January 28, 2022

Ms. Alicia Forsythe
Sites Project Authority
P.O. Box 517
Maxwell, CA 95955

Ms. Vanessa King
Bureau of Reclamation
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Sacramento, CA 95825

Submitted electronically to: aforsythe@sitesproject.org, vking@usbr.gov, EIR-EIS-Comments@SitesProject.org

Re: Comment on the RDEIR/SDEIS for the Sites Reservoir Project

Dear Ms. Forsythe and Ms. King,

The AquAlliance, California Indian Environmental Alliance ("CIEA"), California Native Plant Society ("CNPS"), California Sportfishing Protection Alliance ("CSPA"), CalWild ("CWC"), Center for Biological Diversity ("CBD"), Friends of the River ("FOR"), Northern California Council Fly Fishers International ("NCCFFI"), Planning and Conservation League ("PCL"), Save California Salmon ("SCS"), Sierra Club California, and the Winnemem Wintu Tribe, hereinafter referred to as "NGO Coalition" or "the Coalition", respectfully submit the following comments to be considered when finalizing the November 2021 Sites Reservoir Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement ("RDEIR/SDEIS").

The Coalition is submitting extensive comments because we are concerned that the environmental benefits of the proposed Sites Reservoir are a foregone conclusion in state policy – before environmental legal review and required permitting is complete. Project benefits remain speculative, and environmental harms of Sites have yet to be properly assessed. Therefore, it is important to the members of the NGO Coalition for these comments to be considered in the public record by the Sites Project Authority ("Project proponents" or "Sites Authority") before moving forward with the proposed Project.

Overall, the NGO Coalition believes the RDEIR/SDEIS does not meet the legal requirements of the California Environmental Quality Act ("CEQA") and the National Environmental Policy Act ("NEPA") because it:

- fails to consider a reasonable range of alternatives,
- fails to provide an accurate and stable project description,
- fails to accurately assess environmental impacts,
- fails to adequately assess environmental impacts,
- fails to account for National Wild and Scenic Protections, and finally
- is critically deficient in important information and therefore recirculation of a revised EIS/EIR is required.

In addition to the technical comments below, attached is an appendix of previous submissions by members of the Coalition to the Sites Project Authority during the CEQA and NEPA review period. The NGO Coalition appreciates Sites Project Authority's time and consideration of these comments.

I. The RDEIR/SDEIS Fails to Consider A Reasonable Range of Project Alternatives.

The California Environmental Quality Act ("CEQA") and the National Environmental Policy Act ("NEPA") require that the RDEIR/SDEIS consider a reasonable range of alternatives.[1] However, the RDEIR/SDEIS fails to consider a reasonable range of alternatives because it only considers a single operational alternative, whereas other operational alternatives could reduce or avoid adverse environmental impacts. The failure to include any operational alternatives that could reduce or avoid adverse environmental impacts violates NEPA and CEQA. *See, e.g., Citizens of Goleta Valley v. Board of Supervisors*, 52 Cal.3d 553, 566 (1990) (EIR must consider a reasonable range of alternatives that offer substantial environmental benefits and may feasibly be accomplished); *Muckleshoot Indian Tribe v. U.S. Forest Serv.*, 177 F.3d 800, 813 (9th Cir. 1999) (NEPA analysis failed to consider reasonable range of alternatives where it "considered only a no action alternative along with two virtually identical alternatives"); *Natural Res. Def. Council v. U.S. Forest Serv.*, 421 F.3d 797, 813 (9th Cir. 2005).

The RDEIR/SDEIS should have evaluated reasonable and feasible alternatives that result in comparatively reduced water diversions from the Sacramento River (particularly during all but wet water year types and during periods of moderate and low flows), because they would result in reduced adverse effects on native fish and wildlife in the Sacramento River and Bay-Delta estuary. The best available science shows that increased flows in the Sacramento River during the winter-spring period and increased Delta outflows are necessary to protect and restore native fish and wildlife populations and their habitats and comply with state and federal law.

Several commenters, including Pacific Coast Federation of Fishermen's Associations (PCFFA) *et al.* and the California Department of Fish and Wildlife ("CDFW"), submitted NEPA/CEQA scoping comments in January of 2018 specifically stating that the earlier

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[1] Cal. Pub. Res. Code §§ 21002, 21061, 21100; tit. 14, Cal. Code Regs. ("CEQA Guidelines") § 15126.6; 42 U.S.C. § 4332; 40 C.F.R. §§ 1502.1, 1502.14, 1508.25(b).

NEPA/CEQA process was seriously flawed and must analyze more than one operational alternative in order to identify alternatives that would minimize or avoid adverse environmental impacts of the project. The RDEIR/SDEIS should evaluate one or more operational scenarios *that do not result in substantial reductions in Delta outflow during the winter and spring months*, as well as one or more operational alternatives that result in increased Delta outflow during these months. CDFW's scoping comments directed that several operational scenarios should be analyzed, including one that was consistent with the water operational requirements being proposed for the California WaterFix project and another that would fully minimize operational impacts. Moreover, in 2016 and 2017, CDFW submitted potential operational criteria to the Project proponents that included Sacramento River bypass flows and Delta outflow requirements that were designed to reduce adverse environmental impacts of the project on salmon, sturgeon, longfin smelt, Delta smelt, and other native fish species.

However, none of these proposed operational criteria were evaluated in the RDEIR/SDEIS. Instead, the RDEIR/SDEIS only analyzes what is clearly in effect just a single operational scenario in the alternatives that are analyzed.[2] As discussed on the pages that follow, that operational scenario results in significant adverse environmental impacts and could not lawfully be permitted by state and federal agencies. As a result, the RDEIR/SDEIS violates NEPA and CEQA because it fails to consider a reasonable range of alternatives.

In addition, in the prior round of NEPA documents, on January 15, 2018, PCFFA *et al.* and others submitted NEPA/CEQA scoping comments stating that the Project proponents must consider one or more alternatives that did not include a surface water reservoir and instead relied on groundwater storage, conjunctive use, and/or reoperation of reservoirs to improve water supplies and ecosystem protection. Such an alternative would likely cost dramatically less money to construct and operate, and could result in lower environmental impacts, making it a potentially feasible and reasonable alternative. However, the current RDEIR/SDEIS failed to consider such an alternative, in violation of NEPA and CEQA.

II. The RDEIR/SDEIS Fails to Provide an Accurate and Stable Project Description.[3]

The RDEIR/SDEIS violates CEQA because it fails to use an accurate and stable project description. In particular, the modeling of operations in the RDEIR/SDEIS, which is the basis for the analysis of potential environmental impacts throughout the document, does not include the proposed mitigation measure FISH-2, Wilkins Slough Flow Protection Criteria. As a result, the quantitative analysis and modeling in the RDEIR/SDEIS does not analyze the project that is proposed in the RDEIR/SDEIS.[4] Additionally, different RDEIR/SDEIS chapters and appendices use different modeling and analyses, making inconsistent analysis throughout the document and therefore not a stable project description.

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[2] *See, e.g.*, RDEIR/SDEIS at 3-102, 105-107.
[3] For the entirety of Section II, the NGO Coalition requests the Sites Project Authority also refer to the analysis contained in the NRDC et al. RDEIR/SDEIS comments as well.
[4] *See, e.g.*, RDEIR/SDEIS Appendices at 5A1-29, 5A2-28 to 5A2-33.

Despite the absence of a complete Reservoir Operations Plan, the RDEIR/SDEIS also assumes that there will be water exchanges with Shasta and Oroville reservoirs in certain years.[5] However, there are no proposed agreements for such exchanges between the Central Valley Project ("CVP") or State Water Project ("SWP") and Sites, and this element of the Project is hypothetical.[6] Equally important, the RDEIR/SDEIS does not analyze the potential adverse effects that would result from such exchanges, including potential changes in river flows, redd dewatering, or reductions in juvenile salmon survival, and completely ignores the effects of exchanges with Folsom Reservoir.[7]

As a result of all these deficiencies, all of the modeling of proposed operations in the RDEIR/SDEIS does not actually model or analyze the effects of the proposed Project or alternatives, and instead is inconsistent with the actual proposed Project. Therefore, the document fails to analyze the likely environmental impacts of the proposed Project and alternatives altogether.

In addition, key documents that make up the administrative record for this Project fail to consider the same project alternatives. The RDEIR/SDEIS considers four alternatives, including No Action, Alternative ("Alt") 1 (1.5 MAF reservoir), Alt. 2 (1.3 MAF reservoir), and Alt. 3 (1.3 MAF reservoir (with changes in partner investment compared to Alt. 2). The Final Feasibility Report prepared by the USBR in 2020 examines five alternatives, including, No Action, Alt. A (1.3 MAF reservoir with Delevan pipeline for intake and release), Alt. B (1.8 MAF reservoir with Delevan pipeline for release only), Alt. C (1.8 MAF reservoir with Delevan pipeline for intake and release), and Alt. D (1.8 MAF reservoir with Delevan pipeline for intake and release, for "Local Considerations").[8]

The RDEIR/SDEIS considers 1.3 MAF and 1.5 MAF reservoir alternatives with no Delevan pipeline, while the feasibility study considers one 1.3 MAF reservoir alternative and three 1.8 MAF reservoirs, all with the Delevan pipeline. These two important documents fail to correlate. The feasibility report monetizes project benefits to determine the feasibility of the Project. And yet the alternatives reviewed in the report are not the same alternatives analyzed in

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[5] RDEIR/SDEIS at ES-12, 2-35 to 2-37, 5A-2-30 to 5A-2-33, Because these exchanges would be intended to "assist the [Central Valley Project] and [State Water Project] in meeting their regulatory obligations," RDEIR/SDEIS at 2-35, these exchanges do not provide public benefits that justify public taxpayer expenditures for this project. These exchanges are effectively water supply benefits to the contractors of the CVP and SWP who are obligated to pay for meeting regulatory requirements of the CVP and SWP. Additionally, the NGO Coalition that this supposed benefit from the Project will incentive less spill at Oroville in the spring, an important seasonal time for cold-water fisheries.

[6] *See id*. at ES-10 ("exchanges of water may occur with the CVP and SWP") (emphasis added); *id*. at 2-35 (acknowledging that the Sites Reservoir Authority is in discussions with the U.S. Bureau of Reclamation ("USBR") and the California Department of Water Resources ("DWR") regarding potential exchanges).

[7] *See* RDEIR/SDEIS at 5-27; *id*. at 11-103 (admitting that the RDEIR/SDEIS needs to "better reflect the exchanges in the model," that these exchanges are difficult to model, and that the RDEIR/SDEIS underestimates the extent of potential exchanges that could occur under the proposed project). The RDEIR/SDEIS also admits that Sites Reservoir cannot release water to Glenn-Colusa Irrigation District ("GCID") and other participants located between the Hamilton City Pump Station and Knights Landing, and that deliveries of water to those participants would be made by GCID and USBR. RDEIR/SDEIS at 2-34. The RDEIR/SDEIS does not appear to analyze the effects of additional Shasta Dam releases by the USBR to fulfill such exchanges, which could be particularly impactful to the environment in drier years.

[8] North-of-the-Delta Offstream Storage Investigation Final Feasibility Report, USBR, December 2020.

the RDEIR/SDEIS. The documents' failure to consider the same alternatives makes it very difficult for the Coalition, let alone the general public, to understand the decision-making process for this Project.

III. The RDEIR/SDEIS fails to accurately assess environmental impacts.

First and foremost, the regulatory baseline selected for analysis should not assume or include the United States Bureau of Reclamation's ("USBR") 2019 Biological Opinions because they have been withdrawn for reconsultation, and are subject to Court Orders in *PCFFA, et al. vs. Raimondo* and *CNRA vs. Raimondo*. The environmental baseline should, however, include all state-mandated clean water standards of D-1641 and WRO 90-5.

Second, the RDEIR/SDEIS' analysis of significant environmental impacts violates NEPA and CEQA because it assumes that changes in flow or storage less than 5 percent and/or 10 percent are insignificant. However, changes in flow and/or storage less than 5 percent or 10 percent frequently results in these levels dropping below key thresholds relating to the survival of native fish species, including species listed under the California Endangered Species Act ("CESA") and the federal Endangered Species Act ("ESA"). As a result, even changes in flow or storage levels that are a less than 5 percent change from the baseline clearly can and do cause significant adverse impacts to native fish species. Moreover, for salmon and other species, reductions in flow less than 5 percent have synergistic impacts that can be devastating for these species, as reduced flows reduce survival in multiple reaches of the Sacramento River and through the Delta, resulting in cumulatively significant reductions in survival. As a result, the RDEIR/SDEIS fails to disclose significant impacts of the proposed Project and alternatives to species listed under CESA and the ESA, for which mandatory findings of significance are warranted. The RDEIR/SDEIS must be revised to eliminate the assumption that changes in flow or storage less than 5 percent and less than 10 percent are insignificant.

The RDEIR/SDEIS claims that the CALSIM 2 model is not accurate enough to assess changes in flow or storage less than 5 percent, stating that,

> "Incremental flow and storage changes of 5% or less in modeled results are generally considered within the standard range of uncertainty associated with model processing. Therefore, for the purposes of the impact analysis, flow changes of 5% or less were considered to be similar to the NAA for comparative purposes. Changes in flow exceeding 10% were considered to represent a potentially meaningful difference."[9]

These 5 percent and 10 percent thresholds of significance are arbitrary, inconsistent with other NEPA/CEQA documents prepared by the USBR, and not supported by substantial evidence. Moreover, to the extent that CALSIM 2 fails to accurately assess impacts, the RDEIR/SDEIS fails to explain why it does not use the CALSIM 3 model, which has been publicly released by DWR and incorporates more recent hydrological data.

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[9] RDEIR/SDEIS at 11-57.

The RDEIR/SDEIS Is Fundamentally Flawed.

First, the RDEIR/SDEIS provides no justification for why changes in flow less than the 10 percent threshold would not be considered a potentially meaningful difference. The lack of any explanation for this assumption regarding the 10 percent threshold makes it plainly arbitrary and capricious.

Second, the justification for the 5 percent threshold is also irrational and not supported by substantial evidence. Because CALSIM modeling is used in a comparative manner (meaning that it is used to model conditions under both the environmental baseline and action alternatives), there is no need for the 5 percent or 10 percent thresholds. Importantly, there is no basis to conclude that Sacramento River flow reductions due to diversions to storage under the proposed project are an illusory modeling artifact; instead, reduced flow in the Sacramento River is an inevitable and necessary consequence of diverting water from the Sacramento River to fill Sites Reservoir. While the CALSIM model does have significant flaws, failing to disclose changes in flow that are 5 percent (or 10 percent) or less as a significant impact misleads the public and decisionmakers. In fact, other CEQA/NEPA documents that use CALSIM modeling do not use a 5 percent or 10 percent thresholds for determining whether changes in flow or storage constitute a significant impact. For instance, the final CEQA/NEPA documents for the California WaterFix project did not use these thresholds, and the RDEIR/SDEIS provides no reasoned explanation why these assumptions are necessary since they have been omitted from other CEQA/NEPA analyses where CALSIM is used.

Third, the RDEIR/SDEIS does not consistently employ these thresholds. If a 5 percent change is significant, then to avoid impacts the project could simply limit diversions to levels that produce a less than 5 percent change in flow, yet it fails to do this. In addition, changes in Delta outflow from the proposed project are generally less than 5 percent[10], yet as the RDEIR/SDEIS admits, the reduction in abundance of Longfin Smelt that results from reduced Delta outflow would be a significant impact requiring mitigation.[11]

Fourth, using these 5 percent and 10 percent thresholds results in the RDEIR/SDEIS failing to disclose significant environmental impacts for which mitigation is required. For instance, the RDEIR/SDEIS claims that the project and alternatives would cause a significant impact to winter-run Chinook salmon if diversions by the proposed project or alternatives caused flows in the Sacramento River to drop below 10,700 cubic feet per second ("cfs").[12] However, because the RDEIR/SDEIS assumes that a 5 percent reduction in flows in the Sacramento River is simply a modeling artifact and not a real change, the RDEIR/SDEIS would not identify operations that reduce flows by 4 percent, but drop below 10,700 cfs, as a significant effect. Similarly, although the IOS life cycle model used in the RDEIR/SDEIS finds that on average, winter-run Chinook salmon escapement is 3 percent lower under Alternative 1A and 4 percent lower under Alternative 1B, with greater reductions in escapement in wetter water year types, *see*

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[10] RDEIR/SDEIS at Table 5B3-5-1a.
[11] *See Id*. at 11-271.
[12] RDEIR/SDEIS at 11-130 to 11-131.

RDEIR/SDEIS at 11-128, the RDEIR/SDEIS wrongly concludes this is a less than significant effect.[13]

Similarly, the use of arbitrary thresholds for identifying significant impacts is inconsistent with the CEQA guidelines, which require a mandatory finding of significance if a project would "cause a fish or wildlife population to drop below self-sustaining levels" or "substantially reduce the number or restrict the range of an endangered, rare or threatened species." Cal. Code Regs., tit. 14, § 15065(a)(1). Where, as here, populations of winter-run Chinook salmon, Longfin Smelt, Delta Smelt, and other species are below self-sustaining levels, any further impacts that causes those populations to further drop below self-sustaining levels is a per se significant impact under CEQA requiring mitigation.[14] As one example, the RDEIR/SDEIS finds, using the IOS life cycle model, that Alternative 1A would reduce the long-term abundance of winter-run Chinook salmon by 3 percent on average, as a result of reducing survival through the Sacramento River by 1 percent and through the Delta by 1-2 percent. RDEIR/SDEIS at 11-128 to 11-129. The population of winter-run Chinook salmon is not self-sustaining under baseline conditions, and the impact of Alternative 1A is therefore per se a significant impact requiring mitigation. Cal. Code Regs., tit. 14, § 15065(a)(1).

The RDEIR/SDEIS fails to accurately analyze environmental effects and disclose significant environmental impacts because of the use of these arbitrary 5 percent and 10 percent thresholds. The RDEIR/SDEIS must be revised to exclude these improper assumptions regarding the effects of the proposed project and alternatives.

[13] As the RDEIR/SDEIS admits, the OBAN model does not account for the flow:survival relationship in the Sacramento River, RDEIR/SDEIS at 11-129 to 11-130, and therefore the OBAN model does not provide an accurate assessment of the effects of the proposed project and alternatives on salmon. Similarly, the SALMOD model does not accurately assess the effects of the proposed project and alternatives, including because it does not account for the flow:survival relationships in the Sacramento River and through the Delta; SALMOD is an outdated and discredited model should not be relied upon.

[14] In addition, we note that CESA requires that the impacts of the project on listed species be fully mitigated and not jeopardize the continued existence of the species, *see* Cal. Fish and Game Code § 2081, regardless of whether those impacts are designated as significant under CEQA.

IV. The RDEIR/SDEIS fails to adequately assess environmental impacts.

The comments in the section below describe in detail the resulting RDEIR/SDEIS deficiencies for each specific environmental issue area. These include, but are not limited to: A) the Trinity River, B) the Sacramento River, C) Aquatic Biological Resources, D) Terrestrial Biological Resources, E) Water Quality, F) Cultural Resources, and G) Climate Change.

A. Impacts to the Trinity River.

The modeling for Sites RDEIR/SDEIS purports not to harm the Trinity River because it shows no changes in the current pattern of exports, river releases and storage for the Trinity River Division ("TRD") of the Central Valley Project ("CVP"). However, since no operating plan for Sites has been released along with the RDEIR/SDEIS, it is impossible to ascertain if real time operations would impact the Trinity River.

In fact, Chapter 11 categorically excludes impacts on the Trinity River (and thus on the Klamath River as a whole) from any analysis:

> "As described in Chapter 2, Project Description and Alternatives, the Project would not affect or result in changes in the operation of the CVP, Trinity River Division facilities (including Clear Creek) and thus Trinity River resources are not discussed or analyzed further in this chapter." (Page 11-2)

This exclusion is not appropriate, especially as the USBR would (at least under Alternatives 1 or 3) be entitled to the use of between 7 percent and 25 percent of the volume of the Reservoir as an investment partner (i.e., entitled to storage in proportion to their investment), and would thus be able to store Trinity-origin water destined for the CVP in the Project reservoir for various later uses. While this additional Trinity-origin water storage may not increase the total withdrawal of water from the Trinity by the USBR (which is bounded by the 2000 Record of Decision (ROD)), it would nonetheless mean that the timing and use of Trinity-origin flows to the CVP would or could substantially change. The environmental implications of these timing and use changes of Trinity-origin water should be at least discussed and analyzed.

Furthermore, the Trinity River does not have temperature protection incorporated into USBR's state water permits. Until the State Water Resources Control Board (SWRCB) updates USBR's Trinity River water permits, objections to Sites Reservoir are valid because impacts can and will occur.

The Sites Project Authority claims that it has no authority to change TRD operations, which is true. However, it cannot say the same for one of its member agencies that controls the TRD - the USBR. Given that the USBR owns, operates, and has full control of the TRD and has a percentage ownership in Sites Reservoir, it's very clear that construction and operation of Sites could and likely would negatively impact the Trinity River.

For instance, examination of the modeling for the 2017 Sites DEIR/DEIS found that during drier years, USBR would export more Trinity water to the Sacramento River in spring and late winter, while concurrently reducing Trinity exports during critical fall spawning months when Lewiston Reservoir warms substantially. The modeling, if done adequately, should have shown increased temperatures for spawning salmon in the Trinity River. This so-called "modeling error" has been corrected for the current RDEIR/SDEIS. However, without an operations plan, the modeling is meaningless, but the previous modeling exercise gives a clear example of how Sites could negatively impact the Trinity River through USBR operations.

The issue is "How can the Sites Project Authority be held responsible for USBR's actions related to the operation of Sites Reservoir?" There is a way to ensure that the Trinity River is not harmed by USBR's partial ownership of Sites, and that is through amendment of USBR's Trinity River water permits. The legislative and legal history of the TRD of the CVP is rife with requirements to "do no harm" to the Trinity River and its fishery. The proposed Sites Reservoir clarifies the need for USBR to have its state water permits amended to not harm the Trinity River because under the current regulatory scenario, harm to the Trinity River is inevitable.

What Constitutes "Harm" to the Trinity River.

State Water Resources Control Board Water Rights Order ("WRO") 90-5[15] partly identifies what is "harm" to the Trinity River as it relates to the export of Trinity water for temperature control in the Sacramento River:

> *"IT IS FURTHER ORDERED that Permits 11966, 11967, 11968, 11969, 11970, 11971, 11973, 12364, and 12365 and License 9957, on Applications 5627, 5628, 15374, 15375, 15376, 16767, 17374, 17376, 17375, and 15424, be amended to add a condition as follows:*
>
> *Permittee shall not operate its Trinity River Division for water temperature control on the Sacramento River in such a manner as to adversely affect salmonid spawning and egg incubation in the Trinity River. Adverse effects shall be deemed to occur when average daily water temperature exceeds 56°F at the Douglas City Bridge between September 15 and October 1, or at the confluence of the North Fork Trinity River between October 1 and December 31 due to factors which are*
> *(a) controllable by permittee and*
> *(b) are a result of modification of Trinity River operations for temperature control on the Sacramento River.*
>
> *If the temperatures in the Trinity River exceed 56°F at the specified locations during the specified periods, Permittee shall immediately file with the Chief of the Division of Water Rights a report containing project operational data sufficient to demonstrate that the exceedance was not due to modifications of Trinity River operations for water temperature control on the Sacramento River. If, within fifteen days, the Chief of the Division of Water Rights does not advise Permittee that it is violating this condition of its water right, Permittee shall be deemed not to have caused the exceedance in order to*

[15] *See* State Water Resources Control Board Water Rights Order 90-05. Available online: https://www.waterboards.ca.gov/waterrights/board_decisions/adopted_orders/orders/1990/wro90-05.pdf, last accessed 24 January 2022.

control temperature on the Sacramento River.

This term is not to be construed as interfering with the U. S. Department of Interior Andrus Decision dated January 14, 1981, relative to Trinity River releases."

The Trinity River protections found in WRO 90-5 do not provide any protection from other projects or purposes such as diversions to Sites Reservoir, hydropower production or water supply. Water Right Order 90-5 only limits USBR's export of Trinity River to do no harm to Trinity River salmon because of operations for temperature control on the Sacramento River.

A more comprehensive definition of harm to the Trinity River can be found in the North Coast Regional Water Quality Control Board's "Water Quality Control Plan for the North Coast Region" (North Coast Basin Plan).[16] While the North Coast Basin Plan Trinity River 56° temperature objective is included in WRO 90-5, the 60°F July 1- September 15 temperature objective is not. The USBR has made it very clear that because the 60°F objective is not included in WRO 90-5, that the USBR is not required to meet it and clearly does not meet it in many years such as 2021. Therefore, WRO 90-5 is not adequately protective of Trinity River salmon. In this case, the 60°F temperature objective is intended to protect holding adult spring Chinook salmon prior to spawning. Trinity River spring Chinook were recently listed as threatened under the California Endangered Species Act.

The lack of full protection for the Trinity River from diversions for various uses other than temperature control on the Sacramento River leaves the Sites Project Authority vulnerable to criticism that the project will harm the Trinity River and the Lower Klamath River below the Trinity confluence because the USBR will have the ability to move Trinity water into Sites. How can this be fully mitigated? The answer lies with the history of WRO 90-5 dating back to 1989 and the need for promises to be kept, not broken.

In 1989, State Water Resources Control Board WRO 89-18[17] directed that the Central Valley Basin Plan temperature objectives for the Sacramento River would be met through the water rights process, not Waste Discharge Requirements. It directed that the water right hearing for WRO 90-5 be initiated to amend USBR's CVP water rights to include temperature protection for Sacramento River salmon. The County of Trinity participated in the hearing, concerned that protections for Sacramento salmon might harm the Trinity River. As a result, the SWRCB made the following finding:

[16] "Water Quality Control Plan for the North Coast Region" Footnote 5, Table 3-1, page 3-8.00: Accessed at http://www.waterboards.ca.gov/northcoast/water_issues/programs/basin_plan/083105-bp/04_water_quality_objectives.pdf

Daily Average Not to Exceed	Period	River Reach
60°F	July 1- Sept 15	Lewiston to Douglas City Bridge
56°F	Sept 15-Oct 1	Lewiston to Douglas City Bridge
56°F	Oct 1- Dec 31	Lewiston to North Fork Confluence

[17] *See* State Water Resources Control Board Water Quality Order 89-18. Available online: https://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/1989/wq1989_18.pdf, last accessed 24 January 2022.

> *"The State Board should conduct water right proceedings to consider whether the Bureau's permits should be modified to establish temperature limitations or other conditions to assure adequate water quality for protection of the fishery in the Trinity River."*[18]

The SWRCB directed that a water right hearing on Trinity River temperatures be held:

> *"IT IS FURTHER ORDERED that the Division of Water Rights shall initiate proceedings for the State Board to consider modifying the Bureau's permits for the Trinity River Unit of the Central Valley Project to set appropriate conditions to maintain water quality in the Trinity River. The State Board may review Trinity River water quality in the same water rights proceedings* as *it reviews upper Sacramento River water quality, or in subsequent proceedings to the extent that the issues may properly be considered separately.*"[19]

The commitment to protect the Trinity River water quality in Water Quality Order 89-18 was also carried into WRO 90-5:

> *"We have already announced our intention to conduct a water right proceeding to consider whether the Bureau's Trinity River water rights should be modified to establish temperature limitations and other controls on water quality to protect the fishery in the Trinity River. See Order No. WQ 89-18. The proceedings on the Bureau's Trinity River water rights are expected to be commenced late this year. Our hearing record -for this decision is not adequate to set fishery protections for the Trinity River."*[20]

Unfortunately, the water right hearing to consider a full range of temperature protection measures for amendment of USBR's water permits has yet to be scheduled *thirty-three years later*. The USBR has expressed opposition to imposing any additional terms and conditions on its Trinity River water rights, calling it "unnecessary and ill-advised."

The USBR's objection to conforming its Trinity River water permits to the North Coast Basin Plan water quality objectives stands as a roadblock in assuring that Sites Reservoir will not harm the Trinity River's fishery resources. If the USBR opposes updating its Trinity River water permits, objections to Sites are valid and will be the basis of water right protests.

The Coalition therefore recommends a mitigation measure be added to the approvals for the Record of Decision, Notice of Determination, water rights and operating plan for the proposed Sites Reservoir as follows:

> *Sites Reservoir operations by the Sites Project Authority and its members do not cause harm to the Trinity River, as defined by violation the Trinity River Temperature Objectives contained in the "Water Quality Control Plan for the North Coast Region."*[21]

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[18] *Id.* at 17.
[19] *Id.* at 18.
[20] State Water Resources Control Board Water Rights Order ("WRO") 90-5, pg. 31.
[21] *Ibid*.

Construction permits shall not be issued, and construction shall not commence until the State Water Resources Control Board amends the Bureau of Reclamation's Trinity River Water Permits to implement North Coast Basin Plan temperature objectives for the Trinity River.

B. Impacts to the Sacramento River.

The withdrawal of any water from the normal flows of the Sacramento River will have ecological consequences, those impacts being largely only a matter of degree.

The Sacramento River Riparian Ecosystem Is Flow Driven – Project-Induced Flow Changes Could Significantly Impact Riparian Habitat and Riparian-Dependent Species.

