operations

San Luis Reservoir Rule-Curve Logic Change

In the independent modeling, San Luis rule-curve logic was refined for both SWP and CVP operations. San Luis rule-curve is used to maintain an appropriate balance between San Luis Reservoir storage and North of Delta reservoirs. The key considerations in formulating rule-curve are as follows:

- Ensure that sufficient water is available in San Luis Reservoir to meet contract allocations when exports alone are insufficient due to various operational constraints.
- Minimize San Luis Reservoir carryover storage to low point criteria (both CVP and SWP) and Article 56 carryover (only SWP). The basic premise is to maintain Reservoir San Luis storage no higher than necessary to satisfy south of Delta obligations to avoid excessive drawdown of upstream storage.

In DWR's BDCP studies, there were significant shortages in Table A and Article 56 deliveries because of an improper balance between upstream and San Luis Reservoir storage. The updated SWP rule-curve logic reduces these shortages but does not eliminate them. Also, the updated CVP rule-curve logic allows for higher CVP allocations without increasing risk of shorting SOD contractors.

Upstream Storage Release to Fill San Luis Reservoir Above Needed Supply

In the BDCP NAA and the independent modeling FNA, the model has a priority to release excess stored water that will likely be released for flood control purposes from Shasta and Folsom storage for export at Jones Pumping Plant to storage in San Luis Reservoir in the late summer and early fall months. The purpose was to get a head start on filling San Luis Reservoir for the coming water year if there is a high likelihood of Shasta or Folsom spilling. This was an assumed CVP/SWP adaptation to the export reductions in the winter and spring months due to the salmon and smelt biological opinions. However, with the NDD facility in Alt 4, winter and spring export restrictions impact CVP exports much less and there is no longer a reason to impose this risk on upstream storage. As such, the weights, or prioritizations, of storage in Shasta and Folsom were raised so that excess water would not be released specifically to increase CVP San Luis storage Reservoir above rule-curve. This was changed in Alt 4 and not the FNA to better reflect how the system may operate under these different conditions.

Delivery allocation adjustment for CVP SOD Ag service and M&I contractors

CVP SOD Ag service and M&I allocations are limited by both systemwide water supply (storage plus inflow forecasts) and Delta export constraints; whereas similar CVP NOD allocations are dependent solely on water supply. This frequently results in SOD water service contractors receiving a lower contract year allocation than NOD water service contractors, especially under the Biological Opinion export restrictions. However, with the NDD facility operations as proposed under Alt 4 H3, the CVP can largely bypass these Delta export restrictions, and the export capacity constraint on CVP SOD allocations was determine to be overly conservative. Therefore, the export capacity component of CVP SOD allocations was removed in the BDCP Alternative and both SOD and NOD CVP allocations are equal and based only on water supply.

Folsom/Shasta Balance

CVP operations were refined in the BDCP Alternative to provide maximum water supply benefits to CVP contractors while protecting Trinity, Shasta, and Folsom carryover storage in the drier years. As a whole, this was accomplished with refinements to allocation logic and San Luis rule-curve. However, in initial study runs, an imbalance between Folsom and Shasta was created; while there was a total positive impact to upstream storage in dry years, there was a negative impact to Folsom storage. This was resolved by inserting Folsom protections in the Shasta-Folsom balancing logic. With these protections, the positive carryover impacts were distributed to Trinity, Shasta, and Folsom.

North Delta Diversion Bypass Criteria

The daily disaggregation method for implementing NDD bypass criteria as implemented in DWR's BDCP model was left mostly intact for the updated BDCP studies. However, there were modifications to properly fit the bypass criteria implementation within the latest CalSim operations formulation. Modifications are as follows:

1. No NDD operations occur in cycles 6 through 9 so that Delta operations and constraints can be fully assessed without NDD interference.
2. Cycles 10 and 11 (Daily 1 and Daily 2 respectively) were added to determine NDD operations given various operational constraints including the NDD bypass criteria.
3. From July to October, bypass criteria are based on monthly average operations (no daily disaggregation). Given the controlled reservoir releases at this time and the constant bypass criteria (5,000 cfs from July to September and 7,000 cfs in October), this was determined to be a reasonable assumption. This also simplified coordination of DCC gate operations with NDD in October which will be discussed later.
4. When warranted by conditions in cycle Daily 1 (cycle 10), the bypass criteria in May and June were allowed to be modeled on a monthly average basis in cycle Daily 2 (cycle 11). This allowed a reduction in the number of cycles necessary to determine the fully allowed diversion under the bypass criteria when

the Delta was in balance and additional upstream releases were made to support diversions from the North Delta.

Delta Cross Channel Gate Reoperation in October

The BDCP Alt 4 results in significantly more October surplus Delta outflow as compared to the baseline. The cause of this Delta surplus at a time when the Delta is frequently in balance is a combination of proposed through-Delta export constraints (OMR flow criteria and no through-Delta exports during the San Joaquin River October pulse period), Rio Vista flow requirements, and DCC gate operations. In DWR's BDCP studies, it was assumed that the DCC gates would be open for the entire month of October thereby requiring much higher Sacramento River flows at Hood in order to meet the Rio Vista flow requirement than if the DCC gates were closed. Whereas in the independent BDCP modeling it was assumed that the DCC gates were closed for a number of days during the month such that the 7,000 cfs NDD bypass criteria would be sufficient to meet the weekly average Rio Vista flow requirements. The intent was to minimize surplus Delta outflow while meeting Delta salinity standards and maintaining enough bypass flow to use the NDD facility for SOD exports. This is an approximation of what is likely to occur in real-time operations under similar circumstances. Further gate closures may be possible as salinity standards allow if operators decide to preserve upstream storage at the expense of NDD diversions. This type of operation would require additional model refinements.

Wilkins Slough minimum flow requirement

Currently in CalSim II, relaxation of the Wilkins Slough minimum flow requirement is tied to CVP NOD Ag Service Contractor allocations. This does not reflect actual operations criteria where relaxation of the flow requirement is dependent solely on storage conditions at Shasta. From the comparative analysis perspective of our CalSim planning studies, this introduces a potential problem: changes in CVP NOD Ag Service allocations can result in unrealistic changes in required flow at Wilkins Slough, and such changes in Wilkins Slough required flow can result in unrealistic impacts to Shasta storage. To bypass this problem, we assumed that the required flow at Wilkins Slough in the alternative was equal to the baseline.

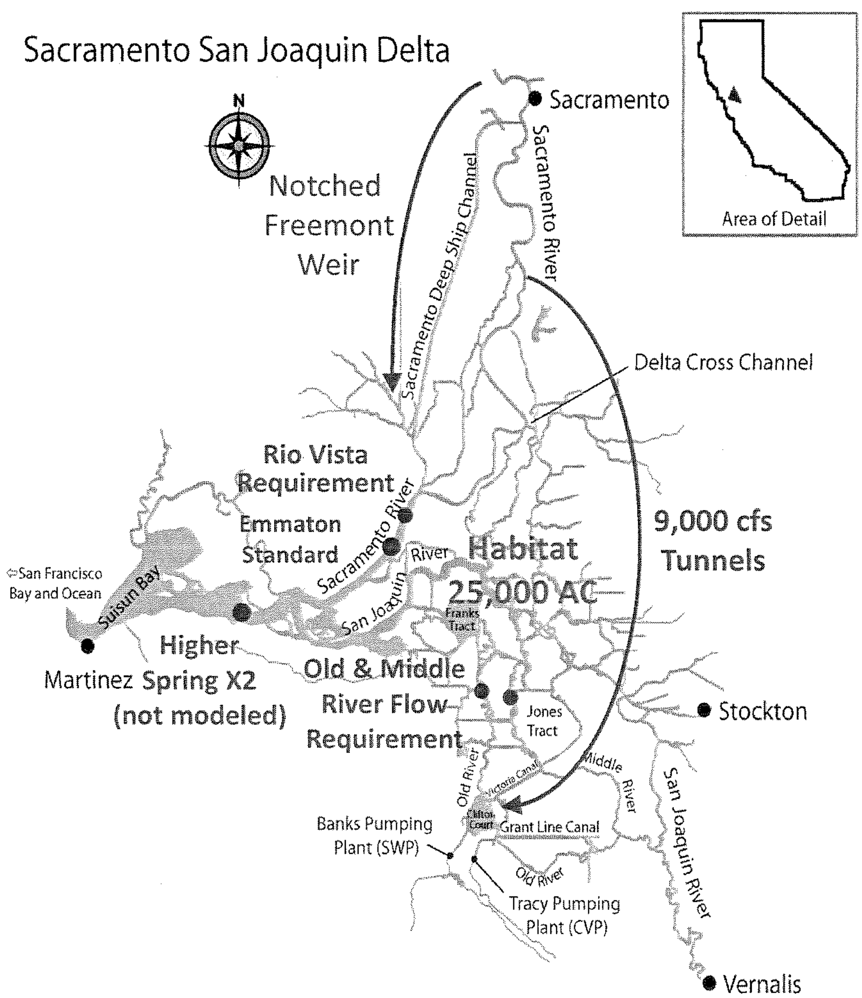
BDCP1722

3.3 Alternative 4 Modeling results

Analysis for this effort was focused on BDCP Alt 4 with existing spring and fall X2 requirements, which corresponds to "Alternative 4 H3" in the Decisions Tree. This modeling is performed without climate change, and includes refined operating criteria for the NDD, CVP and SWP reservoirs, DCC gate closures, and water supply allocations. This modeling includes all Project features that are included in Alt 4 in the BDCP modeling. The Project features are displayed in Figure 39 and summarized as:

- NDD capacity of 9,000 cfs
- Bypass flow requirements for operation of the NDD
- Additional positive OMR flow requirements
- No San Joaquin River I/E ratio
- Changed location for Emmaton water quality standard in SWRCB D-1641
- Additional Sacramento River flow requirement at Rio Vista
- 25,000 acres of additional tidal habitat
- Notched Fremont Weir

Figure 39. Alt 4 Features



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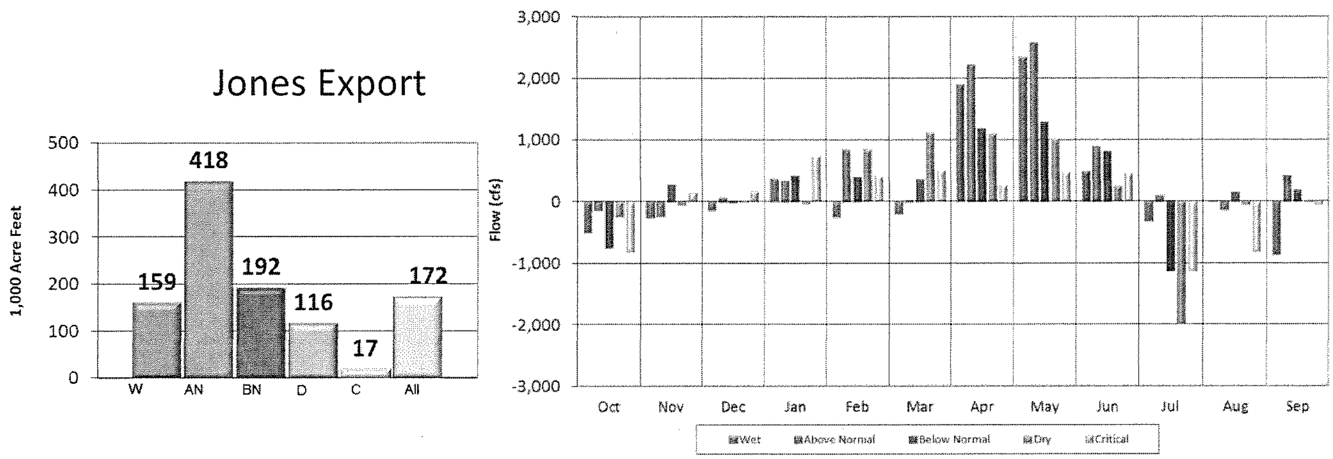
For the purpose of describing results of the independent modeling, the revised Future No Action model scenario is labeled "FNA" and the revised BDCP Alt 4 scenario is labeled "Alt 4".

<u>CVP/SWP Delta Exports</u>

Average annual exports at Jones pumping plant are about 170 TAF higher in the Alt 4 Scenario compared to the FNA scenario, as seen in Figure 40. Increases generally occur from January through June when Old & Middle River (OMR) criteria limit use of Jones PP in the FNA Scenario. Decreases occur in July in drier year types because the increased ability to convey water in spring months reduces the need to convey water stored in upstream reservoirs in July. Reductions in Jones export in October are partially a function of increases in OMR flow requirements.

Figure 40. Change in Delta Exports at Jones Alt 4 minus FNA



Similar to export at Jones, Banks exports are generally higher from January through June because use of NDD allows pumping that is not possible in the FNA Scenario, as seen in Figure 41. Banks exports are increased during summer months of wetter year types. This is due to earlier wheeling for CVP Cross Valley Canal contractors (without NDD Banks capacity isn't typically available until Fall in wet years) and wheeling of CVP water through Joint Point of Diversion (JPOD). CVP export at Banks is displayed in **Figure 42**. In wetter years, upstream CVP reservoirs hold more water than can be exported at Jones pumping plant, this water is typically spilled in the FNA scenario. CVP water stored in upstream reservoirs can be released in July, August, and September to support south of Delta beneficial use of water through use of JPOD in Alt 4.

BDCP1722

Figure 41. Change in Delta Exports at Banks Alt 4 minus FNA

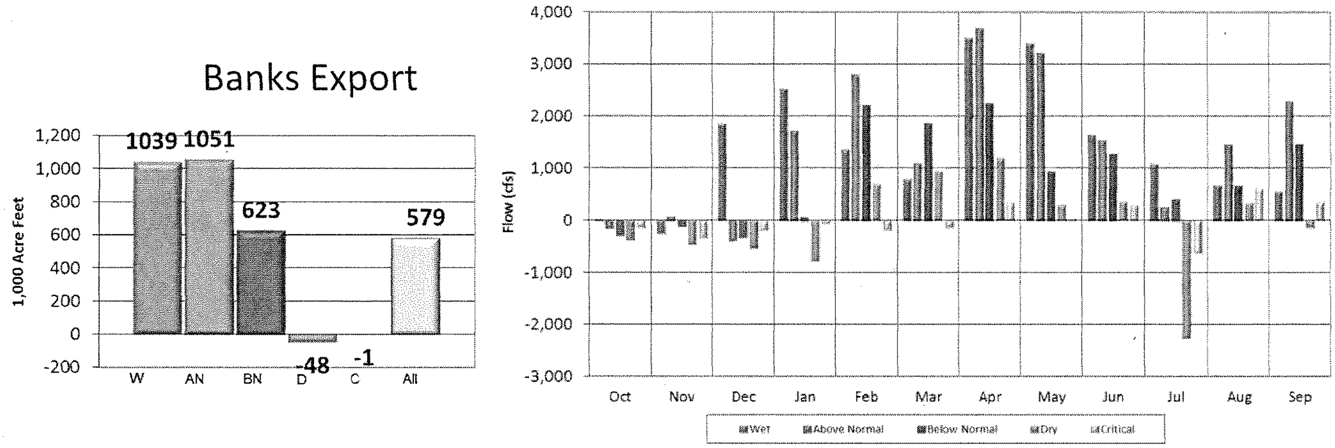
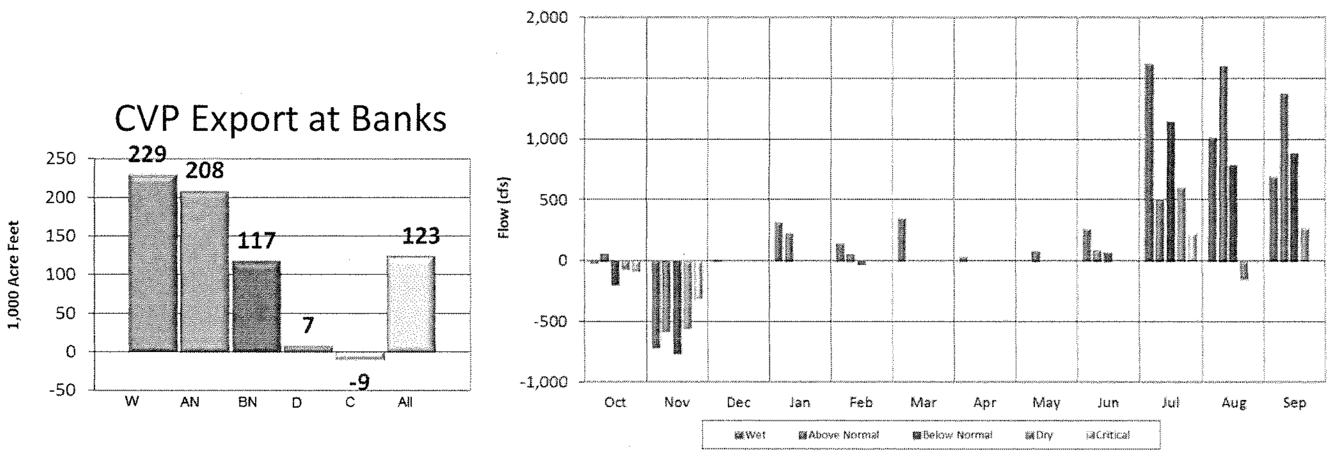


Figure 42. Change in CVP Delta Exports at Banks Alt 4 minus FNA



Changes in total, South Delta, and North Delta exports are displayed in Figure 43. Average annual increase in total Delta exports is about 750 TAF, the increases primarily occur in wetter year types with lesser increases in dryer years. South Delta export decreases about 2.53 MAF in Alt 4 relative to the FNA. Export through the NDD is 3.28 MAF in Alt 4, about 58% of total exports are diverted from the North Delta.

