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October 30, 2015

VIA EMAIL TO: BDCPComments@icfi.com

BDCP/WaterFix Comments
PO Box 1919
Sacramento, CA 95812

SUBJECT: Comments on BDCP/CalWaterFix RDEIR/SDEIS

The Placer County Water Agency (PCWA) provides these comments on the Recirculated Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement (RDEIR/SDEIS) for the Bay Delta Conservation Plan (BDCP)/California WaterFix (CalWaterFix) Project (Project). By letter dated July 28, 2014, PCWA provided comments on what was then the proposed draft BDCP, the draft Implementing Agreement and the Draft Environmental Impact Report/Environmental Impact Statement. PCWA, in its July 28, 2014, comment letter also noted it had participated in the preparation and submittals of comments as part of the North State Water Alliance (NSWA) and the American River Water Agencies (ARWA). Both the NSWA and ARWA also submitted comment letters on the draft BDCP and PCWA, as a member of each of those groups, joined in those letters. In addition to the comments outlined in this letter, PCWA has again participated in the preparation and submittal of comments as part of the NSWA and ARWA and, as a member of those groups, again joins in those letters.

I. INTRODUCTION

PCWA engaged expert consultants to assist in the review of the draft BDCP and the initial environmental documentation prepared and circulated for the BDCP. In this regard, PCWA attached technical memoranda prepared by those experts to its July 28, 2014, comment letter. In reviewing the RDEIR/RDEIS, it is apparent that the issues and concerns raised by those technical memoranda have not been addressed in the RDEIR/RDEIS. Those memoranda are attached hereto and the analysis and conclusions contained in those technical memoranda are incorporated herein. In addition to the analysis and conclusions contained in the attached memoranda, PCWA offers the following comments on the RDEIR/RDEIS:

II. COMMENTS ON THE BDCP/CALWATERFIX RDEIR/SDEIS

An overarching concern with and flaw in the RDEIR/SDEIS is that it completely fails to adequately address or answer basic questions regarding short- and long-term impacts to the American River region and its water supplies. The improper narrow focus of the RDEIR/SDEIS ignores the reasonably foreseeable and inevitable changes to upstream operations, including changes in operation of Folsom Reservoir and the impacts associated with those changes, including water supply impacts and impacts to environmental resources in the Lower American River.

The RDEIR/RDEIS itself is virtually unusable to the average citizen or expert. Its unwieldy and confusing structure and organization, along with internal errors in editing make it, at best, difficult to understand and make understanding the project and its impacts impossible. The RDEIR/RDEIS does not provide meaningful information about many of the Project's adverse effects and it omits consideration of many impacts of concern to PCWA. In these ways the RDEIR/SDEIS fails to summarize and convey information essential to the PCWA's and the public's understanding of Project impacts in a manner reasonably calculated to inform the readers and decision makers, in violation of the National Environmental Policy Act (NEPA) readability requirement and in violation of the California Environmental Quality Act (CEQA).

Given these shortfalls, among other defects, the RDEIR/SDEIS fails to adequately provide the requisite, accurate environmental documentation necessary for the local citizenry and public decision makers to reach an informed and thoughtful determination of whether the Project will provide a reliable water supply for the State while restoring the Delta's ecosystem, without adversely impacting not only the fragile Delta ecosystem, but also upstream water supplies and reliability and the ecosystems that will be impacted by changes in upstream operations resulting from the Project. PCWA, members of the ARWA and NSWA, have invested significant time and resources protecting and enhancing those upstream water supplies and ecosystems and the failure of the RDEIR/RDEIS to adequately inform readers of impacts to those resources and to mitigate for those impacts is a fatal flaw in the RDEIR/RDEIS.

A. The RDEIR/SDEIS Violates CEQA and NEPA in Failing to Actually Inform the Reader

A major criticism of the initial DEIR/DEIS for the BDCP was that it failed to summarize and convey information essential to the understanding of Project impacts in a manner reasonably calculated to inform the readers and decision makers, in violation of NEPA's readability requirement and CEQA. The RDEIR/SDEIS repeats and compounds these problems. The RDEIR/RDEIS contains a confusing mix of new, old and partially edited impact sections; lack of clear and concise summary tables; omission of blocks of text from the revised impact chapters (without any strikeout to inform the reader which sections were deleted from the prior draft); failure to integrate figures into text; reliance on multiple appendices and appendices and exhibits to appendices; and cross references to old (DEIR/DEIS and BDCP) and new (RDEIR/SDEIS) documents. This confusing collection of disconnected information places the burden on readers to independently determine where the actual document revisions are and to make assumptions regarding which portions of the prior draft DEIR/DEIS survived the edits and recirculation. This makes it impossible for even the most able analysts to piece together all the information the RDEIR/SDEIS contends supports its impact assessments and determinations.

PCWA is not alone in expressing significant concern with the readability and presentation of information in the RDEIR/SDEIS. The Delta Independent Science Board (ISB), which is comprised of 10 PhD experts in the areas of hydrodynamics and fisheries biology, found the RDEIR/SDEIS "sufficiently incomplete and opaque to deter its evaluation and use by decision makers, resource managers, scientists and the broader public." (September 30, 2015 correspondence to R. Fiorini et al from Delta Independent Science Board Re. Review of environmental documents for California WaterFix ("2015 ISB Report", attached as Exhibit A, at p. 1.) As a result of these fundamental flaws in the RDEIR/RDEIS, the ISB concluded that the RDEIR/SDEIS "fails to adequately inform weighty decisions about public policy." (Id at p.4.)

A draft EIR must be recirculated when it is "so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded." (CEQA Guidelines, § 15088.5(a)(4).) An EIR that is a "mass of flaws" must be redone completely and recirculated. (*San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus* (1994) 27 Cal.App.4th 713, 741-742.) The RDEIR/SDEIS is so fundamentally and basically inadequate and contains a "mass of flaws" as to render it useless in informing the public of the impacts of the Project. The Project EIR must be completely rewritten and recirculated for public review and comment so that PCWA and the rest of the public can begin to understand the true impacts of the Project -- and in turn, provide detailed, consequential comments to help inform the Project and EIR/EIS.

B. The RDEIR/SDEIS Fails to Summarize or Resolve Disagreements among Technical and Scientific Experts Regarding its Underlying Data and Methodologies

The CEQA Guidelines specify that when experts disagree about an EIR's data or methodology, the EIR should summarize the main points of disagreement. (CEQA Guidelines, §15151.) When the EIR's discussion and analysis is not modified to incorporate the suggestions made in comments on the draft document, the EIR must acknowledge the conflict in opinions and explain why they have been rejected, supporting its statements with relevant data. (*Berkeley Keep Jets Over the Bay Comm. v. Bd. of Port Commissioners* (2001) 91 Cal.App.4th 1344, 1367, 1371.) An EIR that fails to explain major discrepancies in critical data and fails to resolve the conflict with substantial evidence is legally inadequate. (*Preserve Wild Santee v. City of Santee* (2012) 210 Cal.App.4th 260.)

Likewise, CEQ Guidelines state that "[a]ccurate scientific analysis" is essential to implementing NEPA. (40 C.F.R. §1500.1(b).) Agencies must ensure the scientific integrity of analyses in environmental impact statements. (40 C.F.R. §1502.24.) In doing so they must discuss any responsible opposing view and indicate the agency's response to the issued raised. An EIS "must respond explicitly and directly to conflicting views in order to satisfy NEPA's procedural requirements." (*Earth Island Institute v. Carlton* (9th Cir. 2010) 626 F.3d 462, 472.) Here, qualified experts (including, but not limited to, the Delta ISB, and NSWA experts MBK Engineers, Cardno, Dave Vogel and Robert Latour) provided detailed comments constituting substantial evidence that showed why and how the DEIR/DEIS's hydrologic modeling and fisheries analyses were flawed and inadequate to support the DEIR/DEIS's analysis, impact determinations, public participation or agency decision making. These expert comments raised issues of such significance regarding the fundamental assumptions, data and methodology used in the DEIR/DEIS as to merit discussion in a revised and recirculated Draft EIR/EIS. The RDEIR/SDEIS does not address these fundamental expert criticisms of the DEIR/DEIS.

By deferring any discussion of these issues to the Final EIR/EIS, the lead agencies have effectively precluded informed public participation on some of the most important aspects of the environmental review documents and has failed to incorporate the best available science into the environmental review of the proposed project. Given the magnitude of the criticisms levied at the DEIR/DEIS data and methodologies, and the fact that the same errors appear to have been repeated in the RDEIR/SDEIS, it was an abuse of discretion for the lead agencies to fail to directly address the key expert criticisms in the RDEIR/SDEIS so the public and decision makers could understand and weigh the agencies' views and supporting evidence in their evaluation of the RDEIR/SDEIS.

C. Fundamental Flaws in the Hydrologic Modeling Supporting the RDEIR/SDEIS Fatally Undermine its Conclusions

PCWA commented previously on the numerous errors and omissions in the BDCP and DEIR/DEIS's hydrologic modeling. The RDEIR/SDEIS fails to correct these problems, as demonstrated by the further expert report prepared by MBK Engineers and submitted on behalf of the NSWA. Expert reports evaluating the RDEIR/SDEIS submitted previously by PCWA as part of its July 28, 2014 comment letter and being submitted on behalf of the NSWA as part of comments on the RDEIR/RDEIS demonstrate that the same questions and concerns about the impacts of the previously preferred project apply to the new alternatives, including Alternative 4A.

CEQA requires that an EIR analysis and impact determinations be based on substantial evidence. CEQA "[c]ase law defines 'substantial evidence' supporting an agency's decision as ' "relevant evidence that a reasonable mind might accept as adequate support for a conclusion"' [citation] or 'evidence of "'ponderable legal significance . . . reasonable in nature, credible, and of solid value"'' [citation]." (*Banker's Hill, Hillcrest, Park West*

Community Preservation Group v. City of San Diego (2006) 139 Cal.App.4th 249, 26, fn. 10.) NEPA likewise requires a record of sufficiently detailed information to fully assess significant environmental impacts so as to allow determinations by informed, reasoned choice. "Accurate scientific evidence remains essential to an Environmental Impact Statement… [and] an agency [can] not rely on 'stale' scientific evidence or 'ignore reputable scientific criticism" in its Environmental Impact Statement.'" (*City of Carmel-By-The-Sea v. U.S. Dept. of Transp.* (9th Cir. 1997) 123 F.3d 1142, 1151, quoting *Seattle Audubon Soc. v. Espy* (9th Cir. 1993) 998 F.2d 699). The technical analyses supporting the RDEIR/SDEIS do not meet this standard; their flaws are so substantial as to invalidate the RDEIR/SDEIS analysis and impact determinations upon which they are based.

D. The EIR is Inadequate to Support Responsible Agency Decision Making

The numerous flaws with the DEIR/DEIS and RDEIR/SDEIS, including but not limited to the lack of essential information about the Project's effects on upstream water supplies and impacts to threatened and endangered fish species, render the document inadequate to meet the needs of the state responsible agencies and federal agencies with permitting jurisdiction over the Project. For example, as a CEQA responsible agency the State Water Resources Control Board (SWRCB) must rely on the Project EIR when considering the required water rights changes necessary to implement the Project. The DEIR/RDEIR/DEIS/SDEIS cannot support the SWRCB's required findings for petitions to change because there is insufficient evidence to conclude the Project will not injure other legal users of water. The specific bases for this concern have been stated previously in the July 28, 2014, comments of PCWA, the ARWA, and the NSWA, among many others. With respect to the current RDEIR/SDEIS, for example, to the extent the new preferred project (Alternative 4A) includes provisions for additional Delta outflow, the effect of that component on upstream hydrology, and the ability of upstream water users to exercise their water rights, has not been evaluated. Similarly, substantial flaws in the analysis of impacts to threatened and endangered fish species fail to satisfy the informational requirements necessary to support issuance of a Clean Water Act section 404 permit for the proposed diversion structures. For these reasons the DEIR/RDEIR provides no substantial evidence to support a finding that the Project will not injure other legal users of water and is inadequate to support the subsequent approvals required to implement the Project.

E. The RDEIR/RDEIS Fails to Consider Reasonable Alternatives

The Project is a significant departure from the original Draft BDCP. The prior project was a Habitat Conservation Plan purporting to be prepared in accordance with Section 10 of the federal Endangered Species Act. CalWaterFix significantly departed from the BDCP, altogether abandoning the habitat conservation portion of the project, moving to a "conveyance" only project. The change is so significant that the Project no longer qualifies for inclusion into California's Delta Plan. (Water Code section 85320.) As the scope and purpose of the project has changed to eliminate the restoration of the Delta ecosystem as a part of the project, the project proponents must analyze a reasonable range of alternatives to satisfy NEPA. (40 C.F.R. §1505.1(e).) The Council on Environmental Quality, in its Memorandum For Federal NEPA Liaisons, Federal, State, and Local Officials and Other Persons Involved in the NEPA Process, dated March 16, 1981 (CEQ Memorandum), explains that the range of alternatives "include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant." (CEQ Memorandum, π 2a.) The RDEIR/RDEIS fails to consider a reasonable range of practical or feasible alternatives that focus solely on conveyance. As such, the RDEIR/RDEIS fails to satisfy NEPA's mandate that a range of alternatives be considered.

F. The RDEIR/RDEIS Fails to Consider Impacts to Upstream Operations and Fails to Analyze the Impacts Associated with the U.S. Bureau of Reclamation's Commitment to Participate in the CalWaterFix

It should be beyond dispute that the participation by the U.S. Bureau of Reclamation (USBR) in the CalWaterFix is required in order to make the project economically feasible. This is perhaps best demonstrated by the fact that the USBR has joined the California Department of Water Resources (DWR) in submitting Petitions for Change of the points of diversion and/or to add points of rediversion to allow the USBR to move water diverted and stored by the Central Valley Project (CVP) through the new conveyance facility proposed as part of the CalWaterFix. Indeed, the prior iteration of the Project, the BDCP, included draft proposed funding and other commitments that provided for a "wheeling" agreement between the USBR and DWR.

The RDEIR/RDEIS fails to acknowledge, disclose, study, and analyze the effects of such an agreement or commitment to move federal Central Valley Project (CVP) water through the new conveyance facility. By failing to adequately disclose and analyze this commitment and agreement to move federal CVP water through the new conveyance facilities, the USBR has failed to disclose how it proposes to operate the CVP as part of the CalWaterFix. The lack of any available operations plan precludes any review, let alone meaningful review, of the Project on upstream reservoirs and facilities and the ecosystems affected by those operations. For example, adverse impacts associated with changes to operations at Folsom Reservoir, on the ecosystem of the Lower American River, were discussed in the previously submitted technical memorandum prepared by Cardno and attached hereto. The issues raised by that memorandum were not addressed in the RDEIR/RDEIS.

This fatal flaw renders the document inadequate for the SWRCB to undertake its role as a responsible agency under CEQA and makes it impossible to determine whether any legal users of water would be injured as a result of the CalWaterFix when deciding whether to approve the requested changes sought by DWR and the USBR.

III. CONCLUSION

It is well established that "[T]he purpose of an EIR is not only to protect the environment but to demonstrate to the public that it is being protected. (*County of Inyo v. Yorty* (1973) 32 Cal.App.3d 795, 810.) As explained in PCWA's comments, the RDEIR/SDEIS, like the DEIR/DEIS before it, does not provide sufficient information, nor does it present information in a way that allows the public a meaningful opportunity to understand and comment on the CalWaterFix Project's substantial adverse impacts. To date, the EIR/EIS has failed to demonstrate to the rate payers of PCWA that they, their water supplies, and the environment in the American River watershed, will be protected from the significant impacts of constructing and operating the CalWaterFix Project. Due to the fundamental changes in the project since publication of the DEIR/DEIS, the significant changes needed to the underlying technical studies and analyses, and the extensive comment and criticism of these documents, further edits and revisions or partial recirculation of the current DEIR/DEIS or RDEIR/SDEIS will not satisfy CEQA and NEPA's informational mandate. The state and federal lead agencies must start over and prepare a new draft EIR/EIS that addresses the concerns raised in comments on the DEIR/DEIS and RDEIR/SDEIS.