In 1988, as little as two percent of the riparian, or riverside, forests along the Sacramento River remained. These forests support a wide variety of fish and wildlife species, many of which are declining towards extinction due to the loss of habitat. While the river's threatened and endangered salmon and steelhead depend on riverside forests to provide shaded riverine habitat and large woody debris for cover, threatened and endangered wildlife dependent on the Sacramento River's riparian habitat include:

> <u>Western yellow-billed cuckoo (WYBC)</u> – The WYBC was listed as a threatened distinct population segment by the USFWS in 2014. A neotropical migrant, the WYBC typically nests in willow dominated riparian woodlands and forage in the expansive stands of Fremont cottonwood and willows. Continuing habitat succession has been identified as important in sustaining breeding populations. Historically common in riparian habitat throughout the Central Valley, only the Sacramento River and Sutter Bypass between Red Bluff and Colusa currently sustain isolated breeding populations. In addition to the adverse impact associated with the chronic loss of riparian habitat due to agricultural clearing and development, changes in channel dynamics resulting from the operation of water storage and conveyance facilities in the Sacramento River are major factors in the reduction of suitable cuckoo habitat. The continued operation of dams and diversions will likely have compounding effects on riparian habitats into the future. The effects of dam-induced reduction of mean annual peak discharge flow (CALFED 2000), reduction of flood discharge volume (Greco 2013), reduction in stream power (Fremier 2003), sediment starvation (Michalková et al. 2010), and reduced bank erosion rates and overbank deposition (Buer et al. 1989) all contribute to changes in successional riparian forest ecosystems. As the ability of the river channel to migrate laterally is restricted (Larsen et al. 2006) and the quantity of new land production reduces, the amount of new pioneer riparian forests is subsequently decreased (Greco et al. 2007). Even as the WYBC along the Sacramento River have continued to decline under current dam operations, Sites diversions could contribute to the loss of new riparian habitat required by the WYBC.[22]

> <u>Valley elderberry longhorn beetle (VELB)</u> – Listed by the USFWS in 1980 as a threatened species, the VELB was known to occupy only 10 locations on the American and Merced Rivers, and Putah Creek. Subsequent surveys have documented additional populations on the Sacramento and Feather Rivers, and other streams in the Central Valley, where the VELB is considered to be endemic. Even with the additional occupied sites identified, the VELB occupies less than 25 percent of its remaining Central Valley

[22] Biological Opinion for the Reinitiation of Consultation on the Coordinated Operations of the Central Valley Project and State Water Project, USFWS 2019, pgs. 363-392.

habitat due to fragmentation of riparian habitat. Elderberry shrubs are necessary for the VELB life cycle and is found in a variety of riparian and non-riparian habitats where its roots can reach the water table. Sites-induced flow changes in the Sacramento River between Red Bluff and Colusa could impact VELB habitat by reducing river flows that feed groundwater. Loss of riparian habitat due to development, infrastructure construction, and land conversion to agriculture, and the effects of non-native species have greatly contributed to the loss and fragmentation of VELB habitat.[23]

Bank swallow (BS) – A neotropical migrant found primarily in riparian and other lowland habitats in California during the spring-fall period, the BS nests in eroded banks along the Sacramento. Channelization and stabilization of banks of nesting rivers, and other destruction and disturbance of nesting areas, are major factors causing the marked decline of the BS in recent decades, leading to its listing as a state threatened species in 1989. Extirpated from southern California, the BS populations along the Sacramento and Feather Rivers comprise about 64 percent of its breeding colonies and up to 90 percent of the total California population.[24] The core of California's BS population, and therefore the most important habitat for long-term maintenance and recovery of the species, is found along the Sacramento River and its major tributaries. The most practical, and probably also the most cost-effective, system to maintain suitable BS habitat in perpetuity is through conservation of a natural riverine system. The BS is most affected by flooding and erosion disturbances, which can have positive and negative effects to this species. Flooding in freshwater environments causes erosion and soil deposition. Erosion creates the vertical banks needed for nesting, while the alluvial soils deposited during flood events are needed for burrows. Rapidly fluctuating water levels from reservoirs and storms can cause bank undercutting during the breeding season and the loss of nesting colonies.[25] Major modifications to riverine systems will make it difficult to save species like the BS from eventual extinction. Recovery of BS populations in California will not be possible without the protection of nesting habitat along the Sacramento River and its major tributaries.[26]

Riparian habitat along the Sacramento River was maintained by the river's natural flow regime – with high flows in the winter/spring and low flows in the summer/fall. High flows erode banks and sand/gravel bars, destroying habitat but also renewing habitat by depositing sediment and seeds to create new sand/gravel bars. Willows initially populate new sand/gravel bars. Overtime, the willows help capture sediment, which may build the sand/gravel up to a terrace where a climax riparian forest of Fremont cottonwood and valley oak can be sustained. Shasta Dam and other reservoirs on tributaries have altered this natural flow regime, and significant diversions from the river to the Sites Reservoir has the potential to alter flows even further.

Recognizing the importance of the Sacramento River's riparian ecosystem, state and federal agencies, as well as non-governmental organizations (NGOs) have spent millions of

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[23] *Ibid*, pgs. 326-343.
[24] https://www.sacramentoriver.org/bans/index.php?id=bankswallows
[25] http://www.prbo.org/calpif/htmldocs/species/riparian/bank_swallow_acct2.html
[26] Bank Swallow Recovery Plan, CDFW 1992.

dollars (largely from state and federal taxpayers) to protect and restore riparian habitat along the Sacramento River. But little has been done to assure that flows in the Sacramento River are maintained to support this endangered ecosystem. As a result, taxpayer investments in the restoration of habitat along the river may be lost or stranded. Despite RDEIR/SDEIS assurances that impacts will be less than significant, Sites-induced flow changes have the potential to significantly impact the river's riparian habitat and species.

Sacramento River Minimum Flow Standards Do Not Address Riparian Ecosystem Requirements.

Minimum flows were established for the Sacramento River early in the 20th century to facilitate commercial navigation. They were later modified to provide for specific flows and water temperatures for the migration and spawning of salmon and steelhead. The current flow standard for the Sacramento River is 3,250 cfs from October through March in the segment of the Sacramento River affected by Sites diversions.[27] The minimum flow from April to August is only 2,300 cfs.[28] Historically, flows in the Sacramento River have always been well above the minimum flows, but an extended multi-year drought may force the river to its near minimum flow (for example, the flow of the river at Bend in April 2015 was below 4,000 cfs). The flow standard does not address flows needed to maintain the Sacramento River's flow-driven riparian ecosystem.

CALSIM II and USRDOM Models May Produce Questionable Results.

The RDEIR/SDEIS uses the CALSIM II and USRDOM models to estimate flow impacts on the Sacramento River.[29] Use of these models may produce questionable results.

Much of the RDEIR/SDEIS analysis depends on the use of computer models with known deficiencies, particularly CALSIM II. CALSIM II's "daily flow disaggregation below Red Bluff Diversion Dam (RBDD) is known to be flawed…flows below RBDD *are for testing and demonstration purposes only.*"[30] According to a National Academy of Sciences assessment, many CALSIM II users believe that the model's primary limitation is its monthly time step and that the model should be used primarily for comparative analysis between scenarios, but its use for absolute predictions should be discouraged. This same assessment found that although use of models like CALSIM II is justified despite flaws, these models do not go far enough toward an integrated analysis of reasonable and prudent alternatives, and improvements were needed.[31] Further, even the USBR admits that the CALSIM II disaggregation process used to simulate daily flows for modeling water quality "results in a crude representation of flow and temperature conditions on a daily time scale."[32]

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[27] NMFS Biological Opinion 1993.
[28] WRO 90-5.
[29] RDEIR/SDEIS Chap. 7, pg. 7-9.
[30] ESSA Technologies, March 2008, SacEFT Analysis Results Appendix F, pg. F-3 (emphasis added).
[31] National Academy of Sciences 2010, A Scientific Assessment of Alternatives for Reducing Water Management Effects on Threatened and Endangered Fishes in California's Bay Delta.
[32] United States Bureau of Reclamation (USBR), Fish and Wildlife Coordination Act Report Appendix, Shasta Lake Water Resources Investigation, June 2013.

The RDEIR/SDEIS asserts that the problems with CALSIM II have been rectified with a new model, USRDOM. No information is provided as to the provenance and accuracy of this model, or whether it has been peer reviewed. It is referenced with an ambiguous notation – CH2M HILL 2011 – but neither this document or anything approximating a peer review is available on the internet. The USBR provided a copy of the 2011 CH2M-HILL report on USRDOM, which states:

> USRDOM allows the user to establish bounds on availability and operating criteria for diversion of excess flows to NODOS. It simulates realistic daily flow conditions in the Sacramento River based on the operations specified by CALSIM II under projected conditions (future) or historical operations for use in river morphology and fisheries analyses for NODOS. It also can be used to evaluate NODOS performance for ecosystem restoration objectives. Finally, it can be used to demonstrate incremental environmental impacts of various NODOS scenarios.[33]

Based on this description, we must note that the ability of USRDOM to evaluate Sites performance for ecosystem restoration objectives is only as good as the evaluator's basic assumptions. If the evaluator assumes that a less than 5 percent modification in current flows is minimal, they will assume less than significant impacts. It is just another modeling tool that can simulate changes but not necessarily determine whether those changes are significant.

In response to a query, a Bureau of Reclamation employee stated that as far as they know, USRDOM has not been formally peer reviewed. Four other models utilized to analyze various Sites operations impacts on the Sacramento River are based on the CALSIM II/USRDOM models, which increases risk and uncertainty if these models are inadequate and/or inaccurate.

When it comes to specific flows needed for specific purposes, averages are virtually useless. If CALSIM II says the average flow in the Sacramento River during the month of March is 10,000 cfs, the public has no way of knowing whether this average reflects 10,000 cfs of flow for all days of that month or 20,000 cfs of flows for half of the month and zero flows for the other half. A crude example perhaps, but a world of consequences, intended or not, can be hidden in documents based on the monthly average flow. A 2006 review of the CALSIM II model for the San Joaquin River raised this significant issue:

> Users must take responsibility for model selection and application, and they must accept the responsibility for decisions that they make with information produced by the model. Relying on an external body to provide a blanket endorsement covering all possible applications is a dangerous practice. It tempts users to avoid accountability for their work. It tempts decisionmakers to place responsibility on general model reviews which are remote from a particular application. Further, it opens the door to intentional and unintentional abuse, negligence or complacency by model users and developers, or their managers who may shift responsibility to

[33] USRDOM Development, Calibration, and Application, USBR & CH2MHILL, Aug. 2011, pg. 1-1.

> tools or some external general review panel for decisions made or actions recommended based on their use of a model.[34]

CALSIM II/USRDOM Predicted Flow Changes May Not Be as Minimal as They Appear Because Riverine/Riparian Ecosystems Are Very Sensitive to Human-Caused Flow Changes.

Using the CALSIM II/USRDOM models, the RDEIR/SDEIS predicts monthly average flow changes ranging from a 1 percent increase in February at the Bend Bridge to up to a 5 percent decrease in flows below Red Bluff in February.[35] Please note that these percentages are monthly averages – daily flow changes may be much greater but are not shown by the CALSIM II model. Based on these low "system-wide" averages, the RDEIR/SDEIS concludes that Alternatives 1-3 will not substantially alter the natural river geomorphic processes and existing river geomorphic characteristics, and impacts would be less than significant and would have no adverse effect on the Sacramento River.[36]

Riverine ecosystems are governed by patterns of temporal variation in river flows. Flows will be modified due to climate change and the near-ubiquitous human control of river flow, with severe effects on fish and wildlife species. Riverine ecosystems are particularly susceptible to flow changes. A scientific study summarized the sensitivity of riparian ecosystems:

> …even slight modifications to the historic natural flow regime had significant consequences for the structure of riparian plant networks. Networks of emergent interactions between plant guilds were most connected at the natural flow regime and became simplified with increasing flow alteration. The most influential component of flow alteration was flood reduction, with drought and flow homogenization both having greater simplifying community-wide consequences than increased flooding. These findings suggest that maintaining floods under future climates will be needed to overcome the negative long-term consequences of flow modification on riverine ecosystems.[37]

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[34] San Joaquin River Valley CALSIM II Model Review, D. Ford, L. Grober, T. Harmon, J.R. Lund (Chair), D. McKinney, California Bay Delta Authority Science Program and California Water and Environmental Modeling Forum, 2006.

[35] RDEIR/SDEIS, Table 7-4, Chap. 7, pg. 7-18.

[36] The RDEIR/SDEIS determines that this impact is Less Than Significant (LTS) under CEQA and No Effect (NE) under NEPA. For the CEQA analysis, the document concludes that operations under Alternatives 1-3 "…would not substantially alter natural river geomorphic processes and existing geomorphic characteristics and impacts would be less than significant." For the NEPA analysis, it also concludes that Alternatives 1-3 "…would have no adverse effect." RDEIR/SDEIS, Chap. 7, pgs. 7-19, 7-21, 7-22.

[37] Flow regime alteration degrades ecological networks in riparian ecosystems, Jonathan D. Tonkin, et al., Nature Ecology & Evolution, published online Nov. 27, 2017.

In Below Normal to Critically Dry Years, The Percentage of Total Flows That Are Subject to Project Withdrawal Will Be Most Important in Terms of Their Ecological Consequences.

The NGO coalition notes that RDEIR/SDEIS Table 11-6 (Red Bluff) withdrawals are projected to be as high as 14 percent of total river flow in Below Normal-classed years, 10 percent in some Dry years, but scaled down to a maximum of 4 percent in some Critically Dry years, depending upon the alternative chosen. These rates do not appear alarming, if correct.

But in Table 11-7 (Hamilton City), diversions are projected to be up to 25 percent of total flows in Below Normal years for some alternatives, and up to 24 percent in some Dry years (June) and up to 25 percent in some Critically Dry years. Additionally, these two diversions would be cumulative, i.e., they are separate diversions at different points -- but from the same river. What are the total reductions in instream flow that result?

Another concerning aspect of Table 11-7, there seems to be little difference in Critically Dry Years during May through November – under both NAA and all the Alternatives – with even less withdrawals projected in some scenarios as between NAA and the Alternatives during these months, as follows[38]:

Water Year Type	Month	NAA	Alt. 1A	Alt. 1B	Alt.2	Alt. 3
Critically Dry	May	24%	23%	23%	23%	22%
Critically Dry	Jun	25%	24%	24%	25%	24%
Critically Dry	Jul	23%	18%	18%	19%	19%
Critically Dry	Aug	21%	18%	17%	18%	19%
Critically Dry	Sep	11%	9%	9%	9%	9%
Critically Dry	Oct	8%	6%	6%	6%	7%
Critically Dry	Nov	9%	9%	9%	9%	9%
Critically Dry	Dec	3%	2%	2%	2%	2%

There is no explanation why, in the without the Project scenario (NAA), up to 24% of the total volume of the Sacramento River is nevertheless withdrawn, while under the Alternatives there may in fact be less water withdrawn than under the NAA scenario. There are similar anomalies elsewhere in the Table. The Coalition would appreciate clarification from the Project proponents on this discrepancy.

There also appears to be no effort to calculate the cumulative total withdrawal with both diversions (i.e., Red Bluff and Hamilton City intakes) in operation versus the total flow. There is also no way to assess how different the current Sacramento River flow is today from "unimpeded" or natural pre-development flows, and as a result, there is no way to compare resulting Project-created impaired flow to unimpaired flows. There are, of course, also numerous other existing water withdrawals from the Sacramento River north of Hamilton City, and those have also cumulatively reduced total flows. As detailed in other sections of these comments, the Coalition believes the assessment of the cumulative impacts of all these current withdrawals

[38] RDEIR/SDEIS, pg. 11-91.

should be made in order to place planned Project withdrawals into ecological and hydrological perspective.

Summary.

Overall, due to the problems with the CALSIM II/USRDOM models, the RDEIR/SDEIS may be underestimating potential impacts associated with Sites-induced diversions on the flow-dependent Sacramento River riparian habitat. Even if the models are accurate, the RDEIR/SDEIS is ignoring the scientific consensus that Sacramento River riparian habitat is ultra-sensitive to even slight modifications in the natural flow regime. Riparian dependent species along the Sacramento River have continued to decline under the extensively modified flow regime caused by Shasta Dam operations and will likely continue to decline under even minor flow modifications caused by Sites operations. The RDEIR/SDEIS should be withdrawn and a revised analysis provided that better assesses potential adverse impacts to the Sacramento River's riparian habitat and species and proposes mitigation measures to reduce these impacts to less than significant.

C. Impacts to Aquatic Biological Resources.

Below, in italics, are the comments from our hydrologist Greg Kamman with CBEC Eco Engineering.[39]

1. Accounting of Sacramento River Flows

I've completed a monthly accounting of long-term full simulation changes in Sacramento River flow for Alternative 1A minus No Action using data reported in Appendices 5B2 (River Operations) and 5B1 (Project Operations). Using these data, I was able to account for all flow changes due to project diversions and return flows on the Sacramento River except for those reported between Hamilton City and Wilkins Slough. I assume that increases in river flow under Alternative conditions may be due to reduced (relative to No Action) high flow diversions via the Ord Ferry, Moulton, Colusa, and Tisdale weirs. The reduction in flow diversions via the weirs is due to lower peak flows on the river resulting from upstream diversion to Sites Reservoir. The increase in river flow rates under Alternative conditions due to reductions in weir diversions occur in the winter months and in similar proportions to diversions reported for Freemont Weir – the only weir diversions reported in appendices 5B1 and 5B2. Appendix 5A-7 describes daily spill pattern via Ord Ferry, Moulton, Colusa and Tisdale weirs and indicates that daily patterns were developed and integrated into the USRDOM and CalSim II modeling. However, no record of these daily spills is provided in DEIS/R appendices. This is the most logical explanation for the additional flow under Alt 1A as I don't see any major drainages contributing flow to the Sacramento River along this reach. At the very least, this unreported/unaccounted for change in flow should be addressed in the environmental document.

2. Sites Reservoir Temperature Modeling

Appendix 6C presents River temperature modeling results including the Sacramento River at various locations between Keswick Reservoir (upstream) and Butte City (downstream). Butte City is located downstream of both Sites Reservoir diversion sites (Red Bluff and Hamilton City), but approximately 50-miles upstream of the location where return flows from Sites Reservoir enter the Sacramento River. It is my opinion that the RDEIR/SDEIS should have completed River temperature modeling for this 50-mile intervening stretch, as well as downstream of the Colusa Basin Drain (CBD) discharge point into the Sacramento River, to fully address changes in river water temperature and potential impacts to instream aquatic habitat. In short, temperature modeling presented in the RDEIR/SDEIS does not adequately evaluate how the project may impact Sacramento River water quality and habitat conditions downstream of Hamilton City and through the Yolo Bypass, as discussed below.

3. Impacts of Sites Reservoir of Yolo and Sutter Bypass Fishery Habitat

Review of Appendix 11M indicates that all three alternatives will impact fishery rearing potential in both the Sutter and Yolo Bypasses. These impacts occur in two ways. First,

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[39] A number of the NGO Coalition member organizations employed Mr. Greg Kamman's professional services to evaluate the RDEIR/SDEIS and his analysis is incorporated herein.

modeling results indicate that there will be a reduced opportunity for juvenile fish to enter the Sutter and Yolo Bypasses for rearing under all Alternatives. This results in less fish available to take advantage of rearing habitat in the Bypasses.

The second impact is reduced duration of inundated rearing habitat. Modeling results indicate a reduced duration of inundated habitat from January through June in the Yolo Bypass, with the largest reduction (-7%) if inundation occurring during dry year-types under all Alternatives (Table 11M-1). Table 11M-2 also indicates large reductions (average -7.0 to -8.4%) in average daily inundated habitat during the month of July for all alternatives. Modeling results do not indicate reductions in daily inundated habitat for juvenile salmonids in the Sutter Bypass (Table 11M-4).

Habitat modeling results for Yolo Bypass indicate increases in daily inundation habitat during the months of August through November for Alternative 1A and 1B. However, the RDEIR/SDEIS does not address how this change may affect juvenile salmon rearing in the bypass so late in the year. Questions that remain unaddressed include the following.

1. *Are there juvenile salmon present in Yolo Bypass at this time of year (August through November) to take advantage of these increases in inundation?*
2. *Is there any benefit to the juvenile salmon due to the late season increases in inundation?*
3. *What is the temperature of the water being delivered into the Yolo Bypass via Sites conveyance canal/pipeline[40]?*

Like the River water temperature modeling results presented in Appendix 6C and discussed under item 2 above, Appendix 11D (Fisheries Water Temperature Assessment) does not provide an evaluation of project effects on water temperature and salmonid habitat below Hamilton City. Thus, the RDEIR/SDEIS does not provide an adequate impact assessment that addresses how return flows from Sites Reservoir to the Sacramento River or Yolo Bypass impact adult or juvenile salmonid habitats.

The RDEIR/EIS does not disclose impacts to fish production from lack of inundation of Yolo Bypass.

The Coalition is very concerned with the impacts to floodplain habitat for Tribal Trust and endangered species habitat and fish production from the changes in flows from the Sites Project. These impacts will undermine millions of dollars of commitment to fisheries restoration. As hydrologist Greg Kamman alludes to above, the most severe impacts seem like they will occur in the Yolo Bypass and nearby floodplain areas due to low bypass flows and the changing of timing and duration of inundation. By not protecting a bypass flow of 14,000 cfs for the months of December through May, this Project will substantially impact spring run, winter run, and fall run Chinook salmon production and survival rates.

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[40] Page 2-21 of the RDEIR/SDEIS states, "During Project operations, water released from Sites Reservoir would be conveyed south of the reservoir using the existing TC Canal and a new Dunnigan Pipeline. The water would flow south about 40 miles to near the end of the TC Canal, where it would be diverted through a new intake to the Dunnigan Pipeline. The flows would subsequently be conveyed to the CBD and ultimately reach the Sacramento River."

The draft Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project EIS/EIR states:

> "Based on analysis of rotary screw trap (RST) data at Knights Landing and Delta fish survey data, a large pulse of juvenile winter-run Chinook salmon have been observed to emigrate past Knights Landing and into the Delta during and shortly after the first large fall storm event where flows reach approximately 14,000 cfs at Wilkins Slough (del Rosario et al. 2013). Although juvenile Chinook salmon are in the Sacramento River throughout the year, they can only access the Yolo Bypass floodplain following a Fremont Weir overtopping event. Juveniles have been observed in the Yolo Bypass between December and July, with presence peaking between February and April (DWR 2016, as cited in DWR and Reclamation 2017)."[41]

Review of Appendix 11M indicates that all three Project alternatives will impact fishery rearing potential in both the Sutter and Yolo Bypasses. These impacts will occur in two ways. First, modeling results indicate that there will be a reduced opportunity for juvenile fish to enter the Sutter and Yolo Bypasses for rearing under all Alternatives. This results in less fish available to take advantage of rearing habitat in the Bypasses.

On the same page, the draft Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project EIS/EIR also states:

> "Adult Chinook salmon enter the Yolo Bypass from the south, often straying from the adjoining Sacramento River in response to tidal exchange or substantial flow pulses coming from the Yolo Bypass. While adults have been documented in the Yolo Bypass each month that sampling has occurred, the majority have been caught between October and December. Although juvenile Chinook salmon are in the Sacramento River throughout the year, they can only access the Yolo Bypass floodplain following a Fremont Weir overtopping event. Juveniles have been observed between December and July, with peak presence occurring between February and April (DWR 2016, as cited in DWR and Reclamation 2017."[42]

The second impact is reduced duration of inundated rearing habitat. Modeling results indicate a reduced duration of inundated habitat from January through June in the Yolo Bypass, with the largest reduction (-7 percent) if inundation occurring during dry year-types under all Alternatives (Table 11M-1).

Having inundated habitat in the Yolo Bypass has substantial impacts on fisheries growth and survival. A 2001 study showed that

> "During 1998 and 1999, salmon increased in size substantially faster in the seasonally inundated agricultural floodplain than in the river, suggesting better growth rates. Similarly, coded-wire-tagged juveniles released in the floodplain were significantly larger at recapture and had higher apparent growth rates than those concurrently released in the

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[41]*See* USBR draft Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project EIS/EIR, pgs. 8-10, 8-11.
[42] *Id.*

river. Improved growth rates in the floodplain were in part a result of significantly higher prey consumption, reflecting greater availability of drift invertebrates."[43]

Without proper mitigation, the Coalition is concerned that the lack of inundation at the Yolo Bypass will have serious ecological impacts on fisheries.[44]

The Alleged "Environmental Benefits" From This Project Are Vague and Not Substantiated.

"Environmental benefits" and "environmental purposes" of the Project used in part to justify the Project are vague and largely undefined. Insofar as any of those benefits accrue to in-river conditions and aquatic species (such as Chinook salmon and steelhead) in the Sacramento River, only *Alternative 2* makes provisions for returning waters captured from the Sacramento in the winter directly back into the Sacramento (presumably in the summer and fall) to provide cold water benefits for ESA-listed winter run Chinook, spring-run Chinook and steelhead, and also non-listed but declining as well as economically valuable harvested fall-run Chinook in the river.

In any event, those "environmental purposes" should be spelled out as "including providing cold water within the Sacramento River to help meet the needs of the Sacramento-Shasta Temperature Management Plans, D-1641 and WRO 90-5 and other relevant water quality standards, and to prevent temperature-dependent mortalities for anadromous salmonids and other aquatic species as specified in those plans and in any later Biological Opinions for ESA and/or CESA-listed aquatic species."

Protecting ESA-listed species is *not optional*, and rather is legally a higher priority for water use than any conceivable irrigation use, whether by contract or regular water right. The USBR and State must protect these species and abide by relevant Biological Opinions to the best of what is physically possible.

"Environmental benefits" for salmon are also questionable in terms of providing more cold water for cold-water evolved anadromous species. Additional water returned to the Sacramento from Sites Reservoir will likely be warmer water than the ambient temperatures of the river, not cold water, as it will have been sitting in a relatively shallow reservoir with considerable surface area through which to absorb solar energy while in the reservoir.

Nowhere in the Project NEPA documents are these "environmental benefits" – particularly use of stored Project water for reduction of high-water temperatures that threaten anadromous fishes – spelled out or modeled in any detail.

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[43] *See* T.R. Sommer, M.L. Nobriga, "Floodplain rearing of juvenile chinook salmon: evidence of enhanced growth and survival", 2001.

[44] Pacific lamprey and important Tribal trust species and a California species of special concern may also be impacted by changing inundation in the Yolo Bypass. *See* 8-12 Draft Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project EIS/EIR 8-10.

There Is A Potential for Project Impacts on Aquatic Biological Resources Due to Changes in Flow Patterns in The Sacramento River.

The Coalition would like to know the net annual reduction of total water available through: (a) ground seepage from the reservoir; (b) evaporation; and (c) various conveyance losses. These types of water losses would all likely be increased by the process of diverting, storing and then channeling back waters stored in Sites Reservoir. Such water losses should be quantified at the very least so as to determine whether the Project as proposed would even be an effective way to manage water.

Another question to ask is what will be the reduction of high winter-time "flushing flows" because of Project diversions, and how those reductions affect natural scouring mechanisms that reduce the incidence and spread of such fish pathogens as *Ceratanova shasta*, and the avoidance of harmful algal blooms (HABs), both of which have become more prevalent throughout the hydrological system

There also are unacceptable high likely impacts on ESA-listed winter-run Chinook at Hamilton City and Red Bluff intakes:

> "All winter-run Chinook salmon spawning occurs upstream of Red Bluff (Azat 2019), so all juvenile winter-run migrating downstream would need to pass the two intake locations at Red Bluff and Hamilton City. . . It is possible that a relatively large proportion of downstream-migrating juvenile salmonids could pass relatively close to the Red Bluff and Hamilton City intakes, particularly during nighttime periods when most migration occurs [citations omitted]. . .
>
> "[I]t would be expected that approximately 10-30% of downstream-migrating juvenile salmonids approaching the river-oxbow split would enter the oxbow and have the potential to be exposed to the Hamilton City intake screen."[45]

This is an unacceptable amount of "take" for an ESA-listed species (winter-run Chinook) already on the verge of extinction. At a minimum these two intakes must be redesigned to absolutely minimize "take" of these fish, including repositioning them so that there are adequate natural sweeping flows sufficient to guide juvenile fish away from these intakes, and with screens positioned far enough from the intake current to keep juvenile fish from entrainment. These design elements need to be in place in the Plan. It is *not* sufficient to merely plan future studies on these issues, as currently stated:

> "Potential exposure of juvenile salmonids to the Red Bluff and Hamilton City fish screens would be addressed by technical studies focused on diversions at these locations during high winter flow conditions when Project diversions would occur (Appendix 2D)."[46]

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[45] RDEIR/SDEIS, pgs. 11-84 to 85.
[46] RDEIR/SDEIS, pg. 11-86.

Again, without an adequate and stable description of all aspects of the Project plan, its likely impacts simply cannot be analyzed, and this violates the very purposes of both CEQA and NEPA. It is simply not enough to state, as is done above, that all these issues would somehow be addressed later in time, i.e., long after the CEQA and NEPA stage has passed.

This effort to indefinitely defer actual analysis of entrainment impacts simply begs the question: "What happens if entrainment at these intakes is found to be unacceptably high?" The current Project plan does not seem to answer this question, but rather it goes through a convoluted reasoning process[47] to justify the largely still unsupported assertion that:

> "The Red Bluff and Hamilton City fish screens are designed to protective standards for Chinook salmon fry and so near-field effects would be expected to be limited. Impingement could be monitored at the Red Bluff and Hamilton City intakes during high winter flow conditions when Project diversions would occur (Appendix 2D)."

This is more like simply taking these pre-existing intakes as they now are, rather than bringing them up to higher standards based on best available design criteria – and hoping for the best. At the least, if there is to be meaningful monitoring in accordance with Appendix 2D, there should be certain entrainment "triggers" and caps above which, if these levels are reached, the intakes will be redesigned or operated to minimize such problems.

Temperature Effects from Irrigation Diversions on Winter-run Chinook Must Be Considered Cumulatively, Not in Isolation.

Project analysis categorically dismisses most (but not quite all) increased temperature impacts on winter-run Chinook as (1) being less than 5 percent greater under the alternatives than under the NAA, and (2) the exceedance per day was generally less than 0.5° F. greater than under the NAA. The RDEIR/SDEIS then states:

> "Because these biologically meaningful effects occurred in only one month of one water year type, they are not expected to be persistent enough to affect winter-run Chinook salmon at a population level."[48]

And later:

> "Overall, effects of Alternatives 1, 2, and 3 on water temperature-related effects to winter-run Chinook salmon in the Sacramento River are expected to be biologically inconsequential due to the low frequency and small magnitude of differences between Alternatives 1, 2, and 3 and the NAA."[49]

However, requiring "a population level" effect is not the appropriate standard here. The finding of a "take" of this ESA-listed species does not require "population level" impacts – and lack of population level effects does not excuse a "take" of an endangered species.

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[47] RDEIR/SDEIS, pgs. 11-91 to 97.
[48] RDEIR/SDEIS, pg. 11-105.
[49] RDEIR/SDEIS, pg. 11-107.

The winter-run Chinook is a federally ESA-listed species that has been pushed extremely close to extinction already, and lays eggs which are also very temperature sensitive at ambient water temperature thresholds above 53.5° F. Temperature-dependent egg mortalities (TDM) do not change in a linear fashion with increased temperature, they are threshold related. Water temperature increases above that particular biological threshold (now all too common in the Sacramento River system) can result in *very large temperature-dependent egg mortalities even with very small increases* in ambient water temperature above that key biological threshold. In that context even a 0.5° F. water temperature increase above that threshold can result in much larger egg mortalities. (*See* Figure 1).

Generally speaking, the extent of TDM in a cohort of Chinook Salmon eggs is a function of by how much river temperatures exceed 53.5°F at the location of redds, and for how long these conditions persist. Egg mortality rates increase very rapidly at daily average temperatures above 53.5°F (11.94ºC) (Martin et al. 2016), and TDM is above 70 percent when eggs are incubated at constant temperatures of 55ºF (~12.8ºC) and above (see Figure 1); this is likely an underestimate because river temperatures are not constant over the course of a day -- a 55ºF *average* temperature means the eggs will be exposed to even higher temperature "spikes" during the hottest parts of each sunny day.