BDCP1722

Figure 43. Change in Conveyance Source of Exports (Alt 4 minus FNA)

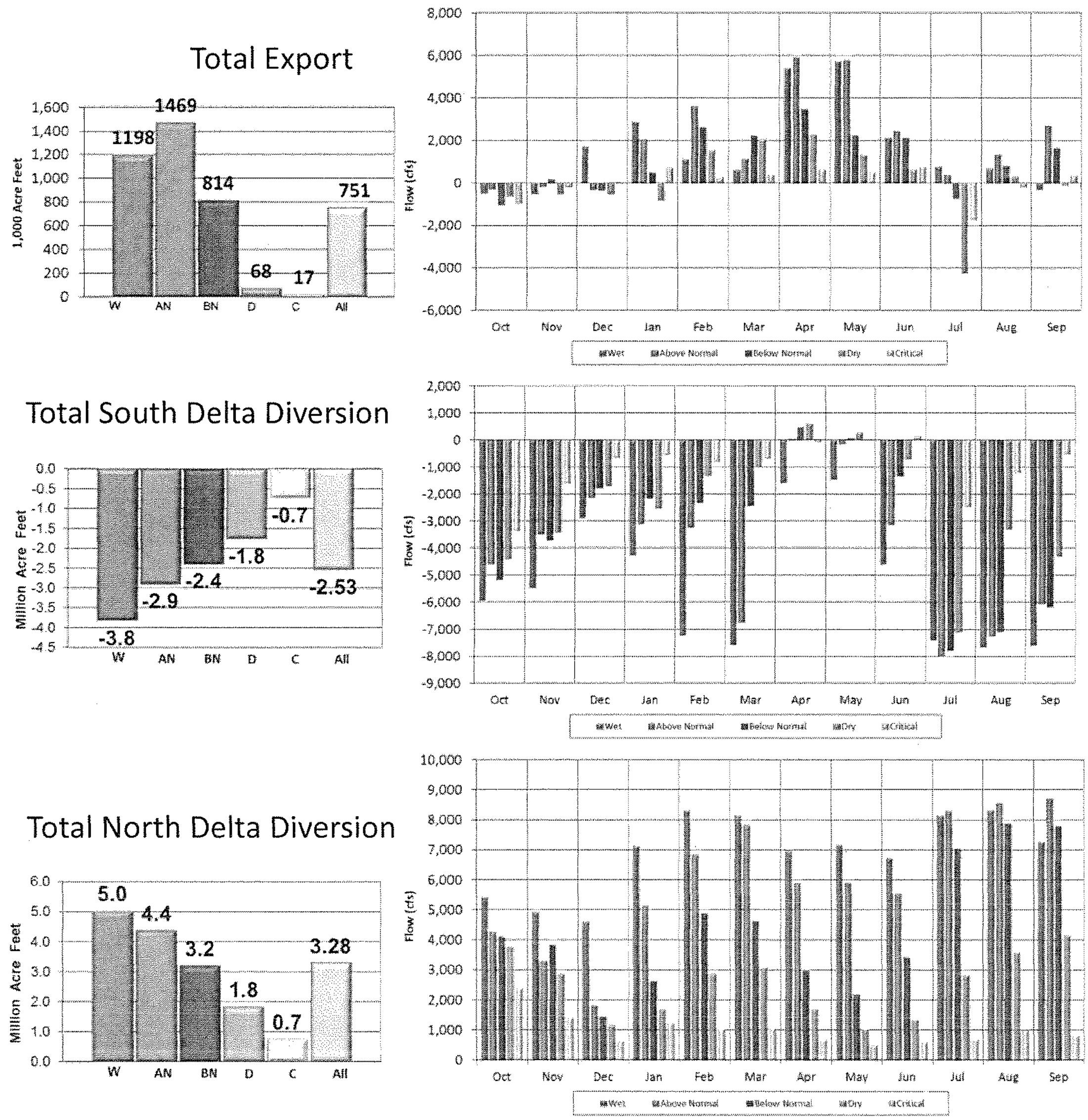
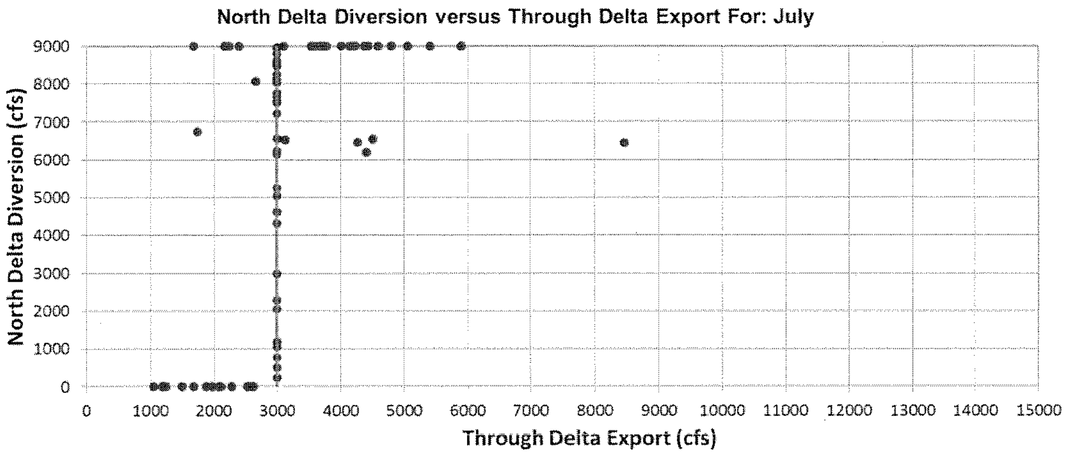
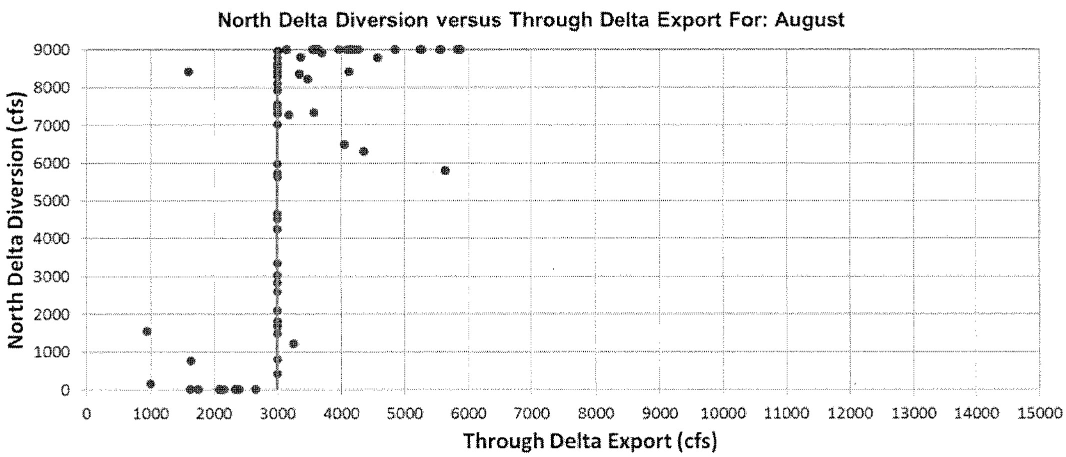


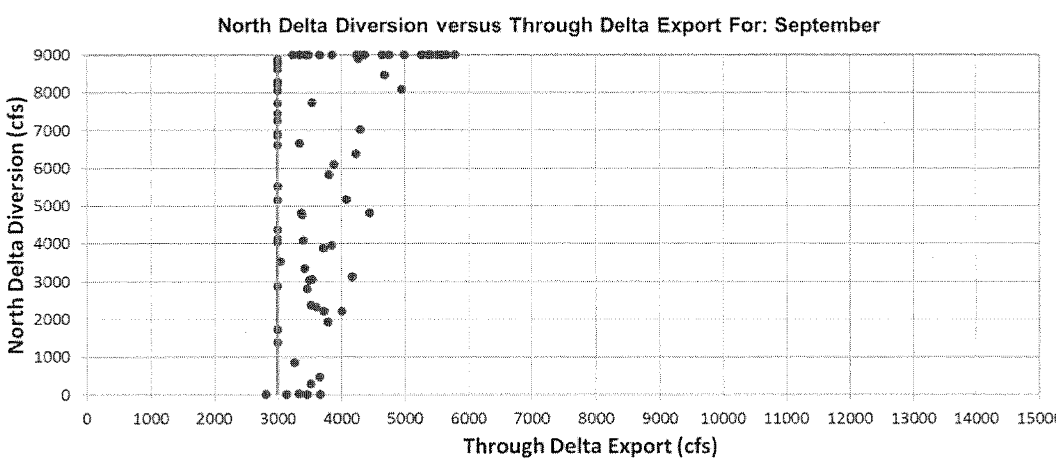
Figure 44 contains modeling results from Alt 4 for July, August, and September that plot NDD against SDD (Through Delta Export). There are many occasions when SDD are 3,000 cfs, which is due to criteria specifying that SDD during this time period need to be at least 3,000 cfs prior to diverting at the NDD facility. Although there are about six occurrences in July and three in August where the model did not satisfy this criterion, this issue has not yet been addressed for this modeling effort.

BDCP1722

Figure 44. Alt 4 North Delta Diversion Versus South Delta Diversion for July, August, and September





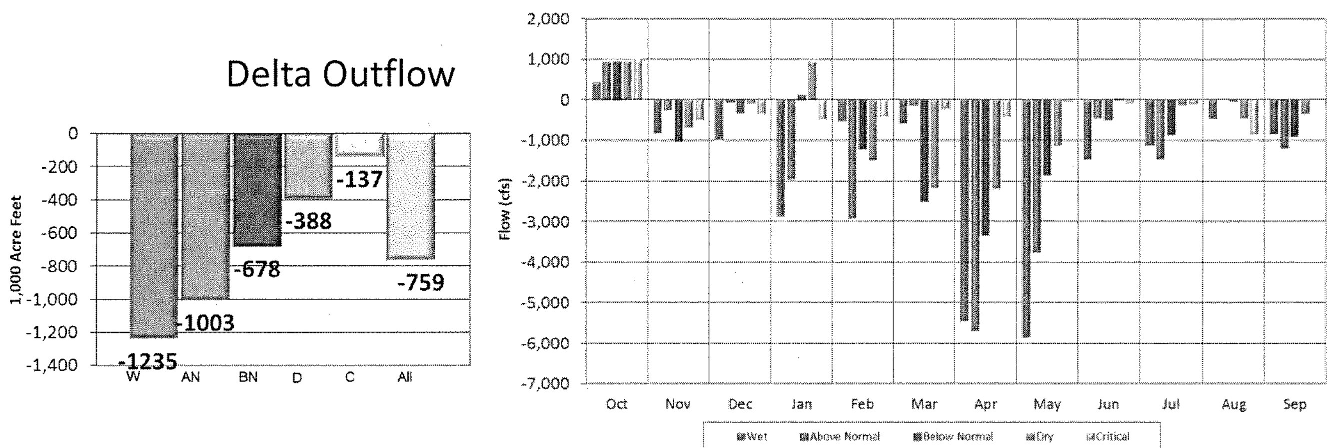


BDCP1722

Delta Outflow

Figure 45 contains annual and monthly average changes in Delta outflow by water year type, average annual Delta outflow decreases about 760 TAF in the Alt 4 Scenario relative to the FNA Scenario. The decrease is primarily due to increases in Delta exports, which are about 750 TAF on average. Larger decreases generally occur in January through May when exports are constrained in the FNA Scenario and in the Alt 4 Scenario the NDD can be used to export water. Delta outflow increases in October due to the combination of additional OMR flow requirements that restrict exports and Sacramento River flow requirements at Rio Vista. The additional surplus Delta outflow in Alt 4 was minimized through coordination of the Delta Cross Channel Gate operations with the Rio Vista flow requirements and North Delta Diversion bypass requirements.

Figure 45. Changes in Delta Outflow (Alt 4 minus FNA)



Carryover Storage

Figure 46, Figure 47, Figure 48, and Figure 49 contain exceedance charts for carryover storage and average monthly changes in storage by Sacramento Valley Water Year Type for CVP and SWP upstream reservoirs. CVP/SWP reservoirs tend to be higher in the Alt 4 Scenario relative to the FNA on an average basis. Generally, CVP/SWP reservoirs are higher in storage in dryer year types and can be lower in wetter year types.

Ability to convey stored water from upstream CVP/SWP reservoirs to south of Delta water users is increased in Alt 4 relative to the FNA. Therefore, when upstream reservoirs are at higher storage levels more water is released to satisfy south of Delta water demands. This is the primary reason Shasta, Oroville, and Folsom tend to be lower during summer months of wetter years.

Currently, and in the FNA Scenario, the CVP and SWP ability to export natural flow, or unstored water, is constrained due to SWRCB D-1641 and requirements in the salmon and smelt biological opinions. With the greater ability to export unstored water during winter and spring months in the Alt 4 Scenario, compared to FNA, there is generally a reduced reliance on stored water to satisfy south of Delta demands. The increased ability to export unstored water allows the CVP and SWP to maintain higher storage levels in upstream reservoirs during dryer year types while still maintaining south of Delta deliveries. Carryover storage in the Alt 4 Scenario tends to be higher than the FNA Scenario at lower storage levels, and Alt 4 storage is lower in wetter years when storage levels are higher. In the wettest of years there is enough water in the system that both scenarios have similar carryover storage conditions.

Figure 46. Trinity Reservoir Carryover Storage and Average Monthly Changes in Storage by Water Year Type

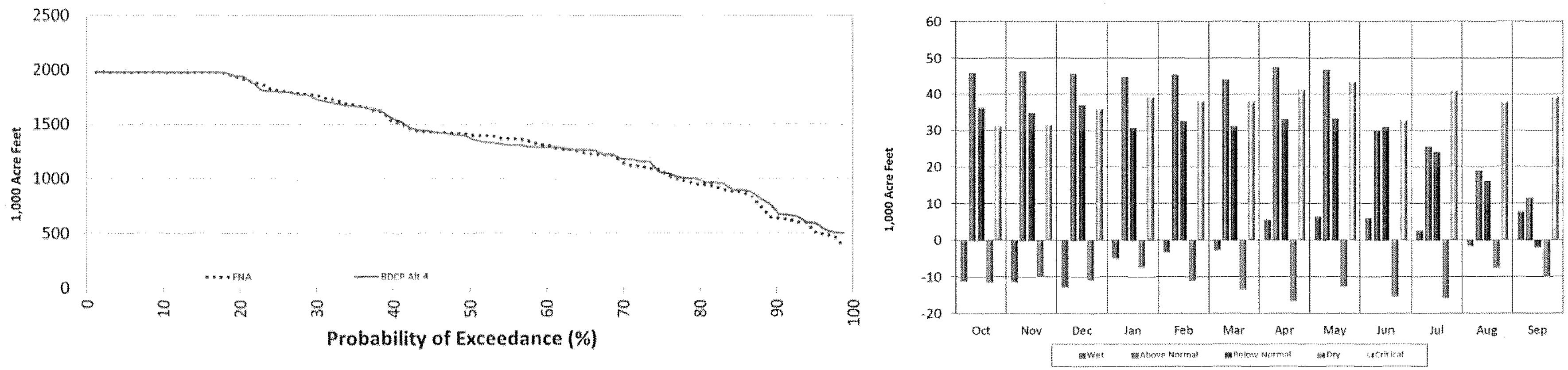


Figure 47. Shasta Reservoir Carryover Storage and Average Monthly Changes in Storage by Water Year Type

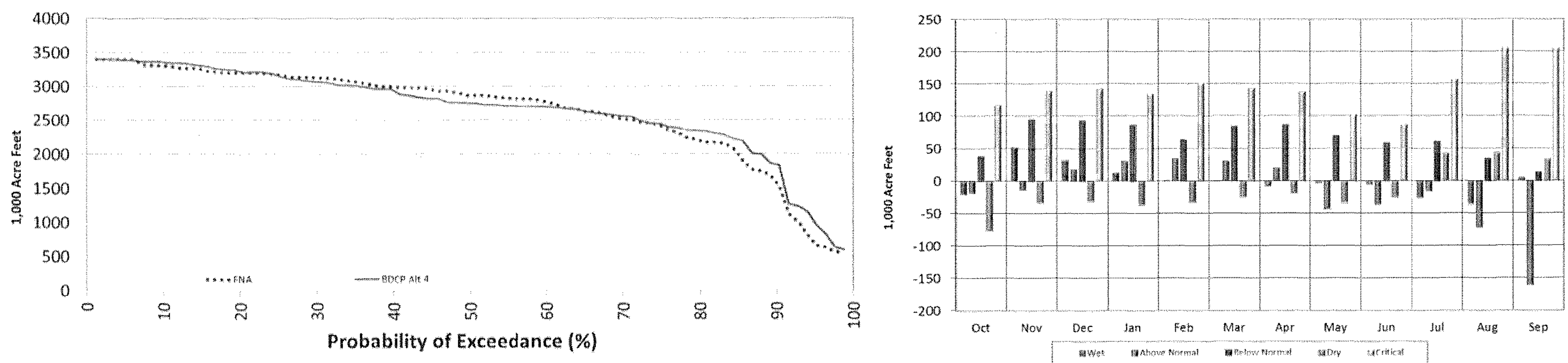


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Figure 48. Oroville Reservoir Carryover Storage and Average Monthly Changes in Storage by Water Year Type