Sincerely,

PLACER COUNTY WATER AGENCY

Andrew Fecko
Director of Resource Development

Attachment

c: U.S. Senator Dianne Feinstein
U.S. Senator Barbara Boxer
U.S. Congressman Doug LaMalfa
U.S. Congressman Tom McClintock
State Senator Ted Gaines
State Senator Jim Nielsen
State Assembly Member Frank Bigelow
State Assembly Member Brian Dahle
State Assembly Member Beth Gaines
State Assembly Member Dan Logue

David Murillo, Regional Director, Mid-Pacific Region, U.S. Bureau of Reclamation
Drew Lessard, Area Manager, Mid-Pacific Region, U.S. Bureau of Reclamation
Placer County Board of Supervisors
David Boesch, Chief Executive Officer, County of Placer
City of Auburn, City Manager
City of Colfax, City Manager
Marcus Yasutake, Environmental & Water Resources Director, City of Folsom
City of Lincoln, City Manager
Town of Loomis, Town Manager
City of Rocklin, City Manager
City of Roseville, City Council and City Manager
Foresthill Public Utilities District
Shauna Lorance, General Manager, San Juan Water District
Brad Arnold, General Manager, South Sutter Water District
Ryan Bezzara, Legal Counsel, American River Water Agencies
Tim Quinn, Executive Director, Association of California Water Agencies (ACWA)
Director of Federal Relations, ACWA
Senior Regulatory Advocate, ACWA
Executive Director, California Municipal Utilities Association
Executive Director, California Special Districts Association
John Kingsbury, Executive Director, Mountain Counties Water Resources Association
Executive Director, National Water Resources Association
David Guy, President, Northern California Water Association
John Woodling, Executive Director, Regional Water Authority
Chief Executive Officer, Sacramento Area Council of Governments
Chief Executive Officer, Sacramento Metropolitan Chamber of Commerce
Tom Gohring, Executive Director, Water Forum
PCWA Board of Directors
Einar Maisch, PCWA General Manager
Scott Morris, PCWA Legal Counsel
PCWA Department Heads
Ed Bianchi, Cardno Inc.
Lee G. Bergfeld, Dan Easton, Water Bourez, MBK Engineers

Attachment

MBK ENGINEERS

Water Resources ● Flood Control ● Water Rights

DATE: July 11, 2014

TO: Dan Kelly, Ryan Bezerra, and Martha Lennihan

FROM: Lee G. Bergfeld, Dan Easton, and Walter Bourez

SUBJECT: Technical Comments on Bay-Delta Conservation Plan Modeling

This technical memorandum is a summary of MBK Engineers' ("Reviewers") findings and opinions on the hydrologic modeling performed in support of the draft environmental document for the Bay-Delta Conservation Plan (BDCP) for Folsom Reservoir and the American River Basin. The results of that modeling are summarized in Appendix 5A to the draft BDCP EIR/EIS.

The Reviewers' analysis of the BDCP modeling is summarized in categories: (1) assessment of general assumptions and operations; (2) assessment of American River demands; (3) assessment of climate change assumptions, implementation, and effects; (4) assessment of the assumptions and operational criteria for inclusion of the new BDCP facilities. The issues discussed in (1), (2) and (3) 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 (4) are specific to the inclusion of the BDCP as defined in the draft BDCP plan and identified as Alternative 4 in the Draft EIR/EIS.

This review focuses on water operations modeling using CalSim II. CalSim II is a computer program jointly developed by DWR and Reclamation. CalSim II presents a comprehensive simulation of State Water Project (SWP) and Central Valley Project (CVP) operations, and is used by DWR as a planning tool to predict future availability of water for the SWP. 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, CalSim II estimates, for various times of the year, how much water will be diverted, how much will serve as instream flows (e.g., flow in the rivers at various locations, such as Delta outflow), and how much will remain in the reservoirs. Within the context of the BDCP, CalSim II is used to estimate the amount of water that will be diverted from BDCP's proposed North Delta Diversion (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 South Delta Diversion (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 upstream reservoirs (including Folsom Reservoir). The location and timing of the diversion and the amount of water remaining instream and in reservoirs 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 or the demand for water by specific water users are input into the model. Criteria 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 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 the 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 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 the 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 affect existing water operations. In reviewing the BDCP modeling, 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.

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 that estimate impacts on water quality, hydrodynamics in the Delta, economics, hydropower, and other parameters and adversely affect the results of analyses based on those subsequent models.

No Action Alternative

Water operations modeling assumptions used in CalSim II for the BDCP No Action Alternatives (NAA) are defined in the December 2013 Draft BDCP[1] and associated draft EIR/S. Those assumptions include assumed changes to hydrology cause by climate change, so the NAA includes that assumed climate change. Assumptions affecting modeling results for Folsom Reservoir and the American River are the focus of this review. Because Folsom Reservoir is operated as an integral part of the CVP, system-wide assumptions affect conditions on the American River and these assumptions are included in this review. Demands for American River supplies also influence American River storage and flow conditions, therefore demand assumptions are included in this review. Because climate change assumptions not only affect system-wide operations, but have a significant influence on American River operations, these assumptions are reviewed to understand the basis for the NAA model results. In addition to input assumptions, the NAA operation depicted by CalSim II is reviewed for reasonableness.

[1] The detailed assumptions are stated in BDCP draft EIR/EIS Appendix 5A.

Each of the NAA 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, American River Flow Management 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 cooperatively developed by Reclamation, NMFS, U.S. Fish and Wildlife Service (USF&WS), California Department of Fish and Wildlife (CDF&W), and DWR.

American River Basin Demands

BDCP model inputs were reviewed to understand demand assumptions for water purveyors in the American River Basin. Table 1 is a summary of average annual demands used in CalSim II by the BDCP modeling at both the existing (Existing Conditions) and future (NAA) levels of development. The Existing Conditions model run was not used in the analysis of project effects, but is provided for reference. A single level of demand was used to represent the two future conditions simulated, early long term (ELT) and late long term (LLT) that represent planning horizons of approximately 2025 and 2060, respectively.

There are several problems with the demands summarized in Table 1. Existing Conditions are approximately representative of current demands. Future demands for Placer County Water Agency (PCWA) are not representative of current projections. PCWA diverts water at the American River Pump Station and delivers water into Folsom Reservoir for diversion by San Juan Water District (SJWD), Sacramento Suburban Water District (SSWD), and the City of Roseville (Roseville). The total projected annual demand for these four entities is approximately 120,000 acre-feet. Demands represented in the BDCP modeling total between 64,000 and 81,000 acre-feet annually, depending on the annual demand of SSWD. One error that contributes to underestimating PCWA's future demand is the assumption that Roseville will take only 5,000 acre-feet of their 30,000 acre-feet of contract supply from PCWA. Most future level of development CalSim II studies, such as those produced for the 2013 State Water Project Delivery Reliability Report, assume Roseville's demand for water from PCWA is 30,000 acre-feet. Roseville's 2010 urban water management plan projects that Roseville will have a demand for its 30,000 acre-feet per year of PCWA water by 2025.[2]

A second concern is that the BDCP modeling assumes that demands will increase significantly over the next 11 years, from Existing Conditions to ELT at approximately 2025, but then remain unchanged over the next 35 years to LLT conditions in 2060. Issues with this assumption are in part illustrated by reference to the City of Sacramento's most recent (2010) Urban Water Management Plan which identifies water demands continuing to increase as a result of development through at least 2035. For example, that UWMP projects total year 2030 demands within the retail service area and wholesale demands to be 250,000 acre-feet and year 2035 demands to be 261,000 acre-feet.

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[2] Roseville's 2010 urban water management plan is available at https://www.roseville.ca.us/eu/water_utility/water_efficiency/plan.asp.

Another demand-related issue with the NAA and the with-Project scenarios is that BDCP modeling does not simulate diversion limitations at the Fairbairn water treatment plant when releases from Nimbus Reservoir are below the "Hodge Flows" limits that apply to the City of Sacramento's diversions at Fairbairn. These limitations are included as terms in the City of Sacramento water right permits, and therefore are known and should be accurately reflected in the BDCP modeling.[3] This omission affects modeling of flows in the lower American River downstream of Fairbairn and simulated diversions at Fairbairn and the Sacramento River Intake.

Table 1. American River Basin Demand Assumptions

Water Purveyor	Existing Conditions (1,000 acre-feet)	NAA (1,000 acre-feet)
Placer County Water Agency (PCWA)	35.5	35.5
PCWA – CVP contract	0.0	35.0
City of Folsom	27.0	27.0
City of Folsom – CVP contract	7.0	7.0
Folsom Prison	2.0	5.0
San Juan Water District (SJWD)	33.0	33.0
SJWD - from PCWA	17.0	24.0
SJWD – CVP contract	11.2	24.2
City of Roseville - from PCWA	5.0	5.0
City of Roseville – CVP contract	32.0	32.0
Sac. Suburban Water District (SSWD) - from PCWA	0.0 - 17.0	0.0 - 17.0
El Dorado Irrigation District (EID)	0.0	17.0
EID – CVP contract	7.55	7.55
El Dorado County – CVP contract	4.0	15.0
So. Cal. Water Company /Arden Cordova Water Service	5.0	5.0
California Parks and Recreation	1.0	5.0
Sacramento Municipal Utilities District (SMUD)	15.0	15.0
SMUD – CVP contract	5.0	30.0
City of Sacramento (Fairbairn and Sacramento River)	120.3	245.0
City of Carmichael	12.0	12.0
Sacramento County Water Agency Total (SCWA)	15.0	109.7
SCWA – CVP contract	10.0	45.0
East Bay Municipal Utilities District – CVP contract	N/A	up to 112.0

Climate Change

[3] Water right permit numbers 11358, 11359, 11360, and 11361.

Analysis presented in the BDCP draft plan and draft EIR/EIS attempts to incorporate the effects of climate change at two future climate periods: ELT at approximately the year 2025; and LLT at approximately 2060. Although BDCP modeling includes both the ELT and LLT, the EIR/EIS relies on the LLT and only includes the ELT in Appendix 5. As described in the BDCP draft plan and draft EIR/EIS[4], 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 were then used to determine how much water is expected to flow into the upstream reservoirs over an 82-year period of variable hydrology; these time-series were then input to the CalSim II 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. Effects of sea level rise will manifest as a need for additional outflow when Delta water quality is controlling operations to prevent seawater intrusion. In this technical memorandum, we do not critique the climate change assumptions themselves, except in the limited manner described below.[5] This review is limited to evaluating how modified flows were incorporated into CalSim II and whether the operation of the CVP and SWP in response to modified flows and modified flow-salinity relationship is reasonable for ELT and LLT conditions. This review focuses on assumed underlying hydrology and simulated operation of the CVP and SWP, assumed regulatory requirements, and the resultant water deliveries.

To assess climate change, the three without Project ("baseline" or "no action") modeling scenarios were reviewed: No Action Alternative (NAA)[6], 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/EIS's modeling appendix[7]. The only difference between these scenarios is the climate-related changes made for the ELT and LLT conditions (Table 2).

Table 2. 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

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

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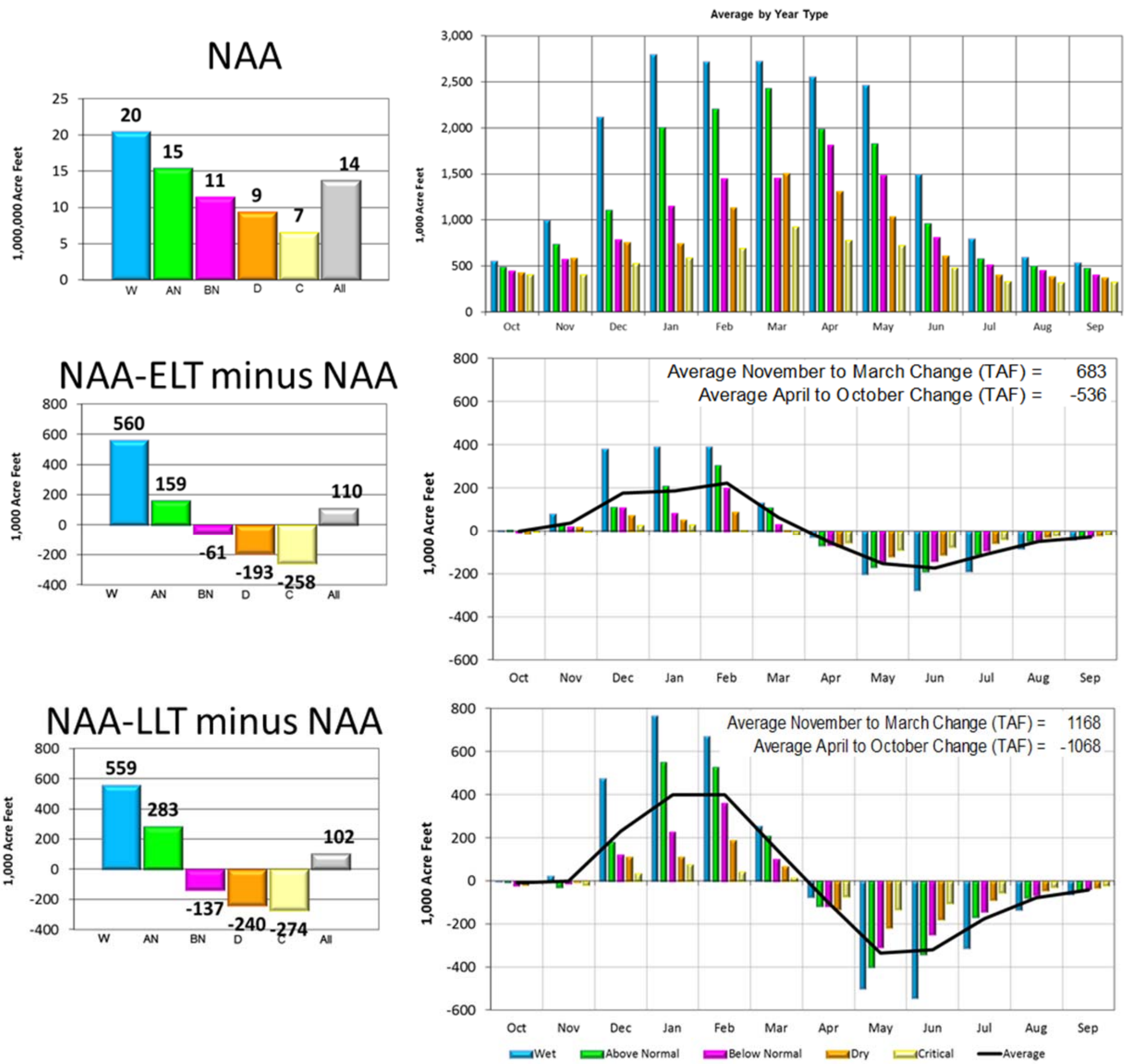
[4] BDCP EIR/EIS Appendix 5A, Section A and BDCP HCP/NCCP plan Appendix 5.A.2
[5] This should not be read to imply that climate change assumptions are reasonable or considered correct or incorrect; the limited review reflects the scope of this memorandum.
[6] NAA is also called the Existing Biological Conditions number 2 (EBC-2) in the Draft Plan.
[7] BDCP EIR/EIS Appendix 5A, Section B, Table B-8.

There is considerable uncertainty regarding the effects of climate change on future temperature and precipitation. Analysis of only one potential future condition at different planning horizons does not cover the range of potential effects. While other analyses attempt to bracket the range of climate change effects (e.g. 2008 OCAP analysis[8]) on proposed projects, BDCP's entire effects analysis is based on a single climate change scenario. Standard practice for modeling CVP and SWP operations is to impose future demand projections on historical hydrology to develop No Action Alternatives. BDCP did not follow the standard practice of evaluating effects of BDCP using historical hydrology, but relied solely on one climate change scenario to form the basis of their analysis.

The significance of changed hydrology between the three without project baselines (NAA, NAA-ELT, and NAA-LLT) is illustrated below in Figure 1. The figure illustrates the projected combined inflow of Trinity, Shasta, Oroville, and Folsom Reservoirs under the NAA and the change relative to the NAA for the NAA-ELT and NAA-LLT baselines. BDCP baselines show 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 drier years.