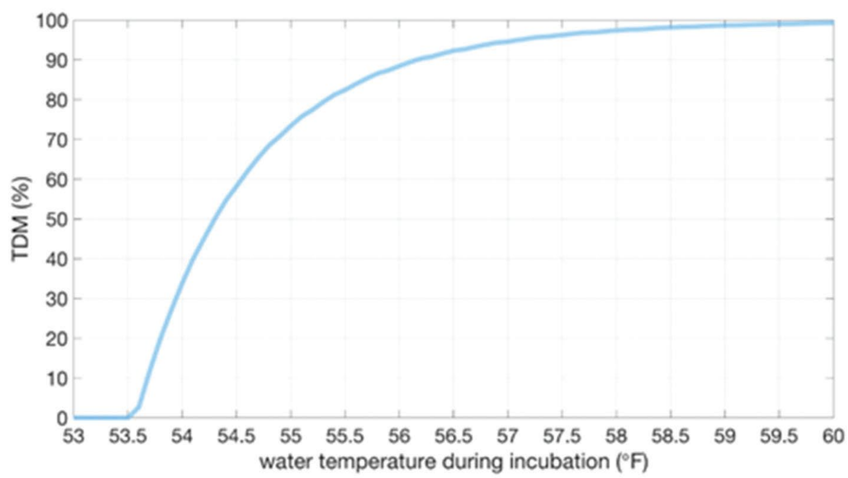

Figure 1: *Temperature-dependent mortality (% TDM) of winter-run Chinook Salmon eggs as a function of water temperatures, as modeled by NMFS based on research published by Martin et al. 2016. Note that eggs begin to die when exposed to constant temperatures above 53.5°F and mortality increases rapidly as temperatures increase. In particular, exposure to constant temperatures of 55°F corresponds to temperature-dependent mortality of greater than 70 percent. In the wild, temperatures are not constant; it is likely that TDM is higher at any given average temperature than it is at the corresponding constant temperature depicted here. (Source: Graph provided to parties by federal defendants October 21, 2021; reprinted from PCFFA, et al. vs. Raimondo, U.S. Dist. Court of Northern California, Case No. 1:20-cv-00431, Declaration of Dr. Jonathan A. Rosenfield, Dkt. 325 (12/16/21))*

Figure 1 also illustrates neatly why the Project RDEIR/SDEIS's broad assumption that impacts that are less than 5 percent of NAA *status quo* can be categorically assumed to be "insignificant" is false, as well as in conflict with NEPA and CEQA standards. In this TMD instance, and in many other instances of "threshold" triggers, once that threshold has been reached, even very small additional impact increases above that threshold "tipping point" can result in *major* changes to a finely balanced ecosystem. In this case, changing ambient water temperatures for cold-adapted salmonid eggs from 53.5°F a mere 0.5 degree upwards to 54.0°F would result in TMD levels rocketing from zero to 30 percent or more.

The RDEIR/SDEIS Must Consider the Cumulative Impacts from all other Sacramento River Diversions.

Never in the Project's CEQA/NEPA documents does it discuss in any detail the cumulative effects on anadromous salmonids or other aquatic species of all the hundreds of individually small irrigation withdrawals throughout the hydrological system that *already* diminish Sacramento River flows within the Project area. Cumulative effects analysis is still a requirement of NEPA, and this requirement is being bolstered by the Biden Administration.[50] CEQA also independently requires a cumulative effects analysis. Without such a cumulative impacts analysis it is impossible to assess potential water diversions resulting from the Project in terms of incremental or additional impacts the Project might create.

But consideration of cumulative effects is also crucial in determining whether this Project's additional impacts, on top of already existing cumulative other impacts, results in a "take" occurring or if there is "jeopardy" to ESA-listed species such as the winter-run Chinook, the spring-run Chinook and steelhead.

The Federal Endangered Species Act (ESA)[51] generally prohibits any person, including both private persons and federal agencies, from "taking" any endangered species, such as in this case winter-run Chinook. And the term "take" is broadly defined to mean "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct."

With the ESA, Congress intended endangered species to be afforded the highest of priorities. The ESA's purpose is "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, [and] to provide a program for the conservation of such endangered species and threatened species."[52]

Under the ESA, conservation means "to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary."[53]

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[50] *See* 86 Fed. Regs. 55757 *et seq.* (Oct. 7, 2021).
[51] 16 U.S.C. §1538(a)(1).
[52] 16 U.S.C. § 1531(b).
[53] *Id*. § 1532(3).

Section 7(a)(2), 16 U.S.C. § 1536(a)(2), is a critical component of the statutory and regulatory scheme to conserve endangered and threatened species. It requires that every federal agency must determine whether its actions "may affect" any endangered or threatened species. If so, the action agency must formally consult with the Fisheries Service as part of its duty to "insure that [its] action is . . . not likely to jeopardize the continued existence" of that species.[54]

The term "jeopardize" is defined as an action that "reasonably would be expected . . . to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species."[55] At the completion of formal consultation, the Fisheries Service will issue a Biological Opinion that determines if the agency action is likely to jeopardize the species.[56]

In formulating its Biological Opinion, the Fisheries Service must use only "the best scientific and commercial data available."[57] The Biological Opinion must also include a summary of the information upon which the opinion is based, an evaluation of the "current status of the listed species," the "effects of the action," and the *"cumulative effects."*[58] "Effects of the action" include both direct and indirect effects of an action "that will be added to the environmental baseline."[59] The "environmental baseline" includes "the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process."[60]

"Cumulative effects" include "future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area."[61] Thus, in issuing a Biological Opinion, the Fisheries Service must consider *not just the isolated share of responsibility for impacts to the species traceable to the activity that is the subject of the Biological Opinion, but also the effects of that action when added to all other activities and influences that affect the status of that species.*

Thus, for both NEPA and CEQA purposes, as well as for ESA incidental take coverage purpose and a Biological Opinion, a cumulative impacts analysis looking at the combined impacts of all other water diversions in addition to or prior to the Project's proposed water diversions on ESA-listed or CEQA-listed aquatic species within the Project's area is necessary.

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[54] *Id*. § 1536(a)(1), (2); 50 C.F.R. § 402.14 (2019).
[55] 50 C.F.R. § 402.02 (2019).
[56] 16 U.S.C. §1536(b)(3)-(4); 50 C.F.R. § 402.14(h).
[57] 16 U.S.C. § 1536(a)(2).
[58] 50 C.F.R. § 402.14(g)(2), (g)(3).
[59] *Id*. § 402.02.
[60] *Id.*
[61] *Id.*

Flow-Related Physical Impacts on ESA-listed Salmonids.

1. *Redd Dewatering*

The RDEIR/SDEIS on page 11-109 notes that:

> "The results for winter-run Chinook salmon show few large changes in redd dewatering between the NAA and Alternatives 1, 2, and 3 (Table 11N-13) . . . Changes for most months and water year types under all Alternatives 1, 2, and 3 are less than 2%. Overall, the effects of Alternatives 1, 2, and 3 on winter-run redd dewatering are minor."

While this may be true *on average*, that average value is merely a mathematical construct, not a real event. In Table 11N-13 there is an outlier high number (highlighted in red) for July-October period in a Below Normal water year, in which the percentage of redds dewatered under those conditions is projected to be 2 percent. In an extremely weak population baseline, such as that of the endangered winter-run Chinook salmon stocks, that 2percent loss could well be deemed significant. Repeated such loss events could be even more so.

Similar claims of insignificant impacts from redd dewatering for spring-run Chinook and fall-run Chinook could be made. However, in a related table (11N-14) showing percentage of ESA-listed spring-run Chinook redds likely to be dewatered, there are also data outliers in the September-December time frame in Above Normal water years for Alternative ("Alt") 1B (2.3 percent reduction), for Alt 3 (4.5 percent reduction), and during the October-January time period for Above Normal years under Alt 3 (2.2 percent) reduction, and for Critically Dry water years for Alt 1A (4.5 percent reduction), Alt 1B (3.2 percent reduction), Alt 2 (3.2 percent reduction) and finally Alt 3 (3 percent reduction).

There are also similar redd dewatering problems listed for fall-run Chinook in Table N-15 of between 2 percent and 4.1 percent in some time frames and water years for some Alternatives.

These redd dewatering projects outliers are of some concern. The Coalition requests the Project proponents please explain what, if any, mitigation measures they will take (e.g., reducing Project intakes in Critically Dry years during peak egg-laying season for salmonids) to mitigate these potential impacts on redds. And keep in mind also, there is no analysis about cumulative other impacts on river conditions that have already taken a high toll on the redds that are still typically present. Without that information on cumulative impacts it is not possible to say whether up to an additional 5 percent loss of redds through dewatering – especially in light of the cumulative losses from all other impacts -- is a "significant" impact on the population as a whole or not.

2. *Spawning Habitat Loss*

At page 11-111, after earlier describing the WUA ("weighted usable area") method used in the analysis, Project proponents state:

> "Almost all spawning by winter-run occurs in the upper two segments (Segment 6 and 5) of the Sacramento River, between Keswick Dam and Cow Creek, with spawning density (redds per RM) especially high in Segment 6 (Table 11K-1). . . Mean winter-run spawning WUA differs by less than 5% for most months and water year types, but mean WUA in Segment 6 under Alternatives 1, 2, and 3 is 5% to 6% lower than WUA under the NAA in May of Critically Dry Water Years (Table 11K-2)."

However, the draft goes on to say:

> "In general, Alternatives 1, 2, and 3 are not expected to substantially affect winter-run spawning WUA."

This latter assurance is, on its face, contradicted by the fact that at least during May, in Critically Dry water years, RDEIR/SDEIS tables show that up to 6.1 percent of all the *very small amount of still remaining* winter-run Chinook spawning habitat is expected to be lost. *This impact, even by the Project's own questionable <5 percent significance level definition, is thus a significant impact.*

There are similar spawning area Segment 5 habitat losses projected for river Segment 5 for spring-run Chinook[62] for Above Normal water years for Alternative 3 of 9.4 percent spawning area losses.

These relatively higher spawning area losses are of some concern – please explain what, if any, mitigation measures Sites Authority will take (e.g., reducing Project intakes in Critically Dry years during peak egg-laying season for salmonids) to mitigate these potential impacts of spawning area losses.

It is also important to note that there should also be an analysis about cumulative other impacts on river conditions that have already taken a high toll on spawning areas that were once typically present. Without that information on cumulative impacts it is not possible to say whether up to an additional 5 percent loss of spawning habitat through dewatering is a "significant" impact on the population as a whole or not. Even a 5 percent loss of what may already be only a very small remainder of once abundant habitat could easily be "significant."

3. *Rearing Habitat Loss*

At page 11-111, the RDEIR/SDEIS states:

> "These results indicate that Alternative 3 would have a moderate effect on rearing habitat for winter-run fry in the Sacramento River during October of Below Normal Water Years and the other alternatives would have no adverse effects."

This is an over-simplification, at best. As noted in Table 11K-23 for Segment 6 of the upper Sacramento River (one of the two main areas in which the winter-run still spawn), in September there would be a 5.1 percent winter-run fry rearing area reduction under Alternative

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[62] *See* RDEIR/SDEIS, Table 11K-6.

3, and in October under Below Normal conditions there would be a 7.1 percent loss under Alternative 3 and a 5.1 percent loss in Critically Dry years. The Coalition also reminds Project proponents that these losses are cumulative *in addition to* major winter-run Chinook spawning and rearing habitat losses over many decades, losses which are in large part the trigger for their current ESA-listing as "endangered."

There are similar problems for loss of spring-run Chinook fry rearing habitat[63] in Sacramento River Segments 4 and 5, and for fall-run Chinook as well under certain conditions.[64]

These rearing habitat area losses projected are of some concern – please explain what, if any, mitigation measures Project proponents will take (e.g., reducing Project intakes in Critically Dry years during peak fry rearing season for salmonids) to mitigate these potential additional impacts that will lead to yet more fry rearing area habitat losses.

There should also be an analysis about cumulative other impacts on river conditions that have already taken a high toll on rearing habitat areas that were once typically occupied. Without that information on cumulative impacts it is not possible to say whether up to an additional 5 percent loss of spawning habitat through dewatering is a "significant" impact on the population as a whole or not.

4. *Increases in Juvenile Salmonid Strandings*

There is an unfortunate dearth of analysis of salmonid juvenile stranding risk, as noted in Appendix 11-N (Other Flow-Related Upstream Analysis):

> "11N.3.3 Juvenile Stranding. A juvenile stranding analysis for salmonids was conducted in the Sacramento River only. No information is available from the Feather and American Rivers for relating changes in flow to numbers of juvenile salmonids stranded. Furthermore, daily flow data are needed to reliably estimate juvenile stranding, and only monthly data are available for these rivers."[65]

One would then have to assume, as a precautionary measure, that juvenile stranding problems in these other rivers would be comparable to typical stranding problems in the Sacramento. The Project proponents cannot just assume them away from lack of data.

And it turns out there are likely to be serious juvenile stranding problems within the Sacramento River:

> "The largest increases in juvenile stranding occur for the April cohort at all three locations [upper Sacramento River: Keswick Dam, Clear Creek, and Battle Creek], ranging as high as 30% in Dry Water Years under Alternative 1A, 1B, and 2 at the Keswick Dam location."[66]

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[63] RDEIR/SDEIS, Table 11K-30 through 34.
[64] RDEIR/SDEIS, Table 11K-46, looking at Sacramento River Segment 4.
[65] RDEIR/SDEIS, pg. 11N-42.
[66] RDEIR/SDEIS, pg. 11-112.

But then, remarkably, this very troubling and clearly significant impact is dismissed out of hand with the following justifications:

> "The principal period of stranding vulnerability for the winter-run is for cohorts emerging in July through October, when some large reductions and increases in juvenile stranding occur, but large reductions in juvenile stranding are more frequent than large increases. Therefore, Alternatives 1, 2, and 3 are not expected to affect winter-run juvenile stranding (Table 11N-28 through Table 11N-30)."[67]

> "The results generally show little evidence of major overall effects of Alternatives 1-3. The redd dewatering and juvenile stranding analyses found many increases in potential negative effects balanced by many reductions in such effects." [68]

This is false, and at best, contradictory reasoning. Stranding events and non-stranding events cannot be traded off against each other "on average" because they are not biologically symmetrical. Once an individual juvenile fish is stranded, even once, *it is dead* – it does not matter one bit if in other places at other earlier or later times, it would not been stranded at all or would have benefited in some way. It only takes a single event (not an "averaged sum") for a stranding to result in death. *Once a fish is dead, it stays dead. It cannot benefit from later more benign events.*[69] *In short, its death cannot be averaged away.*

Removing large numbers of juvenile fish from the river, including by periodic mortality events like strandings, just means fewer fish to benefit from later changing conditions. Dead fish, from whatever the cause, are in fact removed from the population. Juvenile stranding events with mortalities of as much as 30 percent of the fish present[70] thus represent significant mortality events that have serious implications, particularly for already extremely weak and now geographically very limited populations like the endangered winter-run Chinook. Mitigation measures to prevent these mortality events should be incorporated into the Project Plan and into its permits.

5. *Migration Flow – Survival Relationships*

At page 11-119, the NGO coalition notes the following correct summary of what is now the best available science with regard to the relationship between higher flows of water through the Delta and out-migrating salmon survival rates:

> "Diversions from the Sacramento River to Sites Reservoir under Alternatives 1, 2, and 3 have the potential to affect survival of juveniles salmonids, including winter-run Chinook salmon, based on flow-survival relationships. Several recent analyses provided evidence

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[67] RDEIR/SDEIS, pg. 11-112.
[68] RDEIR/SDEIS, Appendix 11N-53.
[69] This is comparable to in-river fish mortality events in response to summer daily hot water temperature spikes. Once a spike occurs at fatal temperatures, *even once*, the fish affected by that spike are dead. It does not matter thereafter what the "average daily temperature" was for that day. The "average daily temperature" is a mathematical construct while the high temperature spike is a real mortality event.
[70] RDEIR/SDEIS, Table 11N-28 through Table 11N-30.

for positive correlations between Sacramento River flows and survival of Chinook salmon [citations omitted]."

On that same page, the RDEIR/SDEIS also states:

"The discussion in Section 11P.2 of Appendix 11P, *Riverine Flow-Survival*, illustrates that the Sites Reservoir diversion criteria generally minimizes diversions during the historical periods of fish movement … and application of the flow-threshold criteria … suggests that flow-survival effects on juvenile Chinook salmon (including winter-run Chinook salmon) would be greatly limited by the diversion criteria."

Project proponents also claim:

"As discussed in Chapter 6, the effects of Alternatives 1A, 1B, 2, and 3 on water temperatures at the Sites Reservoir release site in the Sacramento River would be relatively small with the releases generally tending to cause a slight reduction in water temperature (Tables 6-12a through 6-12d). Therefore, temperature-related effects of Alternatives 1A, 1B, 2, and 3 on winter-run Chinook salmon at the Sacramento River release site would be minimal … For Alternatives 1A, 1B, 2, and 3, water temperatures at this location would either stay the same or be reduced due to Sites Reservoir releases." [11-120]

Hypothetical reductions in Sacramento water temperatures due to Sites Reservoir timed inputs, of course, depends on two things: (a) whether those inputs are applied directly to the Sacramento River or not, which according to the description of the Project alternatives in the Executive Summary[71] could *only be achieved under Alternative 2*, and; (b) the initial temperature of the water originating at the Sites Reservoir at the upper end of the pipeline to the river.

Left to itself the Sites Reservoir is simply going to absorb sunlight, especially during summer months, and heat up, collecting and spreading that solar energy broadly through its increased surface area like any other lake. Unless the reservoir becomes temperature stratified, it will become just like a bathtub of warm water, water that might well be warmer (not cooler) than the Sacramento River at the time of inflow.

The RDEIR/SDEIS should explain in more detail any water temperature reduction measures, if any, that are planned for keeping the water temperatures of water delivered from Sites Reservoir to the Sacramento River as low-temperature as possible. For instance, is the reservoir expected to stratify in temperature, and if so, will there be temperature control devices sufficient to take water *only* from the lower-temperature level of that stratification? What will the average depth of the reservoir be? Will it be covered in some way, such as naturally with the introduction of floating water plants, or with floating solar collectors as some have proposed, in order to reduce initial water temperatures?

[71] RDEIR/SDEIS, Table ES-1 on pg. ES-8.

The Coalition would like to know the initial water temperature (for water from the reservoir) that is assumed and built into Table 11-15. An overly-optimistic assessment of the water temperature effects on the slack-water, completely exposed reservoir from (particularly summertime) solar heating would lead to nonsensical conclusions.

Mitigation Measures FISH-2.1 And FISH-3, Wilkins Slough Flow Protection Criteria, are not adequate.

The NGO Coalition notes some concerns with Mitigation Measures FISH-2.1 and FISH-3 as the Project's primary fish impacts mitigation measures. These measures by its own terms [11-131], would only be in place during March through May of each year. However, salmonid species like the ESA-listed winter-run and spring-run Chinook, and the non-listed but seriously depressed fall-run Chinook, are well known to be present and migrating through the system at other times of the year, during which these stocks would be more severely impacted.

For example, the RDEIR/SDEIS at 11-130 to 11-131 states: "Mitigation Measure FISH-2.1 will limit the potential for negative flow-survival effects to winter-run Chinook salmon during their dispersal to rearing habitat and/or migration downstream toward the Delta." However, as the RDEIR/SDEIS admits, winter-run Chinook salmon migrate past the diversion points for Sites Reservoir (at the Red Bluff Diversion Dam and at Hamilton City) and past Wilkins Slough well before the month of March, which is when the protections provided by FISH-2.1 would begin, and they are generally migrating out of the Delta between December and May.[72] Indeed, most migrating juvenile Chinook salmon, including nearly all juveniles of the winter-run and late-fall run, will not be protected by this bypass flow requirement as most of these fish have migrated downstream of Knights Landing before March.[73]

In short, mitigation measure FISH-2.1 will limit pumping that reduces flows in the Sacramento River below 10,700 cfs only ***after*** winter-run Chinook salmon have already migrated downstream to the Delta, and as a result this mitigation measure wholly fails to protect juvenile winter-run Chinook salmon from the harmful effects of the proposed Project and alternatives as they migrate down the Sacramento River. The RDEIR/SDEIS's conclusion that the proposed project and alternatives will not cause significant environmental impacts to winter-run Chinook salmon is simply unsupported by its own analysis, and is thus arbitrary and capricious, and the document must be revised to include adequate mitigation measures that apply when winter-run Chinook salmon are actually migrating down the Sacramento River.

Similar timing problems for related flow bypass measures also invalidate mitigation measures proposed to protect spring-run (FISH-3) and fall-run Chinook, as well. Since all these species are present in the river outside the very limited March through May mitigation period,

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[72] *See* RDEIR/SDEIS at 11-79 to 11-80 (noting that half of the annual migration of juvenile winter-run Chinook salmon have passed the Red Bluff Diversion Dam before late October and 90 percent before January 1; noting that winter-run Chinook salmon are caught in Knights Landing rotary screw traps between mid-September to mid-March, with the bulk of the run (90 percent) generally passing between early October to mid-March; noting that winter-run Chinook salmon are generally caught in the Chipps Island trawls between December 1 and May); *see id.* at 11-124 ("the main period of juvenile winter-run Chinook salmon occurrence in the Delta (i.e., December–April")).

[73] *See* RDEIR/SDEIS at 11-120 and citations therein.

these essentially unmitigated additional impacts on already severely depressed salmonid stocks could not be “insignificant” in any sense of the word.

D. Impacts to Water Quality.

The RDEIR/SDEIS downplays the evidence and the risk to surface water quality that is likely to occur upon execution of the Project. This iteration is an improvement from the 2017 version which claimed, “[b]ecause no potentially significant direct water quality impacts were identified, no mitigation is required or recommended.” In the RDEIR/SDEIS, Project proponents now acknowledge some water quality issues but offer contradictory mitigation measures while downplaying or ignoring other water quality issues.

The RDEIR/SDEIS Does Not Disclose Reasonably Foreseeable and Currently Occurring Clean Water Act Processes and Impairments that Impact the Project.

The State of California Water Resources Control Board and Central Valley Water Board have the responsibility of implementing the Clean Water Act (“CWA”) and Porter Cologne Water Quality Control Act for California Waters. California is also responsible for protecting the public trust and preventing unreasonable use of water.

This means that California is also responsible for listings under the CWA 303(d) process and creating associated Total Maximum Daily Loads (TMDL) and updating and implementing Basin Plans. Under these processes California has not only been working to update the Bay Delta Water Quality Control Plan, which will require flow enhancement actions, they have also been working to catch up on the 2018, 2022, 2024 303(d) listings.

The state decided to not include new temperature listings for the Sacramento River and Bay Delta in the 2018 303(d) list updates despite significant evidence that listings were warranted and a huge body of scientific studies and evidence showing that there is a temperature impairment. Furthermore, the Central Valley Water Resources Control Board released its draft report which called for the listing of two segments of the Sacramento River and one segment of the Bay Delta as temperature impaired on June 4, 2021 and took public comment on July 6, 2021. This information was then publicly available to Project proponents before the release of the RDEIR/SDEIS. The State Water Resources Control Board then took comments on the 303(d) listings in December 2021 and approved the listings in January 2022.

Therefore, the RDEIR/SDEIS statement that “[n]one of the waterbodies in the study area are listed on the 303(d) list as having water temperature impairments,”[74] is intentionally misleading.

Cold water fisheries, particularly their spawning and rearing, are the most sensitive beneficial uses within the Sites project. Elevated temperatures and low Dissolved Oxygen (DO) impairments are the principal threats to cold water fisheries within the project area. Despite this, no water quality related mitigation measures related to survival of cold-water fisheries are

[74] RDEIR/SDEIS, 6-5.

proposed in this RDEIR/SDEIS. Mitigation Measure FISH-2.1, Wilkins Slough Flow Protection Criteria, is inadequate to deal with temperate and DO impacts to cold water fisheries.

New 303 (d) listings in the Project Area[75]

Waterway	Impairment
Sacramento River (Keswick Dam to Cottonwood Creek)	Temperature, water
Sacramento River (Cottonwood Creek to Red Bluff)	Toxicity
Sacramento River (Cottonwood Creek to Red Bluff)	Mercury
Sacramento River (Cottonwood Creek to Red Bluff)	Temperature, water
Sacramento River (Red Bluff to Knights Landing)	Toxicity
Sacramento River (Red Bluff to Knights Landing)	DDT (Dichlorodiphenyltrichloroethane)
Sacramento River (Red Bluff to Knights Landing)	Dieldrin
Sacramento River (Red Bluff to Knights Landing)	Mercury
Sacramento River (Red Bluff to Knights Landing)	Oxygen, Dissolved
Sacramento River (Red Bluff to Knights Landing)	PCBs (Polychlorinated biphenyls)
Sacramento River (Knights Landing to the Delta)	Toxicity
Sacramento River (Knights Landing to the Delta)	Chlordane
Sacramento River (Knights Landing to the Delta)	DDT (Dichlorodiphenyltrichloroethane)
Sacramento River (Knights Landing to the Delta)	Dieldrin
Sacramento River (Knights Landing to the Delta)	Mercury
Sacramento River (Knights Landing to the Delta)	PCBs (Polychlorinated biphenyls)
Sacramento River (Knights Landing to the Delta)	Temperature, water
Sacramento River (Sacramento City Marina to Suisun Marsh Wetlands)	Toxicity
Sacramento River (Sacramento City Marina to Suisun Marsh Wetlands)	Fipronil
Sacramento River (Sacramento City Marina to Suisun Marsh Wetlands)	Pyrethroids
Sacramento River (Sacramento City Marina to Suisun Marsh Wetlands)	Temperature, water
Sacramento Slough	Toxicity
Sacramento Slough	Mercury
Sacramento Slough	Oxygen, Dissolved

The RDEIR/SDEIS Does Not Accurately Assess or Mitigate Water Quality Impacts.

Chapter 6 mentions mercury 574 times indicating the focus on this particular constituent but places less scrutiny over the other water quality constituents contained in water diverted to, impounded in, and released from Sites Reservoir: water temperature, salinity, aluminum, arsenic,

[75] Compiled from the State Water Resources Control Board 2022 Water Quality Assessment Integrated Report. Available online: <https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/2020_2022_integrated_report.html>

cadmium, chromium, copper, iron, lead, manganese, nickel, selenium, silver, zinc, pesticides, nutrients, and HABs (Harmful Algae Blooms).These water quality constituents exceed established water quality criteria in some existing waterbodies in the study area and will be present in the source waters, increased by evaporative enrichment and exacerbated by operations of a surface water reservoir. Since water quality in the proposed reservoir will reflect that of the source waters, the reservoir will hold numerous metals, including aluminum, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, silver, and zinc.

On page 6E-30 the Project proponents state, "Quantitative assessment was performed for total concentrations of four metals: aluminum, copper, iron, and lead. These four metals are of greatest concern based on what the measured data show for seasonal changes in concentration and concentrations above standards." The Coalition applauds the consultants for recognizing these 4 metals pose a challenge to meeting standards and correctly inferring that "seasonal changes" (e.g. high flow events) will raise metal concentrations. However, ignoring the other existing metals and failing to analyze synergistic effects will not protect the environment. Each of these metals may adversely affect reservoir water quality by themselves and must be analyzed to determine combined synergistic effects. The SWRCB 2016 "A Compilation of Water Quality Goals" states that "When multiple constituents have been found together in groundwater or surface waters, their combined toxicity should be evaluated," and that "theoretical risks from chemicals found together in a water body shall be considered additive for all chemicals having similar toxicologic effects or having carcinogenic effects."[76] This RDEIR/SDEIS did not consider the combined effects of metals and is therefore deficient.

Additionally, the streams within the footprint of the reservoir and the presumed source waters emanating from the Cottonwood Creek drainage are known to contain concentrations of these water quality impediments, especially during high flow events.[77]

According to the Project proponent's website, "Sites Reservoir does not rely on snow-melt but captures winter runoff from uncontrolled streams below the existing reservoirs in the Sacramento Valley. … Much of the rainfall from extreme events – especially those that occur back-to-back when the ground is saturated…"[78] When there is significant precipitation, releases from the upstream reservoirs during the winter will be curtailed during high runoff periods to prevent downstream flooding. These time periods would increase the contribution of elevated tributary metal constituents, especially those coming from Cottonwood Creek. The negative impacts on water quality in the Sacramento River will be greater at these times then those predicted by the metric on page 6E-30 which dilutes the metal-laden tributary water with Shasta Reservoir water. The proposed metric would more accurately characterize the metal concentration by measuring metal concentrations pouring out of Cottonwood Creek during high flow rather simply tabulating cfs for Keswick + Bend Bridge. The failure to monitor metal concentrations on a set time schedule rather than during highest flow events is a significant oversight and leaves the RDEIR/SDEIS deficient.

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[76] *See* State Water Resources Control Board 2016 "A Compilation of Water Quality Goals", pg. 44.
[77] RDEIR/SDEIS, pg. 2-30. "Sites Reservoir would be filled through the diversion of Sacramento River water that generally originates from unregulated tributaries to the Sacramento River downstream from Keswick Dam."
[78] *See* https://sitesproject.org/about-sites/, last accessed 24 January 2022.

1. Selenium

The Sites Reservoir planners are aware of the potential for diminished water quality from naturally occurring selenium in the region they plan to inundate. A survey done by the Regional Water Quality Control Board ("RWQCB") in 1988 demonstrated that Sacramento River water generally met water quality standards for selenium except for streams that flowed into the valley draining the coast range. While the RWQCB survey did not directly measure selenium concentrations in the streams that drain the Antelope Valley, it did measure streams on both sides of the project. The survey indicated that precipitation events mobilize selenium in the watersheds of the Sites region to unsafe levels for fish, humans and agriculture. [79] According to USGS research, "Evaporative enrichment can cause elevated selenium concentrations in terminal water bodies" (p. 24) and "…selenium can be transported from source areas in mountains to irrigated areas in adjacent valleys" (p. 27).[80]

Therefore, the DEIS/EIR must survey the Antelope Valley watershed to determine the amount of selenium that is likely to dissolve into the stored water. Furthermore, the analysis must determine if evaporative enrichment would exacerbate any environmental or agricultural problems associated with excessive selenium concentrations.