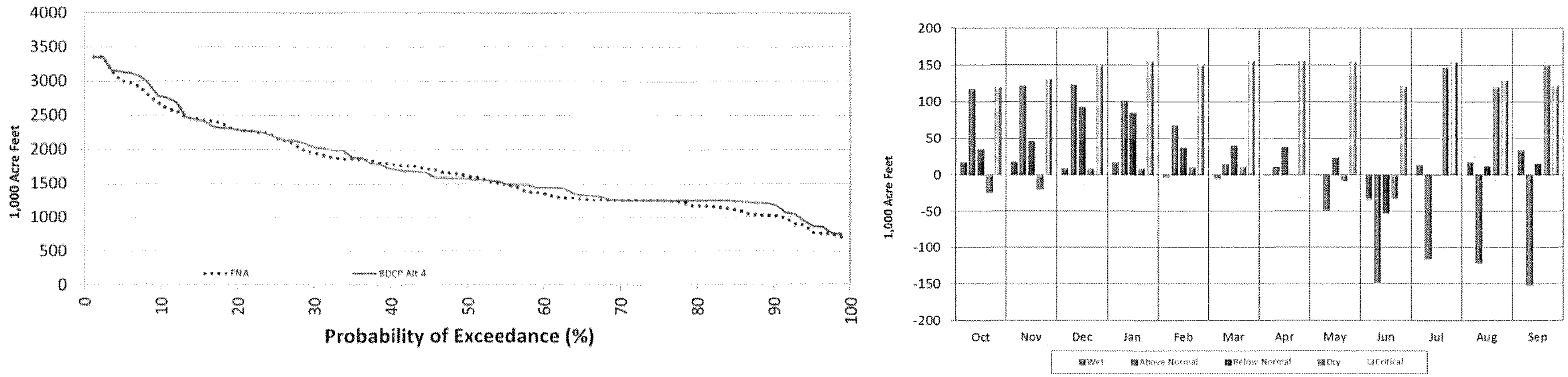
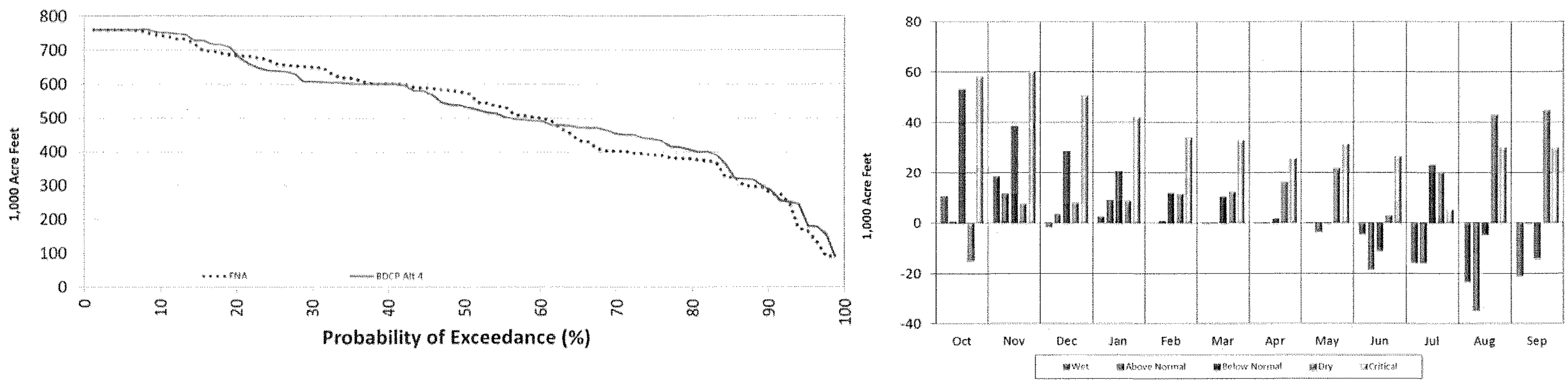


Figure 49. Folsom Reservoir Carryover Storage and Average Monthly Changes in Storage by Water Year Type



BDCP1722

San Luis Reservoir Operations

As seen in Figure 50 and Figure 51 below, both CVP and SWP portions of San Luis Reservoir storage fills more regularly in the Alt 4 Scenario. As described earlier in this document, low point in both CVP and SWP San Luis Reservoir is managed to satisfy water supply obligations the model makes during the spring of each year. This is a complex balance involving available upstream storage, available conveyance capacity, delivery allocations, and south of Delta demand patterns. Considering this myriad of variables, there are times when low point in San Luis Reservoir is higher in the Alt 4 Scenario than the FNA Scenario and times when the opposite is true.

Figure 50. SWP San Luis

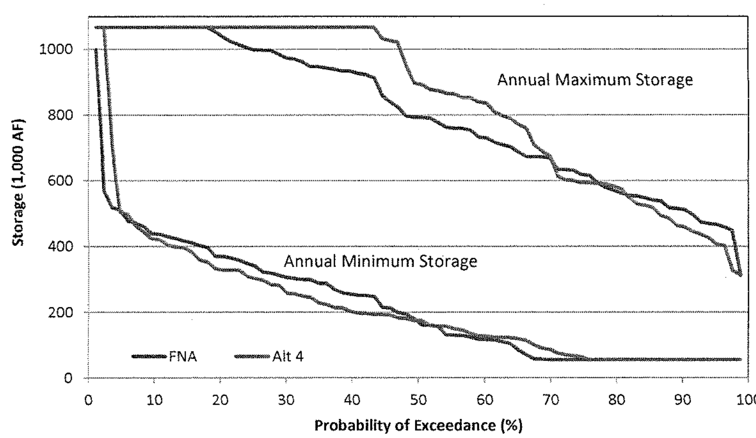
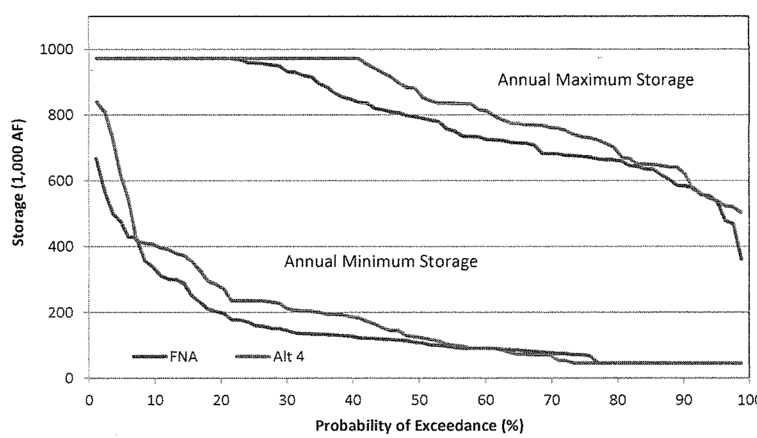


Figure 51. CVP San Luis



CVP Water Supply

As can be seen in Table 5, the independent modeling analysis shows an average increase of approximately 262 TAF of delivery accruing to CVP customers in the Alt 4 Scenario relative to the FNA Scenario, mostly occurring to CVP SOD agricultural customers. Delivery increases are greater in wetter year types with lower increases in dryer years. Figure 52 contains exceedance probability plots for CVP water service contractor deliveries and allocations. Changes in Sacramento River Settlement and San Joaquin River Exchange Contractor deliveries do not occur in the modeling analysis and are not an anticipated benefit of the BDCP. Although modeling demonstrates minor changes to NOD CVP service contractors, this increase is not an anticipated benefit of the BDCP.

BDCP1722

Table 5. CVP Delivery Summary

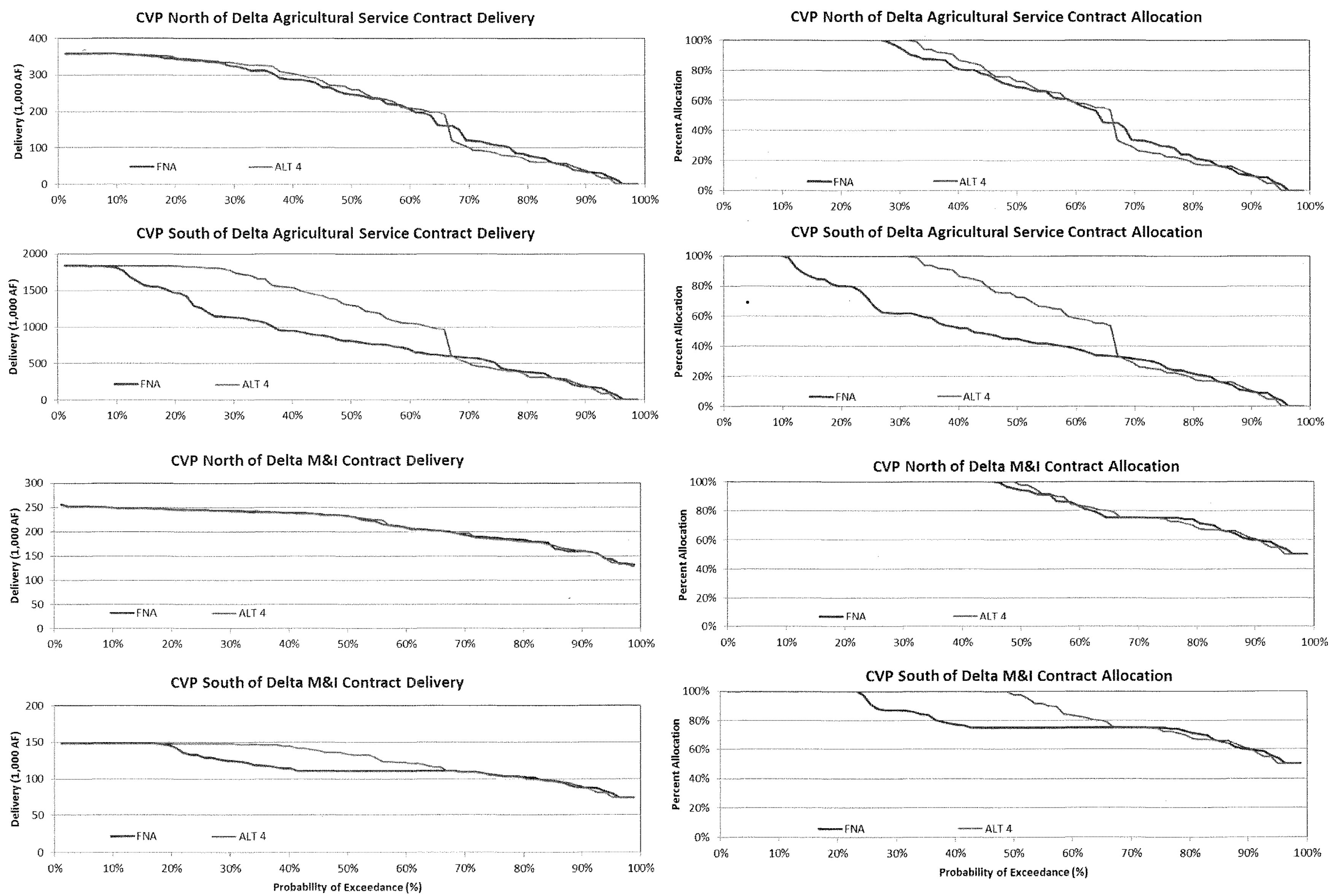
Average Annual CVP deliveries by Water Year Type FNA (1,000 AF)

	AG NOD	AG SOD	Exchange	M&I NOD	M&I SOD	Refuge NOD	Refuge SOD	Sac. Setlmnt	CVP NOD Total	CVP SOD Total
All Years	**220**	**882**	**852**	**214**	**116**	**87**	**273**	**1860**	**2380**	**2306**
W	327	1408	875	241	135	90	280	1856	2515	2881
AN	284	999	802	221	113	83	258	1716	2304	2341
BN	206	725	875	217	111	90	281	1900	2413	2176
D	138	569	864	195	106	88	277	1896	2317	2000
C	43	202	741	157	87	71	234	1754	2025	1447

Difference: Alt 4 minus FNA (1,000 AF)

	AG NOD	AG SOD	Exchange	M&I NOD	M&I SOD	Refuge NOD	Refuge SOD	Sac. Setlmnt	CVP NOD Total	CVP SOD Total
All Years	2	251	0	0	9	0	0	0	2	260
W	0	305	0	0	10	0	1	0	0	316
AN	10	492	0	1	14	1	0	-2	10	504
BN	12	354	0	5	16	0	-2	1	19	366
D	-10	67	0	-4	4	1	0	-1	-15	72
C	2	27	0	2	2	1	0	-1	4	29

Figure 52. CVP Water Supply Delivery and Allocation



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SWP Water Supply

The independent analysis shows an increase in average annual SWP SOD deliveries of approximately 450 TAF, but a reduction in critical year deliveries of approximately 116 TAF. Annual average Article 21 deliveries increase by about 100 TAF and Article 56 increases by about 18 TAF. Figure 53 contains exceedance probability plots for SWP SOD deliveries for the FNA and Alt 4 Scenarios, each of these plots show increases in higher delivery years. Although Table A deliveries increase in 65% of years, there are decreases in 35% of the dryer years (see Table 6).

Table 6. SWP Delivery Summary

FNA

	Table A	Art. 21	Art. 56	Total
All Years	**2426**	**64**	**90**	**2580**
W	3221	98	121	3440
AN	2628	86	81	2794
BN	2527	82	95	2703
D	1809	14	70	1893
C	1105	17	48	1170

Difference Alt4 minus FNA

	Table A	Art. 21	Art. 56	Total
All Years	328	102	18	448
W	525	220	14	759
AN	636	98	-1	733
BN	565	50	31	647
D	-63	41	27	6
C	-124	-8	16	-116

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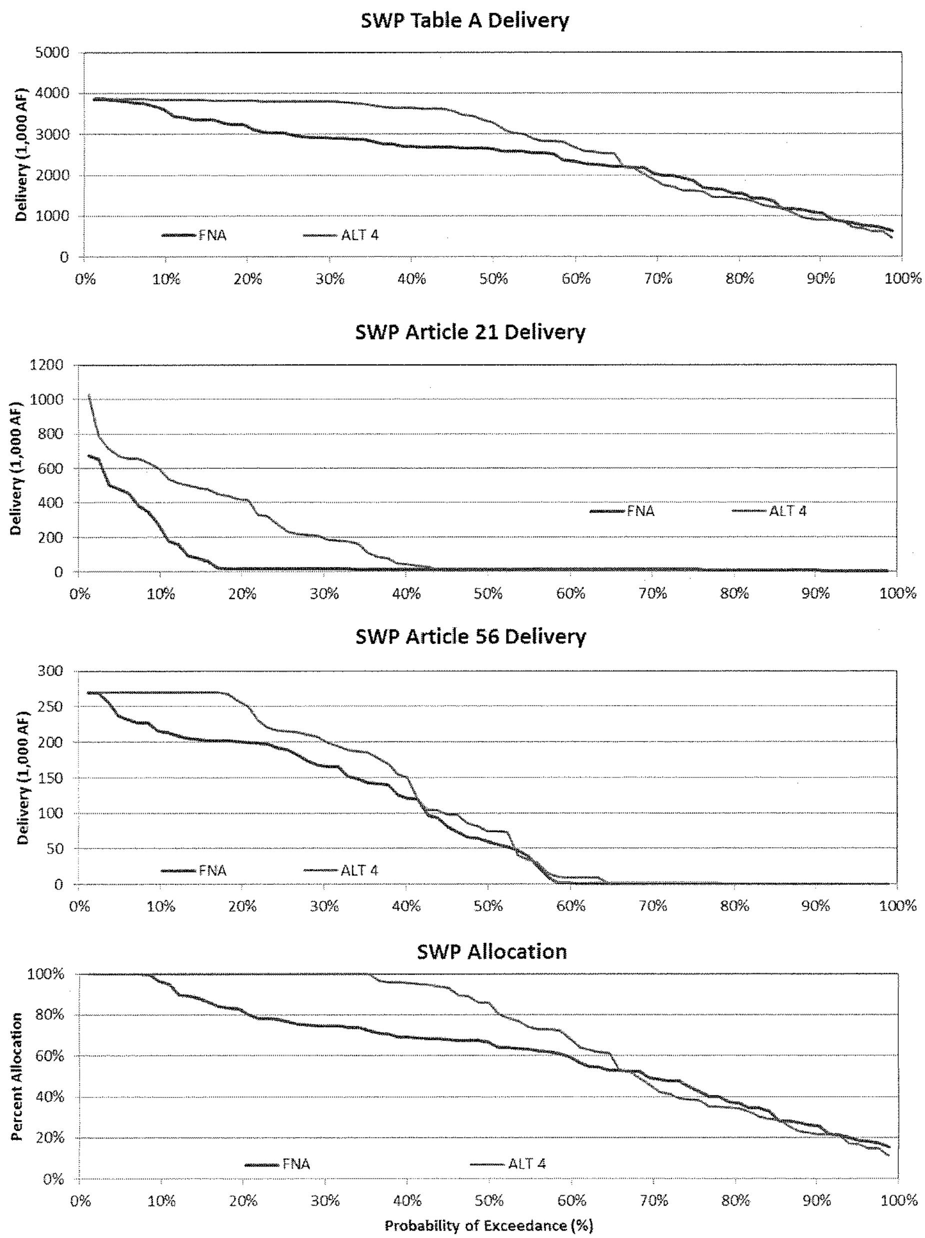
Figure 53. SWP Delivery for Alt 4 and FNA



BDCP1722

4 COMPARING INDEPENDENT MODELING AND BDCP MODELING

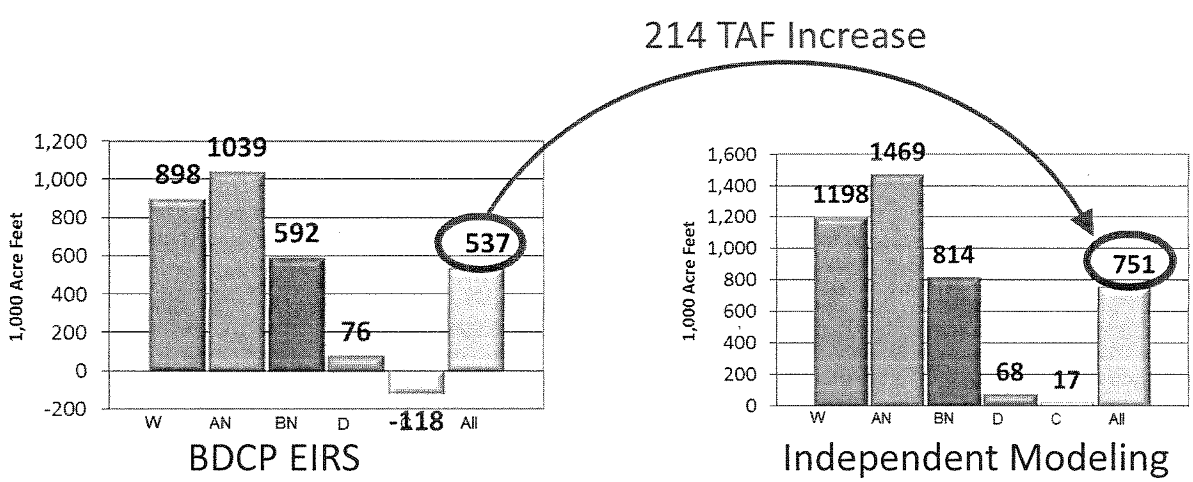
The independent modeling effort originally stemmed from reviews of DWR's BDCP modeling where we found that BDCP modeling does not provide adequate information to determine how BDCP may affect the system. Based on the premise that the independent modeling portrays a more accurate characterization of how the CVP/SWP system may operate under Alt 4, this comparison is meant to demonstrate the differences between results of a more accurate analysis and BDCP modeling. Differences in results between these modeling efforts are believed to provide insight regarding how effects that BDCP will have on the actual CVP/SWP system differ from modeling used to support the Draft EIRS.