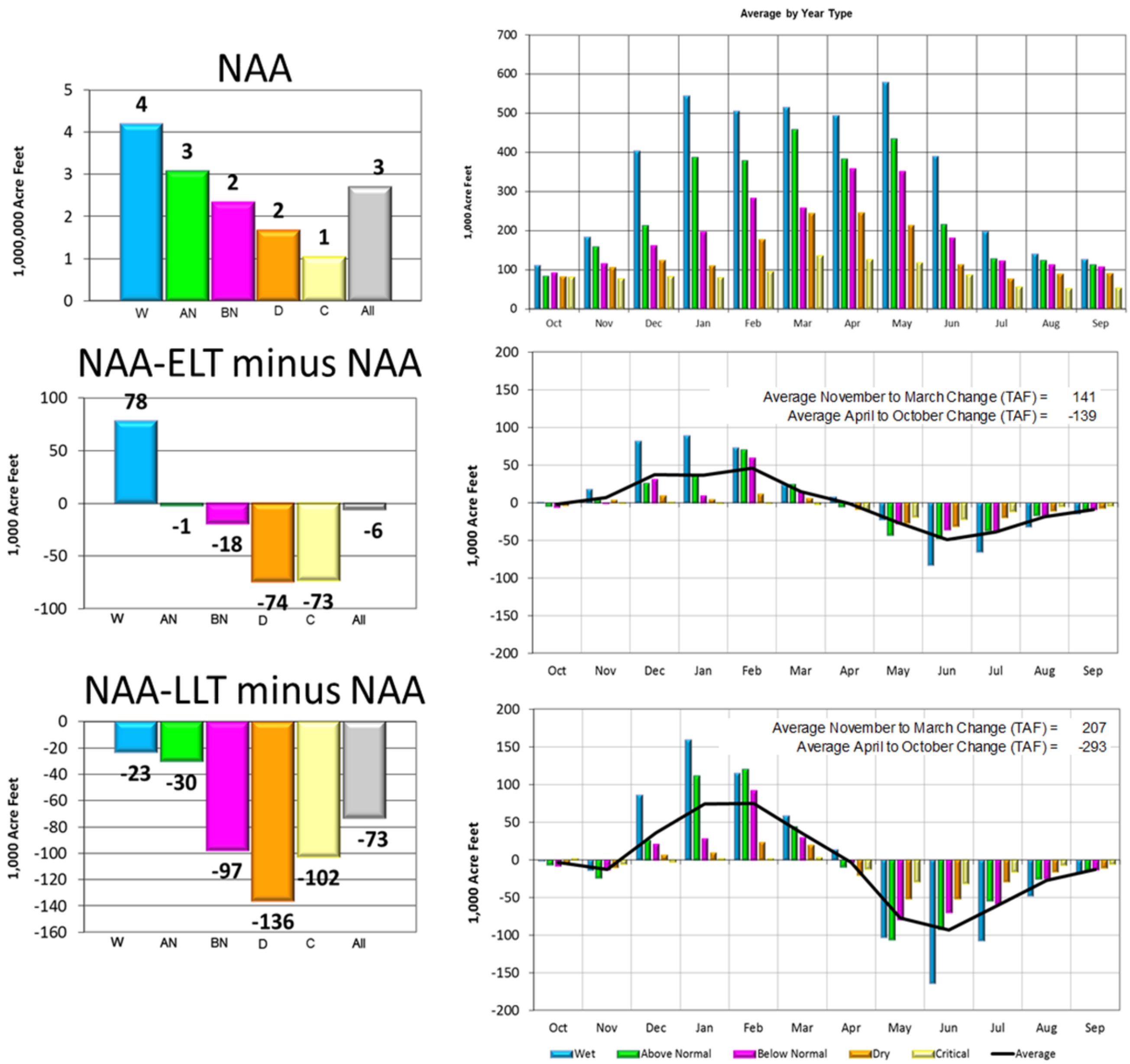
[8] USBR, 2008. Biological Assessment on the Continued Long-term Operations of the Central Valley Project and the State Water Project, Appendix R Sensitivity of Future Central Valley Project and State Water Project Operations to Potential Climate Change and Associated Sea Level Rise, U.S. Bureau of Reclamation, July 2008.

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



The effect of assumed climate change on average annual Folsom Reservoir inflow in the NAA-ELT scenario is minor, but causes decreases in inflow of about 70 TAF in the NAA-LLT scenario. The spring to winter shift in runoff is also projected for Folsom Reservoir inflow. Figure 2 is an illustration of Folsom inflow under the NAA and the change relative to NAA for the NAA-ELT and NAA-LLT baselines. To properly incorporate climate change into modeling of Folsom Reservoir and the American River, climate change effects must be applied to flows and reservoirs upstream from Folsom, which was not done. There is significant storage capacity in the upper American River watershed in PCWA's Middle Fork Project and the Sacramento Municipal Utility District's (SMUD) Upper American River Project. The operation of Folsom is significantly affected by changes in upstream conditions and operations.[9] Because climate change in BDCP modeling is imposed on the American River by adjusting only the inflow to Folsom only, however, the effect on the American River is likely misrepresented in the BDCP NAA-ELT and NAA-LLT scenarios.

Figure 2. Projected Inflow to Folsom Reservoir – NAA, NAA-ELT and NAA-LLT



Comparison of inflow changes illustrated in Figure 1 and Figure 2 show the effects of climate change are large in the American River Basin relative to changes in other river basins. Total changes illustrated in

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[9] SMUD's Upper American River Project alone is estimated to have water storage capacity of about 430,000 acre·feet. "The History of SMUD's UARP", Sacramento Municipal Utility District (2001).

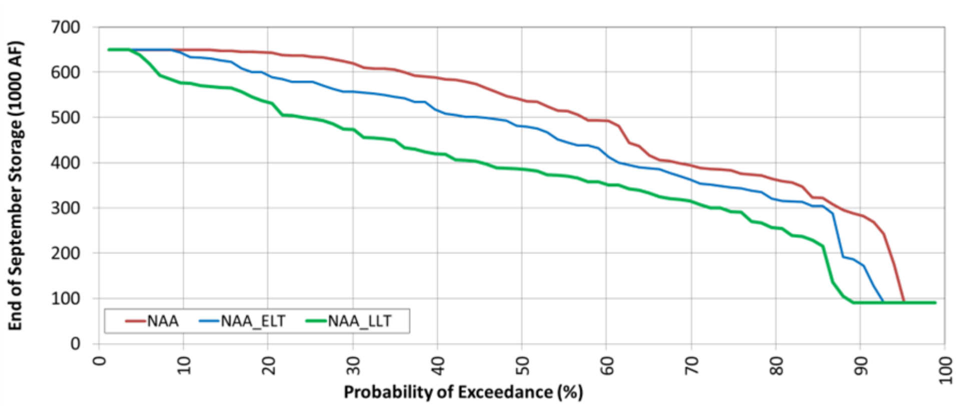
Figure 1 show wetter conditions in wet years and drier conditions in dry years when considering the four basins together. However, climate change in the American River Basin for the LLT shows drier conditions in all year-types. Additionally, a large percentage of the dry and critical year inflow reduction, 57 and 37 percent respectively, for the combined four basins occur in the American River Basin. By comparison, runoff from the American River at Folsom is approximately 20 percent of the sum of runoff of the Trinity, Sacramento, Feather, and American rivers.

Changes in Folsom inflow can affect American River operations in a variety of ways, such as changes in lower American River flows based on the June 2009 NMFS BO Action II.1 (American River Flow Management), availability of water to M&I purveyors in the American Region Basin, and flood control operations in Folsom Reservoir. Climate change is imposed on the American River Basin by adjusting Folsom inflow without adjustments to operations upstream from Folsom. Lower American River flow requirements are calculated and adjusted using several different indices that include forecasted inflow to Folsom, end-of-September storage in Folsom and upstream reservoirs, forecasted Folsom storage, and the Sacramento River Index. Water deliveries from Folsom are partially based on water supply in upstream reservoirs. Required flood reservation space in Folsom Reservoir is affected by storage in upstream reservoirs. Because Folsom Reservoir operation is affected by storage conditions upstream from Folsom, climate change must be applied to the entire American River basin to properly analyze conditions with climate change.

For Folsom and other upstream CVP and SWP reservoirs, the shift of in timing of inflows along with a continuing need to satisfy downstream environmental requirements and demands significantly affects carryover storage. Because of climate change's assumed effect on hydrology and the lack of CVP/SWP operational adaptations in the BDCP modeling, 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 3 illustrates change in carryover storage in Folsom Reservoir. The relatively high frequency (approximately 10% of time) of minimum storage occurring at Folsom Reservoir leads us to question whether the NAAs reflect credible or defensible operations. The projected occurrences of low and dead storage conditions projected by the BDCP modeling result in severe reduction of flow available to sustain habitat in the Lower American River and severe reductions in water supply reliability.

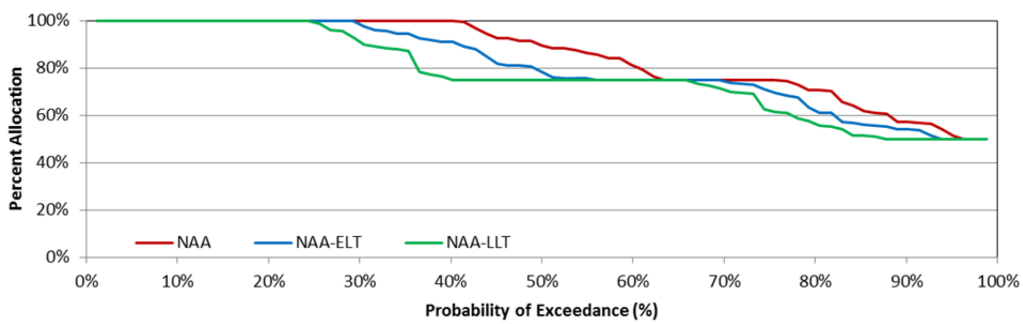
Figure 3. Folsom Reservoir Carryover Storage

	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



Assumed effects of climate change and lack of adaptation reduces CVP water supply allocations to American River CVP Water Service Contractors. Figure 4 contains exceedance probability plots of CVP M&I allocations for the NAA, NAA-ELT, and NAA-LLT scenarios. Full allocations are made 40% of the time under the NAA, this is reduced to about 30% in the NAA-ELT, and full allocations are made about 25% of the time in the NAA-LLT. The occurrence of 50% allocation increases from about 4% in the NAA to about 7% in the NAA-ELT and to about 12% in the NAA-LLT. In addition to reduced water service contract allocations, water supply allocations under any right cannot be satisfied due to low storage levels in Folsom Reservoir and low flow in the Lower American River. It is not physically possible to divert water for M&I use from Folsom Reservoir when reservoir storage drops below about 100,000 acre-feet because, at that level, the M&I intake in the reservoir would be dry. In addition, flows in the lower American River below about 500 cfs make it impossible for the City of Sacramento to divert water at its Fairbairn diversion. The water-supply and other effects of these physical conditions occurring in the NAA scenarios are not identified or evaluated in the draft BDCP EIR/EIS.

Figure 4. CVP North of Delta M&I Water Service Contract Allocation



If climate change were to result in significant inflow changes, it is highly likely that certain underlying operating criteria such as instream flow requirements and flood control diagrams would also require changes. For example, the CVP and SWP are unlikely to draw reservoirs to dead pool as often as the NAAs depict. The NAA-ELT and NAA-LLT model scenarios show that, in 10% of years, Folsom Lake levels would drop to a "dead pool" condition where diversions to M&I use from the reservoir would not be physically possible. As a result, in this scenario, the modeling implies that American River M&I deliveries from the reservoir would be below what is needed for public health and safety in 10% of years. Additionally, low storage in Folsom would lead to water temperature conditions that would likely be detrimental for listed species and not achieve the temperature objectives in the June 2009 NMFS BO Action II.2 (Lower American River Temperature Management). In addition to affecting fishery habitat in the lower American River, increases in temperature cause problems with water treatment for urban water supplies. In short, the NAA-ELT and NAA-LLT do not provide reasonable underlying CVP and SWP operations on which to superimpose the BDCP and evaluate effects of Alternatives.

In the Reviewers' opinion, the CalSim II operations depicted in the NAA BDCP modeling that incorporate climate change do not represent a reasonably foreseeable future operation of the CVP and SWP. Although an argument is typically made that these NAAs will be used in a comparison analysis with Project Alternatives tiering from these NAAs, the Reviewers believe that the depicted NAA operations are so fundamentally flawed that there can be no confidence even in the comparative results. Therefore, results of the depicted operations are inappropriate as the foundation of technical analysis of a Project Alternative. As such, although the modeling approach may provide a relative comparison between equal foundational operations, little confidence can be placed in the computed differences shown between the NAA and Project Alternative Scenarios.

Conclusions Regarding No Action Alternatives

BDCP No Action Alternatives include errors and omissions in American River demands and Fairbairn diversion limitations. However, the most significant issues with the NAAs are in operation of the CVP/SWP with climate change. 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 these assumptions is that BDCP's modeled changes in water project operations and subsequent environmental impacts are caused by undefined combinations and inter-relations of three different factors: (1) sea level rise; (2) climate change; and (3) implementation of the alternative that is being studied.

The inclusion of 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;[10] 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.

Description of the BDCP Project

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 contain a set of studies evaluating the projected operation of a specific version of such a facility. Each Alternative was

[10] See www.waterboards.ca.gov/waterrights/water_issues/programs/drought/tucp.shtml for information concerning the SWRCB's urgency drought orders for CVP/SWP operations this year.

imposed on two baselines: the NAA-ELT scenario and the NAA-LLT scenario. The BDCP Preferred Alternative, Alternative 4, has four possible sets of operational criteria, termed the Decision Tree. Key components of Alternative 4 ELT and Alternative 4 LLT are as follows:

> The same system demands and facilities as described in the NAA 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 Vernalis Adaptive Management Program; modification to the Fremont 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); relocation of the Emmaton salinity standard; redefinition of the E/I ratio; and removal of current permit limitations for the south Delta export facilities. Set within the ELT environment.

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

BDCP Alternative 4 has four possible sets of operational criteria, termed the Decision Tree, that differ based on the "X2" standards 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 NDD, implementing authorities would select the appropriate decision tree 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[11] indicates 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

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[11] Draft BDCP, Chapter 3, Section 3.4.1.4.4

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 under the CVP/SWP Coordinated Operations Agreement (COA)[12]. In subsequent discussions, DWR and Reclamation suggested the additional water for the HOS scenario may be purchased from other water users. However, the actual source of water for the additional outflow has not been defined. The actual source of the water will involve impacts that cannot be reflected in the modeling until the source is identified. While it is agreed that this is 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 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.

The Reviewers' 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 NAA-ELT and NAA-LLT. This allowed the Reviewers to focus the analysis on the effects of BDCP operations independent of the possible change in the X2 standard.

High Outflow Scenario (HOS or H4) Results

According to the Draft EIR/EIS[13], 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 BDCP modeling, SWP contractors would get less water with BDCP than under the NAA.

The shared CVP and SWP obligation to provide flow to satisfy Delta outflow requirements is described in the COA. Because the CVP and SWP share responsibility for meeting required Delta outflow based on that specific sharing (rules under the COA), 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. These results, however, are what the BDCP modeling projects for the HOS-LLT scenario. 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 that the CVP would incur if the SWP were used to meet HOS requirements. It 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 users. However, this approach is unrealistic. During most of the spring months, when BDCP proposes that Delta outflow be increased, agricultural water users are not irrigating. This means that there is not sufficient transfer

[12] August 7, 2013 meeting with DWR, Reclamation, and CH2M HILL
[13] Draft EIR/EIS, Appendix 5A-C, Table C-13-20-2

water available to meet the increased Delta outflow requirements without releasing stored water from the reservoirs.

The overall effect of the HOS appears to be increases in Oroville releases to 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 drier 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.

American River Changes with Proposed Project

The following section presents comparisons of model results and describes changes between the NAA-LLT and Alternative 4 H3 evaluated at LLT (referred to in this discussion as Alt 4-LLT) for key American River operations. These results focus on changes that directly impact American River water purveyors, flows, and temperatures in the American River downstream of Folsom Dam.

Based on a comparison of BDCP modeling of Alt4-LLT to NAA-LLT, there is a general trend for Folsom Reservoir to be drawn down more in Alt4-LLT during May and June and then remain lower until September. This change in storage is accompanied by increases in Lower American River flow in May and June and decreases from July through September. This shift in timing forms the basis of many concerns regarding impacts of BDCP on American River operations and environmental conditions.

BDCP modeling did not include a with-Project scenario without climate change. As a result of this omission it is impossible to clearly identify the effects of the Project separate from the effects of climate change.

Figure 5 is a comparison of simulated monthly Folsom Reservoir water surface elevations for the baseline and with-Project scenarios. A probability of exceedance chart for each month illustrates differences between the two model simulations and potential Project effects. Dashed horizontal lines indicate water surface elevations when groups of shutters on the intake device must be removed. For example, when the water surface elevation goes below approximately 430 feet, the first group of shutters must be removed. These lines are 30 feet above the top of shutter elevations for the three groups of shutters to account for water depth to prevent the formation of a vortex and cavitation at the intake which would prevent diversion.

Results presented in Figure 5 illustrate that Folsom Reservoir water surface elevation is lower under the with-Project scenario. The largest difference in Folsom elevation occurs from June through August and can affect temperature management by changing when shutters are removed. Shutters are removed from Folsom Dam's intakes in order to access colder water located lower in the reservoir. While removing shutters causes the temperature of water diverted and released from the reservoir to drop almost immediately, that effect does not cause release temperatures to remain cooler indefinitely. Accordingly shutters must be removed strategically.