2. Mercury

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[79] Regional Water Quality Control Board, Central Valley Region 1988. Water Quality Survey for Selenium in the Sacramento River and its Major Tributaries. "Historical data on selenium concentrations in surface water of the Sacramento River Basin indicated periods of elevated selenium levels, especially from areas originating in the western portion of the basin. Selenium concentrations as high as 390 ug/L were recorded in surface water in the Sacramento River Basin. This concentration is similar to the levels found in agricultural drainage water entering Kesterson Reservoir via the San Luis Drain (USGS, 1985). Because of the concern over the effects that these selenium levels may have on aquatic life in both the River Basin and the Delta, a program of water quality monitoring was initiated to help define the sources of selenium and whether further assessment of waste discharge regulation was needed." pdf p. 12; "Of the samples taken prior to 1984, the highest reported selenium concentration occurred principally along the western half of the basin. Samples taken in the Stony Creek Watershed and the Clear Lake area showed consistently high values. Between 1980 and 1981, DWR conducted a trace element survey in the Stony Creek area in conjunction with the Thomes-Newville water storage project study (DWR Files). Total selenium concentrations regularly exceeded the 10 ug/L standard with the highest reported selenium at 240 ug/L. Samples taken in the Clear Lake area have shown concentrations reaching 80 ug/L for total selenium. The Colusa Basin Drain which receives runoff from the westside streams, as well as a significant amount of irrigation return flow, showed the highest concentration at 390 ug/L total selenium in 1981." pdf p. 18 "A special survey in Black Butte Reservoir which included composite sediment sampling was conducted in October 1986 to verify historical data that showed high [selenium] values in the reservoir discharge. "In October 1986, sediment and water samples were taken from the Black Butte Reservoir area, to verify historical data reporting selenium levels up to 240 ug/L (DWR files) and in response to selenium levels ranging from 0.7 mg/Kg to 1.9 mg/Kg detected in fish livers by the California Department of Fish and Game during 1984 and 1985." pdf p. 20. Available online: http://www.waterboards.ca.gov/rwqcb5/water_issues/swamp/historic_reports_and_faq_sheets/bckgrnd_selenium/wq_sur vey_sacrvr_tribs_88.pdf

[80] Ralph L. Seiler, et.al. 1999. Areas Susceptible to Irrigation-Induced Selenium Contamination of Water and Biota in the Western United States U.S. GEOLOGICAL SURVEY CIRCULAR 1180. Available online: https://www.fws.gov/mountainprairie/contaminants/papers/circ1180.pdf.

Impact WQ-2 (Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface water quality during operation) is identified as CEQA significant and unavoidable (SU) and NEPA substantial adverse effect (SA) for all alternatives. This obviously conflicts with and obstructs implementation of a water quality control plan (Impact WQ-5). The identification of Impact WQ-2 admits that the project will violate water quality standards of the Central Valley Water Quality Control Plan (Basin Plan) and will result in a significant impact and substantial adverse effect which conflicts with the Basin Plan. In the Sacramento River at Hamilton City, Table 6-5 shows that total mercury concentrations have been measured as high as 54 ng/L, which are higher than the CTR criterion of 50 ng/L and raise concern for significant and substantial adverse effects when waters with these types of concentrations are diverted into the reservoir.

Table 6-5 shows that total mercury concentrations have been measured as high as 14.4 ng/L in the Sacramento River at Red Bluff but only 0.52 ng/L in Oroville Reservoir. The comparatively low concentrations of total mercury from the water in Oroville Reservoir have been sufficient to cause fish from this reservoir to exceed the numeric criterion and objectives for fish, including both sport and prey fish, for the protection of human health and wildlife as contained in the Sacramento–San Joaquin River Delta Estuary TMDL for Methylmercury and Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California—Tribal and Subsistence Fishing Beneficial Uses and Mercury Provisions. Fish tissue concentrations as high as 0.7 mg/kg have been found in fish from Oroville Reservoir (DWR 2007). Since mercury concentrations of up to only 0.52 ng/L in Oroville Reservoir have been enough to cause levels to be exceeded in Oroville, concentrations of mercury as high as 14.4 ng/L in water diverted to the proposed reservoir from the Sacramento River at Red Bluff is likely to cause severe impacts and adverse effects in the proposed reservoir and in downstream releases.

The RDEIR/SDEIS states on page 6-17 explains how newly inundated reservoirs in this region often have, "higher net methylmercury production in early years after filling, when organic carbon is relatively abundant, relative to long-term average production. This initial spike in mercury methylation can increase the concentrations of water column methylmercury to double or triple the long-term average concentrations for up to 10 years." The RDEIR/SDEIS strategy for dealing with this dangerous water quality problem is 1) to not stock the reservoir with fish for 10 years, and 2) release water from high in the reservoir since the methylmercury concentrations are greater deep in the reservoir. While the Coalition admits recognition of the issue, the suggested mitigation measures are insufficient. There is no assurance that methylmercury levels will drop sufficiently to allow fish stocking or that private citizens will refrain from stocking the water. In fact, reservoir fluctuations would also contribute to conditions favorable to mercury methylation. It is expected that the Project fluctuations would be greater than median fluctuations of other reservoirs in the state, which indicates that Sites Reservoir fluctuations would likely contribute to conditions favorable to mercury methylation.

The inundation of native landscapes transforms woodlands, grasslands and riparian zones into drowned dead zones that, when drained, are highly erodible. The RDEIR/SDEIS states on page 6-31 that "[w]ind, rain, and wave action commonly erode bare soil adjacent to reservoirs and could cause erosion along the edge of Sites Reservoir when it is not full. These phenomena may temporarily increase turbidity along the reservoir's edge prior to settling of the sediment, but this increase would not markedly affect beneficial uses of the reservoir (i.e., recreation, water supply, fisheries and wildlife)." Erosion of soils in the exposed inundation zone will deposit sediment on the reservoir bottom and re-suspend soils laden with metals and other contaminants, which will exacerbate water quality impacts in the reservoir and downstream releases.

3. *Evaporative Enrichment of Contaminants*

The RDEIR/SDEIS on page 6-32 states that evapoconcentration could increase constituent concentrations in Sites Reservoir by up to 48 percent. When the source water is more highly contaminated with metals and the soils in the reservoir contribute more salt/metal into the reservoir and the impounded water is exposed to heat/wind causing evaporation, water quality declines over time despite the introduction of dilution. It is therefore inevitable that water released from Sites Reservoir to the Sacramento River will contribute higher concentrations of constituents such as salt and metals. The RDEIR/SDEIS does not adequately evaluate the effects from these higher concentrations on water quality and beneficial uses of the Sacramento River.

The RDEIR/SDEIS recognizes existing data is insufficient and considers collecting additional source- water quality samples for metals at predetermined intervals to identify problematic metal loads that may occur after the reservoir is built and in operation. There has been ample time during the 20+ years this Project has been promoted to collect appropriate high-flow metal data. Data provided by retired DWR water quality Chief Boles during the 2017 DEIR/DEIS era illustrated existing quality constituents are elevated during high flow and highlighted data gaps that must be filled prior to building and operating a reservoir in this dubious location. The failure of the proponents to fill this data gap while selling the benefits to naïve investors is reprehensible. Collecting this data after the project is completed to determine the severity of the problems might be helpful but would result in a bad outcome for local irrigators who might be stuck with water too contaminated to put back in the river. CEQA requires impact analysis *prior* to approval and construction of a project.

The post-building data collection protocol is deficient. The Reservoir Management Plan (Page 2D-37) states that *"[p]ast studies of metal concentrations in the Sacramento River have not focused on high flows that will be the source water for Sites Reservoir*. Metal concentrations at the diversion(s) will be measured within 24 hours of the start of diversions at RBPP and every 2 weeks during continuous diversions."[81] "After 2 years of measuring metal concentrations in the diversions, the frequency of measurements will decrease to monthly." The measuring of metal loads might be inconvenient during high flow precipitation events, but this is exactly the time to target the data collection. A set schedule of monitoring would inevitably miss the close relationship between flow and metals concentrations. Event based monitoring may require data collection biweekly, weekly, or daily as flow conditions vary.

The data gaps must be filled and then measured against the appropriate standards. There are water quality thresholds applicable to this project, including California and Federal Drinking Water Standards (MCLs), California Public Health Goals (PHGs), California State Notification and Response Levels for Drinking Water, Suggested No-Adverse-Response Levels (SNARLs),

[81] Emphasis added.

Cancer Risk Estimates, Health-based criteria from USEPA Integrated Risk Information System (IRIS), Proposition 65 Safe Harbor Levels, California Toxics Rule Criteria to Protect Human Health and Aquatic Life, USEPA Recommended Criteria to Protect Human Health and Aquatic Life, Agricultural Use Protective Limits, and Taste and Odor Based Criteria. These are the thresholds to which the proposed project should be analyzed, but the RDEIR/SDEIS fails this test.

4. *Harmful Algae Blooms*

Water quality conditions would be conducive to the growth of HABs forming cyanobacteria as well as algae, particularly in the summer when water temperatures in the reservoir would be warmer and nutrients would be more concentrated due to reduced storage volume. Concentrations would likely be higher toward the water's surface where cyanobacteria and algae would be concentrated. Water would be released from lower in the reservoir if water quality monitoring indicated that organic carbon concentrations were high (Section 2D.3).

5. *Salt*

Saline water has been observed to seep from underground salt springs in the vicinity of the Salt Lake fault along the slopes above the valley and along the valley floor within the proposed inundation area of Sites Reservoir. "These areas are generally located in the Funks Creek watershed. The water from the underground springs accumulates along the trough of the valley and forms Salt Lake (USGS, 1915)". The proponents failed to accurately survey the depth or hydrodynamics of Salt Lake and fail to model how much more active the saline springs would be if the reservoir was inundated. The assumption that the salty water would "[g]enerally accumulate at the bottom of the reservoir" does not assure a more general mixing into the whole reservoir during filling and emptying. The recognition that "Saline water will increase the salinity of the water in storage. Salinity in Sites Reservoir may also increase due evapoconcentration, which may increase EC by 13%-16% on average, with maximum increases of 41%–48%," is an important consideration. The optimistic but short-sighted analysis of how much salinity would be introduced into the Sacramento River Basin if Sites Reservoir is filled is insufficient and must be reconsidered.

Contradictory mitigation example: Fish contaminated with bioaccumulated mercury would have disastrous impacts on humans, raptors and the fish themselves. Releasing water from high in the reservoir as a mitigation to avoid high mercury concentrations deep in the water is contradicted by the mitigation suggested for avoiding contaminating reservoir releases with HABs that are likely to form in that upper water levels.

When high concentrations of metals approaching, or exceeding water quality criteria exist in proposed project source waters they can't be regulated by governmental agencies as being natural occurrences. But once impounded, enriched by evaporation, added to by erosion of un-inundated bare-soil reservoir edges, and seasoned by salt springs, they are subject to water quality regulation. All releases of water from the proposed reservoir will be subject to review by water quality regulatory agencies to ensure that such releases do not adversely affect downstream benefits due to the heavy metals loads in the releases. Proponents claim on page 6-47 "The

Antidegradation Policy may allow for some degradation of water quality (i.e., increases in constituent concentration) if beneficial use increases. Evapoconcentration in reservoirs, for example, is generally accepted due the benefits of water storage." But if the already compromised source water quality is reduced beyond quality criteria or standards by the added impediments recognized by proponents, it is likely to reduce or eliminate the balance of benefits to supply and to the environment. The Antidegradation policy must be considered as a distinct possibility. The impounded metal-laden water could presumably still be used in lieu of Shasta releases on agricultural soils, but the long-term impacts to farms and refuges must be considered.

The presentation of data and analysis minimizes the severity of the heavy metals, salt, organic carbon and HAB problems in the source water and the impoundment footprint. The contradicting operational strategies meant to mitigate environmental damage will fail to protect the environment and may leave the impounded water vulnerable to the state antidegradation policy.

E. Impacts to Terrestrial Biological Resources.

The RDEIR/SDEIS fails to adequately assess impacts to terrestrial biological resources. The Project would inundate and destroy terrestrial and aquatic habitat covering approximately 13,200 acres in Antelope Valley, devastating the habitat of numerous terrestrial and semi-terrestrial species.[82] In addition to the habitat lost to inundation, the construction of roads and new water transfer infrastructure will sever ecosystems and inhibit species movement and proliferation. Despite the immense magnitude of the Project's impacts on biological resources, the RDEIR/SDEIS fails to conform to legal standards for environmental review.

The RDEIR/SDEIS's treatment of terrestrial biological resources is legally inadequate for two overarching reasons. First, the RDEIR/SDEIS fails to accurately describe the baseline condition of the project site and the presence of special status species, undermining the accuracy of the impact analyses. Second, the RDEIR/SDEIS does not adequately mitigate the Project's significant impacts, either by impermissibly deferring the formulation of specific mitigation measures, or by relying on insufficient and/or ineffective mitigation. For the reasons laid out below, the RDEIR/SDEIS's analysis of terrestrial biological resources impacts is inadequate, and the Authority must remedy the failures before moving forward in the environmental review process.

The RDEIR/SDEIS Fails to Adequately Describe Baseline Environmental Conditions and Assess the Proposed Project's Potential Impacts to Special-Status Species, Sensitive Habitats and Natural Communities.

The proposed Project entails significant alterations to the sensitive habitats and natural communities that now exist within the Project site, including riparian areas and wetlands. These habitats are utilized by a number of special-status plant and wildlife species. It is critical that the RDEIR/SDEIS, before it can fully analyze the impacts of the Project, requires exhaustive surveys of the Project area to ascertain the presence of wildlife. Under both NEPA and CEQA, the Authority must evaluate the potential environmental impacts of the project as compared to the existing environmental conditions (the "environmental baseline"), so that the Project's environmental impacts can be meaningfully analyzed and compared to alternatives.[83] Furthermore, a project's impacts should be compared to actual, existing pre-project conditions rather than to hypothetical conditions when determining the significance of a project's impacts.[84] In providing the decision-maker with knowledge of the regional setting, "special emphasis should be placed on environmental resources that are rare or unique to the region and would be affected by the project."[85] The RDEIR/SDEIS provides a grossly deficient picture of existing conditions because it failed to include species-specific site surveys that follow established

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[82] RDEIR/SDEIS at ES-11.
[83] 40 C.F.R. § 1502.15; CEQA Guidelines § 15125(a) [existing physical conditions "normally constitute the baseline physical conditions by which a Lead Agency determines whether an impact is significant"]; *see County of Amador v. El Dorado County Water Agency*, 76 Cal.App.4th 931, 952 (1999); *Neighbors for Smart Rail v. LA County Metropolitan Transit Authority*, 57 Cal. 4th 310, 315 (2013).
[84] *Communities for a Better Environment v. South Coast Air Quality Management Dist.* (2010) 48 Cal.4th 310, 322.
[85] CEQA Guidelines § 15125(c).

protocols and agency guidance, and instead based its analysis on an incomplete review of occurrence data combined with improperly used habitat modeling.

A. Minimal wildlife and habitat surveys conducted in unidentified areas of the Project are grossly insufficient and information is not adequately disclosed to the public.

According to the RDEIR/SDEIS, "[l]imited access was obtained for geotechnical boring investigations for the Project, and focused bird surveys prior to geotechnical work were conducted in these specific locations in 2020 and 2021"[86], but only minimal information from January 2021 surveys is reported in Appendix 10A. The exact dates, locations, and methods used when the surveys were conducted are not provided, and the "focused bird surveys" were not conducted following the appropriate guidelines and protocols for specific species. The California Department of Fish and Wildlife (CDFW) has specific survey protocols and guidelines for special-status birds [87] including Swainson's hawks, bald eagles, golden eagles, and burrowing owls. For example, a complete burrowing owl survey consists of four site visits on four separate days from two hours before sunset to one hour after or from one hour before sunrise to two hours after (California Burrowing Owl Consortium, 1993), and bald eagle breeding surveys should include three site visits, one each in early March, late April or early May, and mid-June (CDFW, 2010). The RDEIR/SDEIS fails to provide when and where the 2020 bird surveys were conducted and the results of those surveys. In addition, they dismiss data from habitat and wildlife surveys that were conducted within the Project study area from 1998 to 2004 and in 2010 to 2011, stating they were not considered "[b]ecause these surveys are 10 to 23 years old."[88] That is not a legitimate reason to dismiss such data. In environmental analyses it is critical to consider the best available science, which, in this case, should include on-the-ground focused surveys conducted in the Project study area. Such information provides insight into the habitats and species that occur, historically occurred, and/or have the potential in the Project area and should be considered and provided in the RDEIR/SDEIS. Failing to consider and disclose these data and instead opt to use only other sources of data and habitat modeling is a failure to use the best available science and renders the analysis inadequate. There is no substantive reason provided to exclude these data, particularly since access to the Project study area is limited and other data sources used, like CNDDB and eBird, provide historical occurrence data. It almost seems like the RDEIR/SDEIS is trying to hide information from the public by not providing survey data and results from on-the-ground surveys conducted in 1998-2004, 2010-2011, and 2020. Without using the most pertinent data to the area, the RDEIR/SDEIS fails to adequately assess and disclose baseline environmental conditions.

The RDEIR/SDEIS fails to adequately disclose and assess the occurrence or potential occurrence of special-status animals and plants. No maps are provided to inform the public of where occurrences have been documented, which is industry standard in EIRs. In addition, the RDEIR/SDEIS fails to consider important sources of occurrence data. Although the RDEIR/SDEIS uses occurrence data from various locations, including CNDDB, an unofficial

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[86] RDEIR/SDEIS at 10-7.
[87] CDFW Survey and Monitoring Protocols and Guidelines available at https://wildlife.ca.gov/Conservation/Survey-Protocols
[88] RDEIR/SDEIS at 10-7.

USFWS list, the California Essential Habitat Connectivity project by CDFW, and eBird, they fail to include other important, publicly available data from robust sources like iNaturalist, GBIF/VertNet, and Herpmapper.[89] By failing to consider these publicly available occurrence data and the data from the 1998 to 2004 and 2010 to 2011 on-the-ground surveys, the RDEIR fails to adequately assess and disclose the baseline environmental conditions of the Project area, which can lead to erroneous assumptions. For example, the RDEIR/SDEIS states that the foothill yellow-legged frog (FYLF), a species of special concern, has low potential to occur in the Project area, in part, because the "nearest known occurrence is 6 miles from the study area" as documented in CNDDB (RDEIR/SDEIS Appendix 10A at 10A-23), and therefore FYLF is assumed to not be present and is excluded from the impact analysis. However, within two to three miles of the Project area potentially near a branch of the Antelope Creek, iNaturalist shows a "Research Grade" occurrence with photo documentation and identification by an iNaturalist Curator who currently works at CDFW as a CNDDB zoology data manager.[90] Therefore, potential impacts to FYLF should be included in the assessment. This is another example of how the RDEIR/SDEIS fails to adequately assess and disclose the baseline conditions of the Project area. Other such critical data for sensitive species could have been erroneously excluded from the analysis.

B. *The RDEIR/SDEIS also fails to establish the environmental baseline by relying on deficient plant surveys.*

The RDEIR/SDEIS fails to describe the environmental baseline because the plant surveys only covered a portion of the project site, and the surveys that were included are so outdated that their value in setting the environmental baseline is negligible.[91]

First, the plant surveys conducted between 1998 and 2003 are too distant in time to be relied on to establish an accurate baseline assessment. Ecological settings are prone to change, and plant surveys conducted nearly 20 years ago are not representative of the environmental conditions on the ground today. New populations of special-status plants may have become established in the project area since the last surveys were conducted. Per CDFW Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities ("CDFW Protocols")[92], surveys for rare species must be current, defined as within 5 years in many habitats.[93] For a project undergoing environmental review in 2021, surveys conducted between 1998 and 2003 fall far below acceptable standards of recent surveys.

Second, the surveys are deficient because the exact date and location of the surveys were not disclosed, so it's unclear whether they were conducted over multiple years, as is required to adequately document the biodiversity on the project site. The RDEIR gives a range of dates for when the surveys were performed (1998-2003), but this does not disclose to the public if the same areas were surveyed over this period, or whether the five-year span includes one-off

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[89] RDEIR/SDEIS at 10-7.
[90] iNaturalist observation: https://www.inaturalist.org/observations/93302474
[91] RDEIR/SDEIS Ch. 9, pg. 10.
[92] Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities, https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=18959&inline.
[93] CDFW Protocols, p. 6 n. 14.

surveys conducted in separate locations. It is also unclear whether the surveys were seasonally appropriate for identifying plants with the potential to occur on the project site. This lack of clarity makes it impossible for decision-makers and the public to understand and assess the sufficiency of the surveys. Considering the abundance of grasslands in the project area, multiple annual surveys are necessary to establish the environmental baseline. Grasslands in California's Central Valley and adjacent foothills are home to many imperiled species, and multiple years of surveys are necessary to document biodiversity due to the nature of interannual variation in species composition in grasslands. This is confirmed in the CDFW Protocols, which state that grassland habitats that "have annual and short-lived perennial plants as major floristic components, may require multiple annual surveys to fully capture baseline conditions."[94] Moreover, Central Valley grasslands and adjacent foothills are among the most impacted habitats in the state, and the Central Valley has already has lost a significant portion of its grasslands to development. As a result, this habitat is home to many imperiled species and any loss or degradation of remaining grasslands is potentially significant. Failing to perform recent surveys of the grasslands in the project area further imperils this already sensitive habitat and the important species that depend on it.

Finally, in addition to being substantively deficient, the surveys the RDEIR relies on only cover a portion of the project site. For the portions of the project area that were not surveyed at all, the lead agency has failed to establish an environmental baseline with respect to special-status plants altogether.

For all of the reasons above, the RDEIR fails to establish an environmental baseline, and makes it impossible for the lead agency to properly analyze and mitigate the project's impacts to plants and vegetation.

C. The habitat models are insufficient; reliance on such models with unsubstantiated assumptions and no on-the-ground information is inadequate.

Although habitat models can be a useful tool to help determine where species may occur (historically, currently, or potentially), adequate assessments for project-level analyses require additional on-the-ground data to inform and/or ground-truth the model. The RDEIR/SDEIS heavily relies on habitat models and makes unsubstantiated assumptions for the models. It states that "[b]ecause the models are limited in part by the accuracy of aerial imagery interpretation and the inability to field verify the land cover mapping, they generally overestimate the amount of potential habitat in the study area for special-status wildlife species"[95]; however, this is conjecture and not based on science. Conversely, such models have the potential to underestimate the amount of potential habitat for special-status species, and model assumptions are important in determining the most accurate model.

For example, the habitat model for vernal pool branchiopods is based on "seasonal wetland and ditch land cover types when the ditch is adjacent to or surrounded by annual grassland" as identified using aerial imagery.[96] But, as acknowledged by the RDEIR/SDEIS, the

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[94] CDFW Protocols, p. 6 n. 14.
[95] RDEIR/SDEIS, Appendix 10B at 10B-1.
[96] RDEIR/SDEIS Appendix 10B at 10B-2.

resolution and scale of the aerial imagery makes it difficult to accurately identify all potential vernal pools and ditches. In addition, if the imagery was taken during dry months and/or during extended drought, locations of vernal pools would be even more difficult to decipher. Yet the RDEIR/SDEIS does not provide the context of the imagery used for the model, and it states the model still likely overestimates suitable habitat "because it is assumed that all seasonal wetlands and ditches adjacent to or surrounded by annual grassland provide conditions necessary for habitat to be suitable for vernal pool branchiopods, which is unlikely to be the case."[97] This is unfounded and not supported by any substantial evidence.

Another example in which the models may underestimate suitable habitat is the western pond turtle (WPT) habitat model. It assumes upland habitat is within 1640 feet of modeled aquatic habitat (based on aerial imagery that they cannot field verify), but nests have been found up to 1919 feet from aquatic habitats and individuals have been documented to move regularly between aquatic habitats with long-distance movements of up to 2018 feet (615 m) (Sloan, 2012). Similarly, the western spadefoot toad (WESP) model assumes potentially suitable upland habitat "consists of annual grassland, blue oak woodland, chamise chaparral, foothill pine, mixed chaparral, and oak savanna within 1,200 feet of modeled aquatic habitat"[98] even though a recent study found that the occurrence of WESP was strongly correlated with grassland habitat within 6562 feet (2000 m) of vernal pools (Rose et al., 2020). California red-legged frogs (CRLF) have been found to migrate about 600 feet between breeding ponds and non-breeding upland habitat and streams, with some individuals roaming over 4,500 feet from the water (Fellers & Kleeman, 2007), yet the RDEIR/SDEIS's model only includes potential upland habitat within 300 feet of aquatic habitat. The best available science, including data regarding the longest dispersers, should be considered when assessing potential suitable habitat, particularly when dispersal and metapopulation dynamics are important, as is the case for species like WPT, WESP, CRLF, and others.

These are just a few examples of how the habitat models are inadequate and potentially misleading. The RDEIR/SDEIS inadequately assesses the baseline environmental conditions and impacts special-status species and sensitive habitats. Note that this is not a comprehensive list of inadequacies that need to be addressed for the RDEIR/SDEIS to comply with CEQA.

D. Lack of access to private property in the Project Area is not an excuse for failing to perform surveys.

The RDEIR/SDEIS blames property access restrictions in most of the project area for the lack of field studies.[99] The fact that the Sites Project Authority has elected to develop a site that it does not yet own and cannot access for technical studies does not excuse the lead agency from its obligations under CEQA. As discussed above, CEQA requires the agency to establish the environmental baseline and analyze the project's impacts against that baseline. Sufficiently recent field studies are essential for both of those tasks, and by failing to perform adequate field studies the lead agency has failed to comply with CEQA.

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[97] RDEIR/SDEIS Appendix 10B at 10B-3.
[98] RDEIR/SDEIS Appendix 10B at 10B-13.
[99] RDEIR/SDEIS Ch. 9, p. 10.

The Sites Project Authority could have taken steps to conduct botanical field studies in the privately-owned parcels, but there is no indication that it has made any attempt to do so. In *Property Reserve, Inc. v. Superior Court (Department of Water Resources)*, 1 Cal.5th 151, 165-66 (Cal. 2016), the court documented the Department of Water Resource's efforts to investigate the feasibility of constructing the Delta twin tunnels project:

> As part of the preliminary steps in going forward with the project, the Department sought to conduct environmental and geological studies and testing on more than 150 privately owned parcels of land that the state, in the future, might seek to acquire for the project through negotiation or eminent domain. In pursuing the proposed studies and testing, the Department proceeded through the specific statutory procedure established by the California Eminent Domain Law (Code Civ. Proc., pt. 3, tit. 7) relating to precondemnation entry and testing. (Code Civ. Proc., §§ 1245.010-1245.060.) The Department filed petitions in superior court relating to the privately owned properties, seeking a court order granting the Department authority to enter the properties and undertake various environmental and geological testing activities. The Department maintained that these activities were necessary to determine the suitability of each property for the project and to comply with the numerous state and federal environmental laws governing such a project. After a four-day hearing, the trial court issued a detailed and lengthy order authorizing the Department to enter all of the private properties and conduct various environmental studies and testing under specified limitations."

Similarly here, the Sites Project Authority has the ability to seek entry of the private lands despite not currently having access to them. This would allow the agency to complete field studies and meet its obligations under CEQA. The RDEIR/SDEIS should not be approved until this possibility is exhausted.

The RDEIR/SDEIS Fails to Adequately Mitigate Potential Impacts to Special-Status Species and Sensitive Habitats and Natural Communities Due to The Proposed Project.

The RDEIR/SDEIS fails to meet CEQA's cornerstone requirement to include feasible mitigation measures that reduce potentially significant environmental impacts to a less than significant level.[100] Mitigation must be effective, and the effectiveness of a proposed measure must be demonstrated by substantial evidence.[101] For the reasons described below, the RDEIR/SDEIS fails to meet these requirements.

As a threshold matter, the failure to accurately present the baseline environmental conditions and to quantify the scope of species-specific impacts precludes the formulation of CEQA-compliant mitigation.[102] It's hard to fix a problem when the extent of it is unknown. Furthermore, the proposed mitigation suffers from multiple defects, namely by deferring the formulation of the actual steps to mitigate the acknowledged significant impacts, and for those

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[100] Cal. Pub. Res. Code § 21002; § 21081.6(b); CEQA Guidelines § 15126.4(a); *see also Sierra Club v. Gilroy City Council* (1990) 222 Cal.App.3d 30, 41.

[101] *Sierra Club v. County of San Diego* (2014) 231 Cal.App.4th 1152; *POET, LLC v. State Air Resources Bd.* (2013) 218 Cal.App.4th 681.

[102] S*ee City of Long Beach v. City of Los Angeles* (2018)) 19 Cal.App.5th 465, 487 (the court found the EIR's failure to accurately quantify the impact (frequency and duration of particulate matter pollution) precluded the public and decision makers from fairly considering alternatives or mitigation measures).

measures that appropriately described, a lack of evidence that proposed mitigation will effectively reduce impacts.

A. The RDEIR/SDEIS's mitigation is inadequate and improperly deferred.

The goal of informed decision-making necessitates that the public be provided information about the extent of a project's impacts, and how those impacts will be mitigated, before a project is approved. To that end, it is generally impermissible to defer the formulation of a mitigation measure to some point after a project is approved.[103] Deferring the selection of mitigation measures is allowed in cases where specific performance standards are identified, and the agency commits to achieving those standards in an enforceable manner.[104] Many of the mitigation measures simply require site surveys for species found to be significantly impacted by the Project, and then include a laundry list of possible measures that "may" be taken. (e.g., MM WILD-1.1 for vernal pool branchiopods; MM WILD-1.6 for valley elderberry longhorn beetle; MM WILD-1.10 for monarch butterfly nectar and larval host plants; MM WILD-1.14 for WESP, CRLF, WPT; MM WILD-1.24 for burrowing owls; etc.). As discussed above, the claim that protocol level surveys could not be conducted because site access was limited in an absurd attempt to circumvent CEQA's disclosure and analysis requirements. Beyond the problem of trying to meet both CEQA's analytical and mitigation requirements at the same time, the mitigation measures noted above, among others, are vague and do not specify the actions the Authority will take.

For example, MM Wild-1.3 requires the mitigation of vernal pool branchiopod species but doesn't specify how much habitat must be accounted for.[105] The failure to quantify how much mitigation habitat is required is consequential, particularly if the Authority seeks to fulfill its requirements at a mitigation bank. Available vernal pool credits at approved mitigation banks are scarce, and the availability, and where such banks are, should be disclosed to the public before Project approval. The measure then allows for the long-term management of unspecified "conservation areas."[106] The most egregious portion of the measure is the so-called performance standard of 5 percent occupancy for created/restored vernal pools.[107] First, there is no discussion of how that standard was derived, nor is there a reference past studies, agency guidance or scientific literature to support the use of this standard. Such justification is warranted, because on

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[103] CEQA Guidelines § 15126.4(a)(1)(B).
[104] *See POET, LLC v. California Air Res. Bd.* (2013) 217 Cal.App.4th 1214, 737-38. *See also Sundstrom v. County of Mendocino*, 202 Cal.App.3d 296, 307 (Cal. Ct. App. 1988). Deferring environmental assessment to a future date is contrary to the "policy of CEQA which requires environmental review at the earliest feasible stage in the planning process." Additionally, "[e]nvironmental problems should be considered at a point in the planning process 'where genuine flexibility remains.' . . . A study conducted after approval of a project will inevitably have a diminished influence on decisionmaking. Even if the study is subject to administrative approval, it is analogous to the sort of post hoc rationalization of agency actions that has been repeatedly condemned in decisions construing CEQA." *Id.* (internal quotations and citations omitted).
[105] RDEIR/SDEIS at 10-38-39. Other examples include Mitigation Measures VEG-1.1 and VEG-2.1, which propose deferring surveys for special-status plants, sensitive natural communities, and oak woodlands until prior to construction. Surveys need to be completed prior to project approval so that the public and decision-makers can be aware of project's impacts, assess whether the proposed mitigations are sufficient to address those impacts, and seek project design features that adequately avoid or protect rare or sensitive resources.
[106] *Id.*
[107] *Id.*

its face a 5 percent occupation of mitigation pools created at a 1:1 ratio of what is impacted, up to 366 acres according to the habitat modeling, doesn't appear to reduce the potentially significant impacts to a federally listed species to a less than significant level, as the RDEIR/SDEIS concludes. The RDEIR/SDEIS's approach to mitigation leaves the public completely in the dark as to what the Authority is committing to do as far as mitigation, and whether that mitigation will be effective.