Although thorough comparisons of modeling were performed, only key differences are illustrated for the purpose of this comparison.

Delta Exports

Figure 54 displays changes in the Delta exports for the BDCP modeling (Alt 4-ELT minus NAA-ELT) and for the independent modeling (Alt 4 minus FNA). Independent modeling analysis shows about 200 TAF greater increases in exports than the BDCP modeling. A large component of this difference is due to fixes of known modeling issues, as described in the 2013 SWP DRR. This difference is also attributable to more realistic reservoir operations, more efficient DCC gate operations, changes in water supply allocation logic, and more efficient operation of the NDD.

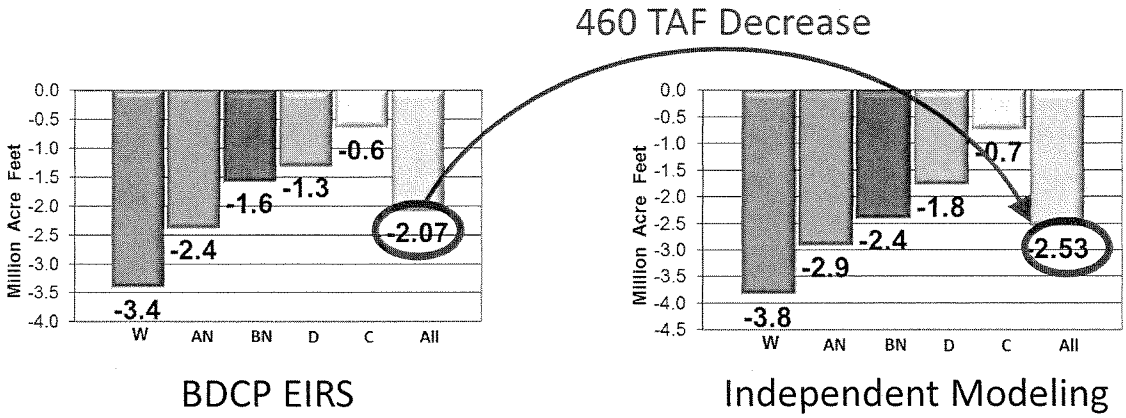
Figure 54. Result Difference: Delta Exports



Average annual SDD are decreased by about 460 TAF in the independent analysis compared to the BDCP modeling. A large component of this difference is due to fixes of known modeling issues, as described in the 2013 SWP DRR. These fixes prevent "artificial" bypass criteria from limiting use of the NDD beyond what is intended in the BDCP project description. This difference is also attributable to more efficient DCC gate operations and more efficient operation of the NDD. Figure 55 demonstrates the difference between the BDCP and independent analysis, where SDD decrease by 2.07 MAF in the BDCP analysis and by 2.53 MAF in the independent analysis.

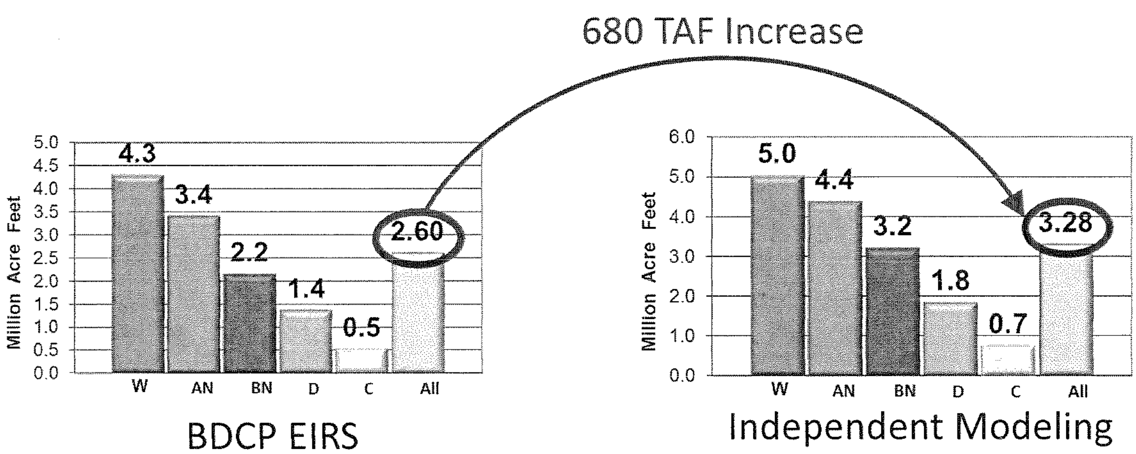
BDCP 1722

Figure 55. Result Difference: South Delta Diversion



Use of the NDD is 680 TAF greater in the independent analysis relative to the BDCP analysis. A large component of this difference is due to fixes of known modeling issues, as described in the 2013 SWP DRR. These fixes prevent "artificial" bypass criteria from limiting use of the NDD beyond what is described in the BDCP project description. Figure 56 compares average annual NDD in the BDCP to the independent analysis.

Figure 56. Result Difference: North Delta Diversion



Delta Outflow

Total Delta exports in the independent analysis are about 200 TAF greater than the BDCP modeling analysis with a corresponding decrease in Delta outflow in the independent analysis of about 200 TAF. Figure 57 compares average annual changes in Delta outflow between the independent analysis and BDCP modeling, BDCP modeling shows a decrease of about 567 TAF and the independent analysis shows a decrease of about 759 TAF.

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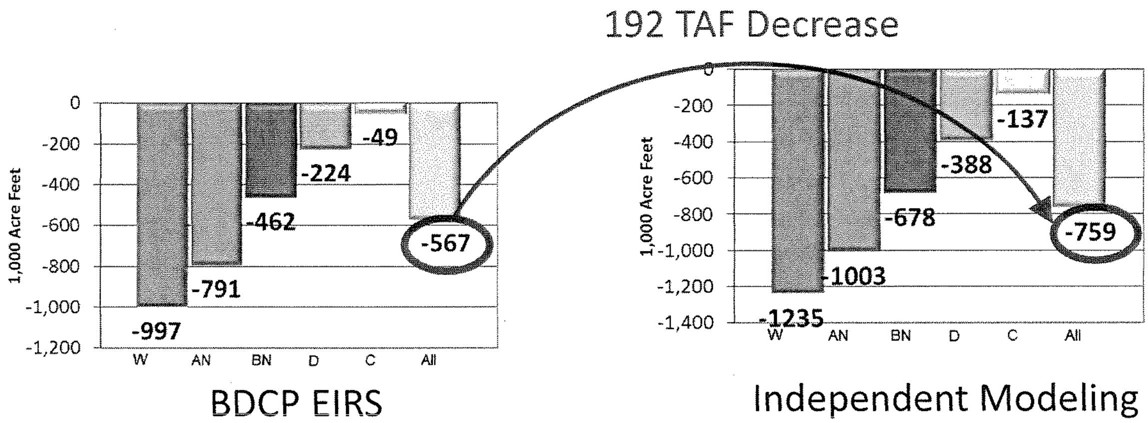
Figure 57. Result Difference: Net Delta Outflow



Reservoir Storage

Reservoir operating rules for Alt4 in the BDCP EIRS modeling are changed relative to the NAA. In the BDCP EIRS modeling of Alt 4 rules are set to releases more water from upstream reservoirs to San Luis Reservoir from late winter through July, reduce releases in August, and then minimize releases to drive San Luis Reservoir to dead pool from September through December. This operation is inconsistent with actual operations and causes reductions in upstream storage from May through August. Figure 58 and Figure 59 contain exceedance probability plots of carryover storage and average monthly changes in storage by water year type for Shasta and Folsom for the BDCP and independent modeling. Although carryover storage for Alt 4 and the NAA is similar in the BDCP EIRS modeling, there is drawdown from June through August that may cause impacts to cold water pool management. In the independent modeling upstream reservoirs are drawn down more in years when storage is available while dryer year storage is maintained at higher levels, this is illustrated in the carryover plots for Shasta and Folsom in Figure 58 and Figure 59.

Figure 58. Result Difference: Shasta Storage

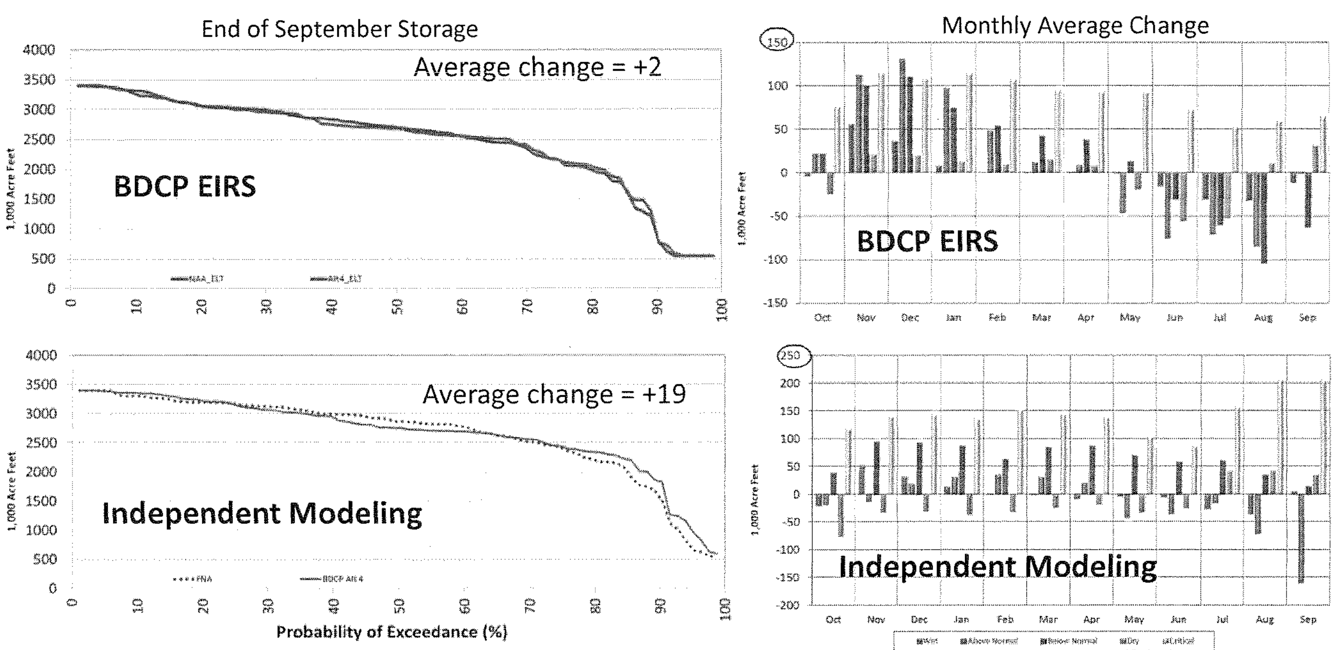


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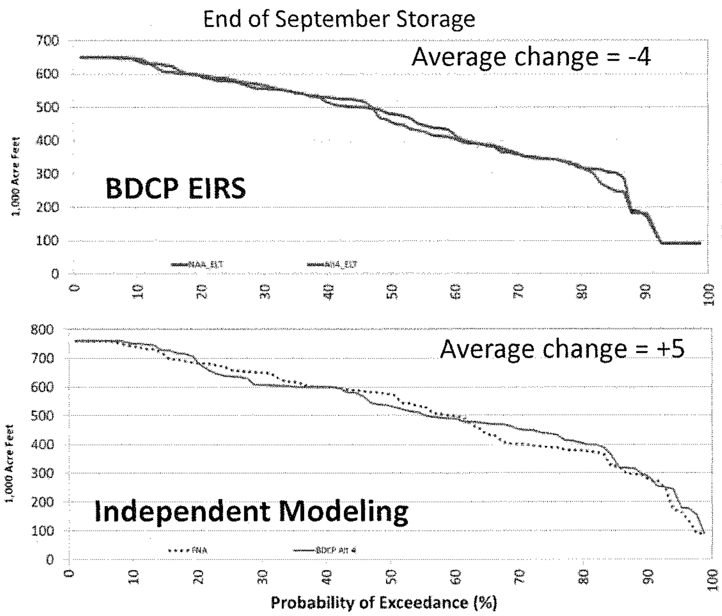
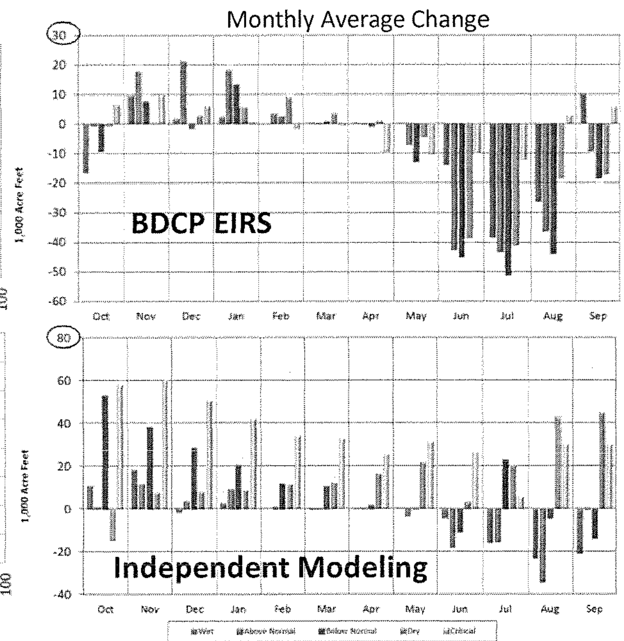
Figure 59. Result Difference: Folsom Storage

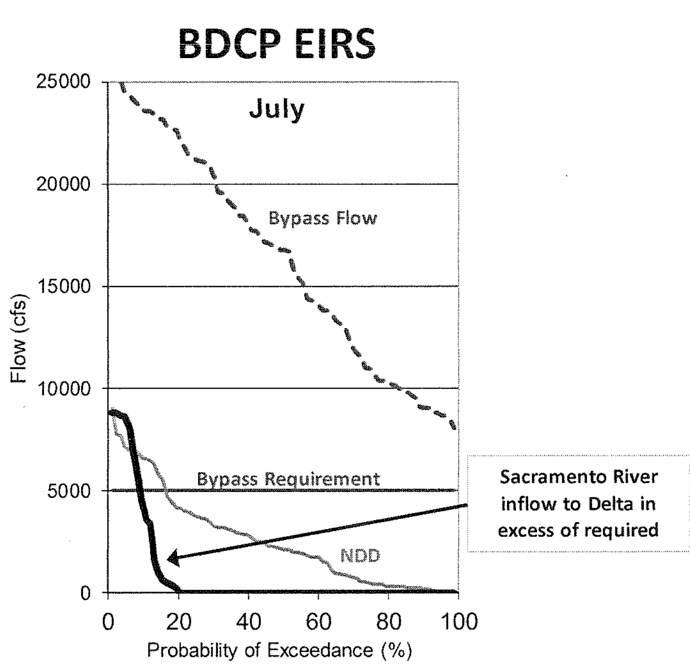


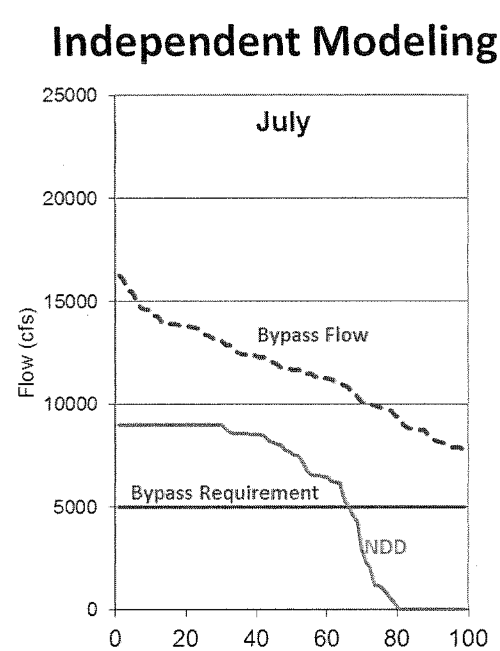


North Delta Diversions

Independent modeling shows greater NDD during July and other months because the BDCP EIRS modeling includes artificially high Sacramento River bypass flow requirements. Figure 60 contains exceedance probability plots of Sacramento River required bypass, Sacramento River bypass flow, NDD, and excess Sacramento River flow to the Delta. As can be seen in Figure 60, bypass flow is always above the bypass requirement. The BDCP version of CalSim sets a requirement for Sacramento River inflow to the Delta that the independent modeling does not need in order to satisfy Delta requirements, therefore the NDD is higher in the independent modeling.