The timing of shutter removal at Folsom Reservoir would change in the with-project condition. For example, in August the probability of all three shutters being in use is reduced from approximately 25 percent to 15 percent, and the probability of at least one shutter still in used is reduced from approximately 90 percent to 85 percent. Figure 6 is a comparison of simulated monthly Folsom

Reservoir storage for the baseline and with-Project scenarios. A probability of exceedance chart for each month illustrates differences between the two model simulations and potential Project effects. Dashed horizontal lines in Figure 6 represent storage levels below which M&I water purveyors cannot meet peak demands (322 TAF) with diversions from Folsom (illustrated for peak demand months only) or when M&I diversions are interrupted because water levels in Folsom are below the M&I intake (90 TAF). Results summarized in Figure 6 show that Folsom Reservoir storage is more likely to be lower under the BDCP Alt4-LLT than the NAA-LLT particularly in peak summer months. Lower storage impacts the ability of the water purveyors that divert directly from Folsom Reservoir, as well as downstream purveyors on the American River, to meet peak demands in the summer and increases the probability of M&I delivery interruptions.

Figure 5. NAA-LLT and Alt 4-LLT Simulated Folsom Reservoir Elevation

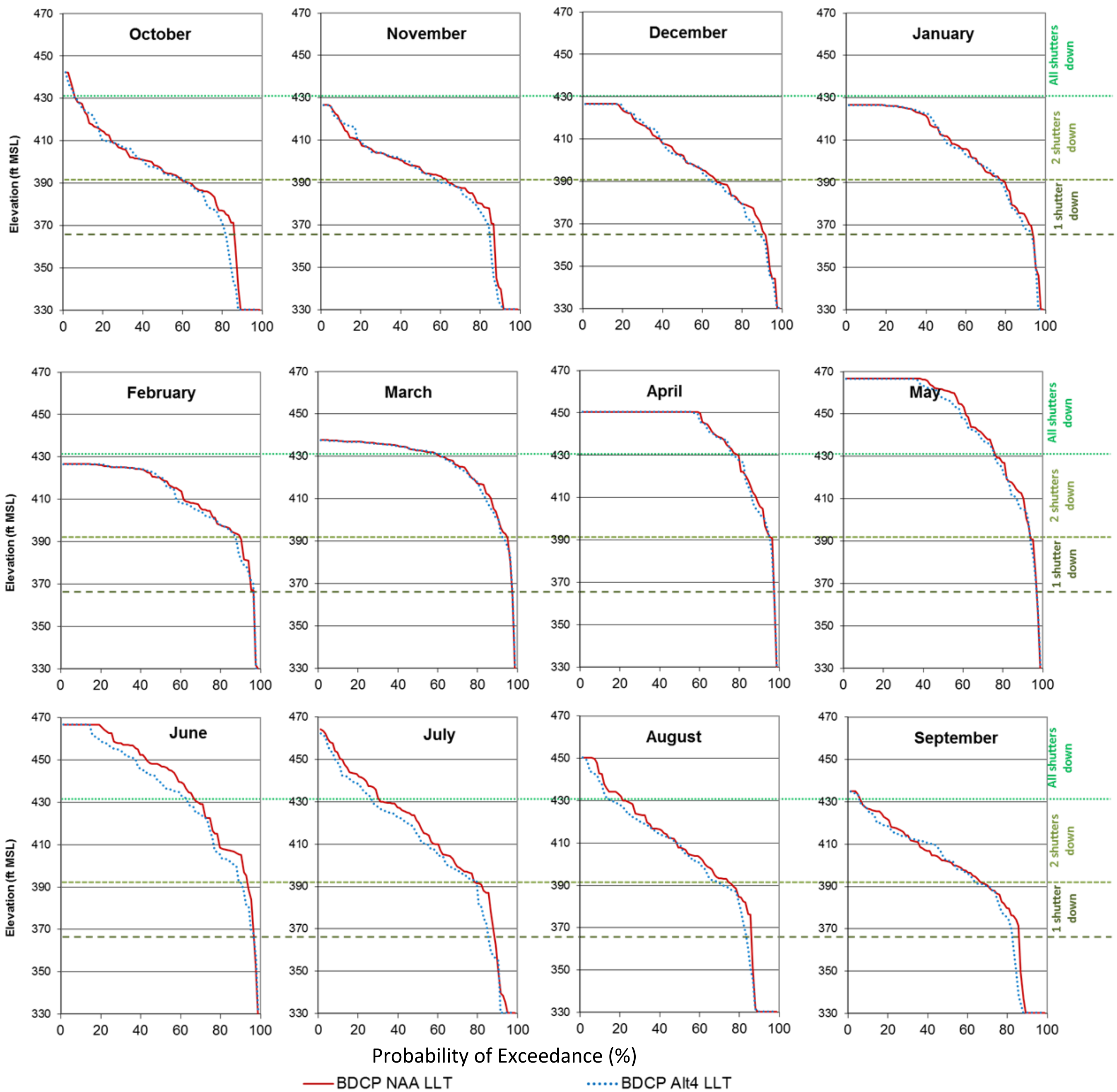


Figure 6. NAA-LLT and Alt 4-LLT Simulated Folsom Reservoir Storage

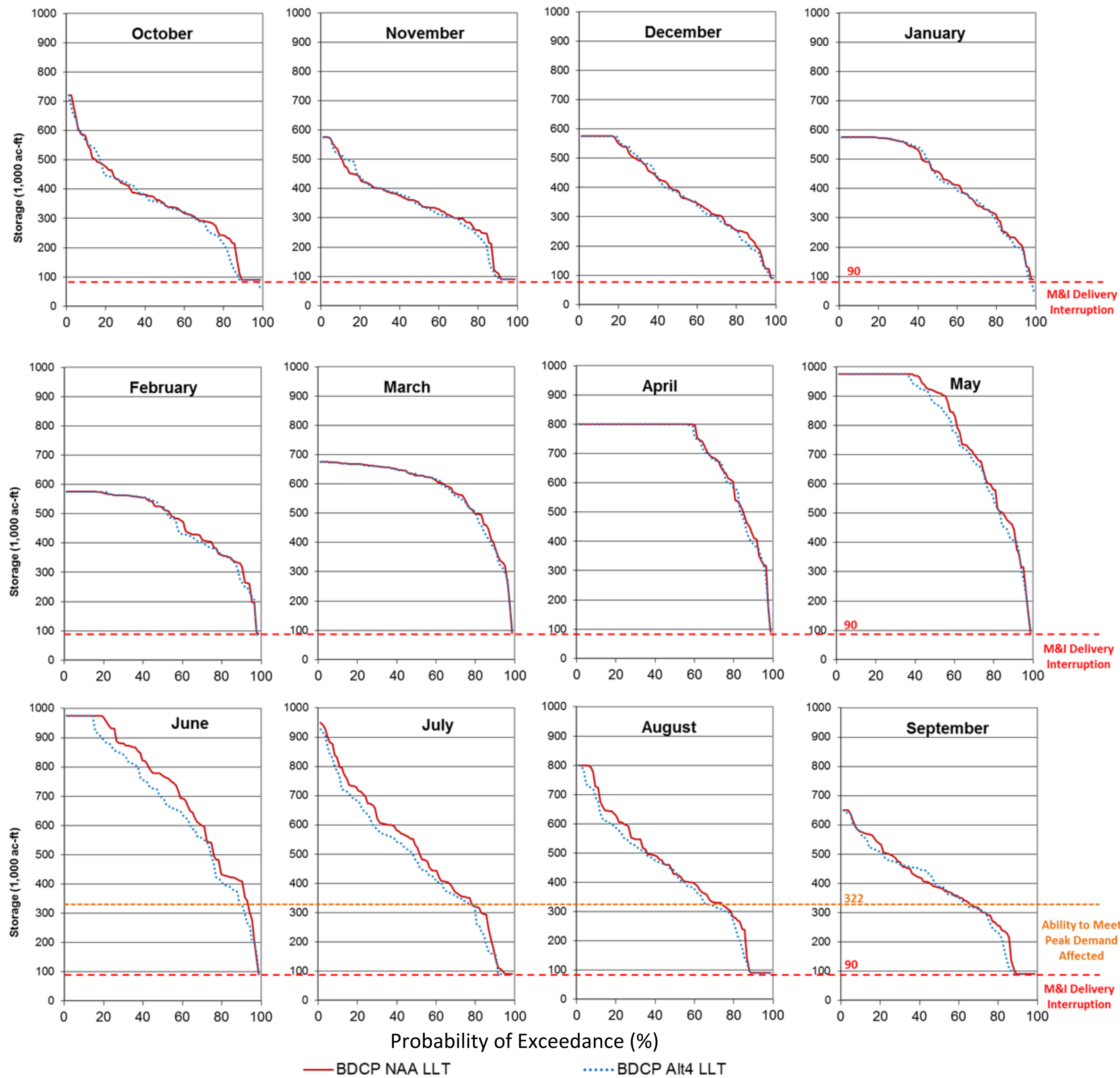


Figure 7 and Figure 8 contain comparisons of simulated monthly flow at Nimbus and H Street for the NAA-LLT and Alt4-LLT scenarios. Results show that under the Alt4-LLT American River flow is higher in the months of May and June, and lower in July, August, and September. Higher releases in May and June drive changes in Folsom storage and water surface elevation seen in previous figures. Likewise, lower releases from July through September bring simulated end-of-September storage between the baseline and with-Project scenarios closer. BDCP modeling shows a higher probability of Lower American River flows being above Hodge Flows in May and June and a higher probability of flows being below Hodge Flows in July, August, and September. When Nimbus releases are below Hodge Flows, diversion limitations under the City of Sacramento's American River water right permits for the Fairbarn Water Treatment Plant on the American River constrain the amount of water available to divert. The changes in American River flows will affect the location of the City of Sacramento's diversion, but this is not reflected in the BDCP modeling. There are also limitations on the City's Sacramento River diversion capability, which could interfere with any such shift in the location of diversions, and hence reduce the supply available to the City. This is not reflected in the BDCP modeling. In the Alt 4-LLT the City of Sacramento will be able to divert more water from the American River at Fairbairn during May and June and less during August and September.

Flow in the lower American River at H Street drops below 500 cfs in both the NAA-LLT and Alt4-LLT. This is critical for the City of Sacramento because their ability to divert water from the American River is affected when flow at H Street falls below 500 cfs due to the potential for pump cavitation. There are times when American River at H Street falls below 500 cfs more often in Alt 4-LLT than in the NAA-LLT. Water availability to the City of Sacramento, including under its settlement contract with Reclamation[14], would be curtailed or eliminated on the American River when water levels in Folsom Reservoir drop below to dead pool level of 90,000 AF.

Changes in Nimbus release under the Alt4-LLT would likely affect cold-water pool management and water temperatures downstream of Folsom Dam. Increased releases in May and June would reduce cold-water pool, lower reservoir water surface elevation, and require shutters to be removed earlier. Removing shutters earlier would drain Folsom Reservoir's limited cold-water pool more rapidly and potentially impact salmon and steelhead in the lower American River by resulting in warmer river temperatures. From July through September temperature management would be affected by the combination of a reduced cold-water pool and lower releases from Nimbus, i.e. lesser amounts of warmer water would be released and warm up quicker as it flows downstream.

The change in timing of release from Folsom Reservoir is caused in the Alt 4-LLT by BDCP using of different assumptions for balancing reservoirs upstream of the Delta with San Luis Reservoir in Alt 4-LLT relative to assumptions in the NAA. In other words, the BDCP operations triggered changes in the timing of Folsom Reservoir releases. These balancing rules attempt to move more water into San Luis Reservoir earlier in the year in the with-Project scenario. It is unclear why BDCP modeling changed these assumptions to simulate Project alternatives.

[14] Operating Contract No.14-06-200-6497.

Figure 9 contains comparisons of simulated monthly flow in the Sacramento River at the confluence of the American River for the NAA-LLT and Alt4-LLT scenarios. When Sacramento River elevation falls below two feet above sea level (NGVD 1929) the City of Sacramento's intake structure capacity is reduced. Elevation 2.0 occurs when the flow rate is between approximately 5,000 cfs and 9,000 cfs and depends on tidal variation. Moreover, flow rates below 5,000 cfs may result in cavitation or vortexing, causing significant pump damage. Based on CalSim II modeling results, the frequency of the Sacramento River falling below 6,000 cfs is similar in the NAA-LLT and Alt4-LLT.