B. The RDEIR/SDEIS's mitigation ratios are unacceptably low.

The RDEIR/SDEIS is estimated to impact hundreds of acres of modeled aquatic habitat and thousands of acres of terrestrial habitat, impacting numerous special-status animals and plants as well as sensitive natural communities. Mitigation ratios are grossly insufficient and are not based on the best available science. CEQA requires that feasible mitigation measures be adopted[108], and that the effectiveness of those measures is supported by substantial evidence.[109] For example, MM WILD-1.3 provides a 2:1 mitigation ratio for preservation and 1:1 mitigation ratio for impacted vernal pool branchiopods, and WESP. Similarly, MM WILD-1.18 provides a 2:1 mitigation ratio for preservation and 1:1 mitigation ratio for impacted CRLF habitat, MM VEG-3.2 and MM VEG-3.3 provide a 1:1 mitigation ratio for creating or restoring impacts to wetlands and WPT, MM VEG-4.2 provides a 1:1 mitigation ratio for oak woodlands (and an inadequate replacement planting program), and MM VEG-2.2 provides a minimum 1:1 mitigation ratio for sensitive natural communities (including riparian areas) and a 3:1 mitigation ratio for shaded riverine areas. The RDEIR/SDEIS does not provide potential sites for compensatory mitigation or restoration for these and other mitigation measures, which makes it impossible for the public to ascertain whether such mitigation is sufficient to minimize the Project's impacts.

Avoidance of impacts to sensitive habitats like vernal pools, wetlands, riparian areas, and other sensitive natural communities should be prioritized, after which in-kind mitigation should be a minimum of 3:1 given that these habitats support numerous special-status species and high levels of biodiversity, can be important for wildlife connectivity, and so much of these habitats have already been lost, and 5:1 for habitat restoration or creation with continued monitoring, adaptive management strategies, and well-defined success criteria, to be funded in perpetuity. Created habitat mitigation ratios should not be lower than preservation mitigation ratios. The RDEIR/SDEIS needs to consider that, due to their project, habitat loss and species displacement are immediate, while any gains from their mitigation are uncertain. Therefore, higher mitigation ratios coupled with extended years of effective monitoring and adaptive management strategies are needed to improve chances of successfully mitigating impacts and achieving no net loss of habitats like vernal pools, wetlands, riparian areas, and other sensitive natural communities (Ambrose et al., 2006; Moilanen et al., 2009; Sudol & Ambrose, 2002). Scientists recommend 15-20 years or more of monitoring to determine the success, or lack thereof, of enhanced, restored, or created habitat (Mitsch & Wilson, 1996; Zedler & Callaway, 1999). If higher mitigation ratios are not feasible, the RDEIR/SDEIS must provide evidence and analysis supporting that conclusion. For comparison, the City of San Diego Vernal Pool Habitat

[108] CEQA Guidelines § 15126.4(a).
[109] *See Gray v. County of Madera* (2008) 167 Cal.App.4th 1099, 1116-17 [An agency's finding that a mitigation measure will be effective will not be granted deference if the finding is not supported by substantial evidence].

Conservation Plan requires 4:1 mitigation when no listed species are present, and up to 8:1 when listed species are present (City of San Diego, 2019).

Another example of inadequate compensatory mitigation is MM WILD-1.21, which provides 3:1 and 1:1 mitigation ratios at USFWS- or CDFW-approved conservation/mitigation banks. for permanent and temporary losses of giant garter snake habitat. However, potential conservation/mitigation banks are not provided, which again, makes it impossible for the public to ascertain whether such mitigation is sufficient to minimize the Project's impacts. The RDEIR/SDEIS goes on to state that if credits are not purchased, then the Authority will plan and develop an unspecified amount of conservation areas. Does this mean they plan to create giant garter snake habitat? If so, would the mitigation ratios be the same as those for mitigation bank credits? As mentioned above, avoidance of impacts should be prioritized followed by in-kind preservation mitigation. Created habitat mitigation ratios should be much higher than preservation mitigation ratios, and they should be coupled with extended years of effective monitoring and adaptive management strategies (Ambrose et al., 2006; Moilanen et al., 2009; Sudol & Ambrose, 2002). Scientists recommend 15-20 years or more of monitoring and adaptive management to determine the success, or lack thereof, of enhanced, restored, or created habitat (Mitsch & Wilson, 1996; Zedler & Callaway, 1999). If higher mitigation ratios are not feasible, the RDEIR/SDEIS must provide evidence and analysis supporting that conclusion.

These are just a few examples of the inadequate mitigation ratios provided in the RDEIR/SDEIS; this is not a comprehensive list of the issues. With one third of America's plant and animal species vulnerable to impacts from human activity and one fifth at risk of extinction (Stein et al., 2018), it is crucial that strategies to prevent further degradation and loss of biodiversity are explicit and scientifically sound. The Project would result in thousands of acres of impacts to habitats and sensitive natural communities that support numerous special-status species and much of California's biodiversity. Mitigation measures must be considered in the RDEIR/SDEIS so that the proper environmental analysis can take place.[110] More discrete mitigation measures that incorporate the best available science need to be included in the RDEIR/SDEIS to enable the public and decision-makers to evaluate their effectiveness in avoiding, minimizing, and mitigating the Project's impacts to sensitive habitats and natural communities.

The RDEIR/SDEIS Fails to Adequately Assess and Disclose Information Regarding the Baseline Conditions of Wildlife Connectivity and Vegetation in The Project Area.

The ability of wildlife to move between distinct habitat areas is critical to both individual and population survival. As landscapes become more fragmented by development, it is critical that proposed Projects are designed to minimize impacts on habitat connectivity. This is especially vital as climate change alters the range and amount of habitat available to different species. Despite concluding that Project impacts to wildlife movement would be significant and unavoidable, the RDEIR/SDEIS fails to properly disclose and analyze the extent of the impacts, nor does it do nearly enough to mitigate the significant impacts.

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[110] See *Sundstrom v. Co. of Mendocino* (1988) 202 Cal.App.3d 296.

A. The RDEIR/SDEIS's assessment and disclosure of wildlife connectivity in the Project area is inadequate.

There is insufficient discussion of the baseline conditions of wildlife connectivity in the Project area. It is not until the impact analysis on page 10-137 that there is any mention of identified connectivity areas and linkages in the RDEIR/SDEIS, and no maps are provided to visualize where important connectivity areas are in the Project area, or where there is nearby protected open space, like the Sacramento National Wildlife Refuge. The RDEIR/SDEIS fails to adequately disclose the importance of the Project area to local, regional, and continental wildlife connectivity for numerous special-status species, including mountain lions and American badgers, valley elderberry longhorn beetle and monarch butterflies, CRLF and WESP, native bees and giant garter snake, tricolored blackbirds and western yellow-billed cuckoos, burrowing owls and native bats, and many other species. CDFW has identified much of the project area as having high connectivity value and high biodiversity ranking, with some areas marked as "irreplaceable and essential corridors" and "conservation planning linkages" in their Areas of Conservation Emphasis (ACE) program, yet this is erroneously omitted from the RDEIR/SDEIS. The RDEIR/SDEIS fails to adequately assess and describe the wildlife connectivity baseline conditions in the Project area, making it impossible for the public to determine whether the Authority adequately assesses and mitigate impacts due to the proposed Project.

The Project would result in the destruction and removal of thousands of acres of contiguous, diverse habitats and eliminate local and regional connectivity for small, less mobile species. The Project also includes the construction of multiple roads. Roads and development create barriers that lead to habitat loss and fragmentation, which harm native wildlife, plants, and people. As barriers to wildlife movement, poorly planned development and roads can affect an animal's behavior, movement patterns, reproductive success, and physiological state, which can lead to significant impacts on individual wildlife, populations, communities, landscapes, and ecosystem function (Ceia-Hasse et al., 2018; Haddad et al., 2015; Marsh & Jaeger, 2015; Mitsch & Wilson, 1996; Trombulak & Frissell, 2000; van der Ree et al., 2011). For example, habitat fragmentation from roads and development has been shown to cause mortality and harmful genetic isolation in mountain lions in southern California (Ernest et al., 2014; Riley et al., 2014; Vickers et al., 2015), increase local extinction risk in amphibians and reptiles (Brehme et al., 2018; Cushman, 2006), cause high levels of avoidance behavior and mortality in birds and insects (Benítez-López et al., 2010; Kantola et al., 2019; Loss et al., 2014), and alter pollinator behavior and degrade habitats (Aguilar et al., 2008; Goverde et al., 2002; Trombulak & Frissell, 2000). Habitat fragmentation also severely impacts plant communities. An 18-year study found that reconnected landscapes had nearly 14 percent more plant species compared to fragmented habitats, and that number is likely to continue to rise as time passes (Damschen et al., 2019). The authors conclude that efforts to preserve and enhance connectivity will pay off over the long-term (Damschen et al., 2019). In addition, connectivity between high quality habitat areas in heterogeneous landscapes is important to allow for range shifts and species migrations as climate changes (Cushman et al., 2013; Heller & Zavaleta, 2009; Krosby et al., 2018). Loss of wildlife connectivity decreases biodiversity and degrades ecosystems.

Connectivity is critical for resilience to climate change. Climate change is increasing stress on species and ecosystems, causing changes in distribution, phenology, physiology, vital rates, genetics, ecosystem structure and processes, and increasing species extinction risk (Warren et al., 2011). A 2016 analysis found that climate-related local extinctions are already widespread and have occurred in hundreds of species, including almost half of the 976 species surveyed (Wiens, 2016). A separate study estimated that nearly half of terrestrial non-flying threatened mammals and nearly one-quarter of threatened birds may have already been negatively impacted by climate change in at least part of their distribution (Pacifici et al., 2017). A 2016 meta-analysis reported that climate change is already impacting 82 percent of key ecological processes that form the foundation of healthy ecosystems and on which humans depend for basic needs (Scheffers et al., 2016). Genes are changing, species' physiology and physical features such as body size are changing, species are moving to try to keep pace with suitable climate space, species are shifting their timing of breeding and migration, and entire ecosystems are under stress (Cahill et al., 2012; Chen et al., 2011; Maclean & Wilson, 2011; Parmesan, 2006; Parmesan & Yohe, 2003; Root et al., 2003; Warren et al., 2011). Thus, the RDEIR/SDEIS must use the best available science and adequately assess the baseline conditions of the Project area so impacts can be adequately assessed and mitigated.

B. The RDEIR/SDEIS's assessment and disclosure of impacts to plants and vegetation in the Project area is also inadequate.

The RDEIR fails as an informational document because it also does not sufficiently quantify, analyze and disclose the project's impact to plants and vegetation. The Legislature has made it clear that an EIR is "an informational document" whose purpose is "to provide public agencies and the public in general with detailed information about the effect which a proposed project is likely to have on the environment; to list ways in which the significant effects of such a project might be minimized; and to indicate alternatives to such a project."[111] Here, the RDEIR makes it nearly impossible for the lead agency or the public to understand the magnitude of the project's impacts to rare plants and habitats. The RDEIR explicitly admits that "the full extent of impacts on special-status plants is currently unknown because recent botanical surveys for special-status plants have not been conducted throughout the study area."[112] It goes on to state that for some special status plants for which there are no habitat models, the extent of impacts cannot be calculated at all, and therefore the impact assessment is merely qualitative.[113] Even where habitat models have been utilized, models are not an appropriate substitute for surveys.

Despite the EIR's claim that the proposed mitigation measures will mitigate impacts to plants to a less than significant level, this failure to quantify and analyze impacts before proposing mitigation measures is unlawful. "[T]his short-cutting of CEQA requirements subverts the purposes of CEQA by omitting material necessary to informed decision-making and informed public participation. It precludes both identification of potential environmental consequences arising from the project and also thoughtful analysis of the sufficiency of measures to mitigate those consequences."[114]

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[111] *Laurel Heights Improvement Assn. v. Regents of University of California*, 47 Cal.3d 376, 391 (Cal. 1988).
[112] RDEIR/SDEIS, Ch. 9, pg. 13.
[113] *Id.*
[114] *Lotus v. Dep't of Transp.*, 223 Cal.App.4th 645, 658 (Cal. Ct. App. 2014); *San v. County*, 149 Cal.App.4th 645, 663-64 (Cal. Ct. App. 2007); *see also San v. County*, 149 Cal.App.4th 645, 663-64 (Cal. Ct. App. 2007) ("a mitigation measure cannot be used as a device to avoid disclosing project impacts.").

C. The RDEIR/SDEIS's mitigation of wildlife connectivity impacts is inadequate.

While Project "impacts on wildlife movement and habitat connectivity after mitigation would remain significant and unavoidable"[115], we are encouraged to see mitigation measures like MM WILD-1.15, which provides for the design and construction of wildlife crossings for new roadways at suitable locations using guidelines provided by Kintsch et al. (2015) and in coordination with CDFW, and MM WILD-1.16, which provides for monitoring and maintenance of the wildlife crossings. However, such mitigation should not be limited to only new roads. CEQA requires a lead agency to adopt feasible mitigation measures that would reduce a project's significant environmental impacts.[116] The RDEIR/SDEIS must do more to mitigate the significant impacts to wildlife connectivity. Given the severity of the Project's impacts to the region's wildlife connectivity, such measures to plan and implement wildlife crossings for various target species should extend to nearby roads that present existing barriers to wildlife movement. In addition, the Authority should work with CDFW, Caltrans, and other local and regional stakeholders to determine areas along State Highway 20 and State Highway 162 to identify appropriate locations and designs for wildlife crossings and implement them. In-depth analyses that include on-the-ground movement studies of which species are moving in the area and their home range area, habitat use, and patterns of movement, as well as roadkill data from sources like the UC Davis Road Ecology Center and potentially elsewhere, are needed to determine how to best implement such crossings. Any crossings implemented on new or existing roads should be approved by CDFW.

The Coalition is also encouraged to see that the RDEIR/SDEIS acknowledges that different species have different mobility capabilities—smaller, less mobile species often need more frequent crossing structures compared to larger, more mobile species—and that optimal crossing design includes suitable habitat on both sides of the roadway. Although Gunson et al. (2016) recommend that crossing structures generally be spaced about 300m (~1000 feet) apart for small animals when transportation infrastructure bisects large expanses of continuous habitat, they recognize that some amphibians may need more frequent crossings no more than 50m (~160 feet) apart. Therefore, the previously mentioned analyses of species that occur in the area and how they move should be considered when determining the spacing of the wildlife crossings. In addition, the mitigation measures should require the Authority to follow guidelines and best management practices discussed in Langton & Clevenger (2021), "Measures to Reduce Road Impacts on Amphibians and Reptiles in California." Also, the preservation and management of suitable habitat on both sides of the wildlife crossings should be included as a requirement of the mitigation measure.

Design that incorporates wildlife connectivity should be implemented as early as possible for it to be most effective in terms of both cost and function for the targeted species or guild; therefore, experts should be involved in the design process from the very beginning. Yet MM WILD-1.15 states "[p]rior to final roadway design for the Project, a wildlife connectivity assessment will be conducted to assess existing and expected wildlife movement and habitat connectivity conditions, evaluate Project-related impacts on connectivity and species movement,

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[115] RDEIR/SDEIS at 10-139.

[116] Pub. Res. Code § 21002, 21002.1(b); *see also* CEQA Guidelines §§ 15021, 15091.

and identify appropriate wildlife crossing locations and designs."[117] This suggests that much of the roadway design could be completed prior to the completion of the wildlife connectivity assessment, which could then undermine the assessment's findings. The wildlife connectivity assessment should be completed and approved by CDFW prior to the start of roadway design so that the assessment can inform the design from the beginning.

Last, monitoring and adaptive management of the wildlife crossings through MM WILD-1.16 should include monitoring the effectiveness of the wildlife crossings for wildlife movement using wildlife cameras and roadkill surveys.

D. The RDEIR/SDEIS's mitigation of plants and vegetation impacts is inadequate.

The RDEIR/SDEIS's inadequate impacts analysis described above prevents the creation of sufficient mitigation measures. Simply put, how can decision-makers and the public evaluate if mitigation measures are sufficient for a particular impact if the magnitude of the impact in the first place is unknown? For example, in *Save the Agoura Cornell Knoll v. City of Agoura Hills*, 46 Cal.App.5th 665, 694 (Cal. Ct. App. 2020), the court found that "an updated [plant] survey would not merely be helpful, but would be necessary to formulate an adequate mitigation measure for these affected plant species." Similarly here, sufficiently recent plant surveys are essential for formulating appropriate mitigation measures.

In any event, the proposed mitigation measures are unlikely to mitigate the project's impacts to special-status plant species to a less than significant level. First, Mitigation Measure VEG-1.1 (Section 9-26) "will require qualified botanists to conduct special-status plant surveys of the Project footprint." While this may seem sufficient, the presence of annual plant-dominated habitats on the site (i.e. grasslands) may make it impossible to complete this requirement. As the CDFW Protocols state, such habitats "may require multiple annual surveys to fully capture baseline conditions." Though VEG-1.1 states that surveys will follow CDFW Protocols "or the most current protocols, specifically with respect to the number and timing of surveys, use of reference populations, and evaluation of negative findings," it is unclear that the construction timeline will allow for multiple years of surveys to be completed as required, and which is especially necessary in light of California's recent drought conditions.

Mitigation Measure VEG-1.2 (Section 9-27), which states that the Authority, "will acquire and permanently protect compensatory mitigation habitat for each affected species at a minimum 2:1 ratio," is also flawed. The RDEIR/SDEIS fails to provide rationale that a 2:1 mitigation ratio will be sufficient to compensate for the loss of habitat for all special status plants that occur or are likely to occur on the project site. This type of determination can only be made if a species-specific analysis of impacts is conducted. The RDEIR/SDEIS contains no evidence or analysis that a blanket 2:1 ratio will be appropriate for each species that will be affected by the project. Mitigation Measure VEG-1.2 also states that, "compensatory mitigation will be accomplished by procurement of existing offsite occupied habitat acquired in-fee." This is a vague mitigation measure that may not be possible, given the lack of information in the RDEIR/SDEIS. The Sites Project Authority cannot guarantee that habitat for compensatory mitigation is available for all the special-status plants that may be present on the project site,

[117] RDEIR/SDEIS at 10-64.

because it does not know how many special-status plants are on the site in the first place. By extension, the Authority cannot guarantee that there are funds available for the purchase of vast amounts of land for mitigation that may be required. Without first confirming the actual impact to special status plants, the proposed mitigation measures are speculative at best. Vague and deferred mitigation measures have been shown to be legally indefensible.[118]

CEQA requires an agency to make findings that a project's impacts can be mitigated, and those findings must be based on substantial evidence.[119] Because the RDEIR/SDEIS's analysis of impacts at present is largely uninformed by actual data, it is impossible for the lead agency to form conclusions based on substantial evidence about how the project will impact special-status plants and sensitive plant communities, and whether the proposed mitigation measures are sufficient to mitigate the impacts to less than significant levels. The best the RDEIR/SDEIS can do is speculate that "Construction of Alternative 1 or 3 could also result in an undetermined loss of potential habitat for the special-status plants not previously observed during surveys of the study area but were assessed as having a high probability of occurrence,"[120] and then propose vague and unenforceable mitigation measures that are untethered to actual analysis of their effectiveness. This lack of quantification and analysis renders the adopted mitigation measures vague and inadequate, and violates CEQA's substantial evidence standard.

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[118] *See Save the Agoura Cornell Knoll v. City of Agoura Hills*, 46 Cal.App.5th 665, 694 (Cal. Ct. App. 2020).
[119] CEQA Guideline § 21081, 21081.5.
[120] RDEIR/SDEIS Ch. 9, pg. 23.

F. Impacts to Cultural Resources.

The RDEIR/SDEIS does not discuss Tribal Beneficial Uses and Impacts to Tribal Communities and Trust Species Are Not Analyzed.

The RDEIR/EIS states that "[t]he area that would be affected by Project operations involves nearly all of the Sacramento Valley from Redding in the north through the Yolo Bypass in the south, with a focus on the major rivers (i.e., Sacramento, Feather, and American Rivers) that flow into the valley."[121]

The Coalition is concerned that not only did the Sites Project Authority not engage in meaningful government to government consultation with all the impacted Tribes within this area, they did not even *notify* Tribes that will be impacted by the Project's changes to water diversions and floodplain inundation.

This lack of meaningful consultation is particularly egregious because this Project includes impacts to cultural resources that cannot be mitigated. The most notable Project change is the intent to expand the Red Bluff diversion and change the entire flow regime of the Sacramento River.[122] As proposed, this Project will have serious impacts on water quality and fisheries. It will also substantially reduce acres of floodplains and inundated wetlands in the Northern Delta such as the Yolo Bypass. These areas are not only critical to the growth, production, and survival of Tribal trust fisheries such as salmon, trout and lamprey, they are also needed for cultural plants such as tullies and willow. These plants cannot survive or provide for Tribal people without adequate high-water events that provide floodplain and wetland inundation.

The Coalition disagrees with the RDEIR/SDEIS statement that:

> "The nature of the planned work does not occur in an area that would affect Indian hunting or water rights nor is the alternative on Indian trust lands. Pulse flow protection measures applied to precipitation-generated flow events from October through May and a fish monitoring program to inform real-time operational adjustments limit the potential for adverse effects on fishing resources (i.e., juvenile salmonids); Mitigation Measure FISH-2.1, Wilkins Slough Flow Protection Criteria, will further reduce effects on juvenile salmonid rearing and migrating habitat."[123]

The Project will definitely "affect" Tribal rights and impact Tribal trust resources. As affirmed in both federal and state law[124], Tribes can have both appropriative and riparian water rights.[125]

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[121] RDEIR/SDEIS at 23-6.
[122] The Coalition also highlights that the Project impacts from the vast improvements to canals and pumps do not appear to be included in the RDEIR/SDEIS.
[123] RDEIR/SDEIS at 29-1.
[124] The Coalition would also like to note that California is currently in the process of identifying Tribal beneficial uses in the Bay Delta, and it is highly likely the Sacramento River, Tribal Subsistence Fishing, and Tribal Tradition and Culture will be listed.
[125] In *United States v. Adair*, the 9th Circuit Court of Appeals held that "(1) the Tribe and its members have water rights sufficient to maintain their treaty rights to hunt and fish on the former reservation; (2) individual Indian

Tribal water rights not being adjudicated does not mean that they do not exist, nor does the Tribe's land not being in trust mean that rights have been lost.[126] This is especially important because the Sites Project Authority does not have any water rights or water contracts for the proposed Project, which means any water rights that might be issued would be junior to Tribal rights.[127]

Furthermore, Tribes have identified the San Francisco Bay Delta as an important Tribal site and salmon as a Trust species. The claims of the Sites Project Authority that there is no impact on Tribal trust resources ignores the Project's impacts to river flows and salmon migration. As discussed previously, the Coalition has established that salmon will be impacted by this project as will the Sacramento and Trinity Rivers. The Sites Project Authority should take steps to 1) engage in meaningful consultation and 2) analyze the Project impacts to Tribal trust resources.

The Project proponents fail to meet the tribal consultation legal requirements under CEQA.

The Project proponents have not completed tribal consultation as required by Assembly Bill (AB) 52 under the California Environmental Quality Act.[128]

Beginning in February 2017, the Sites Project Authority sent Project notification letters to seven Tribes identified by the California Native American Heritage Commission that have a "traditional and cultural affiliation with the geographic area of the Project", and as outlined in consultation with California Native Tribes under California Public Resource Code section 21080.3.1. The seven Tribes included: the Cachil Dehe Band of Wintun Indians; Cortina Indian Rancheria of Wintun Indians; Grindstone Indian Rancheria of Wintun-Wailaki; Yocha Dehe Wintun Nation; Paskenta Band of Nomlaki Indians; Mechoopda Indian Tribe; and Estom Yumeka Maidu Tribe of the Enterprise Rancheria.

Only two out of the seven tribes responded in 2017 and subsequently, the same two tribes in 2019 and 2020. In November and December of 2020, the Project proponents attempted to notify all seven Tribes due to Project changes. Five out of seven Tribes that did "not respond" as stated in Table 23-2 "Summary of AB 52 Consultation" either had "no email available" and/or the "tribal office phone did not take messages." Even though "follow-up" emails were sent, there was no indication at any time that the Authority received "receipt of confirmation" from the five out of the seven Tribes that did not respond.

The same could be said about the outreach letter sent to seven additional Tribes by the Sites Project Authority in June 2021. The "seven additional Tribes with traditional and cultural

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landowners have water rights, subject to the paramount rights of the Tribe, sufficient to maintain agriculture on their lands" 723 F.2d 1394, 1397 (9th Cir. 1983).

[126] In *Herrera v. Wyoming*, the United States Supreme Court upheld the Crow Tribe of Indians' treaty right to hunt on unoccupied lands outside its reservation, ruling that the right survived Wyoming's statehood.

[127] In *Agua Caliente v. Coachella Valley Water District, et al.*, the Ninth Circuit Court of Appeals issued a unanimous opinion on March 7, 2017 holding that the *Winters* doctrine applies and that the Tribe "has a reserved right to groundwater underlying its reservation as a result of the purpose for which the reservation was established."

[128] Pub. Res. Code § 21080.3.1; California Government Code § 65352.4.

affiliation to [where] the river reaches [that] were identified within these areas operations" included: Wintu Tribe of Northern California, Redding Rancheria, Konkow Valley Band of Maidu, United Auburn Indian Community of the Auburn Rancheria, Shingle Springs Band of Miwok Indians, Ione Band of Miwok Indians, and Wilton Rancheria. According to Table 23-3 "Additional Outreach to California Native American Tribes" all seven tribal responses were listed as "None" or non-responsive. Reasons listed for not responding included: "unsuccessful attempt to email"; "no email or phone number provided on website"; and "left a message on answering machine." Regardless of whether or not the Tribes received a "follow-up" email, there was no indication by the Authority once again that they received "receipt of confirmation" from all seven additional Tribes.

Furthermore, there is no record of the Winnemem Wintu Tribe being asked for consultation, despite their stated interest in this Project. While federal laws do not mandate consultation with non-federally recognized Tribes, California AB 52 does. California Government Code section 65352.4 defines "consultation" as

> "'the *meaningful* and *timely* process of seeking, discussing, and considering carefully the views of others, in a manner that is cognizant of all parties' cultural values and, where feasible, seeking agreement. Consultation between government agencies and Native American tribes shall be conducted in a way that is *mutually respectful* of each party's sovereignty. Consultation shall also recognize the tribes' potential needs for confidentiality with respect to places that have traditional tribal cultural significance."[129]

Tribal Consultation by the Sites Project Authority has not been "mutually respectful" in its attempt to contact Tribes, and its inadequate attempts at "Tribal Outreach" should not be dismissed.

Making phone calls or sending emails to unspecified people at Tribes at the height of a pandemic does not constitute Tribal consultation or even an attempt to pursue meaningful dialogue. Since the release of the RDEIR/SDEIS, at least two Tribes have commented at public forums that they have not been consulted, or even notified of this Project. Both the Yurok Tribe and Save California Salmon have commented at public meetings or calls with the Sites Project Authority that they are concerned that Tribes are not being invited to meetings.

The Project proponent's engagement with the Yurok Tribe and their subsequent involvement in stakeholder meetings led to changes in the Project, which shows the importance of both formal and informal consultation. Furthermore, there are many more Tribes that will be directly impacted by this Project who, as indicated in the RDEIR/SDEIS, have not been engaged or contacted by any means. These include several within the Bay Area and surrounding locations.

Overall, the substantial amount of non-responses from Tribes due to the incomplete outreach process indicates that tribal consultation for the Project is inadequate. Therefore, the Coalition believes that any further progress on this Project should be remitted until true, proper, and meaningful tribal consultation is complete.

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[129] Emphasis added.

G. Impacts to Climate Change.

The RDEIR/SDEIS fails to adequately analyze the impacts of greenhouse gas (GHG) releases from the project, the influence it will have on climate change, or how these factors will have negative environmental justice impacts.

Given that the project's lead agency under NEPA is inherently a federal agency, it stands that current federal policies are to be considered in project planning including those of the Council on Environmental Quality whose current NEPA guidance supports the need for thorough review of GHG emissions and climate change impacts stemming from any project funded or approved by federal agencies.[130] Relevant to that, current federal policy put forth by Executive Order (EO) 13990[131] states that "…the Federal Government must be guided by the best science and be protected by processes that ensure the integrity of Federal decision-making." Given this guidance and all guidance or requirements needed additionally under CEQA, the RDEIR/SDEIS fails to adequately address the impact the project will have on GHG emissions, climate change, or environmental justice (EJ).

Chapter 21. Greenhouse Gas Emissions.

Within the table summaries of Chapter 21, clear evidence is immediately presented that any and all of the action alternatives will have a Significant Impact/Substantial Adverse Effect during the construction phase. Similarly, a Significant Impact/Adverse Effect is expected during the operations phase. These impacts should not be taken lightly in the face of the current global climatic disaster we are facing and the current list of project activities do not appropriately account for the associated GHG emissions that will come from disturbed natural areas impacted by the reservoir's existence, GHG emissions from changes in the water-level, and other sources of GHGs that will further discussed below.

As referenced earlier, EO 13990 requires that the Federal Government must be guided by the best science. The latest science shows that storage reservoirs significantly contribute to GHG emissions. [132] Based on the latest 2020 study by Harrison et al., data suggest that more methane (CH4) bubbles come from storage reservoirs that was previously known through the processes of degassing and ebullition. This includes bubbling directly out of the reservoir and bubbling that is emitted downstream of a reservoir. This is further supported by a 2017 study conducted by Beaulieu et al. which states that "…water-level drawdowns [of reservoirs] can stimulate ebullitive CH4 flux in reservoirs…, thereby establishing a connection between water-level

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[130] Council on Environmental Quality, "National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions," February 19, 2021, https://www.federalregister.gov/documents/2021/02/19/2021-03355/national-environmental-policy-act-guidance-on-consideration-of-greenhouse-gas-emissions.

[131] Executive Office of the President, "Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis," January 25, 2021, https://www.federalregister.gov/documents/2021/01/25/2021-01765/protecting-public-health-and-the-environment-and-restoring-science-to-tackle-the-climate-crisis.