Figure 60. NDD, and Sacramento River Flow





Delta flows below the NDD facility

Figure 61 contains monthly exceedance probability plots for Sacramento River below the NDD for the following scenarios: 1) BDCP NAA-ELT, 2) BDCP Alt 4-ELT, 3) independent modeling FNA, and 4) independent modeling Alt 4. The most significant differences in flow changes occur in October, July, August, and September. Changes in Sacramento River flow entering the Delta are a key indicator of changes in interior Delta flows, water levels, and water quality.

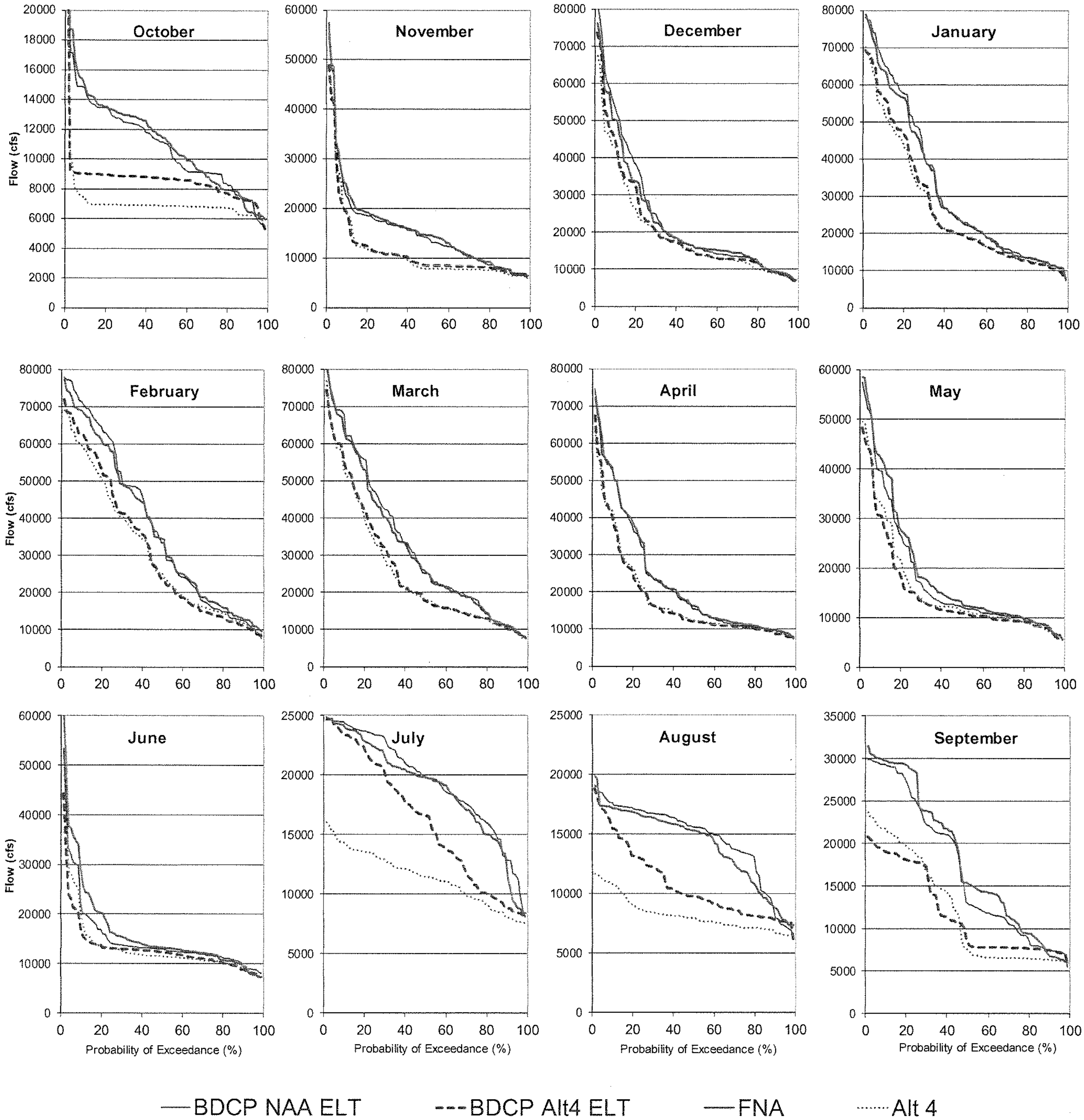
For the month of October the independent modeling shows flow below the NDD to be about 2,000 cfs lower than the BDCP modeling. The difference in this month is largely due to reoperation (closure) of the cross channel gate to lessen the amount of Sacramento River flow at Hood necessary to maintain Rio Vista flow requirements downstream of the cross channel gates.

The most substantial difference between the BDCP and independent modeling occurs in July and August. The differences in these two months are primarily attributable to model fixes that have occurred since the BDCP modeling was performed. In the independent modeling, July flows are reduced on average about 7,500 cfs while BDCP shows a reduction of about 3,300 cfs. In the independent modeling August flows are reduced on average about 5,900 cfs while BDCP shows a reduction of about 3,900 cfs.

In the independent modeling September flows are reduced by about 6,100 cfs while BDCP modeling shows a reduction of about 5,300 cfs. The independent modeling shows Sacramento River flow entering the Delta to be about 7,000 cfs 50% of the time, BDCP modeling show Sacramento River flow is about 8,000 cfs 50% of the time.

BDCP1722

Figure 61. Sacramento River below Hood

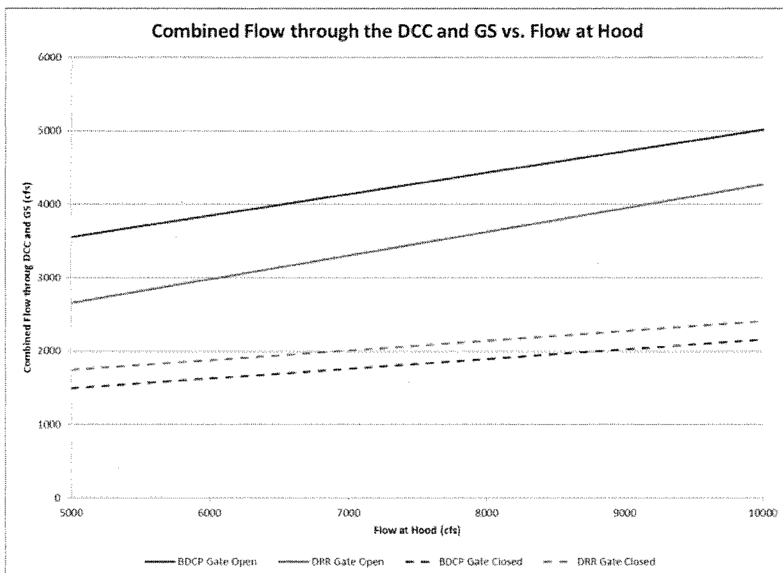


BDCP 1722

Sacramento River water entering the Central Delta

In CalSim, flow through the DCC gate and Georgianna Slough from the Sacramento River into the Central Delta is assumed to be linearly dependent on flow at Hood. There are two linear relationships; one is used when the DCC gates are closed, and the other is used when the DCC gates are open. The 2013 SWP Delivery Reliability Report CalSim II modeling, and therefore our independent modeling, used different linear flow relationships than BDCP. The BDCP and 2013 DRR (and independent) flow relationships for both the open and closed gate conditions are compared in Figure 62. When Sacramento River flow at Hood is in the range from 5,000 cfs to 10,000 cfs the balance between Hood flow, required flow at Rio Vista, and DCC gate operation can affect upstream reservoir operations, SOD exports, and Delta outflow. As shown in Figure 62, given the same flow at Hood and DCC gates closed, the independent analysis will show slightly higher flow into the Central Delta (12% to 17% difference for the Hood flows in the 5,000 cfs to 10,000 cfs range). With DCC gates open the same flow at Hood, the independent analysis will show lower flow into the Central Delta (-15% to -25% difference for the Hood 5,000 cfs to 10,000 cfs range). Figure 63 and Figure 64 show the differences through the DCC and combined flow through the DCC and Georgiana Slough.

Figure 62. Flow through Delta Cross Channel and Georgiana Slough versus Sacramento River Flow at Hood



In addition to the differences in flow equations for portion of Sacramento River entering the interior Delta through the DCC and Georgiana Slough, the DCC gate operations were modified for the month of October. In the independent modeling, the DCC gate is operated to balance the amount of Sacramento River flow needed to meet flow standards at Rio Vista on the Sacramento River and flow needed to meet western Delta water quality. This changed operation often results in DCC gate closures for about 15 days during the month of October. The reduction in flow through the DCC during October can be seen in Figure 64.

BDCP1722

Figure 63. Cross Channel Flow

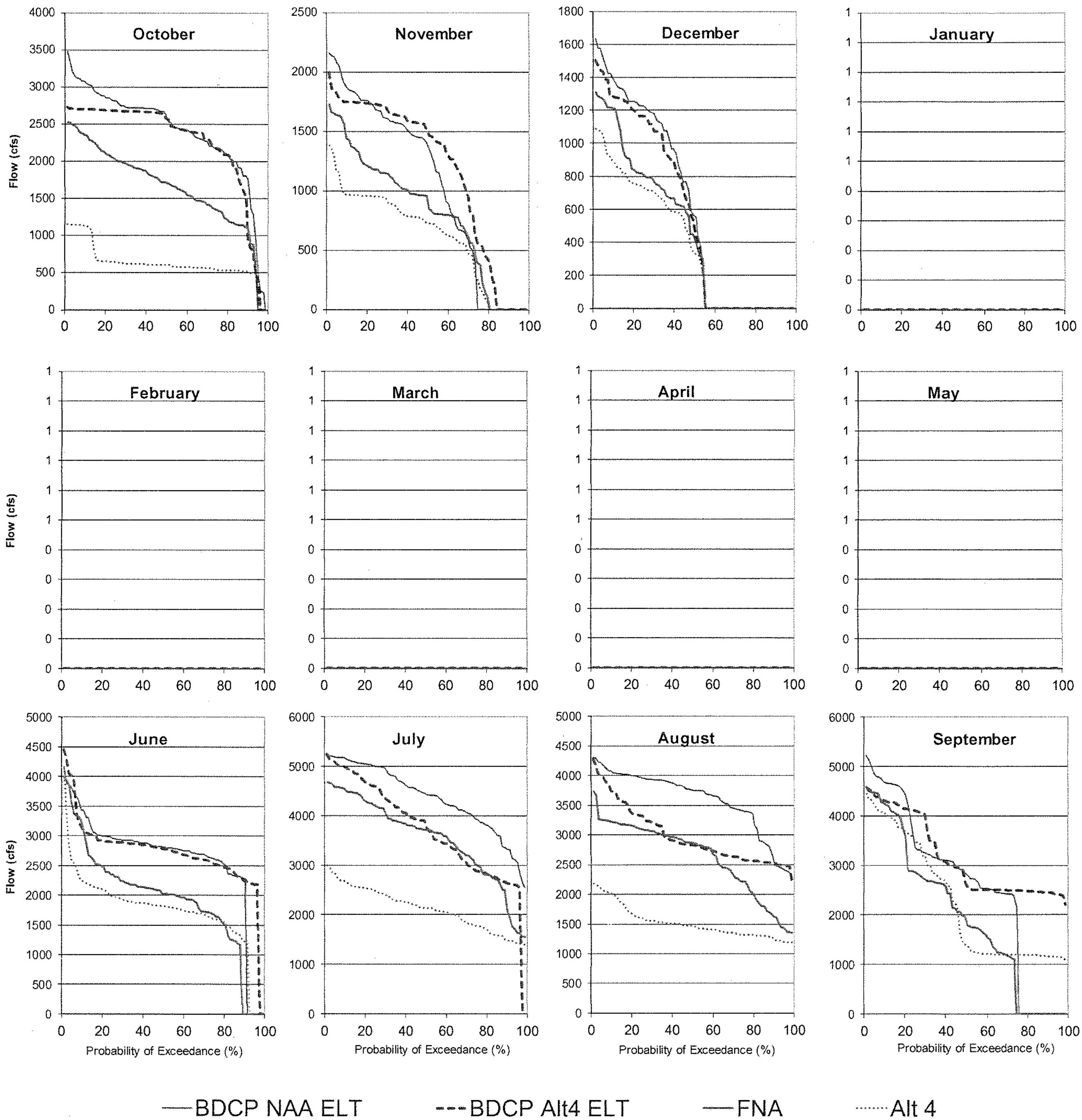
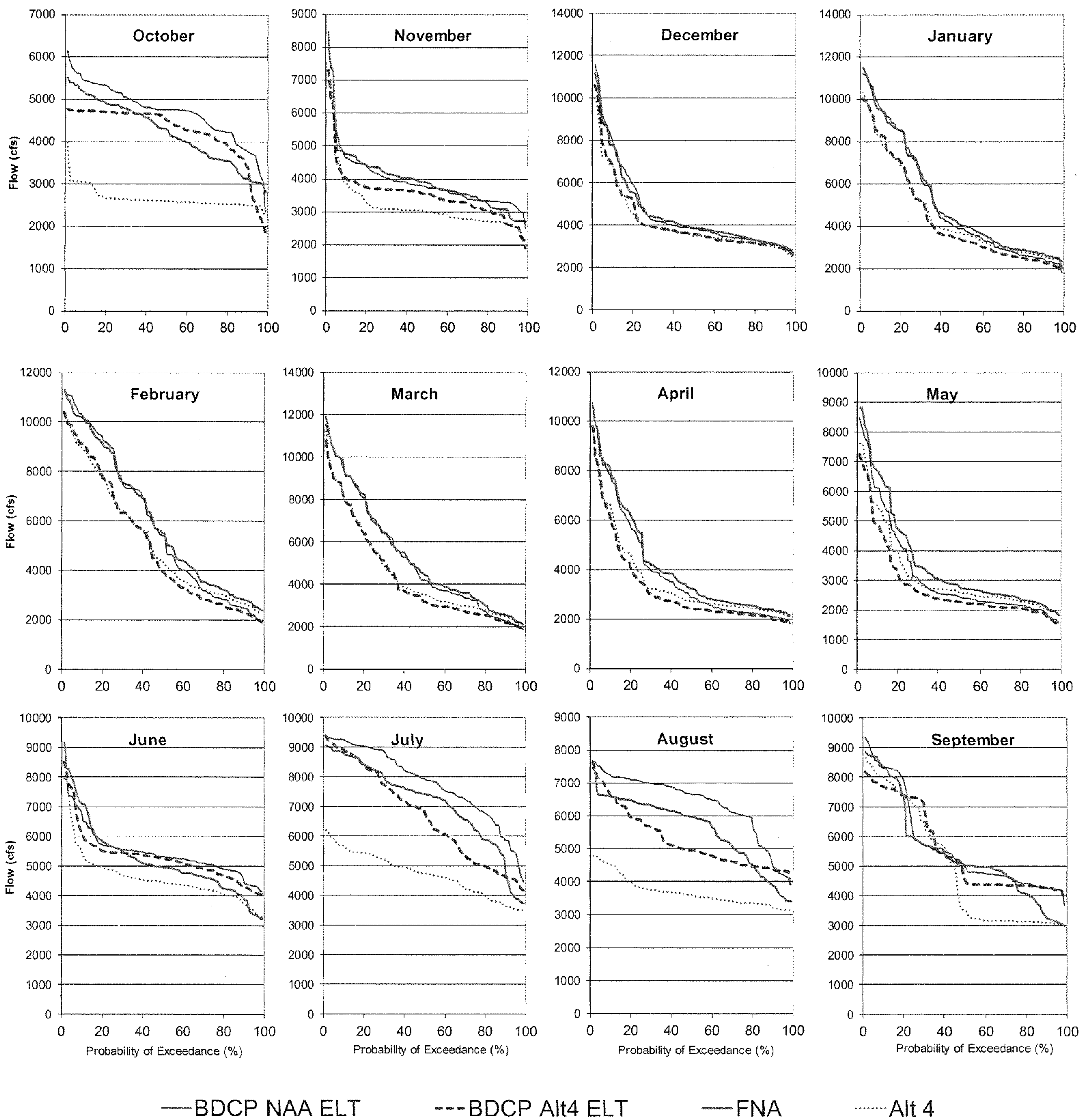


Figure 64. Flow through Delta Cross Channel and Georgiana Slough



Conclusions regarding BDCP effects

Based on the Independent Modeling, the amount of water exported (diverted from the Delta) may be approximately 200 thousand acre-feet (TAF) per year higher than the amount disclosed in the Draft EIR/S. This total represents

- approximately 40 TAF/yr more water diverted and delivered to the SWP south of Delta contractors, and
- approximately 160 TAF/yr more water diverted and delivered to the CVP south of Delta contractors.