Figure 7. NAA-LLT and Alt 4-LLT Simulated Nimbus Release

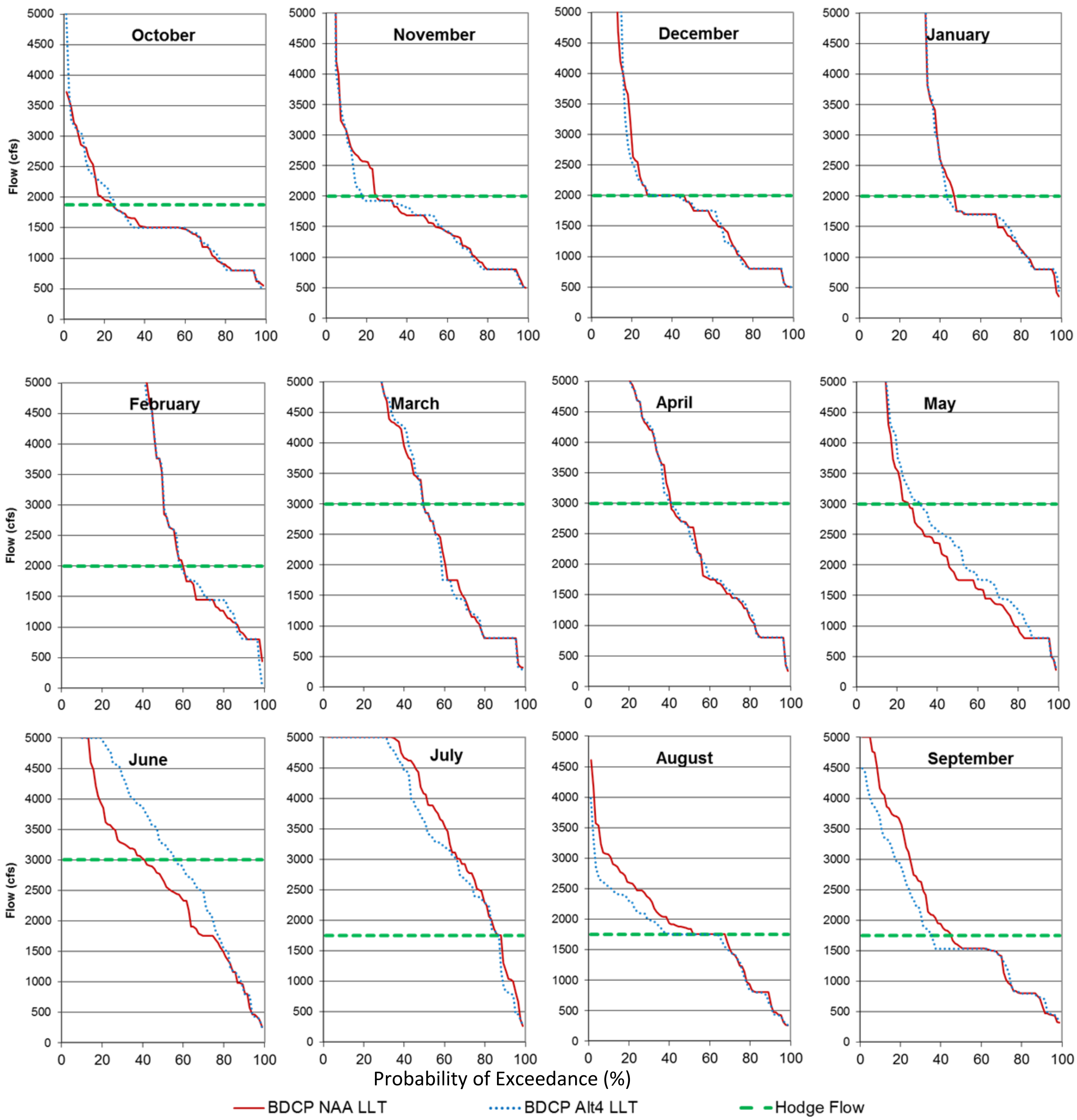


Figure 8. NAA-LLT and Alt 4-LLT Simulated H Street Flow

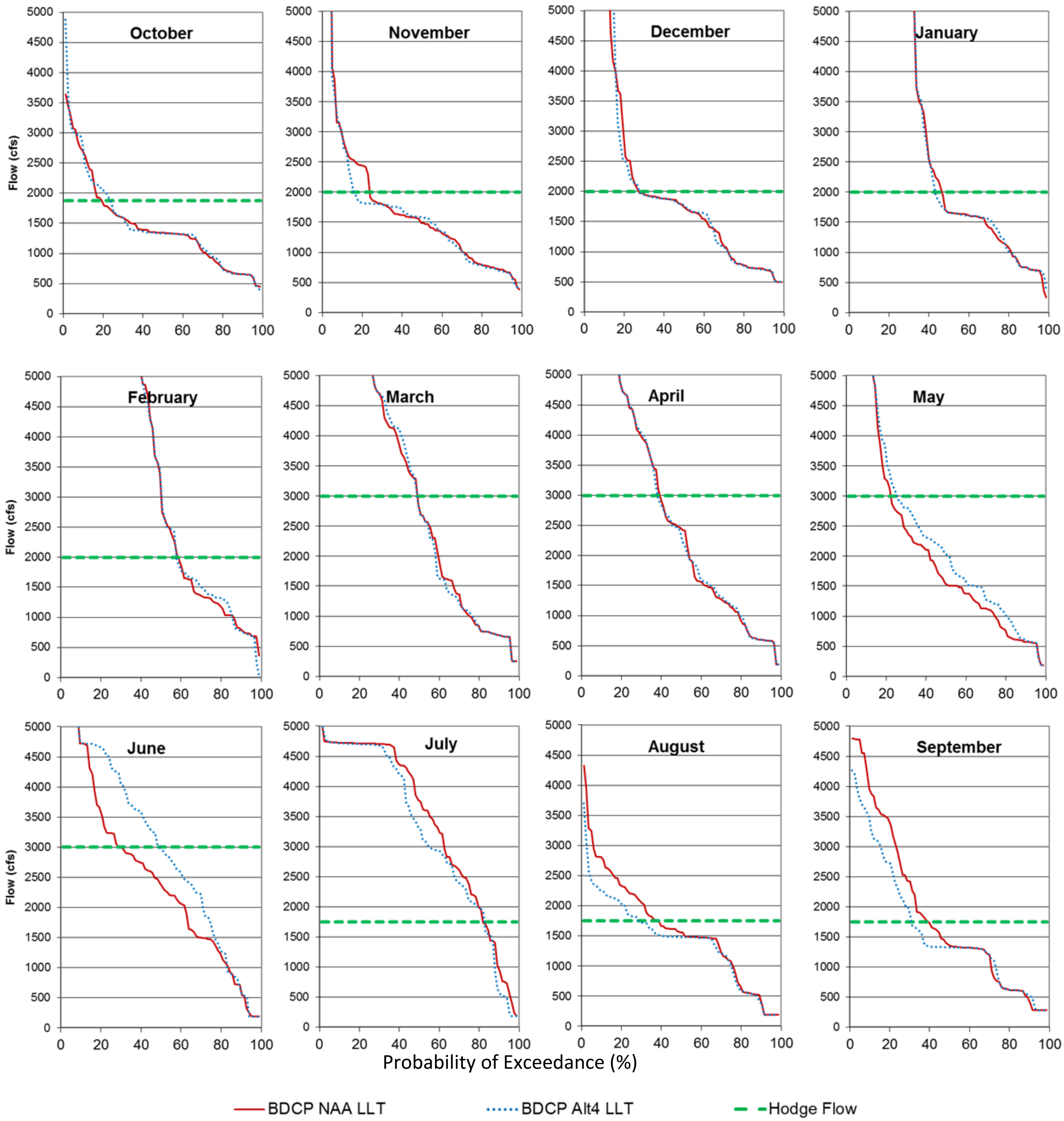


Figure 9. NAA-LLT and Alt 4-LLT Simulated Sacramento River Flow at the American River

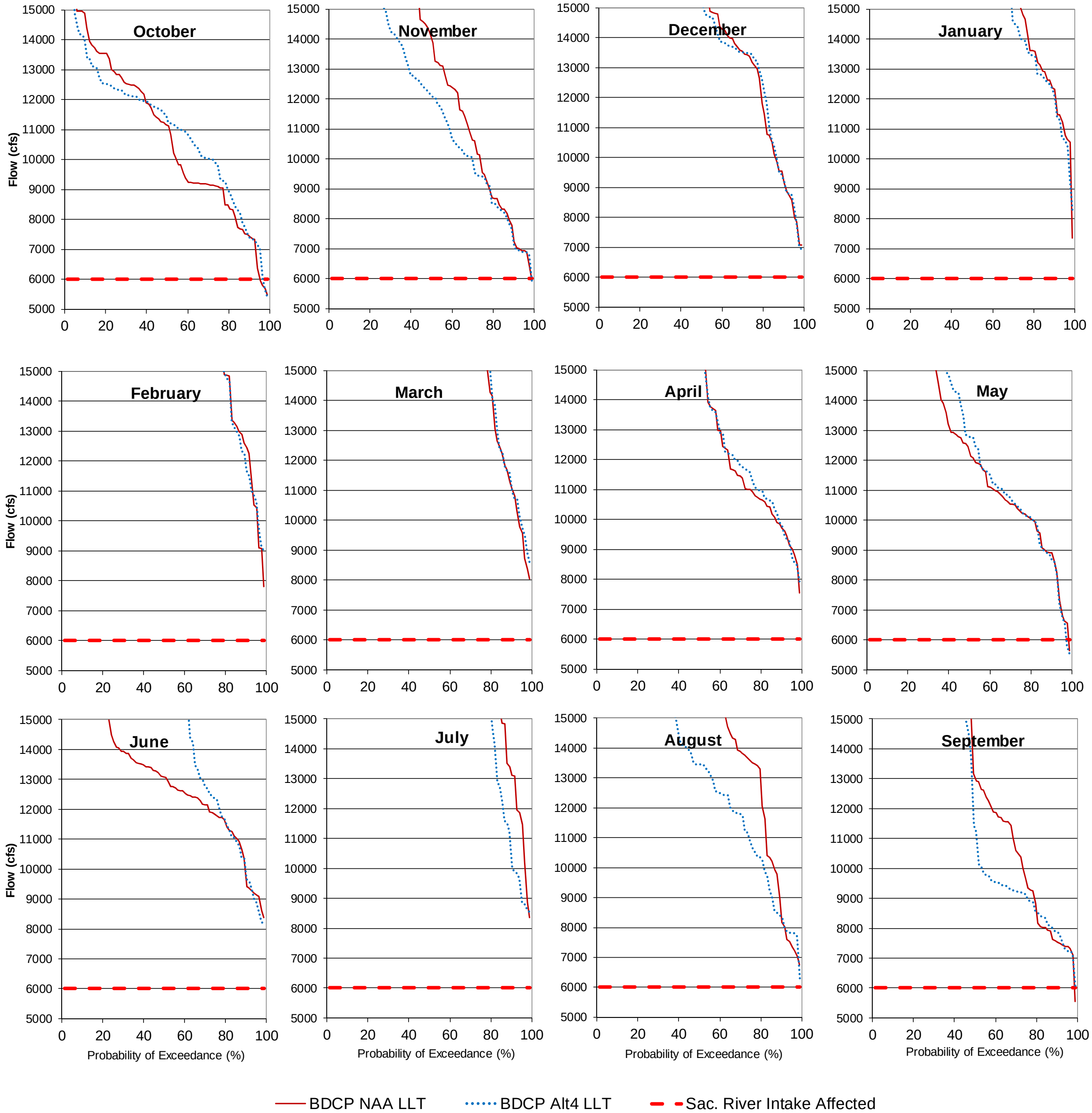
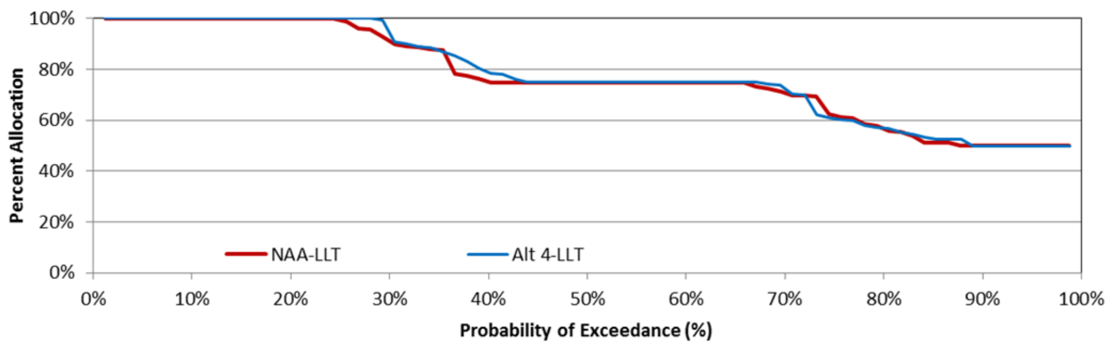


Figure 10 is an exceedance probability plot of CVP North of Delta M&I Water Service Contract Allocation for the NAA-LLT and Alt4-LLT. Changes in these allocations would affect the numerous CVP water-service contractors in the American River Basin, including the cities of Folsom and Roseville, Placer County Water Agency, SMUD and Sacramento County Water Agency. Average annual allocation to CVP M&I water service contractors is about 78% and increases by about one half of one percent in Alt 4-LLT compared to NAA-LLT. Although allocation never falls below 50%, deliveries are not always met due to low reservoir and river flows

Figure 10. CVP North of Delta M&I Water Service Contract Allocation



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 modeling 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 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 balancing to ensure the burden does not fall on only one of the projects. The BDCP modeling 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 modeling overstates the impacts of increased Delta outflow on the SWP and understates the effects on the CVP, including Folsom Reservoir and the Lower American River.

Furthermore, based on the information made available from the BDCP environmental review process and 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 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 users. However, this approach may be unrealistic. During most of the spring, when BDCP proposes that Delta outflow be increased, agricultural water users, who are the only source of water in adequate volumes, are not irrigating. This means that they cannot transfer water during that time frame, and hence 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 would deplete cold water pools and could potentially impact salmonids on the Sacramento and American River systems.

Technical Memo

Effects of Implementation of the Bay Delta Conservation Plan

As Evaluated in the Draft Environmental Impact Report/Environmental Impact Statement

on

Central Valley Steelhead and Fall-run Chinook Salmon in the Lower American River

Prepared for Placer County Water Agency

Prepared by Cardno ENTRIX

July 2014

Page

1.0 INTRODUCTION

This technical memo provides an evaluation of the effects of implementation of the Bay Delta Conservation Plan (BDCP), as evaluated in the December 2013 Draft Environmental Impact Report/Environmental Impact Statement (Draft EIR/EIS), on Central Valley (CV) steelhead (*Onchorhynchus mykiss*) (Federally Threatened, 71 Federal Register [FR] 834) and fall-run Chinook salmon (*O. tshawytscha*) (Federal Species of Concern, 69 FR 19975) in the Lower American River (LAR). The evaluation focuses on Folsom Reservoir operations and resulting physical habitat/temperature conditions for CV steelhead and Chinook salmon in the LAR.

The effects analysis in the Draft EIR/EIS is fundamentally flawed and fails to disclose significant adverse impacts on CV steelhead and fall-run Chinook salmon and their habitat in the LAR (critical CV steelhead and non-natal spring-run Chinook salmon critical habitat, 70 FR 52488, Sept. 2, 2005, and Essential Fish Habitat for Chinook salmon, 73 FR 60987, Oct. 15, 2008). If properly evaluated, the information provided in the Draft EIR/EIS would result in National Marine Fisheries Service (NMFS) issuing a jeopardy opinion under the Federal Endangered Species Act (ESA) for the BDCP effects on CV steelhead in the LAR based on the modeled Folsom Reservoir and LAR operations. Similarly, significant unmitigated impacts under California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) would exist for both CV steelhead and fall-run Chinook salmon in the LAR.

By failing to disclose impacts from implementation of the BDCP on anadromous fish in the LAR, the Draft EIR/EIS does not comply with CEQA (California Public Resources Code §21000 et seq.), or NEPA (42 U.S.C. 4321 et seq.). To comply with CEQA and NEPA, the underlying modeling assumptions, alternatives analysis, and impact analysis in the Draft EIR/EIS requires substantial modification such that re-circulation of the document is necessary.

The following discussion identifies adverse impacts to CV steelhead and fall-run Chinook salmon in the LAR under future operations of the Central Valley Project (CVP)/State Water Project (SWP).

2.0 ADVERSE IMPACTS TO CENTRAL VALLEY STEELHEAD AND FALL-RUN CHINOOK SALMON IN THE LOWER AMERICAN RIVER

The following identifies impacts to CV steelhead and fall-run Chinook salmon in the LAR under operations of the CVP/SWP, as modeled in the Draft EIR/EIS. The impacts are based on comparing modeled existing and future BDCP habitat and water temperature conditions. The discussion first describes the LAR setting, summarizes the current status of CV steelhead and fall-run Chinook salmon, describes key life history information and temperature requirements, reviews existing habitat conditions in the LAR (including key environmental stressors), and discusses the BDCP temperature significance criteria in the Draft EIR/EIS. The discussion then characterizes habitat conditions in the LAR under future BDCP operations of the CVP/SWP compared to existing conditions and identifies the resulting adverse impacts to CV steelhead and fall-run Chinook salmon.

2.1. LOWER AMERICAN RIVER SETTING

The American River is a major tributary to the Sacramento River. Historically, it provided over 125 miles of anadromous salmonid habitat (CV steelhead, Chinook salmon). The majority of the historical spawning and rearing habitat existed upstream of present-day Nimbus and Folsom dams (NMFS 2009; Yoshiyama et al. 2001). Since 1955, after construction of Folsom and Nimbus dams, use of the American River by anadromous fish has been limited to the lowest 22.5 miles of river downstream of Nimbus Dam (LAR). The Nimbus Fish Hatchery was built immediately downstream of Nimbus Dam in 1955 to mitigate for lost anadromous fish habitat due to construction of the Folsom-Nimbus Project (the adjacent American River Trout Hatchery was constructed in 1968 to rear resident salmonids).

Historically, summer and early fall habitat conditions in the LAR were relatively unsuitable for cold water salmonids due to naturally low flows and high water temperatures in the summer – fall (as high as 75-80^{o}F) (Gerstung 1971). The Folsom-Nimbus Project modified the hydrology of the LAR. Currently, winter/spring flows in the LAR are much lower than historical flows and summer – fall flows are much higher (NMFS 2009). Folsom Reservoir provides a source of summer cold water for the LAR from the hypolimnion of the reservoir. However, the LAR is on the Central Valley floor at an elevation of approximately 100 feet (ft) above sea level. Summer and early fall air temperatures are very warm, with peak daily temperatures frequently above 100^{o}F. Under existing conditions, water temperature in the LAR is colder in the summer – early fall, but warmer in the late-fall – winter than historical water temperatures (Reclamation 2008; NMFS 2009).

Extensive effort has been made to provide and maintain water temperatures in the LAR suitable for the remaining CV steelhead and fall-run Chinook salmon habitat and the two cold water fish hatcheries. Most of the cold water rearing and spawning habitat in the LAR occurs in the upper 13-mile portion (Nimbus Dam downstream to Watt Avenue [River Mile (RM) 9.4]), because the downstream portion of the river is generally too warm, in spite of, the cold hypolimnetic releases from Folsom Reservoir. Selective withdrawal shutters have been installed on the three powerhouse intakes and the municipal water intake at Folsom Dam to provide cold water management capability for the LAR. Detailed temperature modeling and reservoir operations scheduling are performed each year to obtain the best summer temperature conditions for CV steelhead, fall temperature conditions for fall-run Chinook salmon, and summer/fall temperature conditions for the hatcheries.

Water temperature management of the LAR is challenging and water temperatures are impaired for cold water fish under existing conditions, particularly in drier/low storage years due to high summer/fall temperatures (NMFS 2009; Reclamation 2008; Water Forum 2005; CDFW 2001). In addition to management for LAR water temperature (salmonid species and the fish hatcheries), Folsom Reservoir storage is also managed to meet Delta water quality objectives and deliveries to municipal and industrial (M&I) and agricultural water users. LAR water temperature is severely constrained by the limited amount of storage available in Folsom Reservoir. The amount of cold water pool available for release to the LAR is directly related to the amount of storage in the reservoir at the beginning of the summer when reservoir stratification occurs. In drier years and/or when the storage in Folsom Reservoir is drawn down heavily to meet downstream demands (e.g., Delta water quality requirements, water exports, etc.), the cold water pool is not large enough to provide sufficient cold water releases for CV steelhead juvenile rearing (June – September), fall-run Chinook salmon spawning (October – December), and summer/fall hatchery operations. Water temperature management for both CV steelhead and fall-run Chinook salmon, particularly in low Folsom storage years, requires tradeoffs between releasing cool water in the summer for CV steelhead rearing or saving some cool water until the fall for fall-run Chinook spawning/incubation.