[132] John A. Harrison et al., "Year-2020 Global Distribution and Pathways of Reservoir Methane and Carbon Dioxide Emissions According to the Greenhouse Gas from Reservoirs (G-Res) Model," *Global Biogeochemical Cycles* no. 6, no. e2020GB006888 (2021).

management and CH4 emissions."[133] Additional studies or text that also support the connection between CH4 emissions and changes in reservoir water levels include Deemer et al. 2016[134], Beaulieu et al. 2016[135], Harrison et al. 2017[136], and the 2017 technical report from the World Bank[137]. Aside from the bubbling of CH4 that contributes this GHG, the scientific literature also suggests that sediment trapping and composition can lead to eventual hot and low spots in a reservoir.[138]

Beyond that, it is well known within the science community that methane releases are a significant concern related to greenhouse gasses and accounts for about 20 percent of global emissions.[139] The Sites Project Authority and the USBR do not analyze or disclose the impacts GHG emissions from reservoir releases at all despite numerous recent studies analyzing reservoir emissions[140] and federal and state regulations and guidance of the issue of GHGs. In the case of Sites, there is good reason to conclude that the operation of the Project will lead to significant GHG emissions in the form of methane due to its location, shallow nature, and polluted source water. Additionally, newer reservoirs are also considered to be sources of methane gas.

Moving away from the reservoir itself, the currently planned Mitigation Measure GHG-1.1 fails to integrate ongoing local, state, national, and global efforts that are working diligently to significantly reduce GHGs. Additionally, the mitigation measure presented has several faults in the logic and approach:

- The measure assumes that the associated plan and actions will meet the goal of reducing and GHGs.
- The measure assumes that operations emissions are reduced over time by relying on the electric power sector having successfully transitioned to more renewable energy sources all while the Project proponents do not make a guarantee that they will ensure that GHG emissions are completely mitigated.
- The measure proposes that the Project may bank credits for the following year of construction and/or operations if emissions are lower than expected during a given year when all actions taken by any federal agency (see EO referenced above) or project should be doing its part to reduce GHG in the first place.

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133 Jake J Beaulieu et al., "Effects of an Experimental Water-Level Drawdown on Methane Emissions from a Eutrophic Reservoir," *Ecosystems (New York, N.Y.)* 21, no. 4 (2018): 657–74, https://doi.org/10.1007/s10021-017-0176-2.

134 Bridget R. Deemer et al., "Greenhouse Gas Emissions from Reservoir Water Surfaces: A New Global Synthesis," *BioScience* 66, no. 11 (November 1, 2016): 949–64, https://doi.org/10.1093/biosci/biw117.

135 Jake J. Beaulieu, Michael G. McManus, and Christopher T. Nietch, "Estimates of Reservoir Methane Emissions Based on a Spatially Balanced Probabilistic-Survey," *Limnology and Oceanography* 61, no. S1 (2018): S27–40, https://doi.org/10.1002/lno.10284.

136 John A. Harrison et al., "Reservoir Water-Level Drawdowns Accelerate and Amplify Methane Emission," *Environmental Science & Technology* 51, no. 3 (February 7, 2017): 1267–77, https://doi.org/10.1021/acs.est.6b03185.

137 World Bank, "Greenhouse Gases from Reservoirs Caused by Biogeochemical Processes" (December 2017), https://doi.org/10.1596/29151.

138 Stephan Hilgert, Cristovão Vicente Scapulatempo Fernandes, and Stephan Fuchs, "Redistribution of Methane Emission Hot Spots under Drawdown Conditions | Elsevier Enhanced Reader," 2019, https://doi.org/10.1016/j.scitotenv.2018.07.338.

139 EPA, "Importance of Methane," 2021, https://www.epa.gov/gmi/importance-methane.

Beyond the construction and operations, claims made in Chapter 21 about Recreational Vehicles Trips are also faulty in their logic. During a time where public interest in outdoor recreation opportunities is continuously growing[141] and was accelerated by the COVID-19 pandemic, claiming that less visitors will travel to existing reservoirs is immensely flawed. The construction of another reservoir would likely increase the amount of Recreational Vehicle Trips and contribute to GHG emissions.

Chapter 28. Climate Change.

As discussed earlier, the fact that several assumptions are made about GHG emissions, their mitigation, and lack of proper assessment, the fact that GHGs will be an issue conversely poses an issue in terms of climate change. It goes without saying that GHGs contribute to climate change. Unfortunately, the building of a reservoir will contribute GHGs and essentially create a negative feedback loop. The likely constant flux of water storage, low water years, aquatic area for HABs to grow, and resulting reduced potential in carbon storage in the land will all exacerbate climate change impacts.

Chapter 30. Environmental Justice and Socioeconomics.

In addition to pushing for the use of best science, EO 13990 is only one of many federal Executive Orders[142] requiring agencies to not only consider, but prioritize Environmental Justice (EJ) as part of agency actions. That said, the summary tables of Chapter 30 explicitly note that any and all of the action alternatives will have a Substantial Adverse Effect on Minority Populations and Low-Income Populations. In addition, the summary tables also outline that even with Mitigation Measures that are currently considered, EJ impacts will not be fully reduced. If this is the case for identified effects, then any *unidentified* effects will surely not be mitigated at all.

In a time where there is a racial and social reckoning occurring, EJ considerations for such an impactful Project should not only be properly assessed, they should be prioritized in the RDEIR/SDEIS.

Chapter 31. Cumulative Impacts.

While there is a list of several planning documents that were reviewed as part of the RDEIR/SDEIS, there is no mention of any state legislation or international climate change guidance. As such, the Coalition assumes the RDEIR/SDEIS does not consider the cumulative impacts of GHG emissions, climate change, or environmental justice. This requires significant attention and the Coalition requests the Project proponents address this issue in a revised RDEIR/SDEIS.

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[141] Patricia L. Winter et al., "Outdoor Recreation, Nature-Based Tourism, and Sustainability," *Sustainability* 12, no. 81 (2020).

[142] Executive Office of the President, "Executive Order on Tackling the Climate Crisis at Home and Abroad," January 25, 2021, https://www.energy.gov/nepa/articles/eo-14008-tackling-climate-crisis-home-and-abroad-2021.

Chapter 14. Land Use.

When considering the concept of land conversion and its contribution to climate change, there is significant and well-known evidence that conversion of natural or working lands (NWL) plays a major role in the climatic changes we are facing across the globe. With this in mind, RDEIR/SDEIS Chapter 14, *Consistency with Land Use and Zoning Designations* states:

> "In Glenn County, the existing land use designations and zoning…are Foothill Agriculture/Forestry and Intensive Agriculture, neither of which specifically allows the construction of a reservoir and associated facilities. The County of Glenn may need to amend its general plan."

Not only does this acknowledge that NWL, which have potential to store carbon, are being converted into a different land use type, but that the current local planning guidance in one of the counties of the Project area does not support the construction of the Project or its related facilities.

V. The National Wild and Scenic Rivers Act (NWSRA) requires federal agencies to consider potential wild, scenic, and recreational river areas in all basin and project plan reports and to evaluate this potential as alternative uses of the water.

Section 5(d)(1) of the NWSRA states:

> In all planning for the use and development of water and related land resources, consideration shall be given by all Federal agencies involved to potential national wild, scenic and recreational river areas, and all river basin and project plan reports submitted to the Congress shall consider and discuss any such potentials. The Secretary of the Interior and the Secretary of Agriculture shall make specific studies and investigations to determine which additional wild, scenic and recreational river areas within the United States shall be evaluated in planning reports by all Federal agencies as potential alternative uses of the water and related land resources involved.

In plain language, this means that rivers and streams that may be impacted by water resource projects should be assessed for their potential as nationally protected wild and scenic rivers and that this protection should be considered as an alternative to water resource development.

In passing the NWSRA in 1968, it was the stated intent of Congress to "complement" the nation's existing national policy of dam building with a new policy to protect for the benefit and enjoyment of present and future generations certain selected free-flowing rivers with outstanding remarkable scenery, recreation, geology, fish, wildlife, history, and cultural values. The NWSRA was and continues to be an important balance to ensure that some free-flowing rivers are protected for their outstanding natural and cultural values, water quality and other vital national conservation purposes.[143]

There is significant precedent for the implementation of this legal requirement, including:

- San Joaquin River Gorge – In 2014, the Bureau of Land Management (BLM) completed a section 5(d)(1) wild and scenic river evaluation of the San Joaquin River Gorge in response to a proposal to build the Temperance Flat Dam. The BLM found an 8-mile segment of the Gorge to be eligible for NWSRA protection and recommended to Congress that the river should added to the federal system. This was in tandem with the Bureau of Reclamation's proposed study of the Temperance Flat Dam and Congress' consideration of authorization and funding for the dam.[144]
- North & Middle Forks American River – In 1993, the Bureau of Reclamation completed a section 5(d)(1) wild and scenic river evaluation of the North and Middle Forks American River in conjunction with their study of the proposed Auburn Dam. Reclamation headed up a multi-agency team that also included the BLM, California Dept. of Parks and Recreation, U.S. Forest Service, and the USFWS, which found 44 miles of the North and Middle Forks to be eligible for NWSRA protection. This eligibility

[143] National Wild and Scenic Rivers Act, sec. 1(b).
[144] Bakersfield Resource Management Plan & Record of Decision, BLM, December 2014.

decision was considered when Congress debated authorization of the proposed Auburn dam, ultimately rejecting the project three times.[145]

- Sacramento River – In 1993, the BLM completed a section 5(d)(1) wild and scenic river evaluation of the Sacramento River between Balls Ferry and Red Bluff. The agency found a 25-mile segment of the river to be eligible due to its outstanding remarkable scenery, recreation, fish, history, culture, and ecological values.[146] In 1975, the U.S. Army Corps of Engineers ("USACE") completed a section 5(d)(1) wild and scenic river evaluation of the Sacramento River from Keswick Dam to Sacramento because the agency was considering several water resource projects that could impact the river. Perhaps because the USACE evaluation was conducted prior to the adoption of detailed federal guidelines concerning the evaluation and management of wild and scenic rivers, the 1975 document failed to come to any conclusions about the river's eligibility, but it did identify the significant natural values of several segments of the river.[147] In 1983, the National Park Service completed the Nationwide Rivers Inventory, which was intended to identify potential NWSRA candidates. The 1982 inventory and the current NRI both identify a 96 mile segment of the Sacramento River between Redding and Colusa as a potential candidate for NWSRA protection, due to the river's outstanding scenery, recreation, fish, wildlife, and ecology values.[148]

In response to the NWSRA section 5(d)(1) mandate, federal agencies such as the Forest Service, BLM, National Park Service, and even the USBR have identified nearly 2,700 miles of rivers and streams as eligible for NWSRA protection.

Several federal actions warrant evaluation of the Sacramento River's NWSRA eligibility, including adoption of federal guidelines outlining in detail how to conduct section 5(d)(1) studies, establishment of the Sacramento River National Wildlife Refuge (SRNWR) by the USFWS (which includes 30 properties along the Sacramento River between Red Bluff and Colusa totaling 10,353 acres), and the proposal to divert significant amounts of freshwater from the Sacramento River to fill the proposed Project.

Establishment of the SRNWR complements the efforts of non-federal agencies to protect and restore riparian habitat along the Sacramento River between Red Bluff and Colusa, including the 3,900-acre Sacramento River Wildlife Area managed by the California Department of Fish and Wildlife, three state parks on the river managed by the California Department of Parks and Recreation, and on-going efforts by NGOs to acquire and restore riparian habitat. Altogether, there are more than 38,000 acres of protected conservation lands along the Sacramento River between Redding and Colusa, much of the federal lands managed by the BLM and USFWS.

It is important to note that NWSRA protection would not necessarily prohibit the diversion of freshwater from the Sacramento River by the proposed Sites Reservoir. It would

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[145] Determination of Wild and Scenic Eligibility of Segments of the American River, Bureau of Reclamation, Mar. 1993.
[146] Redding Resource Management Plan & Record of Decision, BLM, June 1993.
[147] Wild, Scenic, and Recreational Characteristics Sacramento River, Calif., Keswick Dam to Sacramento, US Army Corps of Engineers, August 1975.
[148] https://www.nps.gov/maps/full.html?mapId=8adbe798-0d7e-40fb-bd48-225513d64977

require that such diversions *do not harm* the free-flowing condition of the river and its outstanding remarkable natural and cultural values. Rivers can be deemed "free-flowing" even if their flows are modified by upstream dams and instream diversions – as long as the sufficient flow remains in the river to maintain its specific outstanding values.

Several factors require a section 5(d)(1) NWSRA evaluation of the Sacramento River at this time. They include:

- Both the BLM and the USFWSR manage federal public lands along the Sacramento River between Redding and Red Bluff;
- Federal funds may be used to construct the Sites Project and federal funds have and will continue to be used to acquire, protect, and restore riparian and aquatic habitat along and in the Sacramento River;
- The Bureau of Reclamation is the federal partner in the proposed Sites Reservoir Project, and;
- Flows in this reach of the river could be modified by Sites diversions in a manner that adversely affects the river's free-flowing condition and outstanding values.

These factors unambiguously require compliance with NWSRA section 5(d)(1). The RDEIR/SDEIS must be withdrawn and revised to include a NWSRA section 5(d)(1) study of the Sacramento River.

VI. The RDEIR/SDEIS is deficient because it does not provide adequate mitigation for environmental impacts and is missing critical information, therefore recirculation of a Revised EIS/EIR is required.

Due to the previously described deficiencies, and resulting RDEIR/SDEIS failure to disclose environmental impacts from the project and project alternatives, the NGO coalition believes that recirculation of a revised RDEIR/SDEIS is legally required.[149]

VII. Conclusion.

Thank you for the opportunity to comment on the RDEIR/SDEIS for the proposed Sites Reservoir Project. Due to the multiple failures and deficiencies described in these comments, the NGO Coalition requests that the Sites Project Authority revise and recirculate the RDEIR/SDEIS to the public.

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[149] *See, e.g., Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova*, 40 Cal.4th 412, 447-449 (2007).

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APPENDICES

No.	Title
1	Sites Reservoir DEIR/DEIS Comments by Friends of the River, Sacramento River Preservation Trust, and Sierra Club Mother Lode Chapter (January 15, 2018)
2	Sites Reservoir DEIR/DEIS Comments by Natural Resources Defense Council (NRDC), Defenders of Wildlife, The Bay Institute, Pacific Coast Federation of Fishermen's Associations, Institute for Fisheries Resources, Center for Biological Diversity and Golden Gate Salmon Association (January 15, 2018)
3	Sites Reservoir DEIR/DEIS Comments by NRDC et al. Addendum A
4	Sites Reservoir DEIR/DEIS Comments by NRDC et al. Addendum B
5	Sites Reservoir DEIR/DEIS Comments by NRDC et al. Addendum C
6	Sites Reservoir DEIR/DEIS Comments by California Sportfishing Protection Alliance, AquAlliance and the California Water Impact Network (January 13, 2018)
7	Sites Reservoir DEIR/DEIS Comments by AquAlliance (October 1, 2017)
8	Sites Reservoir DEIR/DEIS Comments by the California Department of Fish and Wildlife (January 12, 2018)
9	Sites Reservoir DEIR/DEIS Comments by the State Water Resources Control Board (January 12, 2018)
10	NGO Coalition Request for a Recirculated Draft Sites Reservoir EIS/EIR (March 17, 2019)

Appendix 1

January 15, 2018

Mr. Jim Watson
Sites Project Authority
P.O. Box 517
Maxwell, CA 95955
Via Email: EIR-EIS-Comments@SitesProject.org

Re: Comments on Sites DEIR/S

Dear Mr. Watson:

Thank you for inviting comments on the Sites Reservoir Project Draft Environmental Impact Report/Statement (DEIR/S).

Overall, the DEIR/S is incomplete and deficient. Much of the document appears to be boilerplate from DWR's 2013 administrative DEIR for the same project. In addition, our review discovered numerous instances were absolute mistakes have been made. Our impression is that this important document was rushed out the door for public review to meet California Water Commission funding deadlines. We believe that the Sites JPA should withdraw this inadequate DEIR/S, revise it to correct mistakes, including additional information concerning the many issues raised by the public, and recirculate it for further public review and comment.

I. The DEIR/S does not provide an adequate description of the project.

The DEIR/S does not provide an adequate description of the project. It fails to describe how the project will be operated. Although one operation scenario is described in the accompanying Feasibility Report, it is unclear that the operation summarized in the report is encompassed by any of the DEIR/S alternatives. The Feasibility Report summarizes CVP/SWP contract deliveries and environmental water deliveries under each Alternative in Table ES-2. No similar table is found in the DEIR/S, making it difficult to determine whether the Feasibility Report is describing the same project operationally as the one in the DEIR/S. The DEIR/S also fails to identify the preferred environmental uses of Sites water. Instead, a menu of different environmental uses is offered but none are identified as preferable, leaving reviewers to wonder which environmental benefits the final project will provide. The DEIR/S is also unclear as to who operates the project and who will assume the responsibility for meeting project outputs and environmental compliance.

II. The DEIR/S does not offer an adequate range of alternatives.

The DEIR/S focuses largely on alternatives that maximize storage. Three of the four retained alternatives include a 1.8 million acre feet (MAF) reservoir and one alternative on a 1.3 MAF reservoir. The .8 MAF alternative was eliminated in the preliminary evaluation without any discussion about the impacts and benefits of this alternative in comparison to the larger reservoir alternatives. The alternatives examined in detail do not offer a range of different environmental benefits. None of the alternatives consider the potentially significant impacts of the Sites project on other concurrent actions. These include the California Water Fix, Water Board's Phase II update of the Bay-Delta Water Quality Plan, Central Valley Flood Protection Plan, Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project, and other projects and actions. No preferred alternative is identified, leaving reviewers to assume that Alt. C or D will likely be the alternative chosen in the final EIR/S. However, USBR NEPA guidelines require evaluation of all resource management alternatives, including a preferred alternative. The same guidelines also note that essential consultation with the USFWS and other agencies is usually initiated for a preferred alternative. The DEIR/S alternatives analysis would benefit substantially from consultation with other agencies.

III. The DEIR/S fails to includes any meaningful information about water rights.

The DEIR/S fails to include any meaningful information about water rights needed to operate the project. The project intends to use water from Sacramento River tributaries and cites a 1977 water rights application submitted by the state. But little or no information is provided on how the project will ensure that only tributary water will be diverted to Sites. Nor does it address the issue of water rights over-allocation or the Water Board's Phase II process.

IV. The DEIR/S fails to adequately consider the impacts of Sites diversions on the Sacramento River.

The DEIR/S fails to adequately consider the impacts of Sites diversions on the Sacramento River and the river's flow-driven ecosystems, which support numerous sensitive, threatened, and endangered species. A major deficiency in the DEIR/S is that the Sacramento River, the source of water used to fill the Sites Reservoir, is considered part of the Secondary Study Area, with the implication that this secondary area requires less rigor in the analysis.

We believe that the DEIR/S is incorrect in asserting that impacts to the river will be less than significant. The DEIR/S does admit that project impacts on the Sacramento River's shaded riverine aquatic (SRA) habitat is unknown but fails to disclose this as a potentially significant impact. At the minimum, we believe the reach of the Sacramento River directly affected by Sites diversions should be included in the Primary Study Area, that further analysis is needed, and that impacts on the river and its SRA habitat should be considered potentially significant.

Models –

Much of the DEIR/S analysis depends on the use of computer models with known deficiencies, particularly CALSIM II. CALSIM II's "daily flow disaggregation below Red Bluff Diversion Dam (RBDD) is known to be flawed…flows below RBDD **are for testing and demonstration purposes only**."[1] According to a National Academy of Sciences assessment, many CALSIM II users believe that the model's primary limitation is its monthly time step and that the model should be used primarily for comparative analysis between scenarios, but its use for absolute predictions should be discouraged. This same assessment found that although use of models like CALSIM II is justified despite flaws, these models do not go far enough toward an integrated analysis of reasonable and prudent alternatives, and improvements were needed.[2] Further, even USBR admits that the CALSIM II disaggregation process used to simulate daily flows for modeling water quality "results in a crude representation of flow and temperature conditions on a daily time scale."[3]

The DEIR/S asserts that the problems with CALSIM II have been rectified with a new model, USRDOM, but no information is provided as to the provenance and accuracy of this model, or even if it has been peer reviewed. Four other models utilized to analyze various impacts on the Sacramento River are based on the CALSIM II/USRDOM models, which increases risk and uncertainty if these models are inadequate.

Environmental Standards –

The DEIR/S bases its finding of no significant impact on the assertion that the project will be operated to meet existing flow standards for the Sacramento River and existing requirements established in biological opinions for threatened and endangered fish in the river. But these flow standards are inadequate. They are intended to meet water temperature targets for the river upstream of Red Bluff and to ensure that a minimum amount of salmonid spawning habitat is covered. The existing minimum flows of 3,250 CFS and BiOp requirements have largely failed to prevent the continued decline of Sacramento River salmonids.

The standard that ensures a minimum flow in the Sacramento River of 5,000 CFS is intended to provide for commercial river traffic that no longer exists and is not based on environmental needs. No standards have been established to ensure that flows are provided to maintain the river's complex flow-driven riparian and aquatic ecosystems. Claiming less than significant impacts based on compliance with weak and inadequate standards is a major flaw in the DEIR/S that must be rectified. Any "take" of water from an already over-allocated and stressed riverine

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[1] ESSA Technologies, March 2008, SacEFT Analysis Results Appendix F, pg. F-3.
[2] National Academy of Sciences 2010, A Scientific Assessment of Alternatives for Reducing Water Management Effects on Threatened and Endangered Fishes in California's Bay Delta.
[3] USBR, Fish and Wildlife Coordination Act Report Appendix, Shasta Lake Water Resources Investigation, June 2013.

system that supports many threatened and endangered species is, by definition, a significant impact.

Flow tables in the DEIR/S appendices confirm that the project will divert water much of the year and in virtually all water years, which will increase the likelihood that river flow will be reduced to minimum levels. There is little or no information available about the potential impacts to the Sacramento River associated with the project reducing river flow to minimum levels, particularly in dry and critically dry years. On average, the project will reduce flows in the Sacramento River downstream of Red Bluff 11 months out of the year and by as much as 8.3% in March (an important month for riparian habitat regeneration). Even more significant flow reductions will also occur in the Sacramento River in critically dry years during March. But because the project will meet the currently inadequate minimum flow standard, the DEIR/S assumes no significant impact.

Public Lands & Land Use –

The DEIR/S notes that non-compliance with existing land use plans is a significant unavoidable impact. But the Land Use chapter primarily focuses on non-compliance with county general plans and barely acknowledges land use associated with federal and state public lands along the Sacramento River. Federal and state agencies, as well as many non-governmental organizations, have spent millions of dollars to acquire lands along the Sacramento River to protect and restore riparian habitat and to provide public recreation opportunities. At least 20,000 acres of public lands are located on the river between Red Bluff and Colusa, including units of the Sacramento River National Wildlife Refuge, the Sacramento State Wildlife Area, and three state parks. The presence and ecological health of these public lands, even where they are adjacent to proposed project facilities, are virtually ignored in the DEIR/S. Existing and restored riparian habitat on these public lands depend on Sacramento River flows, which will be modified by the project. The Land Use chapter also fails to recognize the Upper Sacramento River Fisheries and Riparian Habitat Plan (aka, the S.B. 1086 plan) or its implementing entity, the Sacramento River Conservation Forum as land use plans. Compliance with these impact plans must be assessed in the DEIR/S.

V. The DEIR/S fails to adequately describe potential project impacts on Sacramento River water quality.

The DEIR/S claim of less than significant project impacts on water quality creates a high level of concern. Sites is a relatively shallow reservoir located in a part of the Sacramento Valley known for its extreme summer temperatures. And yet the models used to assess temperature impacts associated with Sites releases into the Sacramento River suggest that temperature impacts will be minimal (in many cases, less than 1% change in temperatures). This claim challenges all logic and raises concerns that the USRWQM, CALSIM II and USRDOM models are inadequate to accurately assess these impacts. In addition, helping to meet water quality standards is a primary environmental benefit from Sites, and yet this benefit remains unquantified. Documents produced by DWR and the Sites JPA suggest that the Delta water quality benefit simply disappears when the Delta tunnels are constructed. The DEIR/S fails to disclose where this environmental water goes if the tunnels become a reality.

VI. The DEIR/S fails to adequately address the potential for reservoir-triggered seismicity (RTS), particularly on local communities and structures.

The DEIR/S discounts the possibility of the Sites reservoir triggering an earthquake. It notes that RTS earthquakes are primarily associated with reservoirs deeper than Sites. But the DEIR/S fails to fully examine the role that frequent filling and emptying of Sites would play in potentially triggering earthquakes. Faults beneath the reservoir footprint are capable of producing up to scale 7 earthquakes. Triggering of such quakes by Sites has serious implications for unreinforced structures in homes, ranches, and communities adjacent to the reservoir. The DEIR/S discounts the possibility of Sites triggering a seismic event because the reservoir is slightly smaller than the large reservoirs typically associated with RTS and because the faults beneath the reservoir and the associated rocks are compressed and have relatively low permeability. Nevertheless, the DEIR/S does admit that smaller reservoirs have been known to create RTS and at least one of two existing reservoirs located along the same fault system has been subject to RTS.

The DEIR/S fails to address the fact that repeated filling and draining of Sites is an important RTS factor. Protracted RTS (occurring long after a reservoir was initially filled) depends on the frequency and amplitude of lake-level changes, reservoir dimensions, and hydromechanical properties of the substratum. Earthquakes are associated with large and/or rapid lake-level rises. The Monticello Reservoir in South Carolina, which is much smaller than Sites, has experienced protracted RTS, perhaps because it's a pumped storage facility similar to Sites. In addition, RTS seems restricted to shallow depths with pumped storage reservoirs.[4] Located across the Coast Range west of Sites, Lake Mendocino in Mendocino County is both smaller and shallower than Sites, but it too has experienced RTS associated with the refilling of the reservoir after the 1976-77 drought.[5]

The DEIR/S needs to provide a more robust assessment of potential RTS at Sites and its implications, particularly regarding public safety and the potential RTS threat to unreinforced buildings and structures adjacent to Sites.

VII. The DEIR/S fails to adequately address the potential for the project to increase greenhouse gases that contribute to global climate change.

Most of Chapter 24. Climate Change and Greenhouse Gas Emissions focuses on the Sites project's production of greenhouse gas (GHG) emissions associated with construction and

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[4] Talwani, Pradeep. On the Nature of Reservoir-induced Seismicity. Pure and Applied Geophysics, 1997.

[5] Toppozada, T.R. and C.H. Cramer, Ukiah Earthquake, 25 March 1978: Seismicity Possibly Induced by Lake Mendocino, California Geology, December 1978.

pumped storage operations. The relatively brief section addressing the known effect of reservoirs passively producing GHGs (primarily CO2) concludes without any information supporting the contention in the DEIR/S that Sites is "unlikely to produce substantial GHG emissions." This statement cites Soumis 2004 and Tremblay 2005 as the source of this conclusion. Soumis assessed Shasta, Oroville, and New Melones reservoirs in California and found that Shasta and Oroville produce GHGs. We were unable to find a free copy of Tremblay 2005 on the internet to review. But given the Soumis findings, we recommend that a revised DEIR/S follow the World Bank's guidelines on GHG measurement, preliminary GHG assessment took, and methodology to investigate the potential for Sites to passively produce GHGs.[6]

VIII. The DEIR/S fails to adequately assess impacts on rare plants in the project reservoir footprint.

The DEIR/S claims that all impacts on vegetation communities and rare plants are mitigated to less than significance. There is uncertainty that the federally protected Keck's checkerbloom is present in the primary study area, which requires additional scientific investigation. Given this, the impact on this specific plant should be considered potentially significant. Impacts on other rare plants present or directly adjacent to the primary study area are allegedly reduced to insignificance by following USFWS, CDFW, and CNPS compensation guidelines. However, these guidelines are not provided in the chapter or appendix, making it difficult for reviewers to determine whether full "compensation" is achieved. A revised DEIR/S should include the guidelines and provide sufficient explanation as to how following these guidelines reduce adverse impacts on rare plants to less than significant levels. In addition, the revised DEIR/S should confirm whether the endangered Keck's checkerbloom is found in the primary study area.

IX. The DEIR/S overstates potential project benefits for threatened and endangered salmonids.

A major environmental benefit attributed to the Sites project in the DEIR/S is the potential for coordinated operations between Sites and the existing Shasta, Oroville, and Folsom dams to provide cold water suitable for threatened and endangered salmonids in the Sacramento, Feather, and American Rivers. We do not regard this as a net environmental benefit associated with Sites. Instead, this "benefit" is quite simply mitigation for the existing impacts of these dams. It should be noted that Prop. 1 water bond funding cannot be used to mitigate environmental impacts. Fundign for such mitigation should be provided by those who directly benefit from the dam operations.

Even though the Sites JPA intends to spend millions of dollars of public Prop. 1 funds to provide supposed salmonid benefits, this benefit is not adequately quantified in the DEIR/S. USBR's draft Feasibility Report does provide some quantification of salmonid benefits. On average over the full 82-year simulation period, Alt. D will boost endangered winter run chinook salmon by a

[6] World Bank, Greenhous gas emissions related to freshwater reservoirs, January 2010.

modest 3.3% and threatened spring chinook salmon by 2.4%. In dry years, winter chinook numbers are slightly less (3.2%) than the average improvement, and only slightly improved above the average in critically dry years (4.8%). There is no attempt to assess whether these modest improvements are worth the public cost, or for that matter, represent a net benefit over the more difficult to assess changes caused by Sites operation in the Sacramento River's aquatic ecosystems. Further, there is not attempt to compare these benefits with other actions that could improve salmonid habitat and survival.

It's important to note that the USFWS found that similar modest improvements in threatened and endangered salmonid survival generated by additional cold water from a proposed enlarged Shasta Reservoir was "very limited."[7] The USFWS also found that the cold water improvement was not superior to other actions such as restoring spawning and rearing habitat, improving fish passage, increasing minimum flows, and screening unscreened water diversions. The USFWS also expressed concern that further water resources development on the Sacramento River would result in additional losses of salmonid rearing and riparian habitat and adversely affect the recruitment and natural succession of riparian habitat along the Sacramento River, which is much contributor to SRA habitat.

Scientific research has underscored the importance of the Sacramento River flood plain, including its flood bypasses, in providing optimum conditions for the growth and survival of young out-migrating salmon. The Sites DEIR/S proposes to boost spills into flood bypasses in a few select months and during a few select water years. But the narrative in the DEIR/S fails to acknowledge the cost of this action – reduced bypass spills over many more months and water years. There is no information in the DEIR/S to quantify improved salmonid survival from the boosted spills in comparison to the reduced spills, making it impossible to determine whether this represents a "net" environmental benefit.

The DEIR/S must be withdrawn and revised with more information and better quantification of salmonid improvements and how these improvements could be achieved without Sites.

X. Detailed Comments on Specific Chapters

Chapter 2. Alternatives Analysis

The range of alternatives considered in the DEIR/S is inadequate. Not only does the document focus on the largest possible reservoirs with maximum diversions from the Sacramento River, it fails to consider an adequate range of environmental purposes and benefits that could be provided by the reservoir. Although several environmental uses are mentioned in the DEIR/S, no definitive list of environmental uses is provided by alternative. There is simply a block of water apparently dedicated to environmental use, with no attempt to identify the best environmental use of this water. Instead, JPA staff have indicated that environmental use of

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[7] USFWS, Fish and Wildlife Coordination Report for the Shasta Lake Water Resources Investigation, November 2014 (revised).

this water will be determined later by the state. Since providing water for the environment is a major purpose of the reservoir, the DEIR/S should fully incorporate environmental water benefits in an adequate range of alternatives and not passively leave this up to the state.