The BDCP Model estimates that, under the NAA ELT (without the BDCP), total average annual exports for CVP and SWP combined are estimated to be 4.73 million acre feet (MAF) and in the Independent Modeling FNA combined exports are 5.61 MAF. The BDCP Model indicates an increase in exports of approximately 540 TAF and the Independent Modeling shows an increase of approximately 750 TAF in Alt 4.

The Independent Modeling suggests that Delta outflow would decrease by approximately 200 TAF/yr compared to the amount indicated in the Draft EIR/S.

- This lesser amount of Delta outflow has the potential to cause greater water quality and supply impacts for in-Delta beneficial uses and additional adverse effects on species. To determine the potential effects of the reduced amount of outflow, additional modeling is needed using tools such as DSM2.

The BDCP Model does not accurately reflect the location of the diversions that the SWP and CVP will make from the Delta.

- When the errors in the model are corrected, it reveals that the North Delta intakes could divert approximately 680 TAF/yr more than what was disclosed in the BDCP Draft EIR/S, and
- the amount of water diverted at the existing South Delta facilities would be approximately 460 TAF/yr less than what is projected in the BDCP Draft EIR/S.

Hydrologic modeling of BDCP alternatives using CalSim II has not been refined enough to understand how BDCP may affect CVP and SWP operations and changes in Delta flow dynamics. Better defined operating criteria for project alternatives is needed along with adequate modeling rules to analyze how BDCP may affect water operations. Without a clear understanding of how BDCP may change operations, affects analysis based on this modeling may not produce reliable results and should be revised as improved modeling is developed.

BDCP 1722

FRIANT
WATER AUTHORITY

MEMORANDUM

TO: Donald R. Glaser

cc: Kaylee Allen, Esq.
Ronald D. Jacobsma

FROM: Jennifer T. Buckman, Esq.,
General Counsel, Friant Water Authority

DATE: November 30, 2012

RE: BDCP Issues and Concerns

BACKGROUND

Since September 2010, the Board of Directors of the Friant Water Authority has been expressing its concerns about certain aspects of the BDCP project, particularly the changes in CVP operations and the cost allocations that other CVP contractors have discussed with us. (For your convenience, a copy of our previous letter to you on these issues is attached to this letter as Exhibit A.) As you know, some of the proponents of BDCP have deliberately excluded Friant from being at the table during critical negotiations for this project. Nonetheless, Friant has been generally supportive of the project as a means for those who have lost water supplies to regulatory constraints to recover them. Of course, Friant has always noted that its supportive position may change, depending on what the BDCP proponents select as the features of the project.

In recent months, the team working on BDCP has expended significant effort to define the project's features. As part of these efforts, Dr. David Sunding, an economist under contract with the State of California to analyze the BDCP cost issues, modeled the benefits that would accrue to various stakeholders under some of the BDCP alternatives being considered. Dr. Sunding presented his initial findings at a joint meeting of Friant's Policy and Legislative and Advisory Committees on August 10, 2012. (A copy of Dr. Sunding's power point is attached as Exhibit B.) The modeling looked at four categories of potential benefits from BDCP: (1) water supply reliability, (2) water quality, (3) regulatory certainty, and (4) protection against catastrophic failure of the existing Delta conveyance system.

Unfortunately, the work that the BDCP proponents have shared with us to date has only served to confirm our fears that Friant will be asked to pay a disproportionate share of BDCP costs. Specifically, as set forth in more detail below and as we have summarized in several meetings with you over recent months, Friant obtains little, if any, benefit from BDCP. In fact, the project may actually be detrimental to Friant's water supply reliability.

Under the "beneficiary pays" principle that the BDCP proponents affirm as the basis of the project, there is no legitimate justification for assigning Friant about $2B of the project's anticipated $14B price tag. While Friant supports BDCP and the efforts of certain water users to recoup supplies they have lost to regulatory restrictions, it cannot accept a disproportionate share of the cost burden.

ISSUES AND CONCERNS

I. BDCP'S MODELING RESULTS, ANALYZED IN THE CONTEXT OF EXISTING LAW, CONFIRM THAT THE PROJECT OFFERS LITTLE TO NO BENEFIT TO FRIANT

BDCP's modeling demonstrates that the project reduces Friant's water supply reliability as compared to existing conditions.[1] The modeling also shows that BDCP provides no significant water quality improvement to CVP agricultural water users such as Friant. BDCP's model has assumed regulatory certainty through issuance of an HCP, but the project does not appear to meet the ESA standards for an HCP. Finally, BDCP's modeling reveals that the project offers Friant only some unquantified "insurance" protection against a catastrophic Delta failure that temporarily shuts off all SWP and CVP diversions. Each of these four categories of the BDCP's projected "benefits" is discussed in further detail below.

[1] Consistent with CEQA, the BDCP modeling has appropriately measured the impacts of the proposed project against the "status quo" baseline of existing physical conditions. As we have discussed, the BDCP is a proposed joint federal and state project. As such, it is subject to both the National Environmental Policy Act and the more rigorous standards of the California Environmental Quality Act. For purposes of CEQA, the project's environmental impacts normally must be analyzed against the existing physical environmental conditions. *See* 14 C.C.R. § 15125(a); *Communities for a Better Environment v. South Coast Air Quality Management Dist.*, 48 Cal. 4th 310, 327-28 (2010) (lead agency abused its discretion in analyzing the impacts of the project based on a hypothetical future baseline of full capacity under a permit, when the existing physical conditions did not include full use as authorized by the previously issued permit).

A. BDCP Reduces, Rather Than Improves, Friant's Water Supply Reliability

1. The Friant Division Was Constructed and Approved as One of the Earliest Components of the CVP, with Water Rights Priority Dates Going Back to 1915

Reclamation built Friant Dam in reliance on the San Joaquin River water that was made available through the Exchange Contract. Before Reclamation stepped in, local agencies and the State of California had filed various applications with the State Water Rights Board to construct a dam at Friant and to appropriate additional water from the San Joaquin River; applications advancing this concept were filed in 1915, 1916, 1919, and 1927. However, these proposals stalled because the parties were not able to negotiate an arrangement that satisfied the senior water rights holders on the San Joaquin River.

The parties now known as the Exchange Contractors hold pre-1914 and riparian rights to divert water from the San Joaquin River. Because the proposal to construct a dam at Friant relied upon this water being diverted to other sources, advancing the proposal would require the cooperation of the Exchange Contractors.

The proposal for a dam at Friant gained momentum when it was incorporated into the California Water Plan, which was approved by California voters in 1933. Due to the Depression and the State's inability to finance the Plan, it sought help from the federal government. Under President Roosevelt's administration, Reclamation proposed to construct key components of the Plan as the Central Valley Project (CVP). Friant Dam, the Friant-Kern and Madera canals, and Shasta Dam constituted the cornerstone projects of the first phase of the CVP.

In 1939, Reclamation's negotiations with the senior water rights holders finally resulted in the Purchase Contract and the Exchange Contract. As the names indicate, the Purchase Contract was an agreement for the landowners to sell and Reclamation to purchase certain water rights, while under the Exchange Contract, the Exchange Contractors agreed to not exercise their senior rights to water in the San Joaquin River in exchange for Reclamation's promise to deliver them a firm substitute CVP water supply, which is pumped from the Delta. Reclamation normally delivers about 840,000 acre-feet to the Exchange Contractors, except in the most critically dry years when the amount is somewhat reduced. Some years after executing the Exchange Contract, Reclamation finally reached agreement with other landowners, known as the (San Joaquin River) Settlement Contractors. Under the Settlement Contracts, Reclamation normally delivers about 44,000 acre-feet of substitute Delta water supplies to the Settlement

Contractors, subject to the same shortage criteria as the Exchange Contract. Since the Friant Division began operations, Reclamation has consistently operated the CVP consistent with its water rights permits, the Exchange Contract and the Settlement Contracts, recognizing that the substitute water supply for the Exchange Contractors and the Settlement Contractors take priority over all other south-of-Delta contractors' supplies.

The State Water Rights Board issued its decision granting Reclamation's application for the Friant permits and approving the exchange arrangement in 1959. Under California law, the priority dates for the Friant permits relate back to the dates when the applications were filed, so the Friant Division water rights permits have priority dates of 1915, 1916, 1919, and 1927. *See* Cal. Water Code § 1450.

2. The Water Rights for the Friant Division Were Vested Before the State Water Rights Board Approved the Water Rights for the San Luis Unit

The water rights for the San Luis Unit derive from the 1954 application that Westlands Water District filed with the State Water Rights Board (a copy of which is attached as Exhibit C); this application was subsequently assigned to Reclamation to allow construction of the San Luis Unit. Westlands' 1954 application acknowledged that its appropriation of water was "subject to vested rights." Reclamation protested Westlands' application on behalf of its existing contractors, including those within the Friant Division, and Westlands replied that it did not intend "to cause injury to those having valid vested rights ... and intends to take only that water which is in excess of the water needed to supply the valid vested rights under reasonable means of diversion and use." (A copy of Reclamation's protest is attached as Exhibit D and Westlands' answer is attached as Exhibit E.) Interpreting these facts, the Ninth Circuit Court of Appeals found that "both Westlands and the Bureau understood that prior vested rights had priority over Westlands' [proposed new] water allocations." *Westlands Water District v. United States of America*, 337 F.3d 1092, 1102 (9th Cir. 2003)("*Westlands VII*").

Subsequently, in 1960, Westlands assigned its application to Reclamation. That same year, Congress passed the San Luis Act, Pub. L. No. 86-488, 74 Stat. 156, which authorized construction of the San Luis Unit but required subordination of the west side water rights to those senior water rights that were existing as of 1960. *Westlands VII*, 337 F.3d at 1102; *see also Westlands Water Dist. v. United States*, 153 F. Supp. 2d 1133, 1146-47 (E.D. Cal. 2001) ("*Westlands VI*"). Reclamation then amended Westlands' original 1954 water rights application;

Reclamation's amended application was approved by the State Water Rights Board in 1961 in D-1020, which ordered "the recognition of vested rights" as one of the conditions of the permit. By the time D-1020 was issued, both the Exchange Contractors' substitute water rights and the water rights for the Friant Division had already fully vested.

Westlands entered into its first CVP water service contract with USBR in 1963, more than 18 years after the first Friant Division contract had been signed.[2] Following its 1965 merger with West Plains Irrigation District, Westlands' CVP contract was amended. Westlands did not begin receiving CVP water and putting it to beneficial use until 1968, more than 20 years after the Friant contractors had received their initial deliveries.

3. As the Courts Have Repeatedly Confirmed, the Exchange Contractors' and the Friant Division's Rights Are "First in Time, First in Right" under California Law; Therefore, They Are Highly Reliable

Starting in the late 1980s, legal and regulatory changes started to constrain the amount of water that could be pumped from the Delta. For example, the CVPIA required Reclamation to enter into agreements to provide a combined total of 250,000 acre-feet of CVP water to state and federal wildlife refuges and to dedicate 800,000 acre-feet to fish & wildlife purposes. Around the same time, Biological Opinions began to reduce Reclamation's opportunities for pumping water out of the Delta, which curtailed the availability of supplies.

Consistent with the terms of the water rights permits issued by the State Water Rights Board, Reclamation did not impose the impacts of the reduction in CVP water supplies on the Exchange Contractors. This is demanded by the terms of the San Luis permit, which requires honoring the prior vested rights acquired under the Friant Division permit. *Westlands VII*, 337 F.3d at 1102, 1103, 1104.

Just last year, the District Court summarized the CVP priorities as follows:

> In CVP Federal water service contracting, there are at least three categories of contracts. The first are "Exchange Contracts" which give express contractual priority to CVP water service to designated "Exchange Contractors" on the basis of their preexisting pre-1914 riparian and appropriative rights to the San Joaquin River. *Westlands Water Dist. v. U.S.*, 337 F.3d 1092, 1096 (9th Cir.

[2] The first Friant Division contract, with South San Joaquin Municipal Utilities District, was signed in 1945.

> 2003) ["*Westlands VII*"]. The Exchange Contractors "traded" their pre-existing water rights to the Bureau, which obtained water permits from the SWRCB based on these exchanged water rights, for which the Bureau in turn granted priority access to CVP water supply to the Exchange Contractors in federal water service contracts. This enabled the Bureau to provide water for a proposed CVP expansion in other areas of the San Joaquin Valley. *Westlands* [*VII*], 337 F.3d at 1096-97, *citing Westlands Water Dist. v. U.S.*, 864 F. Supp. 1536, 1539 (E.D. Cal. 1994) ["*Westlands III*"].
>
> The second category of CVP contracts are Settlement Contracts including the Sacramento River Settlement ("SRS") Contracts, which grant a contractual priority to CVP water supply through limitations on shortage provisions. ... "[T]he CVP's water rights are subject to the Settlement Contractors' [pre-existing water rights]" which include riparian, appropriative, and other water rights recognized by the State Board. [Citation omitted.]
>
> The third category of contracts are [*sic*] held by CVP contractors, north-of-Delta, in-Delta, and south-of-Delta. All of these third category CVP contractors, which include . . . SLDMWA and Westlands, held no pre-existing water rights to offer as consideration for CVP water service and have no priority access rights to CVP water supply or deliveries in times of shortage; no guarantee of 100% contract water deliveries; and no recognition they include pre-existing water rights. The Bureau allocates reduced CVP water supplies during Shortages to the third category of CVP water service contractors on a CVP-wide basis in accordance with the terms of all these Contracting Districts' water service contracts.

Tehama-Colusa Canal Auth. v. United States Dep't of Interior, 819 F. Supp. 2d 956, 970-971 (E.D. Cal. 2011).[3]

Despite this long-established priority and course of dealing, Westlands has objected to Reclamation's allocation decisions and repeatedly challenged the senior priority of the Exchange Contractors' substitute Delta water supply.[4] These cases resulted in no less than seven published decisions, including the Ninth Circuit's 2003 decision referred to as *Westlands VII*.

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[3] This case is currently on appeal to the Ninth Circuit; oral arguments are scheduled to be held on December 5, 2012. While the Ninth Circuit may overturn some of the District Court's holdings in the case below, it is extremely unlikely that it would disapprove this statement of the CVP water rights hierarchy, which represents a summary of prior established caselaw.

[4] Westlands has also repeatedly challenged Reclamation's use of San Luis Reservoir to store water for delivery to the Exchange Contractors. It is technically true that the substitute Delta supplies for the Exchange Contractors and the Settlement Contractors do not have priority in the use of storage space in San Luis Reservoir. However, this point does not advance Westlands' arguments because the San Luis water rights permit does not authorize delivery

In *Westlands VII*, the Ninth Circuit affirmed the district court's findings that the Exchange Contractors hold senior water rights that are both riparian and pre-1914 appropriative, and, "under section 8 of the Reclamation Act of 1902 (43 U.S.C. § 383), the Bureau is required to comply with state law in acquiring water rights for the diversion and storage of water by the CVP." The Ninth Circuit concluded "both Westlands and the Bureau understood that prior vested rights had priority over Westlands' water allocations." *Westlands VII*, 337 F.3d at 1102. The Ninth Circuit expressly held that the Exchange Contractors' substitute supply "is a vested priority obligation the Bureau must satisfy without including it in CVP available supply." *Westlands VII*, 337 F.3d at 1104.

We are informed that representatives of Westlands have claimed that the priority given the Exchange Contractors' Delta water supply merely represents a "policy decision" of Reclamation. In the context of the San Luis permit and the Friant Division permit, these statements are flatly inaccurate. As the courts have previously held in rejecting Westlands' claims, Reclamation <u>must</u> comply with state law in its water diversions, and the state water rights permits issued for the San Luis Unit require honoring the Exchange Contractors' priority of water diverted from the Delta. *Westlands VII,* 337 F.3d at 1101 ("Under section 8 of the Reclamation Act of 1902, (43 U.S.C. § 383), the Bureau is required to comply with state law in acquiring water rights for the diversion and storage of water by the CVP."), 1102 (San Luis permit is '*subject to vested rights*', which have priority over Westlands' water allocations), 1103 ("the Exchange Contractors' water allocation has priority over the Westlands water service contract"). While the San Luis Unit CVP contracts do not specifically mention the priority of the Exchange Contractors' substitute Delta water supply, this fact is irrelevant because: (1) the contracts can only authorize the delivery of water that Reclamation has a legal right to divert, and (2) the underlying water rights permits <u>do</u> expressly incorporate the senior priority by requiring Reclamation to honor "prior vested rights."