The Nimbus and American River fish hatcheries at the top of the LAR reach obtain their 20-60 cubic feet per second (cfs) water supply from the Nimbus Dam. Water temperatures are typically within the suitable range for Chinook salmon and CV steelhead, except in the summer – fall. When water temperatures exceed 60°F, fish are treated with chemicals to prevent disease. As temperatures continue to increase, treatment becomes difficult and water temperatures become increasingly dangerous to fish. Hatchery personnel and Reclamation routinely meet to determine a compromise for operations of Folsom Dam to release cooler water. If water temperatures exceed 70°F, the fish may have to be released or moved to another hatchery (Reclamation 2008). In an unprecedented operation this year, 2014, due to anticipated warm water temperatures, California Department of Fish and Wildlife (CDFW) determined in June that it was necessary to release all CV steelhead juveniles early from the Nimbus Fish Hatchery (released at a small size and much lower survival potential) and moved all trout from the American River Trout Hatchery rather than risk potential mortality to fish due to warm summer water temperatures.

Reclamation is required each year to prepare a draft Operations Forecast and Temperature Management Plan for Folsom Reservoir and the LAR and submit it to NMFS for review by May 1 and a final plan by May 15. The plan can be updated, but requires NMFS approval for deviations. The NMFS biological opinion temperature requirement is 65°F (daily average) in the LAR at Watt Avenue from May 15 through October 31 for CV juvenile steelhead rearing. If this temperature is exceeded for three consecutive days, or is exceeded by more than 3°F for a single day, Reclamation is required to notify NMFS in writing and convene the American River Group (ARG) to make recommendations regarding potential cold water management alternatives to improve water temperature, including potential power bypasses. If the May Operations Forecast and Temperature Management Plan identifies that Reclamation cannot meet the 65°F NMFS requirement because of insufficient cold water pool in the reservoir, after taking all actions within its authority, then the target daily average water temperature schedule[1] at Watt Avenue may be increased incrementally (i.e., no more than 1°F every 12 hours) to as high as 68°F. The priority for use of the temperature control shutters at Folsom Dam is to achieve the water temperature requirement for CV steelhead and, thereafter, may also be used to provide cold water for fall-run Chinook salmon spawning (RPA Action II.1, NMFS 2011).

[1] Automated temperature selection procedure schedules are identified in the LAR Flow Management Standard.

2.2. STATUS OF CENTRAL VALLEY STEELHEAD

CV steelhead have been extirpated from most of their historical range and their numbers are a fraction of their historical abundance due to blockage of freshwater habitats (e.g., dams), habitat degradation/destruction, water allocation, and possibly genetic introgression with hatchery fish. It has been estimated that CV steelhead habitat has been reduced from 6,000 miles historically to 300 miles currently. In 1996, NMFS estimated that fewer than 10,000 CV steelhead existed throughout its present-day range (from a combination of dam counts, hatchery returns, and spawning surveys).

CV steelhead were listed as threatened in 1998 (reaffirmed in 2006), including naturally spawned CV steelhead in the American River. The Nimbus Fish Hatchery population in the American River was not listed because it was originally derived from out of basin fish, however, recent genetic information suggests that the status of the Nimbus Fish Hatchery population should be reconsidered (NMFS 2011). Critical CV steelhead habitat was designated in 2005, including all of the American River below Nimbus Dam.

One of the primary goals of the CV steelhead recovery plan (NMFS 2009) is to secure and improve all extant populations. In the American River, the extant CV steelhead population is confined to the LAR; however, 100% of the historical spawning habitat (located upstream of Nimbus Dam) is no longer accessible. Only a few hundred fish currently spawn naturally in the LAR (NMFS 2009). A relatively small percentage of CV steelhead redds are from natural spawned fish (i.e., non-hatchery fish without adipose clips) (Hannon and Deason 2008). In 2014, 112 CV steelhead redds were observed in the LAR (American River Group, Meeting Notes April 17, 2014). Currently, rearing and spawning habitat primarily exists in the upper 13 miles of the LAR. Ninety percent of spawning occurs above Watt Avenue (RM 9.4) (Hannon and Deason 2008). CV steelhead rearing habitat during the summer is particularly limited in the LAR due to warm summer water temperature (see below) and most juvenile rearing, similar to spawning habitat, occurs upstream of Watt Avenue.

Nimbus Fish Hatchery currently produces about 430,000 steelhead annually. The hatchery steelhead population is operated as a “segregated population” to mitigate for recreational fishery losses from the dam and is not used to enhance natural CV steelhead. The hatchery is operated to the extent possible to minimize effects on the limited natural population (California HSRG 2012).

2.3. STATUS OF FALL-RUN CHINOOK SALMON

Four seasonal runs of Chinook salmon occur in the Sacramento-San Joaquin River system. The runs are named after the upstream migration season – winter, spring, fall, and late-fall. Central Valley fall/late fall-run Chinook salmon were lumped together and jointly classified as a Federal Species of Concern in 2004. These two runs are separate runs, however, with the late-fall run occurring primarily only in the Sacramento River (Moyle et al. 2008), whereas, fall-run Chinook salmon occur throughout the Central Valley. Fall-run Chinook salmon are the only Chinook salmon run extant in the American River. Spring-run Chinook (listed as threatened 1996) were extirpated from the American River historically and it is uncertain whether or not a late fall-run existed in the American River (Yoshiyama et al. 2001). Approximately 70% of the historical spawning habitat used by Chinook salmon in the American River was blocked by the Folsom-Nimbus Project.

CV fall-run Chinook salmon are currently and were historically the most abundant Chinook salmon run in the Central Valley (Moyle 2002; Williamson 2006). Since the 1950's escapement has been relatively robust with various cycles of years with low escapement of <100,000 fish (e.g., 1990 and 2007-2009) and years with high escapement >400,000 fish (e.g., 1999-2005 and 2013). The CV fall-run Chinook salmon in the LAR have similar abundance cycles to those of the larger population in the Central Valley. On average 17% of the total Central Valley escapement (48,000 fish) occurs in the LAR and, on average, 75% of the LAR escapement occurs in-river and 25% enters Nimbus Fish Hatchery (CDFW GrandTab data, 1952-2013).

Similar to CV steelhead, the majority of CV fall-run Chinook salmon spawning occurs in the upper portion of the LAR. Both spawning gravels and suitable fall water temperature (<58 to 60^{o}F) are most prevalent above Watt Avenue. Warm water temperature in the fall delays spawning and affects adult mortality and in-vivo egg mortality. For example, in 2001 due to warm fall water temperature, a large portion of fall-run Chinook salmon died before spawning (Water Forum 2005).

Nimbus Fish Hatchery currently produces about 4 million Chinook salmon annually. The hatchery production helps fulfill mitigation requirements for construction of the Folsom-Nimbus Project. However, hatchery production and release of fish in the Carquinez Straits (in the estuary) has been implicated as part of the cause of lack of genetic structure and prevalence of straying in CV fall-run Chinook salmon (California HSRG 2012).

2.4. KEY LIFE HISTORY INFORMATION AND TEMPERATURE REQUIREMENTS

Adult CV steelhead generally migrate from the ocean from August through April and spawn from December through April, with a peak in the LAR from February to early March (Hannon and Deason 2008; OCAP pg 104). Egg incubation occurs between December and May. Most juvenile fish emigrate as fry or rear for approximately a year (through one summer) before emigrating. Emigration typically occurs January through June (SWRI 2001; Sogard et al. 2012). In the LAR, water temperature in the summer is the primary CV steelhead stressor. Marginally acceptable CV steelhead rearing water temperature for short duration (e.g., weeks) is <70^{o}F, with an upper long-term tolerance temperature of approximately 68^{o}F. The upper range of optimal rearing temperature is 65^{o}F (e.g., Cech and Myrick 1999; Bratovich et al. 2011).

Adult fall-run Chinook salmon generally migrate from the ocean in late summer, with migration peaking mid-October through November. Spawning in the LAR occurs between October and December (peak spawning in November). Fry emergence usually begins in mid- to late-January, with peak emergence usually mid- to late-February. Juvenile emigration occurs after emergence from January through June (e.g., SWRI 2001). In the LAR, water temperature in the fall is a primary factor affecting migrating/spawning fall-run Chinook salmon. Spawning does not occur until temperatures are <58-60°F and delayed spawning and warm temperatures can result in adult and in-vivo egg mortality. Acceptable Chinook salmon spawning/incubation water temperature is <58°F (e.g., USFWS 1999; NMFS 2002; Reclamation 2008; Bratovich et al. 2011).

2.5. EXISTING HABITAT CONDITIONS

There are a number of potential environmental stressors for CV steelhead and fall-run Chinook salmon, however, the key environmental stressor in the LAR under existing conditions (and future conditions) is water temperature in drier years with low Folsom Reservoir storage. Water temperature in the summer (CV steelhead rearing) and fall (Chinook salmon spawning) currently exceeds threshold tolerances for critical life stages in drier years (Figure 1). Frequently, only the upper portion of the river provides suitable water temperatures for CV steelhead and Chinook salmon (Figures 2 and 3).

Over the 1922-2003 period of record analyzed in the effects analysis in the Draft EIR/EIS, water temperature at Watt Avenue in August under modeled existing conditions is 69-71°F; at the upper end of the acceptable range for CV steelhead rearing (Figures 4a and b). In drier years, daily measured water temperatures have reached 75°F at Watt Avenue in the summer (Reclamation 2008) (Figures 1 and 2). Water temperature at Watt Avenue in November under modeled existing conditions is 56-57°F (Figures 4a and b), at the upper end of the suitable range for Chinook salmon spawning temperatures.

The primary factor that is responsible for warm water temperature in the LAR is the limited storage/cold water pool in Folsom Reservoir in drier years. Any CVP/SWP operations (or BDCP operations) that reduce storage in drier years for whatever reason (sea level rise, climate change, Delta water quality standards, exports, etc.) directly and negatively impact water temperature conditions for CV steelhead and Chinook salmon in the LAR.

2.6. HABITAT CONDITIONS UNDER BDCP FUTURE CONDITIONS

The Draft EIR/EIS attempts to use the NAA as the baseline for the analysis. Below we show that the NAA is a radical departure from existing habitat conditions and has large, significant, unmitigated impacts on anadromous fish in the LAR compared to existing conditions. The NAA would likely cause age class failures in drier years and eventual local extinction of the small natural rearing CV steelhead population in the LAR. The NAA would result in large scale fall-run Chinook salmon fish kills in the fall of the drier years.

The operation of the CVP/SWP as modeled in the NAA with the sea level rise, climate change, and future demand assumptions results in much lower Folsom Reservoir storage elevations compared to existing conditions (Figures 5a and b) and greatly increased LAR water temperature. The frequency of Folsom Reservoir being at low storage levels (e.g., <350 thousand acre-feet [TAF]) would increase substantially in July and August under the NAA compared to existing conditions (increases from about 10% of the time under existing conditions to about 30% of the time under the NAA) (Figure 5a). In critical years, mean monthly

Folsom Reservoir storage would be 119 TAF, 105 TAF, and 81 TAF lower in July, August, and September, respectively, than under existing conditions (down to 210 TAF, 165 TAF, and 159 TAF, respectively, under the NAA). Mean monthly storage in drier years would drop to less than 350 TAF in August and September under the NAA (>440 TAF under existing conditions) (Figure 5b). Further, the frequency of which Folsom Reservoir would be drained to dead pool storage would increase by about 10% (DWR et al. 2013; p. 5-61). This would result in greatly increased water temperatures in the LAR.

Higher American River summer temperature schedules occur when Folsom Reservoir storage drops, particularly as storage falls below 350 TAF in July. Figure 6 shows a relationship between the Folsom Reservoir storage in July and LAR water temperature schedules[2]. Figure 7 shows relatively large increases in fall water temperature below Nimbus Dam at low Folsom Reservoir water levels as reported in the BDCP EIR/EIS (and the associated Folsom Reservoir storage) under the NAA operations. These changes are most pronounced in drier years.

The marginally acceptable CV steelhead rearing water temperature is <70^{o}F, with an upper long-term tolerance temperature of approximately 68^{o}F (see above). Under the NAA, LAR water temperature increases during summer rearing would have a significant adverse impact on CV steelhead (Figures 4a and b). Mean monthly summer (August) water temperatures increase from the modeled existing condition of 69-71^{o}F to 73-77^{o}F (average and critical water years) under the NAA (Figures 4a and b). Over the 1922-2003 period of record, mean monthly water temperatures at Watt Avenue reach 70^{o}F in 9% more of the July months, 13% more of the August months (90% of all August months), and 34% more of the September months (60% of all September months) under the NAA compared to existing conditions. The assumed CVP/SWP operations in the NAA would significantly impact CV steelhead and would result in take of CV steelhead in the LAR. More significantly, entire year classes of CV steelhead juveniles would be lost and, most likely, a complete loss of the LAR naturally spawning CV steelhead population would occur.

In the critically dry years, for example, average monthly August water temperatures under NAA (and the Proposed Action Alternative) for the entire LAR are ≥76^{o}F (DWR et al. 2013; Appendix 11C). This would kill all over-summering juvenile CV steelhead. Critically dry years occur 15% of the time. Often critically dry years are sequenced back-to-back (e.g., 1976-1977) and sequenced with multiple dry years. Dry years (22% of the years) have entire LAR August water temperatures ≥72^{o}F. Large scale mortality would occur in these years. It is easy to conceive of a sequence of years under NAA (and the Proposed Project) where the naturally occurring CV steelhead population sequential year mortality coupled with the current low abundance would result in the loss of the natural population. The historic sequence of years from 1987 to 1991 (dry, critically dry, dry, critically dry, critically dry, respectively) (DWR et al 2013; Section 5.5) would result in the loss of the LAR CV steelhead population.

Similarly, projected changes in water temperature under the NAA would have large adverse impacts on Chinook salmon spawning in the LAR. Mean monthly fall water temperature

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[2] Automated temperature selection procedure schedules are identified in the LAR Flow Management Standard.

(November) in the LAR would increase from existing conditions (modeling) of 56-57°F to 60°F under the NAA. Acceptable Chinook salmon spawning/incubation water temperature is <58°F (see above). These assumed operations in the NAA would result in significant adverse impacts to Chinook salmon in the LAR (Figures 4a and b). Likely large fish kills of pre-spawning fall-run Chinook salmon would occur due to the extreme delays in spawning similar to pre-spawn mortality that happened in 2001 (Water Forum 2005). Monthly average November water temperatures in the NAA (and Proposed Action Alternative) are 3-4°F higher than the existing conditions that have caused mortality.

2.7. BDCP Temperature Significance Criteria

Under current CVP/SWP operations, LAR water temperatures exceed threshold tolerances for anadromous fish during critical life stages (as discussed in the preceding sections). Because the populations are already in stressful temperature conditions, even small increases in water temperature above the current CVP/SWP operations would result in adverse impacts to these species. The BDCP significance criterion do not consider the current condition of the sensitive species and habitat with respect to water temperature in the LAR. For example, significant impacts in the BDCP EIR/EIS were determined as follows:

> ”*Physical modeling outputs each month and water year type were compared for between model scenarios at multiple locations to determine whether there were differences between scenarios at each location. A "difference" was defined as a >5% difference between the pair of model scenarios in at least one water year type in at least 1 month.*” (DWR et al. 2013, p. 11-102).

The significance criteria in the Draft EIR/EIS are inadequate and incapable of identifying significant impacts. A <5% increase in mean monthly water temperature in the summer months (July-September) during CV steelhead rearing and/or in the fall during fall-run Chinook salmon spawning (primarily in November) would result in significant adverse impacts to these species. For example, a <5% water temperature change with existing summer temperatures at 68°F results in an increase of approximately 3.4°F, which would result in temperatures of approximately 71.4°F, well above the long-term upper tolerance limit for steelhead juvenile rearing (e.g., Cech and Myrick 1999; Bratovich et al. 2011). Similarly, a <5% temperature change in the existing fall-run Chinook salmon spawning temperature at 60°F results in an increase of approximately 3.0°F, which would result in temperatures of approximately 63.0°F, well above the spawning threshold and mortality water temperature threshold for incubating eggs (e.g., USFWS 1999; NMFS 2002; Reclamation 2008; Bratovich et al. 2011). Figures 4a and b shows the modeled 1922-2003 average monthly water temperatures. Under existing conditions, water temperatures are below 68°F in July and September, except in Critical years, and between 60-70°F in August of all water year types, except Critical years. Although the temperature significance criteria were not exceeded in the BDCP EIS/EIR analysis, water temperatures under the No Action Alternative (NAA) and Proposed Action Alternative are above the threshold criteria for CV steelhead and Chinook salmon survival, particularly in the drier years (>74°F in late summer months), and greatly exceed existing conditions.