Pg. 2-20, Table 2-4 and last paragraph: This table displays 15 alternatives – four alternatives that include an .8 MAF reservoir, five alternatives that include a 1.3 MAF reservoir, and six alternatives with a 1.8 MAF reservoir. The reservoir options are then filtered using three different combination of conveyance options. Ultimately, only five alternatives based on the the two largest reservoir sizes are chosen for detailed analysis. Table 2-4 is heavily weighted towards the large reservoir options. The last sentence on this page implies that water supply yield was the overriding filter for formulating alternatives.

Pg. 2-21, Table 2-5 and paragraph 2: The DEIR/S refers to Table 2-5 and states that it shows that "the first three reservoir storage and conveyance options…perform much better" than other options. No explanation is given to support this conclusion, leaving reviewers to conclude that first three options appear to be "much better" to the Sites proponents simply because two of the three options include the largest reservoir and the maximum number of diversions.

The DEIR/S should more carefully consider other alternatives, such as the .8 MAF reservoir using just the new Delevan diversion to reduce flow impacts on the upstream reach of the Sacramento River where river meander is not constrained by levees.

In addition, the DEIR/S should consider an alternative that minimizes storage for consumptive water uses and focuses on providing additional water for maintaining Sacramento River meander, providing wildlife refuge water supply, and other environmental purposes.

Several other projects and actions are currently underway that will have serious implications for Sites operations, including the so-called "California Water Fix" (aka Delta tunnels) and the U.S. Bureau of Reclamation's (USBR) recent Notice of Intent to revise coordinated long-term operations of the CVP/SWP to maximize water deliveries. These two projects alone will have huge implications on the Sites project, but the Sites DEIR/S fails to even mention them. The lack of cumulative impact analysis of this project and other projects and actions that compete for Sacramento River water is a fatal flaw in the DEIR/S.

Chapter 6. Surface Water Resources

No mention is made in this chapter of the State Water Board's (SWB) Phase II Update of the Bay-Delta Plan. The Phase II update is intended to address inflows to the Sacramento River, tributaries, and the Delta. SWB released a final Scientific Basis Report for the Update that found the Bay-Delta ecosystem to be in a state of crisis. Native fish populations have declined precipitously, "…attributed in part to flow modifications due to dams and water diversions and related operations." Upstream water diversions and exports have reduced January to June outflows by an estimated 56% in average and by more than 65% in dry years. DEIR/S Appendices 6B and 6C show that Sites diversions will reduce spring flows even further, particularly in low water years. The SWB report stated that "flow modifications greater than 20 percent likely result in moderate to major changes in natural structure and ecosystem function." The science report proposes new inflow requirements for anadromous fish-bearing tributaries in the Sacramento River basin. The report proposes a numeric inflow objective of 35 to 75 percent of unimpaired flows.[8]

Because the Sites DEIR/S complete fails to address Phase II, the potential impacts of the Sites project on Delta inflow/outflow are undisclosed. This is a major failure of the document requiring that the DEIR/S be withdrawn and revised for public review and comment to address Phase II objectives.

This chapter also fails to address the critical issue that the state has granted rights to far more water than is reliably produced annually by natural run-off. Rights have been granted to approximately five times more water than produced by the state's mean annual runoff. The greatest degree of over-appropriation is in the Sacramento and San Joaquin river basins. About 155% of the Sacramento River's mean annual runoff has been appropriated.[9] Water rights over-allocation becomes particularly acute and obvious in drought years.

Operation of Sites Reservoir could potentially address this problem by diverting water only in high water years and releasing water in dry years. But Sites diversions are planned in every water year type, including critically dry years. Dry year diversions will only make the water rights over-allocation problem worse. According to DEIR/S Appendix 6B, critical water year diversions to Sites will reduce Sacramento River flows below the Red Bluff Diversion Dam by 11.2% in February, below Hamilton City by 13.3% in March, and below the Delevan intake by 11.8% in February.

Pg. 6-12, Table 6-1: This table summarizes existing CVP/SWP water contract "demands." Just as rights have been granted to more water than is produced, water contracts promise to deliver more water than is available. Water management problems will continue so long as existing but unrealistic water rights and contracts form the baseline for perceived water demands and needs.

Controversy over water management in California is based on the perception that there remains "unused" in the Sacramento and other river systems. This is simply not the case, in that all water, even the water that flows to the sea during above normal water uses, is fulfilling a critical environmental function. The DEIR/S should be withdrawn, revised to address the water rights over-allocation issue, and released for additional public review.

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[8] State Water Resources Control Board, Scientific Basis Report in Support of New and Modified Requirements from the Sacramento River and its Tributaries and Eastside Tributaries to the Delta, Delta Outflows, Cold Water Habitat, and Interior Delta Flows. Final 2017.

[9] Grantham, T.E., J.H. Viers, 100 years of California's water rights system: patterns, trends, and uncertainty. Environmental Research Letters, August 2014.

Chapter 8. Fluvial Geomorphology

The analysis in this chapter is adversely affected by the fact that the Sacramento River between Red Bluff and Colusa is considered part of the Secondary Study Area. The Sacramento River is the source of the water to fill the reservoir. To consider the affected river reach to be part of the Secondary Study Area implies that less rigor and analysis is required.

Pg. 8-7, paragraph 2: The DEIR/S cites the 2000 report, *Flow Regime Requirements for Habitat Restoration along the Sacramento River Between Colusa and Red Bluff* (CALFED, DWR). It correctly notes that the "study indicated that the overall flow regime requirements for the Sacramento River could not be determined without further long-term studies…" Since these long-term studies have not be conducted or completed, this raises the serious concern that the DEIR/S conclusion that Sites will have a less than significant impact on Sacramento River fluvial geomorphology, riparian habitat, and river meanders is simply not supported by adequate knowledge and data.

Pg. 8-17, paragraph 4: Using historical daily flow patterns to calculate flow projections from the monthly CALSIM II results does not provide an adequate analysis of potential impacts. This is a long-standing criticism of CALSIM II. According to Appendix 6C, the average monthly flows provided by CALSIM II are "downscaled" to provide an estimate of daily flows by another model, USRDOM. The provenance of USRDOM is unknown. It does not appear to be referenced in Reference Chapter 37. An internet search found references to USRDOM in respect to this DEIR/S and in background documents provided to the California Water Commission, but little else. The USRDOM model wasn't used in similar recent analyses, such as the 2014 Shasta Lake Water Resources Investigation. Appendix 6C does not disclose the source of the USRDOM model or whether it has been peer reviewed. Further, Appendix 6C provides no information on how USRDOM "downscales" monthly flows into daily flows. Without this important background, reviewers must assume that USRDOM simply divides CALSIM II's monthly flow average by the number of days in the month to provide an estimate of daily flows. If this is the case, then estimating flow impacts using CALSIM II still has serious drawbacks.

Pg. 8-17, paragraph 5: Appendix 8A is cited as the source of information to determine the impact of the project on sediment transport capacity. Appendix 8A is USBR Technical Report No. SRH-2011-21, *Sacramento River Migration Analysis of NODOS Alternatives*. The alternatives analyzed in this 2011 technical report do not appear to be the alternatives analyzed in the 2017 Sites DEIR/S and the report's conclusions cannot be automatically incorporated into the DEIR/S without further analysis and explanation.

Pg. 8-18, paragraphs 2 & 5: The SRH-Meander, SRH-1DV (vegetation), and the SacEFT (ecological flows) models are cited as informing this analysis. Although not specifically cited, this discussion seems to be derived from USBR Technical Report No. SRH-2009-27, *Calibration of Numerical Models for the Simulation of Sediment Transport, River Migration, and Vegetation Growth on the Sacramento River*, California, NODOS Investigation Report, March 2011. This technical report cites five models analyzed, noting that:

> "…no single model can simulate all the interacting river processes in complete detail. The strategy applied in this investigation was to use models that focus on difference processes and different scales so that a more complete understanding of each process, and process interactions, could be understood. Five models are used to examine hydraulics, sediment transport, river meandering, and vegetation establishment and survival." Pg. vii

No explanation is given as to why just three of the five models are cited in Chapter 8.

Pg. 8-23, last paragraph; Pg. 24, paragraphs 1-2: The DEIS states that sediment entrainment by the Tehama-Colusa Canal (TCC) under Alt. B would be "approximately 62,000 tons per years as compared to 40,000 tons under the Existing Conditions/No Project/No Action Condition" and cites Appendix 8A as the source of this information. We can find no such information in App. 8A. Further, as previously noted, the alternatives analyzed in the USBR technical reports that comprise App. 8A do not appear to be the same alternatives analyzed in the DEIR/S. It's worth noting that sediment entrainment by the TCC appears to increase by 55%. The GCID diversion would increase sediment entrainment by 46%. This suggests significant sediment entrainment that could impact river meander and riparian succession.

Pg. 8-25, paragraph 4: The DEIR/S states that "It is not certain how Alternative B would affect the shaded riverine aquatic (SRA) habitat that occurs along the banks of a stream." The USFWS considers SRA habitat to be Resource Category 1, representing "one-of-a-kind areas" that "cannot be replaced."[10] This statement underscores the need to more fully analyze this impact. At the minimum, The DEIR/S must acknowledge that impacts to SRA are potentially significant.

Pg. 8-27, paragraphs 4-5 & 7: The DEIR/S again cites sediment entrainment numbers under Alt. C not found in App. 8A. It's again worth noting that the sediment entrainment increase at the TCC and GCID diversions amount to 20-21%, which seems substantial. The 7th paragraph refers to Alt. A. This appears to be incorrect since this section focuses on the impacts of Alt. C.

Pg. 8-28: Paragraph 5 refers to Alternative B when the narrative is about Alt. C. Regarding the statement about SRA habitat in paragraph 7, please refer to our comment about the identical statement found on pg. 8-25.

Pg. 8-30, paragraph 1: The DEIR/S states that "Sacramento River flows and diversion flows are similar under Alternative D and Alternative A…" and yet, Alt. A creates a 1.3 million-acre-foot (MAF) reservoir and Alt. D is a 1.8 MAF reservoir, which is 38% larger. Logically, this would require longer diversions from the river and calls into question the preceeding statement that "model results are similar under Alternative D and Alternative A."

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[10] Impacts of Riprapping to Aquatic Organisms and River Function, Lower Sacramento River, California, June 2004 2nd Edition, USFWS.

Pg. 8-30, last paragraph: The DEIR/S states that "Because no potentially significant impacts were identified, no mitigation is required or recommended." This conclusion is simply incorrect, given that Chapter 8 has obvious errors, cites a document that does not include the data discussed and considers project alternatives that may be different from those analyzed in the DEIR/S, and cites another document that calls for additional study. Further, the statement concerning uncertain impacts on SRA requires a "potentially significant impact" conclusion.

Chapter 14. Terrestrial Biological Resources

Pg. 14-23, paragraph 1: The DEIR/S states that 15 special status wildlife species potentially inhabit the primary study area, of which five species were documented in field surveys. But the species descriptions on pages 14-24 to 14-28 identify six special status species present in or directly adjacent to the primary study area, including bald eagle (active nesting site), valley elderberry longhorn beetle, greater sandhill crane, Swainson's hawk, tricolored blackbird, and giant garder snake. Please explain this discrepancy.

Pg. 14-29, last paragraph: The DEIR/S states that of the 45 species of concern or state fully protected species, 29 species were documented in the field surveys. But the species descriptions on pages 14-30 to 14-41 identify 28 species. Please explain this discrepancy.

Pg. 14-58, paragraph 4: The DEIR/S states "Operational modeling indicates that Sacramento River flows would meet or exceed the *Biological Opinion for the Long-term Central Valley Project Operations Criteria and Plan* requirements with or without the Project (USFWS, 2008a). As previously noted, this BiOp and others have failed to stop the decline of threatened and endangered salmonids and other wildlife species. USBR recently published a Notice of Intent to prepare an EIS to revise the Coordinated Long-Term Operation of the CVP and SWP. The primary purpose of this revision, as directed by Congress, is to maximize water supply delivery. This would increase threats to species already on the brink of extinction. The DEIR/S should analyze the effects of revised CVP/SWP operations and determine whether the "meet or exceed" statement remains true.

Pg. 14-58, paragraph 5: The DEIR/S states that modeling indicates that the Sacramento River's riparian vegetation would increase or remain the same under Alternative A. It's stated on pg. 14-123, that Alt. D's secondary study area impacts on Sacramento River riparian habitat will not be "substantially different" from Alts. A and C. We dispute these findings. See comments on Chapter 8. Fluvial Geomorphology. Alts. D and C include reservoirs that are 38% larger than Alt. A, which will require longer diversion times and more water overall diverted from the Sacramento River. There is a serious modeling problem if it fails to find any substantial difference in flows and flow impacts between Alt. A and Alts. D and C.

Pg. 14-126, Table 14-26: This table lists vague mitigation measures that reduce nearly all impacts identified in this table to "less than significant" and fails to provide sufficient information to assure the public that these serious impacts will indeed be reduced to insignificance. For example, Mitigation Measure Wild-1b requires a combination of habitat protection, enhancement, and restoration for riparian habitat and other natural communities. This mitigation measure should be tied directly to the acreages of habitat type identified in tables for each alternative and how much habitat will be acquired and restored. Other measures also lack details. For example, what exactly does it mean to "Implement Protective Actions" to mitigate impacts to burrowing owl to less than significant levels?

Chapter 16. Geology, Minerals, Soils, and Paleontology

There is no mention of mercury in this chapter. Mercury is discussed extensively in Chapter 7. Surface Water Quality, but that chapter focuses primarily on mercury from upstream sources in the Sacramento River watershed. The proposed Sites Reservoir is in California's coast range, a well-known natural source of mercury. An extensive mercury mining district was located just south of the Antelope Valley. The valley itself appears to possess the pre-requisite geology to potentially produce mercury.

Mercury deposits in western California are found near a thrust fault that separates the Franciscan Assemblage and the Great Valley Sequence.[11] The most abundant rock of the Franciscan complex is muddy, low-density sandstone where cinnabar (mercury) deposits are found. Cinnabar was also deposited in the sandstone of the Great Valley sequence.[12] DEIR/S Table 16-3 on pg. 16-13 confirms that both the Franciscan formation and Great Valley rock units are found in or adjacent to the primary study area. And yet, there is no discussion about mercury naturally occurring in the rocks and soil that will be covered by the reservoir and potentially polluting any water released from the reservoir. This issue requires thorough investigation to address potential mercury pollution from the reservoir site in the DEIR/S.

Appendices 6B and 6C

According to the Executive Summary, "The proposed Project would divert and store water within the Sacramento River watershed when available during high-flow events and when not meeting other environmental and water supply requirements." Our review of Appendices 6B and 6C indicates that this is not an accurate description of Sites diversions and operations. The project diverts water during high flow events, but also diverts water during all water years, even critically dry years and low flow events, when not meeting other environmental and water supply requirements. A brief review of Appendices 6B and 6C indicating some alarming flow impacts to the Sacramento River and the Sutter Bypass, including:

Alt. D reduces average **Sacramento River** flows below:

- Keswick 7 months of the year and by as much as 6.1% in April. Pg. 846
- Bend 7 months of the year and by as much as 5.6% in June. Pg. 851
- RBDD 11 months of the year and by as much as 8.3% in March. Pg. 856

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[11] Mineralium Deposita 1984, Mercury Deposits of Western California: an Overview, P.A. Studemeister, University of Ottawa Geology Dept.

[12] Johnston, A.S., Mercury and the Making of California, University Press of Colorado, 2013.

- Hamilton City 10 months of the year and by as much as 10.5% in March.
- Delevan intake 6 months of the year and by as much as 10.1% in March.
- Wilkin Slough 5 months of the year and by as much as 10.3% in March.
- Verona 6 months of the year and by as much as 5.4% in March.
- Freeport 6 months of the year and by as much as 4.6% in March.

In critically dry years, Alt. D will also reduce flows below:

- Keswick by as much as 11.5% in May.
- Bend by as much as 9.8% in May.
- RBDD by as much as 11.2% in February.
- Hamilton City by as much as 13.3% in March.
- Delevan Intake by as much as 11.8% in February.

(App. 6B, pages 846-881)

Alt. D reduces average **Feather River** flows below:

- Thermalito 7 months of the year and by as much as 5.5% in December.
- Sacramento River confluence 7 months of the year and by as much as 4% in October.
- Shanghai Bend 7 months of the year and by as much as 4% in October
- Sacramento River confluence 8 months of the year and by as much as 4% in October.

In critically dry years, Alt. D will reduce flows below Thermalito by as much as 21.9% in June.
(App. 6B, pages 906-911)

Alt. D reduces average **American River** flows below:

- Nimbus Dam 3 months of the year and by as much as 8% in July.
- Watt Avenue 3 months of the year and by as much as 8.1% in July.
- H Street 3 months of the year and by as much as 8.7% in July.
- Sacramento River confluence 3 months of the year and by as much as 8.7% in July.

In critically dry years, Alt. D will reduce flows below Nimbus by as much as 19.6% in June.
(App. 6B, pages. 931-941)

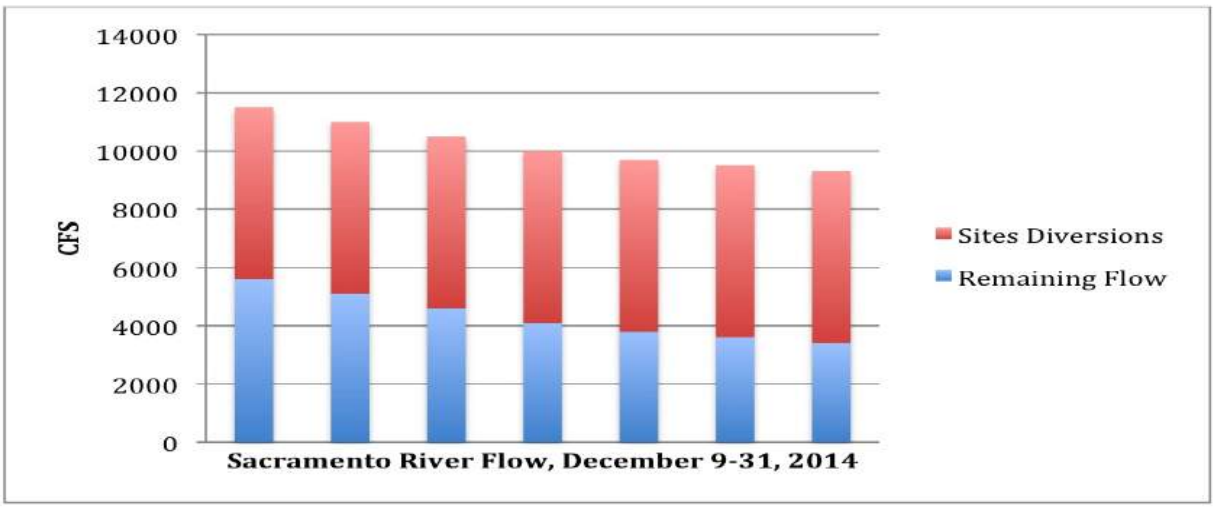
Alt. D reduces:

- **Ord Ferry spills** into the Sutter Bypass for four months from January-April and by as much as 55.5% in January.
- **Moulton Weir spills** into the Sutter Bypass in an above normal water year from January-April and by as much as 29.2% in January.
- **Colusa Weir spills** into the Sutter Bypass for 2-7 months in all water years and by as much as 16.5% in January in an above normal, 45.9% in March in a below normal year, 62% in March in a dry year, and 84% in January in a critically dry year.
- **Tisdale Weir spills** into the Sutter Bypass for 4-7 months in all water years and by as much as 48.5% in March in a dry water year and 100% in March in a critically dry year.

Generally, the Sites project reduces bypass spills significantly in multiple months in various water years in favor of boosting spills for fewer months in fewer water year types.
(App. 6C, pages 81, 86, 91, 96)

The potential impacts of Sites diversions and the reduction of flows in the Sacramento River and flood bypass system during drought years is particularly troubling. 2014 was one of the three driest consecutive years in California history. And yet, DWR in a post on its web site indicated that a brief few weeks of rain in December 2014 was sufficient to boost tributary flows in the Sacramento River to allow the Sites project to divert water. If the project diversions were in place and operating at that time, the diversions would have reduced Sacramento River flows by more than half (see graph below). This is a prime example of why existing minimum flows for the Sacramento River are insufficient.

Sacramento River Flow Impacts
Diversions To Sites Reservoir – Dec. 9-31, 2014



Sources: California Dept. of Water Resources, "FAQ: Sites Reservoir Diversion", March 1, 2015;
USGS Sacramento River Gauge 11389500 at Colusa CA, Dec. 9-31, 2014.

Photo: Sacramento River just upstream of the Delevan Diversion site on December 18, 2017. The flow is 9,000 CFS. The existing environmentally-based minimum flow of 3,250 CFS would allow Sites diversions to take nearly 2/3rds of this flow.

XI. Conclusion

For all the reasons noted above, Friends of the River, Sacramento River Preservation Trust, and Mother Lode Chapter Sierra Club requests the withdrawal of the DEIR/S, its revision, and re-release for additional public review and comment.

Sincerely,

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Appendix 2

January 15, 2018

Jim Watson
Sites Project Authority
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Maxwell, CA 95955

Michael Dietl
U.S. Bureau of Reclamation
Mid-Pacific Region
2800 Cottage Way
Sacramento, CA 95825

Sent via email to: EIR-EIS-Comments@SitesProject.org

Re: Comments on Sites Reservoir Project Draft Environmental Impact Statement and Environmental Impact Report

Dear Mr. Watson and Mr. Dietl,

This letter is submitted as the comments of the Natural Resources Defense Council, Defenders of Wildlife, The Bay Institute, Pacific Coast Federation of Fishermen's Associations, Institute for Fisheries Resources, Center for Biological Diversity, and Golden Gate Salmon Association on the Draft Environmental Impact Statement and Draft Environmental Impact Report for the Sites Reservoir Project ("DEIS/DEIR"). Our organizations have worked for decades to improve the health of the San Francisco Bay-Delta and its watershed, and are dedicated to protecting and restoring fish and wildlife populations and habitats that the proposed Sites Reservoir Project would affect. Our organizations have not taken a formal position on the Sites Reservoir project, in large part because of the absence of reliable information regarding potential impacts on fish and wildlife beneficial uses in the estuary and watershed, including potential impacts to several species on the brink of extinction.

To evaluate the potential impacts and benefits of this project, it is essential that the DEIS/DEIR provides a meaningful and accurate assessment of the project's potential effects. After reviewing the DEIS/DIER, however, we are concerned that the document suffers from several flaws that substantially undermine its informational value for decision makers and the public. Among other problems, the DEIS/DEIR fails to consider a reasonable range of alternatives, uses an inaccurate environmental baseline, and does not adequately assess climate change impacts. It also fails to adequately analyze impacts to aquatic species like Chinook salmon, Delta smelt, and longfin smelt, and terrestrial species like giant garter snakes and migratory birds, fails to disclose significant impacts of the project to these and other species, and inappropriately defers the formulation of mitigation measures. Because the modifications necessary to remedy these and other flaws are substantial and the revised document will include significant new information, the revised DEIS/DEIR should be recirculated in order to provide the public with a more meaningful opportunity to assess the project's impacts and submit comments.

I. The DEIS/DEIR Fails to Consider a Reasonable Range of Alternatives

The California Environmental Quality Act ("CEQA") and the National Environmental Policy Act ("NEPA") require that the DEIS/DEIR consider a reasonable range of alternatives. Cal. Pub. Res. Code §§ 21002, 21061, 21100; tit. 14, Cal. Code Regs. ("CEQA Guidelines") § 15126.6; 42 U.S.C. § 4332; 40 C.F.R. §§ 1502.1, 1502.14, 1508.25(b). However, the DEIS/DEIR fails to consider a reasonable range of alternatives because it only considers a single operational alternative, whereas other operational alternatives could reduce or avoid adverse environmental impacts.[1] The failure to include any operational alternatives that could reduce or avoid adverse environmental impacts violates NEPA and CEQA. *See, e.g., Citizens of Goleta Valley v. Board of Supervisors*, 52 Cal.3d 553, 566 (1990) (EIR must consider a reasonable range of alternatives that offer substantial environmental benefits and may feasibly be accomplished); *Muckleshoot Indian Tribe v. U.S. Forest Serv.*, 177 F.3d 800, 813 (9th Cir. 1999) (NEPA analysis failed to consider reasonable range of alternatives where it "considered only a no action alternative along with two virtually identical alternatives"); *Natural Res. Def. Council v. U.S. Forest Serv.*, 421 F.3d 797, 813 (9th Cir. 2005).

Alternatives that result in comparatively reduced water diversions from the Sacramento River (particularly during all but Wet water year types and during periods of moderate and low flows) are reasonable and feasible, would result in reduced adverse effects on native fish and wildlife in the Sacramento River and Bay-Delta estuary, and should have been evaluated in the DEIS/DEIR. The best available science shows that increased flows in the Sacramento River during the winter-

[1] In addition, the DEIS/DEIR improperly claims that it tiers off of the 2000 CALFED ROD. *See* DEIS/DEIR at 1-10. This is improper because the CALFED program was superseded by other entities nearly a decade ago, and the programmatic environmental review of CALFED is outdated and inconsistent with more recent scientific information. Reliance on the eighteen-year old CALFED ROD and programmatic EIS/EIR is inappropriate.

spring period and increased Delta outflows are necessary to protect and restore native fish and wildlife populations and their habitats and comply with state and federal law.[2]

Several commenters, including NRDC *et al* and the California Department of Fish and Wildlife ("CDFW"), submitted NEPA/CEQA scoping comments specifically stating that the DEIS/DEIR must analyze more than one operational alternative in order to identify alternatives that would minimize or avoid adverse environmental impacts of the project. NRDC *et al*'s scoping comments stated that the DEIS/DEIR should evaluate one or more operational scenarios that do not result in substantial reductions in Delta outflow during the winter and spring months, as well as one or more operational alternatives that result in increased Delta outflow during these months. CDFW's scoping comments directed that several operational scenarios should be analyzed, including one that was consistent with the water operational requirements being proposed for the California WaterFix project[3] and another that would fully minimize operational impacts. Moreover, in 2016 and 2017, CDFW submitted potential operational criteria to the project proponents that included Sacramento River bypass flows and Delta outflow requirements that were designed to reduce adverse environmental impacts of the project on salmon, sturgeon, longfin smelt, Delta smelt, and other native fish species. *See* Exhibit A.[4]

However, none of these proposed operational criteria were evaluated in the DEIS/DEIR. Instead, the DEIS/DEIR only analyzes a single operational scenario in the alternatives that are analyzed. *See, e.g.*, DEIS/DEIR at 3-102, 105-107. As discussed on the pages that follow, that operational scenario results in significant adverse environmental impacts and could not lawfully be permitted by state and federal agencies. As a result, the DEIS/DEIR violates NEPA and CEQA because it fails to consider a reasonable range of alternatives.

[2] As the DEIS/DEIR mentions, the State Water Resources Control Board ("SWRCB") is updating the Bay-Delta Water Quality Control Plan, and the SWRCB's 2016 draft scientific basis report recommends increasing Sacramento River flows and Delta outflow to protect native fish and wildlife. *See* DEIS/DEIR at 2-12. The SWRCB's final scientific basis report was peer reviewed and released to the public in October 2017, and it also recommends increased Delta outflow to protect fish and wildlife. The DEIS/DEIR should evaluate one or more operational alternatives that are consistent with the flow recommendations in the final scientific basis report, such as an alternative that requires Sacramento River flows and Delta outflows that are 65 percent and 75 percent of unimpaired flow (while meeting existing summer/fall outflow requirements of D-1641, and the 2008 Delta Smelt biological opinion).

[3] For instance, the final California Endangered Species Act ("CESA") permit for the California WaterFix project prohibits diversions from the Delta when Delta outflows are less than 44,500 cfs during the months of March, April and May, and the CESA permit and NMFS biological opinion require cessation of diversions from the North Delta when salmon are migrating in the lower Sacramento River and flows in the lower Sacramento River are less than 35,000 cfs.

[4] The documents provided by CDFW that are included as Exhibit A were obtained pursuant to a California Public Records Act request filed by NRDC in 2017.

In addition, NRDC *et al* and others submitted NEPA/CEQA scoping comments stating that the DEIS/DEIR must consider one or more alternatives that did not include a surface water reservoir and instead relied on groundwater storage, conjunctive use, and/or reoperation of reservoirs to improve water supplies and ecosystem protection. Such an alternative would likely cost dramatically less money to construct and operate, and could result in lower environmental impacts, making it a potentially feasible and reasonable alternative. However, the DEIS/DEIR failed to consider such an alternative, in violation of NEPA and CEQA.

II. The Bureau of Reclamation has Violated the Fish and Wildlife Coordination Act in Preparing the DEIS/DEIR

The Fish and Wildlife Coordination Act ("FWCA") requires that the Bureau of Reclamation consult with and fully consider recommendations from the U.S. Fish and Wildlife Service ("FWS"), National Marine Fisheries Service ("NMFS"), and CDFW regarding potential project alternatives and mitigation measures that could reduce or mitigate adverse environmental impacts. 16 U.S.C. §§ 661 *et seq*. The FWCA also requires the Bureau of Reclamation to include the mandatory FWCA report as part of the DEIS/DEIR. *Id*. § 662. The FWCA report must estimate wildlife benefits and losses from the potential project, *id*. § 662(f), and must include proposed measures to reduce or avoid such impacts, *id*. § 662(a)-(b). The DEIS/DEIR acknowledges the duty to consult with state and federal fish and wildlife agencies pursuant to the FWCA. DEIS/DEIR at 4-11. However, the DEIS/DEIR does not include the mandatory FWCA report, fails to consider the recommendations of CDFW, *see* Exhibit A, and fails to demonstrate that the Bureau of Reclamation consulted with FWS and NMFS as required by the FWCA. Indeed, the DEIS/DEIR states that, "FWS will coordinate with CDFW and NMFS and solicit recommendations for the action agency to consider for the conservation or improvement of fish and wildlife habitat for any or all species during the life of the project." DEIS/DEIR at 4-11. If the Bureau of Reclamation had consulted with NMFS as required by the Fish and Wildlife Coordination Act, the DEIS/DEIR could have evaluated the Sacramento River flow criteria that NMFS has prepared in order to reduce or avoid impacts to salmon. *See* Exhibit B.[5]

In preparing the DEIS/DEIR, the Bureau of Reclamation has violated the FWCA by failing to include the mandatory FWCA report, failing to demonstrate consultation with federal fish and wildlife agencies, and by failing to meaningfully consider the recommendations of CDFW. In order to comply with the FWCA, the DEIS/DEIR must be revised to meaningfully consider the recommendations of state and federal wildlife agencies and to include the mandatory FWCA report. Because the Bureau of Reclamation has deprived the public of the opportunity to review the FWCA report during the public comment period on the DEIS, Reclamation must reopen the public comment period upon release of the required report.