In other cases, some water users have sought to establish a senior priority for west side contractors as compared to other contractors who also take water under the San Luis permit. In

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of any water to SLDMWA contractors until the prior vested rights have been fulfilled. Thus, the use of San Luis Reservoir to facilitate delivery of water to the Exchange Contractors and the Settlement Contractors on the San Joaquin River is a matter of convenience *for the SLDMWA contractors.* If this water were not stored in San Luis Reservoir, the entire Exchange Contractor and Settlement Contractor supply would have to be delivered via the Delta-Mendota Canal *before any water could be delivered to any SLDMWA contractor*: if Reclamation were to start delivering SLDMWA contractors water before honoring the prior vested rights of the Exchange Contractors and Settlement Contractors, Reclamation would be in violation of both the terms of the San Luis permit and Section 8 of the Reclamation Act of 1902.

San Luis Unit Food Producers, for example, irrigators who receive water from the San Luis Unit argued (among many other things) that Section 1(a) of the San Luis Act directs Reclamation to provide water to particular users in particular amounts. The District Court rejected this argument, noting that it had previously been presented and rejected in *Westlands Water District v. United States*, 805 F. Supp. 1503, 1508 (E.D. Cal. 1992) ("*Westlands I*"), *aff'd sub nom. Westlands Water Dist. v. Firebaugh Canal Co.*, 10 F.3d 667 (9th Cir. 1993) ("*Westlands II*"):

> Read as a whole, section 1(a) [of the San Luis Act] does not assign exclusive water rights to any party .... Rather, it is a reaffirmation of Congress's consistent treatment of the CVP as an expanding, coordinated water delivery system. The San Luis Act, along with other reclamation acts, explicitly gives the Bureau the authority to manage the CVP. Section 1(a) explains how the San Luis Unit fits into that system. The section imposes no limit on the Bureau's discretion to make water management decisions in the interests of an integrated water project.

San Luis Unit Food Producers v. United States, 772 F. Supp. 2d 1210, 1242 n. 9 (E.D. Cal. 2011), citing *Westlands I*, 805 F. Supp. at 1508.

Westlands I does not hold that Reclamation has absolute discretion to make water management decisions in the interests of an integrated CVP water project. Neither *Westlands I* nor any of the subsequent six decisions in that litigation can be stretched that far. Rather, *Westlands I* and *Westlands II* simply stand for the proposition that *Section 1(a) of the San Luis Act* does not constrain Reclamation's discretion to make water management decisions that have the effect of reducing the water supplies of San Luis Unit contractors. It does not follow that Reclamation has unfettered discretion in its CVP operations. Rather, Reclamation remains bound by all other applicable laws – including Section 8 of the Reclamation Act of 1902, applicable California water rights law, and the terms of the Friant Division permit, as interpreted by the Ninth Circuit in *Westlands VII*.[5] These legal mandates constrain Reclamation's discretion and render it unable to disregard the Exchange Contractors' senior priority to Delta water supplies.

The Ninth Circuit's 2003 *Westlands VII* decision resulted in a final judgment that continues to bind all the affected parties, including Westlands, Friant, the Exchange Contractors,

[5] The federal court's judgment interpreting this matter of California water rights permits and priorities is final and binding on all the parties, including Reclamation. The SWRCB and the courts have concurrent jurisdiction over California water rights matters. *National Audubon Soc'y v. Superior Court*, 33 Cal.3d 419, 426 (1983). In *Natural Resources Defense Council v. Rodgers*, the SWRCB acknowledged that this power extends to federal courts as well as California courts.

and Reclamation. Reclamation can only deliver water as authorized by its permits. Since the San Luis Unit permit expressly establishes the Exchange Contractors' senior priority to their substitute Delta supply, the Exchange Contractors' rights under the Friant Division permit are "first in time, first in right." Under this well-established principle, in times of shortages, junior water users' supplies are reduced before senior water users' rights are curtailed: "As between appropriators . . . , the one first in time is first in right, and a prior appropriator is entitled to all the water he needs, up to the amount he has taken in the past, before a subsequent appropriator may take any." *City of Barstow v. Mojave Water Agency*, 23 Cal.4th 1224, 1241 (2000). In other words, when there is not sufficient Delta water available to serve all users, the "first in time, first in right" principle mandates that the Exchange Contractors' senior water supply is served first, and no junior water user can receive any water until this senior demand is satisfied.

To avoid this result, some south of Delta CVP contractors have suggested that Reclamation could fulfill part or all of the Exchange Contractors' demand from the Friant Division's San Joaquin River supplies rather than the substitute Delta supply. There is no basis for these attempts to resurrect the points that *Westlands VII* already decided: the San Luis Unit permit is conditioned on fulfillment of prior vested rights, including the Friant Division permit. If part of the Exchange Contractors'' supply were taken from the Friant Division supplies, the Friant contractors' supplies would necessarily be reduced by that same amount. California law does not permit shorting senior water users merely to reduce the impact that the junior water users would otherwise suffer. "Case law simply does not support applying an equitable apportionment to water use claims unless all claimants have correlative rights. . . . [C]ases . . . require that courts making water allocations adequately consider and reflect the priority of water rights. . . ." *City of Barstow*, 23 Cal. 4th at 1247 (*disapproving City of Los Angeles v. City of San Fernando*, 14 Cal. 3rd 199, 265-66 n. 61 (1975) to the extent that it "could be understood to allow a court to completely disregard California landowners' water priorities").[6] Reclamation would violate the terms of the San Luis Unit permit if it delivered any water to the San Luis Unit before the Friant Division water rights, including the substitute Delta supply for the Exchange Contractors, had been fully satisfied. Disregarding the senior priority of the Friant Division

[6] Although some have suggested that the public trust doctrine allows equitable reduction of all water rights to address the needs of Delta fisheries, *El Dorado Irrig. Dist. v. State Water Resources Control Bd.*, 142 Cal. App. 4th 937 (2006), confirms that the public trust doctrine only authorizes the disregard of water rights priorities in specific, limited circumstances, such as when adherence to existing priorities would itself violate the public trust. In contrast, where, as here, the best available evidence suggests that the needs of the fish can be met by curtailing the diversions of the junior water users, that is the result compelled by California law. These parameters of the public trust doctrine will be addressed in more detail in a separate memorandum that we are currently preparing for you.

water rights permit would not be consistent with California law or Section 8 of the Reclamation Act of 1902, and were Reclamation to attempt such an action, of course Friant would be forced to defend its legal rights.

Furthermore, Reclamation would violate the terms of the Friant Division repayment contracts by fulfilling part or all of the Exchange Contractors' demand from the Friant Division's San Joaquin River, unless Reclamation is unable to deliver Delta water *under the terms of the Exchange Contract*. Each of the Friant Division 9(d) repayment contracts contains the following language in Article 3(n):

> The rights of the Contractor under this Contract are subject to the terms of the contract for exchange of waters, dated July 27, 1939, between the United States and the San Joaquin and Kings River Canal and Irrigation Company, Incorporated, et al., (hereinafter referred to as the Exchange Contractors), Contract No. I1r-1144, as amended. The United States agrees that it will not deliver to the Exchange Contractors thereunder waters of the San Joaquin River unless and until required by the terms of said contract, and the United States further agrees that it will not voluntarily and knowingly determine itself unable to deliver to the Exchange Contractors entitled thereto from water that is available or that may become available to it from the Sacramento River and its tributaries or the Sacramento-San Joaquin Delta those quantities required to satisfy the obligations of the United States under said Exchange Contract and under Schedule 2 of the Contract for Purchase of Miller and Lux Water Rights (Contract I1r-1145, dated July 27, 1939).

This contractual language plainly prohibits Reclamation from serving the Exchange Contractors from the San Joaquin River, except as authorized under the terms of the Exchange Contract itself.

To the extent the BDCP modeling may assume that Reclamation will change CVP operations so they no longer respect the senior Friant Division water rights, those assumptions are contrary to law and are therefore fatally flawed. To honor its obligation to operate the CVP consistent with California water law, Reclamation must accord senior priority to the water rights that were vested before the San Luis permit was issued, including the Friant Division permit and the Exchange Contractors' substitute Delta water supply.

2. BDCP Would Injure Friant by Decreasing the CVP Delta Diversions in Dry Years, Increasing the Likelihood That the Exchange Contractors Will Make a Call on Friant's San Joaquin River Supplies

With respect to water supply reliability, the modeling results presented by Dr. Sunding show that the BDCP would actually leave Friant worse off than it would be under the status quo. This result is unacceptable to Friant, as it injures Friant's existing water users in violation of California Water Code section 1702. *Id.* ("Before permission to make [a change in the point of diversion] is granted the petitioner shall establish, to the satisfaction of the board, and it shall find, that the change will not operate to the injury of any legal user of the water involved."); *see also* Cal. Water Code §§ 1701.2(d), 1701.3(b)(1).

For over 60 years, Reclamation has respected the Exchange Contractors' senior priority to the water diverted from the Delta. While other Delta exporters have experienced shortages as a result of pumping restrictions, the Exchange Contractors have never been shorted in more than six decades of CVP operations; one hundred percent of the time, they have obtained the full amount of substitute Delta water supply required under the Exchange Contract.[7] Thus, under existing conditions, the senior water rights obtained under the Friant Division permit provide a highly reliable source for the Exchange Contractors' substitute Delta supply.

Under the new pumping regime being modeled by BDCP, more water would be diverted from the Delta in wetter years, and diversions would be reduced in drier years. Slide 9 of Dr. Sunding's presentation shows the results to the State Water Contractors derived from modeling this potential change in operations. As compared to the status quo, in the driest 30-33% of water years, the modeling shows that the State Water Contractors would get less water under BDCP Alternative 4 than they do under the current regulatory regime. (All contractors would have gotten more water under Alternative 1A, but the BDCP proponents have agreed to remove this alternative from further consideration due to concerns about its environmental impacts.) According to the BDCP proponents, under BDCP, the State Water Contractors and the CVP contractors would each take an equal share of the water diverted and the costs. Thus, even though Dr. Sunding's presentation does not include modeling results for CVP contractors, the results for CVP contractors under the proposed BDCP operations would be the same as they are

[7] As you know, hydrological conditions in some years have triggered the Critical Year provision of the Exchange Contract. In those years, under the terms of the Exchange Contract, the amount of Delta water supply required to be delivered to the Exchange Contractors is reduced from 840,000 acre-feet to 650,000 acre-feet. Thus, the Exchange Contractors have received less water in Critical Years. In every year of CVP operations, though, <u>all</u> of the substitute Delta water supply due to the Exchange Contractors has been delivered to them from the Delta.

for State Water Contractors: less water in the driest 30-33% of years, and more water in the wettest years.

This means that BDCP *increases* the likelihood that a full Delta supply could not be delivered to the Exchange Contractors in the driest years, thereby *increasing* the likelihood that the Exchange Contractors would exercise their rights to San Joaquin River water that otherwise would be available to Friant. Thus, in the driest years, when Friant's water supply is most at risk, BDCP would *exacerbate* that risk.

B. BDCP Offers Friant Little to No Water Quality Improvements

As shown in slide 20 of Dr. Sunding's August 10, 2012 presentation to Friant, BDCP's modeling shows that the project would have minimal benefit to CVP agricultural water users. Dr. Sunding previously estimated the present value of benefit to all CVP agricultural water users under BDCP Alternative 4 as $68M – which represents less than one-half of 1% of BDCP's projected $14B cost. (We understand that Dr. Sunding's newly refined analysis now estimates this benefit at $153M, but even this new figure, which is more than double the previous estimate, represents only 1% of BDCP's projected $14B costs.) However, none of these benefits would accrue to Friant water users, since Friant Division contractors do not use any Delta water supplies. In other words, the modeling data seems to indicate that BDCP provides slight water quality benefits, but not for Friant.

C. BDCP's Ability to Provide Regulatory Certainty Is Questionable Because BDCP the Applicants Have Not Ensured Adequate Funding as Required to Obtain an HCP

BDCP is proposed as a habitat conservation plan pursuant to Section 10 of the federal Endangered Species Act, 16 U.S.C. §§ 1531, et seq. *See, e.g.*, Cal. Water Code § 85320. Normally, HCP permittees obtain regulatory certainty through application of the "No Surprises" policy. Under "No Surprises," with certain designated exceptions, the agencies issuing the HCP agree that they will not require the permittees to provide additional mitigation in the form of additional land, water, or money; the permittees' mitigation obligations are capped at the amount specified in the HCP. We understand that the permitting agencies recently have determined that the scientific data do not support application of the "No Surprises" policy to the BDCP. Given this, it is unclear to us how any of the BDCP permittees will gain the benefit of regulatory certainty.[8]

Even if we accept the dubious assertion that an HCP that does not include "No Surprises" can provide regulatory certainty, the BDCP does not appear to meet the minimum statutory standards for issuance of an HCP. To approve an HCP application and conservation plan, the Secretary of the Interior must find, among other things, that "the applicant will ensure that adequate funding for the plan will be provided." 16 U.S.C. § 1539(a)(2)(B)(iii). The funding assurance standard is not met where the applicants merely assume that another entity will participate and fund a portion of the costs of the plan. *National Wildlife Fed'n v. Babbitt*, 128 F. Supp. 2d 1274, 1295 (E.D. Cal. 2000) (openly questioning whether "a funding mechanism that is not backed by the applicant's guarantee could ever satisfy the requirement of § 1539(a)(2)(B)(iii) that the applicant 'ensure' funding for the Plan"). Likewise, an HCP funding plan does not pass muster when it relies on third parties opting in to the Plan at some future time. *Sierra Club v. Babbitt*, 15 F. Supp. 2d 1274, 1282 (reliance on speculation as to funding from third parties is arbitrary and capricious); *National Wildlife Fed'n v. Babbitt*, 128 F. Supp. 2d 1274, 1295 (E.D. Cal. 2000). Likewise, an applicant's assurance of adequate HCP funding is not legally sufficient when it relies upon undependable and speculative sources for the necessary funds. *National Wildlife Fed'n v. Babbitt*, 128 F. Supp. 2d 1274, 1295. For these reasons, HCP funding plans that rely on unproven future actions, such as a proposed bond issue requiring voter approval or a sales tax measure or fee that has not been enacted, do not meet the statutory standard. *Southwest Ctr. for Biological Diversity v. Bartel*, 470 F. Supp. 2d 1118, 1156 (S.D. Cal. 2006). As the court explained in *Sierra Club v. Babbitt*, 15 F. Supp. 2d 1274, 1282 (S.D. Ala. 1998):

> [T]he FWS's speculative reliance on other unnamed sources to contribute funds to make up for the inadequacy of the amounts of offsite mitigation funding required is simply contrary to the law and unsupported by any factually reliable basis in the Administrative Record. . . . Because the Administrative Record does not establish what level of funding has been offered by "other sources," the FWS cannot demonstrate any basis in the Administrative Record upon which the level or amount of offsite mitigation measures are "to the maximum extent practicable."

[8] Even if the state contractors are able to overcome this preliminary determination with more specific scientific data, it is still doubtful whether the benefits of the "No Surprises" policy could be extended to the federal contractors. Section 10's "No Surprises" assurances are not available to federal agencies such as Reclamation, which means that Reclamation's CVP operations will continue to be subject to a Biological Opinion, and the federal water contractors' only legal basis for receiving this water derives from Reclamation's permits and will necessarily be subject to the terms of any applicable Biological Opinion.

Moreover, the law establishes that the FWS cannot comply with the strict ESA mandate that the HCP "minimize and mitigate" the effects of the projects to the "maximum extent practicable" simply by relying on speculative future actions by others. *Cf. Sierra Club v. Marsh*, 816 F.2d 1376 (9th Cir. 1987) (action agency cannot "insure" project will not jeopardize species based on promise of future mitigation measures); *NWF v. Coleman*, 529 F.2d 359 (5th Cir. 1976), *cert. denied*, 429 U.S. 979 (proposed actions by others does not "insure" that agency's actions will not cause jeopardy); *Southwest Center for Biological Diversity v. Babbitt*, 939 F. Supp. 49 (D.C. 1996) (FWS's reliance on future actions by Forest Service does not comport with the language of statute that FWS base its listing decisions on "existing" regulatory mechanisms).

The CVP contractors who are applicants for the BDCP have not identified any means of ensuring that they will provide adequate funding for the Plan. The proponents of the BDCP have proposed that the costs of the plan be split between the CVP and the State Water Project based on the amount of water each project will receive from the BDCP. However, the CVP contractors who will reap most of the benefits of BDCP have indicated to us that they are not able to afford to cover the CVP's share of the costs of the BDCP. To spread these costs, one of these applicants, Westlands, has suggested that the CVP cost-share be allocated to additional CVP contractors, including Friant.[9] BDCP proponents have also suggested to us that they would make up funding deficits through a bond issue or by having the SWRCB impose fees on all water rights holders.

Friant is not an applicant for BDCP. Likewise, no federal agency can be one of the primary applicants for BDCP. *See, e.g.*, HCP Handbook, p. 3-1. Thus, neither Friant nor any federal agency can be used to backstop the CVP applicants' lack of adequate funding, because this would not satisfy the statutory mandate that "the applicant . . . ensure that adequate funding for the plan will be provided." *See* 16 U.S.C. § 1539(a)(2)(B)(iii).[10] The BDCP proponents

[9] Some have suggested that Reclamation would be able to pass through costs to CVP contractors such as Friant, even over their objection, merely by amending the ratesetting policy. We are unaware of any legal basis to support such assertions. The ratesetting policy is a regulation that has been adopted pursuant to federal law to implement certain statutory requirements. It is a fundamental principle of administrative law that regulations must be consistent with their authorizing legislation. Here, there is no existing legislation that authorizes costs of this magnitude and scope for BDCP. To the contrary, all existing federal legislation authorizes studies to determine whether BDCP is a viable project. Absent any federal legislation authorizing this $14B project, we do not believe there is any legitimate legal means of forcing these costs on unwilling CVP contractors through a unilateral change in the ratesetting policy – particularly when BDCP's own modeling confirms that these CVP contractors stand to gain very little, if anything, from the project.