3.0 CONCLUSION

The fatal flaw in the Draft EIR/EIS impact analysis is that under the NAA (which includes sea level rise, climate change, and future demand), the modeled CVP/SWP operations resulted in significant adverse effects to upstream resources, including CV steelhead and fall-run Chinook salmon in the LAR relative to the existing conditions (environment). These modeled operations are not reasonable or a proxy for future operations that would be allowed under the ESA.

The Draft EIR/EIS acknowledges that the CVP/SWP operations would need to change from those depicted. For example, on page 5-61 in DWR et al. (2013), the Draft EIR/EIS discusses operational changes that may need to occur to avoid dead pool conditions:

> *"Adaption measures would need to be implemented on upstream operations to manage coldwater pool storage levels under future sea level rise and climate change conditions. As described in the methods section, model results when storages are at or near dead pool may not be representative of actual future conditions because changes in assumed operations may be implemented to avoid these conditions."* (DWR et al. 2013; p. 5-61)

Further, the Draft EIR/EIS clearly states that future CVP/SWP operations would be different than the operations used for evaluating impacts of the BDCP:

> "*The CALSIM II simulations do not consider future climate change adaptation which may manage the SWP and CVP system in a different manner than today to reduce climate impacts. For example, future changes in reservoir flood control reservation to better accommodate a seasonally changing hydrograph may be considered under future programs, but are not considered under the BDCP. Thus, the CALSIM II BDCP results represent the risks to operations, water users, and the environment in the absence of dynamic adaptation for climate change."* (DWR et al. 2013; pg. 5A.A23)

The modeling developed for the Draft EIR/EIS, by their own admission, failed to address climate change and sea level rise in a manner that is reasonable, prudent, or representative of future hydrologic conditions in the upstream systems, including Folsom operations and resulting hydrology in the LAR. The Folsom operations in the NAA would jeopardize the continued existence of CV steelhead and fall-run Chinook salmon in the LAR. By comparing the environmental conditions in the Existing Condition and NAA, it is apparent that future CVP/SWP operations under climate change and sea level rise, as modeled, are unrealistic. Therefore, a revised operations model must be developed under the NAA that addresses climate change and sea level in a manner that is protective of upstream resources, including CV steelhead and Chinook salmon in the LAR.

The conclusions in the Draft EIR/EIS impact analysis are invalid because they are based on modeling that is not representative of future conditions and do not incorporate climate change adaptations in the CVP/SWP operations. The impact analysis was based on comparison of the NAA to Project alternatives under modeled operations that in all cases result in significant impacts to CV steelhead and Chinook salmon in the LAR compared to the existing condition. The fundamental error in the impact analysis is that it totally ignores these impacts. The analysis assumes that conditions in the NAA are representative of future conditions and compounds this error by modeling the Project alternatives using the same faulty operations. It is not surprising that the impact analysis concluded that there would be no significant impacts to CV steelhead and fall-run Chinook salmon in the LAR – the environmental conditions under the NAA have already jeopardized the continued existence of the species. The conclusions in the alternatives analysis do not disclose impacts of the Project as required under NEPA and CEQA. It is solely the responsibility of the lead agency to ensure that the basis for comparison in the impact analysis is reasonable and an accurate representation of future conditions. Basing the impact analysis on unrealistic modeling for the CVP/SWP and ignoring the associated adverse effects on CV steelhead and fall-run Chinook salmon in the LAR fails to inform the public of the BDCP's probable environmental impacts.

Further, the impact analysis fails to disclose the impacts of the Project because it co-mingles the effects of climate change, sea level rise, future demand, and implementation of the Project. In the analysis, the Draft EIR/EIS concludes:

> "*These results are primarily caused by four factors: differences in sea level rise, differences in climate change, future water demands, and implementation of the alternative. The analysis described above comparing Existing Conditions to Alternative 1A* [used for Alternative 4 as well] *does not partition the effect of implementation of the alternative from those of sea level rise, climate change and future water demands using the model simulation results presented in this chapte*r. " (DWR et al. 2013; pp. 11-405; 11-411; 11-445; 11-455; 11-518).

Therefore, the Draft EIR/EIS is inadequate and does not provide sufficient information to evaluate Project effects on CV steelhead and fall-run Chinook salmon in the LAR. To comply with NEPA and CEQA, the impacts analysis must be revised to disclose project impacts.

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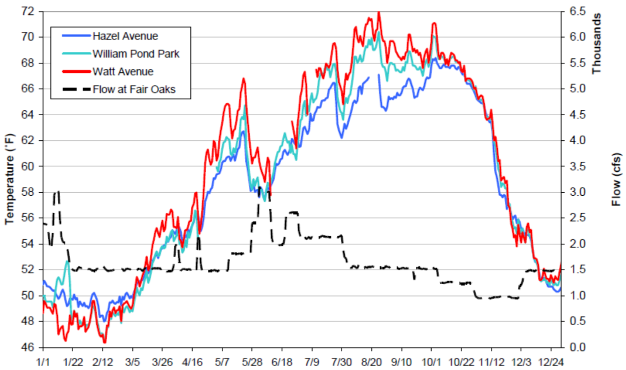
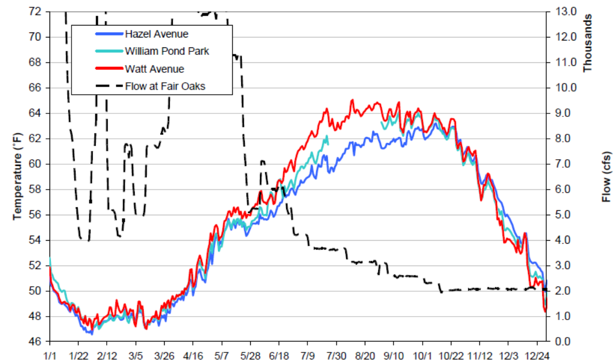
FIGURES

Figure 1. American River Water Temperature and Flow at Monitoring Sites on the Lower American River in Dry and Wet Years.

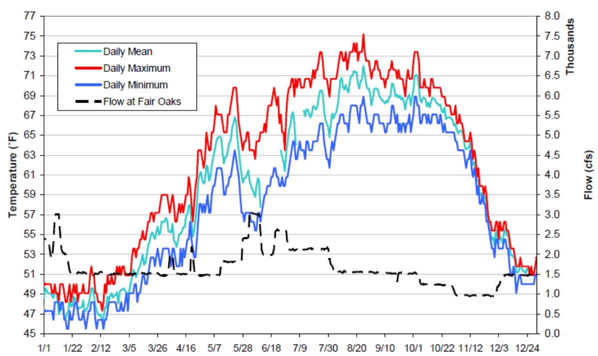
Dry year, measured daily average water temperatures (2001).



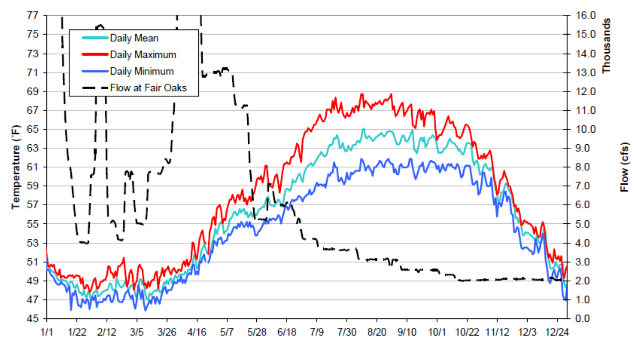
Wet year, measured daily average water temperatures (2006).



American River at Watt Avenue, Dry year, daily average minimum and maximum water temperatures (2001).



American River at Watt Avenue, Wet year, daily average minimum and maximum water temperatures (2006).



Source: Figures 11-16 to 11-19 in Reclamation 2008.

Figure 2. Measured Lower American River Daily Average Water Temperatures below Folsom Dam, at Hazel Avenue, William B. Pond Park, and Watt Avenue and Flow at Fair Oaks Avenue (1998-2012).

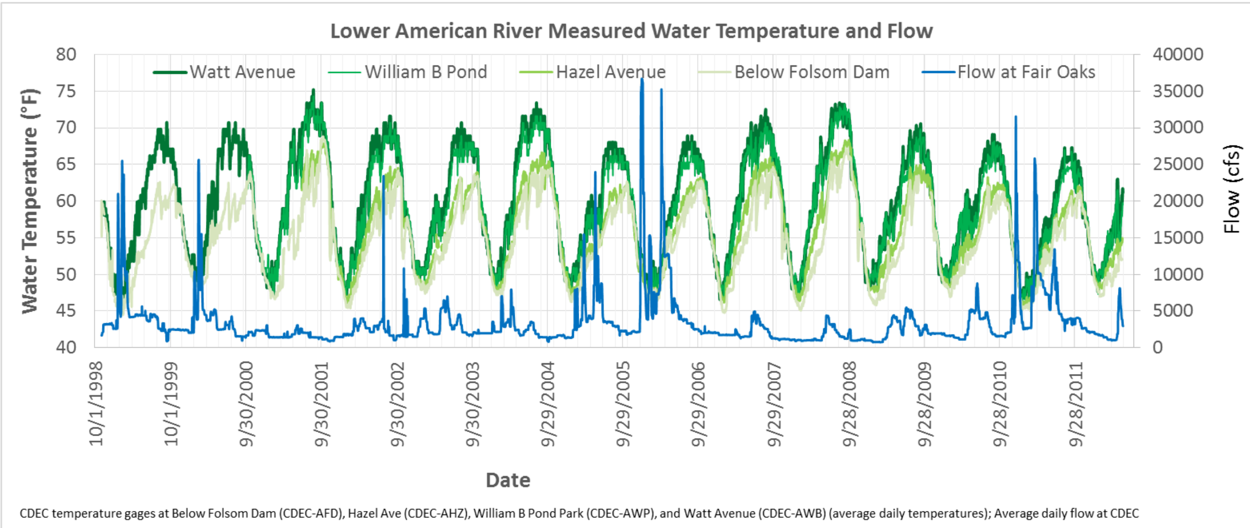


Figure 3. Measured Lower American River Monthly Average Water Temperatures below Folsom Dam, at Hazel Avenue, William B. Park, and Watt Avenue and Flow at Fair Oaks Avenue (1998-2012).

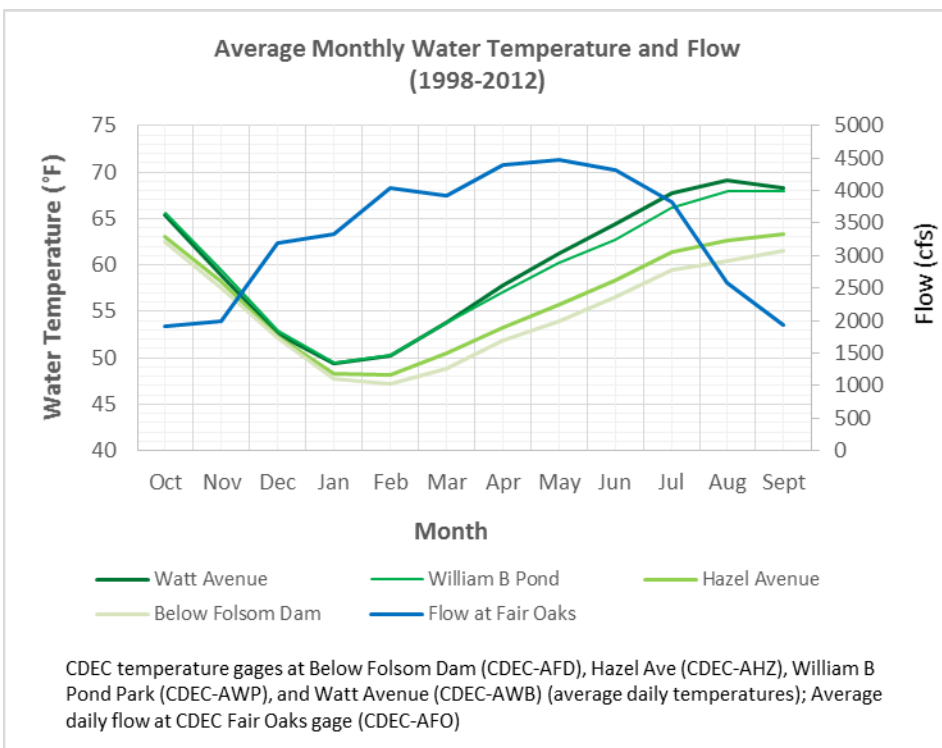
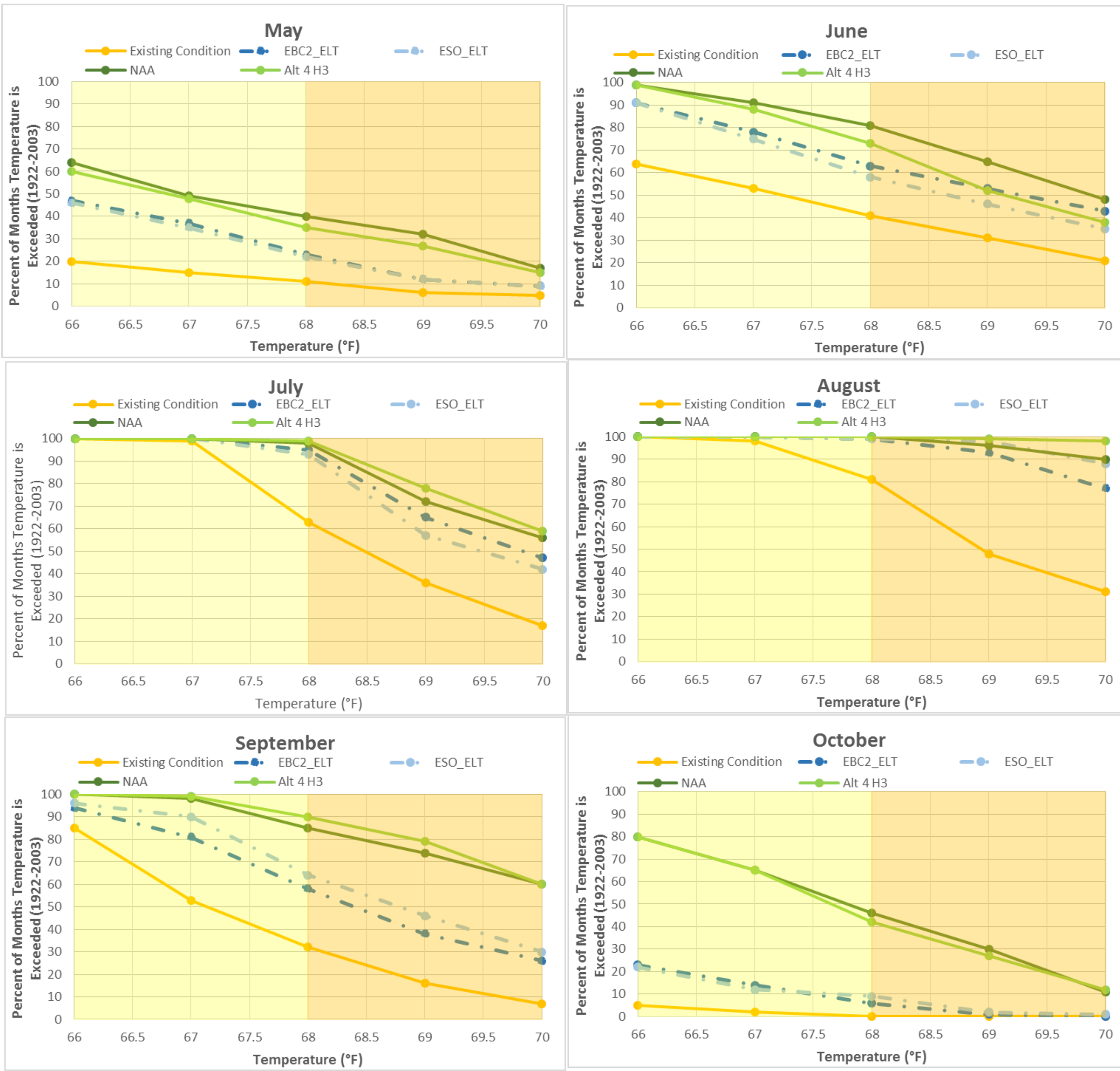
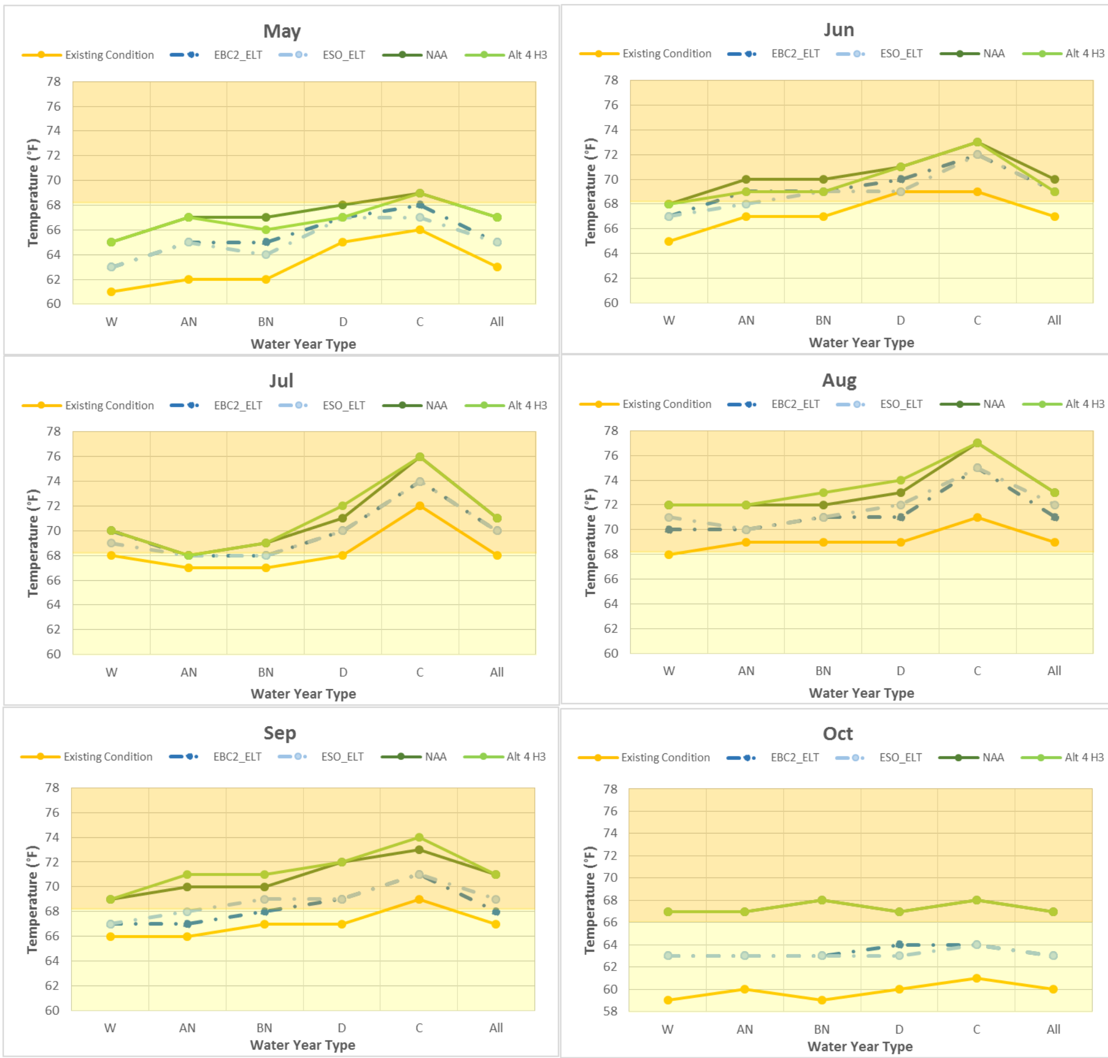


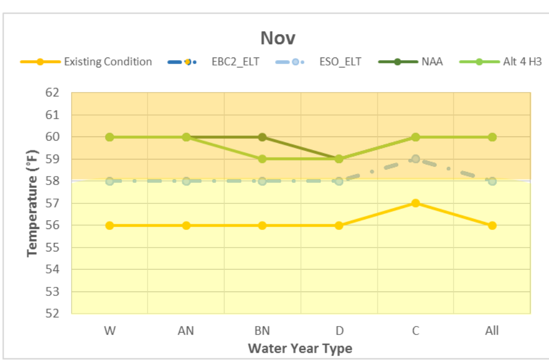
Figure 4a. Percent of Months during 1922-2003 Period during which Mean Monthly Water Temperatures under the Existing Condition, No Action Alternative, and Preferred Alternative (Alternative 4, H3) Scenarios (Early and Late Long-term) in the Lower American River at Watt Avenue Exceeded Temperature Thresholds, May through October.



Source: DWR 2013. Table 5C.5.2-237. Orange and yellow background colors in summer months show temperature threshold of 68°F for steelhead rearing.

Figure 4b. **Mean Monthly Water Temperature (°F) in the American River at Watt Avenue under the Existing Condition, No Action Alternative, and Preferred Alternative (Alternative 4, H3) (Early and Late Long-term).**

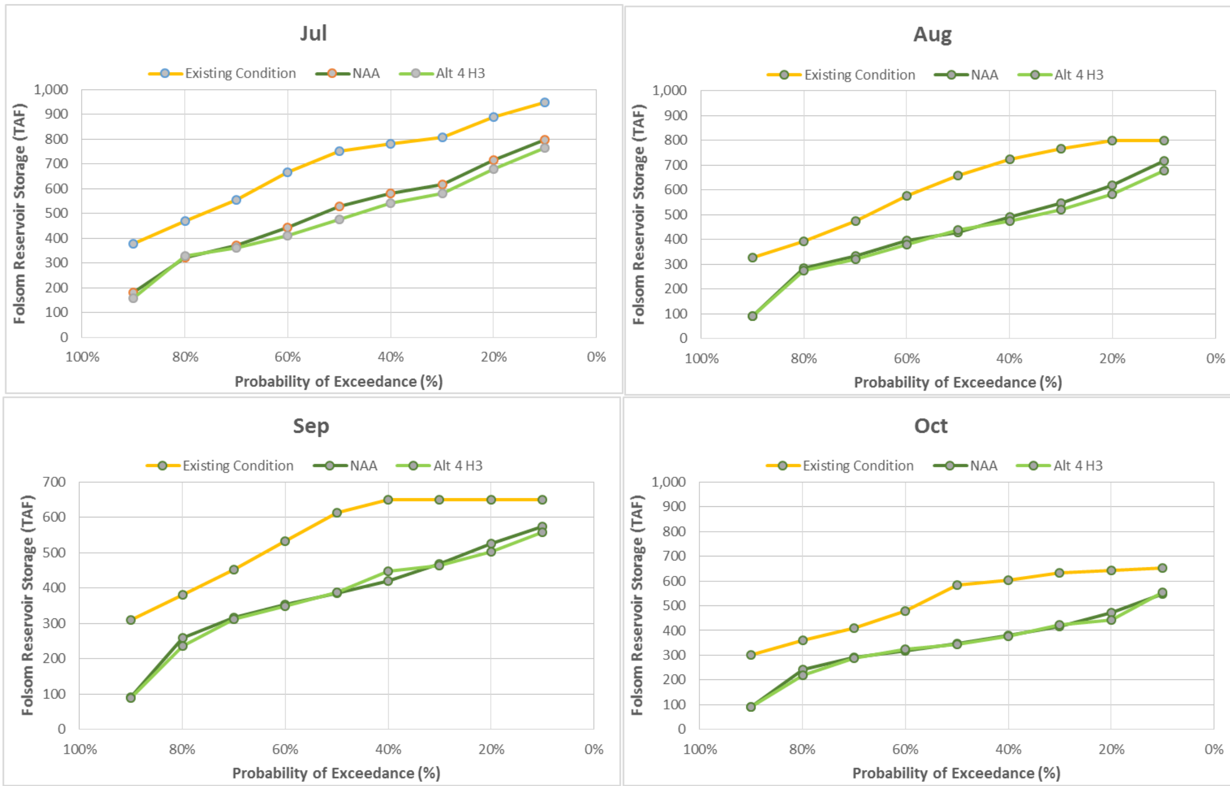




Orange and yellow background colors in summer months show temperature threshold of 68°F for steelhead rearing and in November a 58°F temperature threshold for Chinook salmon spawning.

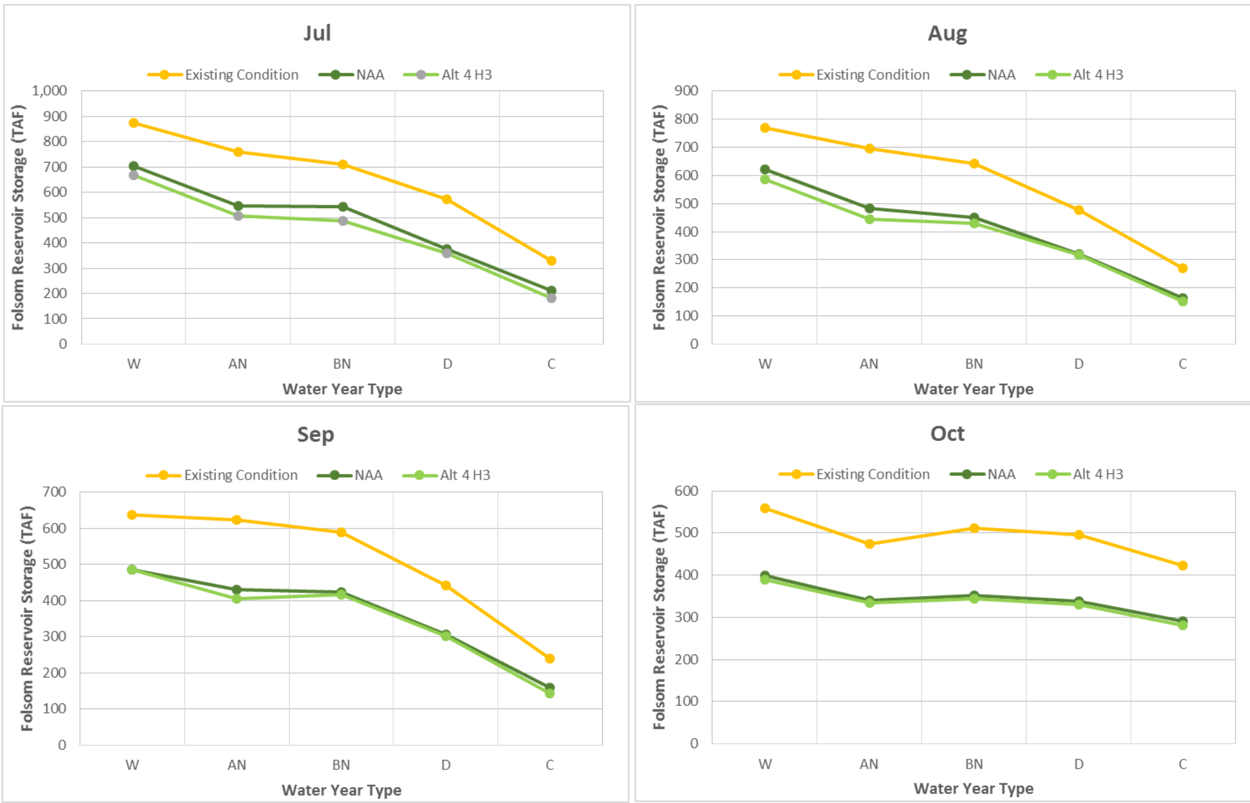
Source: DWR et al. 2013 BDCP Table 11D.4.16 and DWR et al. 2013 EIR/EIS Table 5C.5.2-224 (early long-term scenarios only).

Figure 5a. Summer (July - October) Monthly Mean End-of-Month of Storage Folsom Reservoir Storage (TAF) under the Existing Condition, No Action Alternative, and Preferred Alternative (Alternative 4).



Source: DWR 2013. Tables C-4-1 and 2 and 7; Bay-Delta Conservation Plan EIR/EIS Appendix 5A Section C: CALSIM II and DSM2 Modeling Results

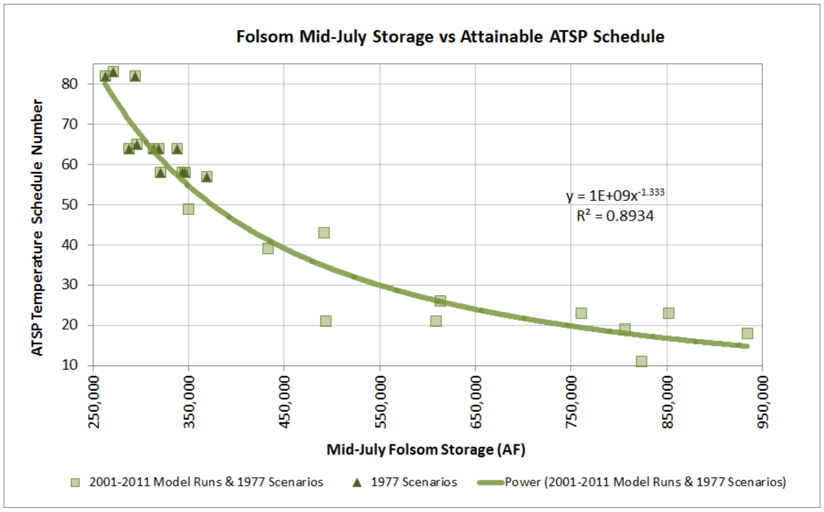
Figure 5b. Summer (July - October) Monthly Mean End-of-Month of Storage Folsom Reservoir Storage (TAF) under the Existing Condition, No Action Alternative, and Preferred Alternative (Alternative 4) by Water Year Type.



Source: DWR 2013. Tables C-4-1 and 2 and 7; Bay-Delta Conservation Plan EIR/EIS Appendix 5A Section C: CALSIM II and DSM2 Modeling Results

Figure 6. Folsom Reservoir Storage (TAF) in Relation to ATSP Temperature Schedule[1]. Higher ATSP Schedules Correspond to Warmer Summer Temperatures. All Schedules Larger than 55 Exceed Summer Temperatures of 70°F.

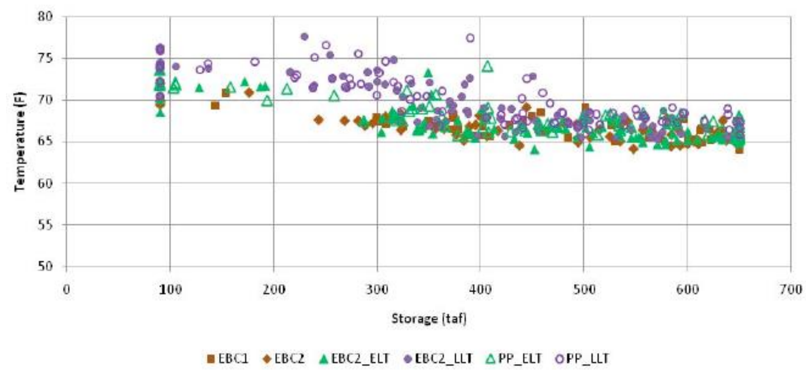
July



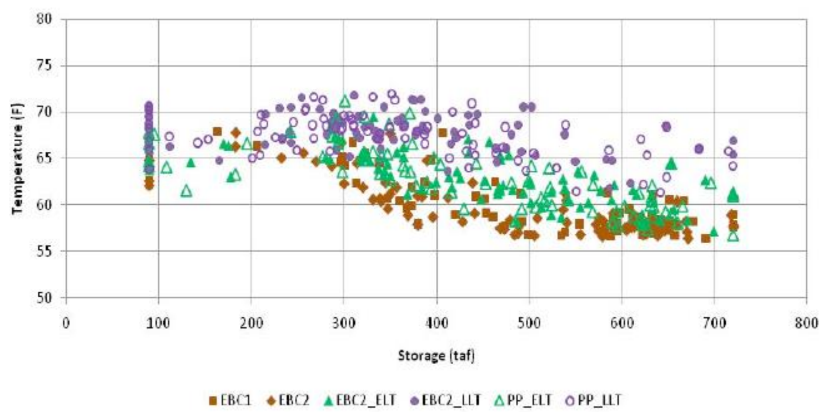
[1] *ATSP (Automated Temperature Selection Procedure); Lower ATSP schedules equal colder water temperatures; as identified in the lower American River Flow Management Standard*

Figure 7. Folsom Reservoir Storage (TAF) in Relation to Water Temperature (°F) at Nimbus Dam (September and October) under the Existing Condition (EBC1), No Action Alternative (EBC2_LLT), and Preferred Alternative 4, H3 (PP_LLT).

September



October



Source: Modified from: Reclamation et al. 2013; Figures Appendix 29C-17a and b. The same data are also included in Figures 5.A.2.5-24 and 25. 70°F red line added; acceptable rearing habitat is <70°F.

ELT = Early Long-term 2025; LLT = Late long-term (2060); EBC = Existing Biological Condition; PP = Proposed/Preferred Project as defined in DWR 2013.