[10] Many of Friant's member districts cannot incur additional bonded indebtedness. As you are well aware, the Friant districts have already incurred significant bonded indebtedness in order to finance the repayment of their CVP

cannot simply assume that a share of the costs will be borne by non-applicants such as Friant; this type of speculation does not satisfy the statutory prerequisites to obtain an HCP.

D. BDCP Would Offer Friant Some Limited Protection from a Catastrophic Delta Failure

Friant acknowledges that the BDCP could provide it some benefit related to protection against catastrophic failure of the existing Delta conveyance system. Obviously, a catastrophic failure of the Delta conveyance system might render it impossible to divert any water from the Delta, so that Reclamation would not be able to deliver the substitute Delta supply to the Exchange Contractors during the period of the facilities outage. Should that occur, the Exchange Contractors can exercise their rights to take the water from the San Joaquin River, which would necessarily diminish Friant's supply. Insurance against this type of call on the Friant Division water has some value to Friant. However, the value of this insurance is somewhat limited because even a catastrophic failure would be temporary in duration, and many Friant Division districts have groundwater supplies that they can use to help them get through a temporary period of shortage. Friant is willing to meet with BDCP proponents to discuss its views on the scope and extent of this potential benefit.

II. THE LIMITED TO NEGLIGIBLE BENEFITS BDCP OFFERS TO FRIANT DO NOT JUSTIFY A PRICE OF $2B OR MORE

A. Under the "Beneficiary Pays" Principle, Friant's Share of the Costs Should Be Proportionate to the Benefits It Receives

BDCP's proponents have long espoused the "beneficiary pays" principle and claimed that the project's cost allocation will be consistent with this principle. BDCP's "beneficiary pays" principle has its genesis in CALFED, the ROD for which states, "a fundamental philosophy of the CALFED Program is that costs should, to the extent possible, be paid by the beneficiaries of the program actions." CALFED Bay-Delta Program Programmatic Record of Decision, p. 34 (August 28, 2000) (relevant excerpts attached as Exhibit F). However, as the California Legislative Analyst's Office (LAO) noted on page 2 of its February 2004 "Analysis of the 2004-05 Budget Bill", "The [CALFED] ROD . . . provides few details as to how this principle would

capital repayment obligations, to assure a funding stream for the San Joaquin River Restoration Program. To obtain this financing, many of the Friant districts entered into agreements that preclude them from issuing additional bonded indebtedness.

be implemented."[11] (The LAO's 2004 Analysis is attached as Exhibit G.) Unfortunately, in the six years since CALFED was reorganized and BDCP succeeded to some of the CALFED vision, BDCP has made little to no progress on defining its proposal for implementing this fundamental concept.

Luckily, though, there is a wealth of California authority to help BDCP navigate the "beneficiary pays" concept. This principle is well-established in California, having been defined in cases considering the costs that can be charged as special assessments to benefited properties and the "fair-share" contributions that can be imposed as development impact fees.[12]

The "beneficiary pays" principle limits a beneficiary's financial contribution to the proportionate share of the benefits it receives. For example, in the context of special assessment districts, the principle is stated as follows: "No assessment shall be imposed on any parcel which exceeds the reasonable costs of the proportional special benefit conferred on that parcel." Cal. Constit., Art. XIIID, § 4(a). In this context, "beneficiary pays" means that no assessment can be imposed unless a special benefit has been conferred on that particular property. *Golden Hill v. City of San Diego*, 199 Cal. App. 4th 416, 422, 423 (2011); *see also Beutz v. County of Riverside,* 184 Cal. App. 4th 1516, 1522 (2010). In other words, if the project does not benefit an entity, that entity cannot be charged for it. A necessary corollary is that the cost of the special assessment must be proportional to, and not exceed, the value of the special benefits conferred. "The special benefit and proportionality requirements are perhaps best understood as being interrelated, not separate, requirements. The proportionality requirement ensures that the aggregate assessment imposed on all parcels is distributed among all assessed parcels in proportion to the special benefit conferred on each parcel." *Beutz*, 184 Cal. App. 4th 1516, 1522.

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[11] Failure to resolve this important issue has plagued CALFED and its successor projects for more than 12 years. *See* letter from Sen. Barbara Boxer to Lester Snow, Director of the California Department of Water Resources (September 29, 1999), p. 2 (asking, among other things, "What steps has CALFED taken to identify those who would benefit from specific water management tools and to determine their willingness to pay?"). (A copy of Sen. Boxer's letter is attached as Exhibit H.) In 2006, when Sen. Mike Machado asked why Governor Schwarzenegger's proposed water bonds did not define "beneficiary pays," the Governor's administration responded, in part, "The Administration does not see the value in further attempting to define this often divisive term." California Senate Committee on Natural Resources and Water, Analysis of SB 34 (2007-08 Regular Session, April 17, 2007 version), p. 2 (attached as Exhibit I).

[12] We understand that the BDCP will be constructed and owned by the State of California, with an agreement between the federal government and the state spelling out the circumstances under which the federal government uses and pays for the facilities. Since the facilities will be state-owned, we have focused on the California authorities defining the "beneficiary pays" principle, though we believe similar results would be obtained under analogous provisions of federal law.

Thus, the "beneficiary pays" principle limits the amount of the costs imposed to the proportion of benefit received.

The "beneficiary pays" principle has also been defined in the context of fair-share calculations for development impact fees, and the validity of using the framework of these types of fees to define CALFED's "beneficiary pays" principle has already been recognized. *See* letter from Sen. Barbara Boxer to Lester Snow, Director of the California Department of Water Resources, p. 2 (September 29, 1999) (posing the question "Consistent with the 'beneficiary pays' principle, what has CALFED done to refine and implement a broad set of impact-based mitigation fees?") (Exhibit H). Under California's Mitigation Fee Act and the California Environmental Quality Act, the project proponent can be required to pay fees that represent its proportionate share of an impact to infrastructure – that is, the extent to which the project will benefit from new infrastructure. The California Supreme Court has stated that a project proponent's share of impact fees should be "roughly proportional" to the impacts caused by its actions and that a project developer "need not pay to mitigate effects caused by other[s]." *City of Marina v. Board of Trustees of California State University*, 39 Cal. 4th 341, 362, 361 (2006); *Tracy First v. City of Tracy*, 177 Cal. App. 4th 912, 937 (2009).[13] For example, if a project includes 1500 homes that will increase traffic at a nearby intersection by 25%, the project proponent may be required to pay fair-share fees amounting to 25% of the cost of the traffic infrastructure improvements necessitated by the addition of the traffic from the project. However, the project proponent cannot be charged a fee simply because the city's existing street system is over-capacity and the intersection is already overwhelmed. The "fair-share" or "beneficiary pays" principle does not require a project proponent to fix problems created by others. The developer's contribution is limited to the impacts caused and the benefits received by its project; a developer cannot be forced to pay fees to build infrastructure that will benefit others.

To meet the fair-share standard, there must be, at a minimum, a reasonable relationship between the amount of the fee and "the deleterious public impact of the development." *Building Industry Ass'n of Central California v. City of Patterson*, 171 Cal. App. 4th 886, 897-98 (2009).[14] Consequently, a fair-share fee must specify the percentage of current and future

[13] Fees that exceed the reasonable cost of providing the regulatory activity or service for which they are charged are vulnerable to attack as they may constitute improper "special taxes." *See* Cal. Gov. Code § 50076.

[14] The "reasonable relationship" test applies to legislatively imposed fees of general applicability. An ad hoc exaction or fee is subject to the more rigorous *Nollan/Dolan/Ehrlich* "essential nexus" and "rough proportionality" test. *Building Industry Ass'n.*, 171 Cal. App. 4th at 897.

improvements for which the developer paying the fee would be responsible. *Anderson First Coalition v. City of Anderson*, 130 Cal. App. 4th 1173, 1188, 1189 (2005). A fee for a project's impacts on affordable housing did not meet the "reasonably related" standard when it was based on the amount of affordable housing the jurisdiction needed to provide, rather than the actual affordable housing impacts caused by the project. *Building Industry Ass'n*, 171 Cal. App. 4th at 899.

The LAO has also suggested that California's "reasonably proportional" standard should be applied to define the "beneficiary pays" principle in the context of CALFED. In 2004, the LAO recommended that the California Legislature enact legislation to provide a framework for the application of the "beneficiary pays" principle for CALFED. The LAO stated that the framework should be "guided by principles of fairness and administrative simplicity" and then went on to specify: "By fairness, we mean that costs imposed on beneficiaries should be reasonably proportional to the benefit received by them." LAO, "Analysis of the 2004-05 Budget Bill" (February 2004), Exhibit G, p. 8. Since BDCP is an outgrowth of CALFED, the LAO's recommendation – to define "beneficiary pays" to mean that costs imposed on beneficiaries should be reasonably commensurate with benefits received – applies with equal force to BDCP.

Here, at least one of the BDCP proponents, Westlands, has assumed in official documents that the costs of BDCP will be spread equally amongst all contractors based on the amount of Delta water received, regardless of the actual benefits accruing to any Delta water user from the BDCP project. Official Statement, $77,000,000 Westlands Water District Refunding Revenue Bonds, Series 2012A (September 1, 2012), p. 35 ("assuming that all state and CVP water delivered south of the Delta share [*sic*] proportionately in the cost of the DHCCP on a per acre-foot basis") (attached as Exhibit J). But, as shown above, BDCP does not make Friant's water supplies any more reliable, nor does it offer Friant any other significant tangible benefits. Westlands' proposal is exactly the type of cost-spreading arrangement that the *Building Industry Ass'n* case found violated the "reasonably related" standard. Westlands' proposed per-acre-foot cost allocation would undoubtedly make the BDCP project more affordable to SLDMWA members such as Westlands, but the cost is utterly divorced from any relationship to the benefits provided by BDCP. Therefore, it does not represent any water user's "fair-share" of the BDCP project, and it does not satisfy the "beneficiary pays" principle as articulated in California law.

B. Since the Benefits Friant Would Receive from BDCP Are Very Limited, Allocating Friant 14 - 20% of the Total Project Cost -- $2B or More -- Is Wholly Unwarranted

According to the last available (2010) cost estimate, the BDCP project may cost as much as $14.2 billion. (Since that time, the preferred project alternative has been revised significantly, and a new cost estimate for this alternative has not yet been completed. However, it is anticipated that the costs for the preferred alternative will remain in the $12-$14B range.)

Friant pays the cost of delivering the substitute Delta supply to the Exchange Contractors and the Settlement Contractors on the San Joaquin River system. Under the per-acre-foot-delivered cost allocation being urged by Westlands, Friant would be charged for 884,000 acre-feet, the amount of the substitute Delta water supply. Assuming average annual deliveries of 6,000,000 acre-feet of water from the Delta, 884,000 acre-feet represents 14.7% of the total. (As the total amount of water delivered decreases, Friant's percentage share increases because of the seniority of its water rights.) Thus, Westlands' proposal results in assigning Friant 14.7% of $14B, or $2.05B. At the farm level, this could equate to a water rate increase of about $150 per acre foot, depending on the means of financing. <u>These charges would more than triple water costs to individual Friant farmers without providing any commensurate water supply benefits.</u>

III. FRIANT SUPPORTS THE BDCP AS A MEANS OF RESTORING WATER SUPPLIES LOST TO OTHER CVP AND STATE WATER CONTRACTORS, BUT FRIANT WATER USERS CANNOT SUBSIDIZE THE COSTS OF PROVIDING THESE BENEFITS TO OTHERS

Friant supports the BDCP project as a means for other water users to recoup reliability for their water supplies. However, Friant cannot support, and will be forced to object, to any proposal to allocate costs to Friant that are disproportionate to the very limited benefits Friant could receive from the BDCP. As noted above, the BDCP proponents have modeled the anticipated four categories of benefits from the project: water supply reliability, water quality improvement, regulatory assurances, and protection against catastrophic failure of the Delta conveyance system. However, BDCP will decrease Friant's water supply reliability, will fail to improve water quality for Friant Division contractors, and does not appear to be able to achieve regulatory assurances. While the BDCP will offer Friant some protection against a catastrophic failure of the Delta conveyance system, this benefit is limited in both duration and scope.

Notwithstanding the BDCP's benefits analysis, Westlands has suggested that "all state and CVP water delivered south of the Delta share proportionately in the cost of the DHCCP on a per acre-foot basis." Official Statement, $77,000,000 Westlands Water District Refunding Revenue Bonds, Series 2012A (September 1, 2012), Exhibit J, p. 35. If this means that Friant is charged for the substitute water supply delivered to the Exchange Contractors and the San Joaquin River Settlement Contractors, the proposed cost allocation violates the beneficiary pays principle. Applying this proposal would result in allocating approximately $2B (or more) of BDCP's estimated $14B cost to Friant, when BDCP's own modeling confirms that the project provides very little benefits to Friant – and in fact decreases the reliability of Friant's water supplies. Friant cannot accept a cost allocation that assigns it a share that far exceeds the value of BDCP's minor benefits to Friant contractors.

Thus, Friant finds itself in a position of agreeing with many of the points made by the Regional Water Authority in its February 14, 2005 letter objecting to CALFED cost allocation proposal put forth by the California Bay Delta Authority staff:

> The "beneficiary pays" principle is fundamental to the Record of Decision and RWA and its members strongly support it. The [Bay-Delta] Authority staff's current funding proposals violate this principle in two ways. First, the proposed Ecosystem Restoration Program fees are not linked to any identified benefits to be provided to the targeted water users. In particular, upstream water users located in the "solution area" have been targeted to pay those fees even though the CALFED program provides them no regulatory assurances. Second, the proposed state surcharge proposes water-user payments to replace State General Fund or bond contributions without identifying any specific benefits to be provided to the water users.
>
> Rather than pursuing these departures from the crucial "beneficiary pays" principle, the [Bay-Delta] Authority should conduct public hearings to identify specific projects with specific beneficiaries. As RWA's experience shows, stakeholders will participate financially in projects when their benefits are clearly demonstrated. The [Bay-Delta] Authority must use a similar and transparent approach in developing any water-user fees.
>
> If the [Bay-Delta] Authority cannot identify its projects' specific benefits and beneficiaries and also obtains only limited federal or state funding, then it must reassess its program's scope and schedule in light of these constraints. . . . The state's and federal government's fiscal constraints would not justify the Authority in decoupling water users' contributions from specifically identified benefits to

> those water users. Such an action instead would contradict the Record of Decision fundamentally.

Letter from Edward D. Winkler, Executive Director, Regional Water Authority, to Gary Hunt, Chair, California Bay-Delta Authority (February 14, 2005), pp. 1-2 (attached as Exhibit K).

Of course, the Bay-Delta Authority no longer exists, and the BDCP has succeeded to some of the CALFED vision for resolving California's water conflicts. However, the Regional Water Authority's arguments apply with equal force to BDCP's attempts to formulate a definition of the "beneficiary pays" principle. Moreover, the same cost issue that plagued CALFED continues to haunt the BDCP as it struggles with this principle: the program is simply too costly for its expenses to be borne solely by its beneficiaries in proportion to the benefits they will receive.

Friant respectfully suggests that the BDCP decision-makers should resist those who urge them to redefine the "beneficiary pays" principle in some unprecedented fashion, or to allocate minor beneficiaries a disproportionate share of the project costs. Instead, if Reclamation, the State of California, and the project's true beneficiaries all feel that this is a worthy project that should be pursued, the funding gap should be addressed by revisiting and increasing the public share, perhaps along the lines of what was suggested by the LAO in 2004 for CALFED's Environmental Water Account (EWA).

Noting that EWA, like many of CALFED's activities, has shared public-private benefits, the LAO suggested that, for those activities, "the activity should be funded by a combination of general-purpose funds and user fees" imposed on the direct beneficiaries. The LAO reasoned: "Because of the very nature of shared benefits, it is difficult to separate out and quantify with precision the benefit to the private beneficiaries. However, this should not mean that the private beneficiaries are absolved from any responsibility for sharing in the costs for activities from which they directly benefit." LAO, "Analysis of the 2004-05 Budget Bill" (February 2004), Exhibit G, p. 9. The LAO then identified the EWA as "a good candidate for this 'shared benefits'" approach because of its two primary objectives: (1) to minimize reductions in water deliveries from the state and federal water projects (or compensate water users for such reductions) and (2) to enhance endangered species protection and recovery. *Id.* The LAO suggested that "water users should pay for at least some of the program's costs because they clearly benefit from EWA to the extent it makes water supplies more reliable." *Id.* On the other hand, the LAO reasoned "it is appropriate for the program's costs to be shared with the public-at-large given the benefits to endangered species protection and recovery." *Id.*

FRIANT
WATER AUTHORITY

BDCP has the same two objectives as EWA did. Therefore, the LAO's analysis applies with equal force to the BDCP cost allocation. Under this model, water users should pay for BDCP to the extent it makes their water supplies more reliable. BDCP's benefits to endangered species protection and recovery, on the other hand, are public benefits, and the costs associated with those activities should be borne by the federal and state governments.

We hope that you take Friant's comments in the constructive vein in which they are being offered, and we reiterate Friant's support for BDCP's twin goals of: (1) allowing those water users who have lost water due to regulatory constraints to enhance the reliability of their supplies, and (2) restoring a healthy Delta ecosystem. Friant remains ready, willing, and able to work with other water users to develop a creative solution to these challenging issues, including a fair cost allocation that assigns costs reasonably proportional to the benefits received by the direct beneficiaries.