[5] The presentation from NMFS that is included as Exhibit B was obtained pursuant to a Freedom of Information Act request filed by NRDC in 2017.

III. The DEIS/DEIR Fails to Use an Accurate Environmental Baseline to Evaluate Potential Environmental Impacts of the Proposed Project

Under both NEPA and CEQA, the DEIS/DEIR must evaluate the potential environmental impacts of the project as compared to the existing environmental conditions (the "environmental baseline"), so that the Project's environmental impacts can be meaningfully analyzed and compared to alternatives. 40 C.F.R. § 1502.15; CEQA Guidelines § 15125(a); *see County of Amador v. El Dorado County Water Agency*, 76 Cal.App.4th 931, 952 (1999); *Neighbors for Smart Rail v. LA County Metropolitan Transit Authority*, 57 Cal. 4th 310, 315 (2013). In general, the environmental conditions at the time the Notice of Preparation ("NOP") are issued constitute the environmental baseline. CEQA Guidelines § 15125(a). However, when an analysis based on existing conditions would be misleading to the public, CEQA requires use of a different baseline in order to give the public and decision makers the most accurate analysis of the project's likely impacts. *Neighbors for Smart Rail*, 57 Cal. 4th at 449, 457. In particular, when environmental conditions will be improved in the near future as compared to existing conditions, the use of the existing conditions baseline would be misleading and contrary to CEQA. *Id*. at 453, fn. 5.

In this instance, substantial evidence demonstrates that the use of the existing baseline conditions, which excludes mandatory permit conditions imposed to protect the environment, misleads the public and decision makers as to the actual environmental impacts, and that in this case the environmental impacts should be assessed against an environmental baseline that includes these regulatory requirements. *See Communities for a Better Environment v. South Coast Air Management District*, 48 Cal.4th 310, 322-326, 328 (2010); *Neighbors for Smart Rail,* 57 Cal. 4th at 451-453. The environmental baseline used in the DEIS/DEIR fails to include several existing permit requirements that were imposed before issuance of the NOP, and which will be implemented before the proposed project could be constructed and operational in 2030.

Most importantly, the environmental baseline in the DEIS/DEIR fails to include the proposed amendment to Action Suite I.2 of the Reasonable and Prudent Alternative in the 2009 NMFS biological opinion ("Revised Shasta RPA").[6] The Revised Shasta RPA was adopted because the best available science showed that the existing RPA actions were failing to prevent Central Valley Project ("CVP") operations from jeopardizing the continued existence of Endangered Species Act ("ESA")-listed salmon and did not use the best available science. The Revised Shasta RPA makes significant changes in CVP operations at Shasta Dam, including requirements that the Bureau of Reclamation maintain higher storage in Shasta reservoir (imposing minimum water storage requirements for the end of April and end of September), as well as colder water temperature requirements in the Sacramento River necessary to protect winter run Chinook

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[6] The Revised Shasta RPA is available online at: http://www.westcoast.fisheries.noaa.gov/publications/Central_Valley/Water%20Operations/nmfs_s_draft_proposed_2017_rpa_amendment_-_january_19__2017.pdf and is incorporated by reference.

salmon. The Revised Shasta RPA was issued by NMFS on January 19, 2017, and the NOP for the Sites Reservoir project was issued on January 23, 2017. However, the DEIS/DEIR fails to include compliance with the Revised Shasta RPA in the environmental baseline. *See* DEIS/DEIR, Appendix 6A, at 6A-1. As compared to the modeling in the DEIS/DEIR, the Revised Shasta RPA would result in significantly higher reservoir storage in Shasta Reservoir, would maintain a greater volume of cold water for salmonids, and would result in colder water in the Sacramento River during the summer and fall months. *See, e.g.,* NMFS-Reclamation Stakeholder Workshop #3, Shasta RPA Draft Proposed Amendment, June 22, 2017, attached as Exhibit C. Modeling in the DEIS/DEIR shows that baseline conditions and alternatives would not achieve the minimum Shasta reservoir storage requirements under the Revised Shasta RPA. *See, e.g.,* DEIS/DEIR, Appendix 6B, at Table SW-07-3a. Implementation of the Revised Shasta RPA may also result in lower Sacramento River flows during some years, and the proposed project could cause environmental impacts by further reducing flows in the Sacramento River. Because the DEIS/DEIR fails to include these updated permit conditions in the environmental baseline, the DEIS/DEIR misleads the public and decision makers of the potential environmental impacts of the Sites Reservoir project.

Second, the environmental baseline in the DEIS/DEIR fails to include compliance with the Shasta RPA action in the NMFS 2009 biological opinion. *See* DEIS/DEIR, Appendix 6A, at 6A-8. The RPA action in the 2009 biological opinion is a mandatory permit condition that provides substantial environmental benefits for salmon, even if the RPA action (prior to the 2017 amendment) was insufficient to prevent CVP/State Water Project ("SWP") operations from jeopardizing the continued existence of winter run Chinook salmon. As a result, modeling of Shasta Reservoir water storage levels and Sacramento River water temperatures in the DEIS/DEIR fail to comply with the requirements of the 2009 Shasta RPA action. *See, e.g.*, DEIS/DEIR, Appendix 6B, at Table SW-07-3a. By failing to ensure that the environmental baseline in the DEIS/DEIR includes existing permit terms and conditions, the DEIS/DEIR fails to adequately assess environmental impacts of the proposed project and fails to disclose potentially significant adverse impacts.

Third, the environmental baseline in the DEIS/DEIR appears to omit compliance with the permit obligation of the CVP and SWP to restore floodplain habitat in the Yolo Bypass, including modifications to the Fremont Weir to increase the frequency of inundation, pursuant to the 2009 NMFS biological opinion. The federal Notice of Intent for this project was published in the Federal Register on March 4, 2013, and in December 2017 the Bureau of Reclamation and California Department of Water Resources released a DEIS/DEIR for the Yolo Bypass Salmonid Habitat Restoration & Fish Passage project.[7]

[7] That DEIS/DEIR is available online at: https://www.usbr.gov/mp/nepa/nepa_project_details.php?Project_ID=30484 and is incorporated by reference.

Appendix 12N of the DEIS/DEIR evaluates potential changes to the extent and frequency of inundating floodplain habitat in the Yolo Bypass. However, as the table below demonstrates, the data presented in Appendix 12N is inconsistent with data on the frequency and extent of inundation of the Yolo Bypass that the Bureau of Reclamation prepared as part of the California WaterFix project (the latter assumes completion of the Yolo Bypass restoration project as required by the 2009 NMFS biological opinion). *Compare* DEIS/DEIR, Appendix 12N, at Table SF-1a *with* California WaterFix draft biological assessment, June 2017, Appendix 5A, Attachment 4, at Table 5.A.A.4-5.[8]

	Fremont Weir spills greater than 3,000 cfs that last > 30 days under No Action Alternative
DEIS/DEIR, Appendix 12N, Table SF-1a	21 years
WaterFix Biological Assessment, June 2017, Appendix 5A, Attachment 4, at Table 5.A.A.4-5	70 years with notched weir

Because the DEIS/DEIR appears to exclude the notched weir, it fails to accurately assess the frequency, duration and extent of floodplain inundation in the Yolo Bypass under no action alternatives as well as under the proposed project and action alternatives. As discussed *supra*, reductions in floodplain inundation as a result of the project are likely to cause significant adverse effects on salmon. The DEIS/DEIR therefore fails to provide the public and decisionmakers with accurate information about the effect of the proposed project on floodplain inundation in the Yolo Bypass.

In addition, the DEIS/DEIR uses a flawed environmental baseline because it fails to accurately model compliance with the Fall X2 action in the 2008 Delta Smelt biological opinion. The Fall X2 action requires that the CVP and SWP "provide sufficient Delta outflow to maintain average X2 for September and October no greater (more eastward) than 74 km in the fall following wet years and 81km in the fall following above normal years." 2008 FWS biological opinion at 369.[9] The biological opinion requires that "[t]he monthly average X2 must be maintained at or seaward of these values for each individual month and not averaged over the two month period." *Id*. However, the modeling of the environmental baseline and alternatives in the DEIS/DEIR

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[8] That biological assessment is available online at: http://cms.capitoltechsolutions.com/ClientData/CaliforniaWaterFix/uploads/App_5.A_CALSIM.pdf and is incorporated by reference.

[9] In general, the monthly Delta outflow necessary to achieve these X2 requirements is approximately 11,400 cfs (wet) and 7,100 cfs (above normal), although the specific amounts of outflow necessary will depend on multiple factors including antecedent conditions (the location of X2 prior to imposition of the Fall X2 RPA action).

fails to achieve the Fall X2 requirements in the month of October. *See, e.g.,* DEIS/DEIR, Appendix 6B at Table SW-30-3a; DEIS/DEIR, Appendix 12G at 12G-2.

Finally, the DEIS/DEIR uses a flawed environmental baseline because it assumes full contract deliveries to Sacramento River Settlement Contractors, resulting in higher diversions from the Sacramento River. To our knowledge, the Sacramento River Settlement Contractors have never utilized their full contract amounts, and have diverted significantly less water than the full contract amounts. Data from the Bureau of Reclamation indicates that during 2009-2014, these contractors never diverted more than 75 percent of their full contract amounts. *See* Bureau of Reclamation, Water Delivered 2009-2014, available online at: https://www.usbr.gov/mp/cvp-water/docs/cvp-water-deliveries.pdf. Yet the DEIS/DEIR assumes full contract demands by these contractors, and it provides no explanation why it would make this assumption, which is inconsistent with the historical record. *See* DEIS/DEIR, Appendix 6A, at 6A-4.

By failing to utilize an accurate environmental baseline, the DEIS/DEIR fails to accurately assess the potential environmental impacts of the proposed project. The environmental baseline must be revised to incorporate the 2017 Revised Shasta RPA, to incorporate changes to the Yolo Bypass (including the notched Fremont Weir) required under the 2009 NMFS biological opinion, to accurately model compliance with the Fall X2 action in the 2008 FWS biological opinion, and to include reasonable assumptions regarding water demands by Sacramento River Settlement Contractors. Because of the significance of these changes, the DEIS/DEIR must be recirculated for comment after it is revised.

IV. The DEIS/DEIR Fails to Accurately Assess Environmental Impacts Because it Excludes Climate Change from the Environmental Baseline and Fails to Evaluate Long Term Impacts of the Project

CEQA and NEPA both require that the analysis of potential environmental impacts address the full duration of the project, not just the environmental impacts at the very beginning of the project. The CEQA Guidelines explicitly require the consideration of "both the short-term and long-term effects." 14 Cal. Code Regs. § 15126.2(a). In *Neighbors for Smart Rail*, the California Supreme Court reiterated that an EIR must evaluate both the near term and long term environmental impacts of a proposed project. 57 Cal. 4th at 455. However, the DEIS/DEIR fails to evaluate the long term environmental impacts of the proposed project, because it only analyzes environmental impacts based on anticipated conditions in the year 2030. *See, e.g.,* DEIS/DEIR Appendix 6A at 6A-1, 6A-2. As a result, the DEIS/DEIR fails to consider the longer term environmental impacts in a future with climate change, violating NEPA and CEQA.

Climate change is anticipated to significantly increase air temperatures, increase the severity of droughts and frequency of floods, and alter precipitation patterns and amounts. *See, e.g.,* DEIS/DEIR at 25-30 to 25-31. The adverse effects of climate change are expected to be more severe in the coming decades than in the near future. *See, e.g.,* DEIS/DEIR at 25-30. This is anticipated to significantly alter hydrologic conditions and stress aquatic resources. However, despite acknowledging these likely effects, *see, e.g.,* DEIS/DEIR Appendix 25B at 25B-1, 25B-2, the DEIS/DEIR only examines potential environmental impacts in the year 2030. *See, e.g.,* DEIS/DEIR Appendix 6A at 6A-1, 6A-2. If approved, the Sites Reservoir project is anticipated to be under construction until the year 2030, and would operate for many decades thereafter.

Moreover, the analysis of conditions in 2030 does not consider the likely effects of climate change. *See* DEIS/DEIR at 2-8 to 2-9. However, CALSIM modeling exists that incorporates the effects of climate change in the year 2030 and in the year 2070, and has been used for multiple analyses, including the CEQA/NEPA analysis of the California WaterFix project, the sensitivity analysis described in DEIS/DEIR Appendix 25A, and water storage project modeling and analysis for the California Water Commission summarized in DEIS/DEIR Appendix 25B. Appendix 25B's conclusion that incremental changes in stream flows and Delta outflows due to the project "could increase if the updated climate change assumptions were used in the CALSIM II model simulations presented in Appendix 25A" is correct, and highlights the importance of incorporating climate change impacts in the assessment of environmental impacts in the DEIS/DEIR (rather than relegating this analysis to an appendix). For instance, the assumption in Appendix 25A that the greatest adverse impacts would be under current climate conditions is false, particularly when compared to the LLT Q2 scenario results. *See* DEIS/DEIR Appendix 25A at 25A-1, 25A-4. Similarly, under the climate sensitivity analysis, the DEIS/DEIR predicts that the project would eliminate many of the purported ecosystem benefits, including providing no Delta outflow for Delta smelt habitat improvement or Sacramento River fall flow stabilization under ELT and LLT climate scenarios, and no Sacramento River flows for temperature control under LLT. *See* DEIS/DEIR Appendix 25A at 25A-19. These results demonstrate that climate change is likely to cause significant changes in the project and to the effects of the project, and that the DEIS/DEIR must be revised to incorporate the projected effects of climate change in the assessment of potential impacts. Appendix 25A inappropriately states that the sensitivity analysis should not be used for detailed evaluation, and provides a recommendation for a multiagency review. *See* DEIS/DEIR Appendix 25A at 25A-20. The failure to assess potential impacts over the duration of the project, deferring the analysis to a multiagency review at some unspecified date, significantly understates the likely environmental impacts of the proposed project over the longer-term period that it would be in operation and fails to accurately assess environmental impacts under NEPA and CEQA.

V. The DEIS/DEIR Fails to Accurately Assess Environmental Impacts Because it Uses the Outdated 2010 CALSIM Model Instead of the Current Version of the CALSIM Model

The DEIS/DEIR acknowledges that it uses an outdated version of the CALSIM model, despite the availability of a more recent model. Using the more recent model would likely address several of the flaws identified in this comment letter, including the failure to include certain regulatory requirements in the environmental baseline and the exclusion of the effects of climate change from the analysis. Moreover, on July 28, 2014, several members of the Sites JPA submitted comments to the State of California regarding the use of the 2010 CALSIM model in DEIS/DEIR for the Bay Delta Conservation Plan, stating that,

> the errors inherent in the use of the 2010 CalSim II model mean that the BDCP modeling analysis fails to satisfy the demands of CEQA Guidelines section 15151. In that regard, the use of the 2010 CalSim II model is like the use of outdated emissions information in *Berkeley Keep Jets Over the Bay.* (91 Cal.App.4th at p. 1367.) Consequently, it is improper for the DEIR/EIS to rely on the modeling contained in that document; instead, the modeling must be redone and the DEIR/EIS revised to reflect the correct methodology and results, and recirculated for public review.

North State Water Alliance (NSWA) comments on the Draft Bay Delta Conservation Plan, EIS/EIR, and Implementing Agreement, July 28, 2014, at 41; *see id*. at Exhibit A (list of Commenting Parties). The sensitivity analysis conducted comparing the 2010 and 2015 versions of the model in Appendix 6D shows major differences in the model output. Table 6D-1 shows average Delta outflow in Alternative D is 21,507 cfs in the 2010 model and 25,592 cfs in the 2015 model. *See* DEIS/DEIR Appendix 6D at 6D-6. This difference of over 4,000 cfs in average outflow—a 19% difference—far exceeds the 5 percent threshold for results to be considered “similar” and described as “model noise” in the comparative results within a model version. *See* DEIS/DEIR at 25-38. The DEIS/DEIR should be revised to use updated CALSIM modeling to ensure that the document accurately assesses environmental impacts.

VI. The DEIS/DEIR Fails to Accurately Assess Environmental Impacts to Aquatic Resources from Proposed Operations

A. <u>Because it uses arbitrary thresholds of significance, the DEIS/DEIR fails to disclose the likely significant adverse impacts of the proposed project on aquatic resources</u>

The DEIS/DEIR fails to accurately assess potential adverse impacts to aquatic resources because it assumes that flow changes of 5 percent or less are similar to existing conditions. *See, e.g.*, DEIS/DEIR at 5-14, 6-13. In other cases the DEIS/DEIR asserts that only flow changes greater than 10 percent constitute “a potentially meaningful difference.” DEIS/DEIR at 12-58. However, these 5 percent and 10 percent thresholds of significance are arbitrary, inconsistent with other NEPA/CEQA documents prepared by the Bureau of Reclamation, and not supported by substantial evidence. As a result, the DEIS/DEIR fails to disclose significant adverse effects on aquatic species of the proposed project and alternatives.

First, the DEIS/DEIR fails to justify using these thresholds. While the DEIS/DEIR provides some explanation for the 5 percent threshold, the document wholly fails to provide any justification why flow changes must be greater than 10 percent to constitute a meaningful difference. *See, e.g.,* DEIS/DEIR at 12-58. Moreover, the justification for the 5 percent threshold is arbitrary and capricious. The DEIS/DEIR claims to justify the 5 percent threshold because CALSIM modeling uses a monthly time step. *Id*. However, even if this threshold were justified for flow or water storage results at the daily time step, it does not justify using this threshold for monthly or seasonal CALSIM modeling results, including changes in monthly or seasonal flows or storage levels and resulting analysis of effects on aquatic resources.

In addition, because CALSIM modeling is used in a comparative manner, and is used to model conditions under both the environmental baseline and action alternatives, there is no need for the 5 percent (or 10 percent) threshold(s). Importantly, there is no basis to conclude that Sacramento River flow reductions due to diversions to storage under the proposed project are an illusory modeling artifact; instead, reduced flow is an effect of the proposed project in the real world. While the CALSIM model does have significant flaws, failing to disclose changes in flow that are 5 percent or less as a significant impact misleads the public and decisionmakers.

Equally important, reductions in flow that are less than 5 percent can and will have significant adverse effects on aquatic resources. For instance, the modeling shows that Alternative A would reduce the abundance of longfin smelt, a species listed as threatened under CESA, by approximately 2.4 percent. *See* DEIS/DEIR, Appendix 12G, at Table AQ-12-3c.[10] Yet CDFW determined that a reduction of longfin smelt abundance greater than 0 percent would be inconsistent with the requirements of CESA, in CDFW's CESA findings for the California WaterFix project.[11] By using the 5 percent threshold, the DEIS/DEIR claims that the project and alternatives would have no effect on longfin smelt, even though this same effect would violate CESA because it would further reduce the abundance of longfin smelt, which have experienced record or near-record low population levels under recent conditions. Indeed, any reduction in abundance of longfin smelt would cause the population of longfin smelt to drop further below self-sustaining levels, which constitutes a mandatory finding of significance under CEQA. *See* CEQA Guidelines § 15065(a)(1), (c).

Second, numerous other CEQA/NEPA documents that use CALSIM modeling do not use a 5 percent or 10 percent thresholds for determining whether changes in flow or storage constitute

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[10] In addition, Table AQ-12-3c of the DEIS/DEIR incorrectly states this is a 0.0% reduction in abundance. The actual reduction is 2.4%, based on comparing the abundance estimates in this table for the No Action Alternative and Alternative A. Similar errors occur on the Tables AQ-12-5c (reported as 0.0%, actual reduction in abundance is 2.8%), Table AQ-12-7c (reported as 0.0%, actual reduction in abundance is 3.2%), and Table AQ-12-9c (reported as 0.0%, actual reduction in abundance is 3.0%).

[11] *See* California Department of Fish and Wildlife, Findings of Fact of the California Department of Fish and Wildlife Under the California Endangered Species Act (Fish & G. Code § 2050 et seq.) for the project proposed by the California Department of Water Resources in reliance on and regarding the Construction and Operation of Dual Conveyance Facilities of the State Water Project (California WaterFix) and the Bay Delta Conservation Plan/California WaterFix Final Environmental Impact Report / Environmental Impact Statement, Incidental Take Permit No. 2081-2016-055-03, July 2017, at 327, available online at: https://ftp.waterboards.ca.gov/NRDC TBI DOW/NRDC-20.pdf. This document is incorporated by reference.

significant effects. For instance, the CEQA/NEPA documents for the California WaterFix project do not use these thresholds. It is unclear what would distinguish the DEIS/DEIR's use of CALSIM modeling results with these arbitrary thresholds from these other CEQA/NEPA documents that used CALSIM modeling without these arbitrary thresholds.

Further, the DEIS/DEIR inappropriately applies the 5 percent threshold of significance to averaged modeling results instead of operational criteria. This leaves exceedances of the 5 percent threshold unidentified in the DEIS/DEIR. For example, Funks to Sites exceedances imply that in January, at times 2,000-3,000 cfs could be diverted out of a total 15,000 cfs in the river, or 15 to 20 percent of the river's flow. This far exceeds the arbitrary 5 percent threshold of significance.

The recirculated DEIS/DEIR should not use these 5 percent and 10 percent thresholds of significance.[12] By using the 5 percent and 10 percent thresholds of significance, the DEIS/DEIR fails to disclose significant adverse effects on aquatic resources. The DEIS/DEIR must be revised to eliminate the use of these thresholds in determining what constitutes significant adverse effects on aquatic resources as a result of changes in river flows or reservoir storage levels.

B. The DEIS/DEIR fails to accurately assess environmental impacts to salmon and steelhead

As discussed above, the DEIS/DEIR fails to adequately assess potential impacts to salmon because it uses an improper environmental baseline that excludes existing regulatory requirements that protect salmon, because it uses arbitrary and inappropriate thresholds of significance, and because it excludes the anticipated effects of climate change in assessing whether the Project would result in significant environmental impacts. As discussed in more detail below, the DEIS/DEIR also fails to adequately assess potential impacts to salmon because it (i) ignores adverse impacts to salmon that will result from reduced flows in the Sacramento River; (ii) arbitrarily assumes no impacts from increased predation or impingement at fish screens; and, (iii) fails to accurately assess the adverse effects on salmon from reduced floodplain inundation. In addition, the DEIS/DEIR relies on ineffective mitigation measures (single pulse flow) that are inadequate to reduce or avoid these impacts. Finally, the DEIS/DEIR also fails to use existing life cycle models that would more accurately assessment impacts to

[12] However, to the extent that the DEIS/DEIR assumes that flow changes less than 5 percent are not significant, this should be applied to the actual river flows whenever flows are less than unimpaired. For example, a diversion of 5,000 cfs would only be allowed when Delta outflow exceeds 100,000 cfs (<5 percent impact), a 1,000 cfs diversion could be allowed when flows exceed 20,000 cfs, and 500 cfs could be allowed when flows exceed 10,000 cfs, assuming no other thresholds were impacted. The 5 percent limit would almost never apply to July-September diversions, because flow in the Sacramento River during that time typically exceeds 100 percent of unimpaired flow, however October through June diversions usually would have to comply with the limitation.

salmon, and instead relies on flawed and outdated modeling approaches. As a result, the DEIS/DEIR must be revised and recirculated.

1. The DEIS/DEIR fails to accurately assess impacts to salmon because it ignores the effects of reduced Sacramento River flows on salmon survival

The DEIS/DEIR fails to accurately assess impacts to migrating salmon because it fails to quantitatively analyze the effect of reduced Sacramento River flows on survival of migrating salmon. Numerous scientific studies have documented that reduced flow in the upper Sacramento River results in reduced survival of salmon. *See, e.g.,* Michel et al 2015; Klimley et al 2017; Notch 2017. The DEIS/DEIR wholly ignores these studies, and fails to use these models and analyses in the DEIS/DEIR to evaluate impacts on salmon from Sites Reservoir diversions that reduce flow in the Sacramento River. *See, e.g*., DEIS/DEIR, Appendix 12B, at 12B-7 (no analysis of the effects of reduced flows on survival).

In recent years NMFS and CDFW have demonstrated that the survival of acoustically tagged salmon is strongly correlated with Sacramento River flows, and that survival of migrating salmon is lower when flows are less than 20,000 cfs, with a more significant reduction in survival when flows are less than 12,000 cfs. As a result, NMFS has recommended minimum base Sacramento River flows during the winter months (4,500 to 8,000 cfs, depending on water year type) and spring months (10,000 cfs to 14,000 cfs, depending on water year type) to protect salmon, as well as additional functional flows during these months. *See* Exhibit 2. More specifically with respect to potential operations of Sites Reservoir, CDFW has identified potential flow thresholds in the upper Sacramento River necessary to reduce or minimize impacts to migrating salmon, including minimum bypass flows of approximately 12,000 - 15,000 cfs at Wilkins Slough, before diversions to Sites could occur. *See* Exhibit 1. However, the DEIS/DEIR entirely fails to consider these studies and analyses, and fails to analyze the effects of reduced flows on salmon survival in the upper Sacramento River. While the document makes qualitative statements about the effects of potential increases in flow during low flow conditions, the DEIS/DEIR ignores the effects on salmon from water diversions to Sites reducing flows in the Sacramento River during higher flow conditions.

Similarly, studies have shown that reduced flow in the lower Sacramento River results in the reduced survival of migrating salmon. For instance, NMFS' biological opinion for the California WaterFix project demonstrates that in the lower Sacramento River, salmon survival is reduced when flows are less than approximately 35,000 cfs. NMFS 2017; *see* Perry *et al* 2017. As with the effect of reduced flow upstream, the DEIS/DEIR wholly fails to analyze the effects of reduced flows on salmon survival in the lower Sacramento River, caused by water diversions to Sites Reservoir.

The DEIS/DEIR must be revised to include the likely adverse effects of Sacramento River diversions to Sites Reservoir when flows are less than 22,000 cfs (upper Sacramento River) or less than 35,000 cfs (lower Sacramento River). Reductions in Sacramento River flows below these thresholds have been demonstrated to reduce salmon survival, yet the DEIS/DEIR wholly ignores these adverse impacts, fails to acknowledge that proposed operations likely will cause significant impacts, and fails to consider feasible mitigation measures to address these impacts. To avoid and/or mitigate significant impacts to imperiled salmon, the recirculated DEIS/DEIR should evaluate mitigations measures that provide for minimum flows of 22,000 cfs (upper Sacramento River) and 35,000 cfs (lower Sacramento River) from November to May.

2. *The DEIS/DEIR fails to accurately assess impacts to salmon because it ignores increased predation and impingement as a result of the new Sacramento River water diversion facility*

The DEIS/DEIR improperly concludes that there will be no adverse impacts from increased predation at the new diversion facilities (or from reduced flow) or as a result of impingement on fish screens as a result of the proposed project, as long as the fish screen meets sweeping and approach velocity requirements. *See* DEIS/DEIR, Chapter 12, at 12-71. However, the 2017 NMFS biological opinion for the WaterFix Project concludes that even when fish screens are operated to meet sweeping and approach velocity requirements, 3-5 percent of migrating salmon would suffer adverse impacts from injury or mortality on a single fish screen. NMFS 2017 at 588. The biological opinion also estimates that increased predation at the fish screens could result in a range of impacts from 0.3 percent to 5 percent mortality, with the latter estimate based on predation mortality studies at the GCID fish screen. *Id*. at 593. The DEIS/DEIR must be revised to consider the likely reductions in survival from increased predation and impingement on fish screens for the new Sacramento River intake.

3. *The DEIS/DEIR fails to accurately assess impacts to salmon because it inaccurately assesses reduced floodplain inundation and ignores the effects of reduced floodplain inundation on salmon survival*

The DEIS/DEIR fails to adequately assess the adverse effects of reduced floodplain inundation on salmon. The DEIS/DEIR appropriately acknowledges that salmon that rear on floodplains are larger and are assumed to have improved survival. However, the DEIS/DEIR's analysis of the extent to which proposed operations reduce inundation of floodplains is flawed, and the DEIS/DEIR improperly concludes that these reductions in inundation would be less than significant. The analysis in the DEIS/DEIR appropriately looks at a range of inundation periods, but it only looks at the effects on inundation at flows less than 10,000 cfs, despite acknowledging that floodplain inundation increases rapidly at flows up to 40,000 cfs. *See* DEIS/DEIR at 12-63.[13] Even at the flow levels that are analyzed, the DEIS/DEIR demonstrates that proposed

[13] The DEIS/DEIR also does not appear to quantitatively analyze potential effects of operations on the frequency and magnitude of Tisdale Weir spills that result in floodplain inundation. In contrast, CDFW recommended specific bypass criteria to ensure that proposed operations would not reduce Tisdale Weir spills up to 5,000 cfs. *See* Exhibit 1. The DEIS/DEIR should be revised

operations will reduce the frequency of Fremont Weir spills; for instance, Table SF-1a shows that Alternative A would reduce Fremont Weir spills of 10,000 cfs that last more than 10 days by more than 10 percent, and would reduce Fremont Weir spills of 10,000 cfs that last more than 20 days by approximately 10 percent. DEIS/DEIR, Appendix 12N, at Table SF-1a. Alternative A also results in reductions in the frequency of Fremont Weir spills at lower flow levels as well. *Id*. Alternative A also results in a reduction in Sutter Bypass Flows, which would also harm salmon. DEIS/DEIR, Appendix 12N, at Table SF-1e. However, the DEIS/DEIR fails to acknowledge that the reduction in the frequency and magnitude of Fremont Weir spills that inundate floodplain habitat would cause a significant adverse impact on salmon. The DEIS/DEIR should be revised to acknowledge this significant impact and to consider feasible mitigation measures that would ensure that the proposed project and alternatives would not reduce the frequency and magnitude of floodplain inundation as a result of Fremont Weir spills.

4. *The proposed mitigation measure in the DEIS/DEIR (Pulse Flows) are inadequate to mitigate impacts on salmon from proposed operations*

The proposed mitigation measure (pulse flows) are inadequate to mitigate these impacts to a less than significant level. Pulse flows can improve survival of those salmon that migrate during the pulse flow event, assuming the pulse flow is of sufficient duration and magnitude. However, salmon that migrate during non-pulse flow events would suffer reduced survival as a result of flow reductions due to diversions to Sites Reservoir storage. NMFS demonstrated that the first storm event of approximately 15,000-20,000 cfs at Wilkins Slough triggers the migration of approximately 50 percent of the population of winter run Chinook salmon. *See* Del Rosario 2013. However, the remaining proportion of this endangered salmon run would not be protected by the proposed pulse flows, *id*.; *see also* SWRCB 2017, and reduced Sacramento River flow as a result of diversions to Sites reservoir would reduce salmon survival as shown above. Equally important, because only those fish expressing the life history trait of migrating on the first storm pulse, this proposed mitigation measure would cause a reduction in life history diversity of salmon, which is one of the critical factors in ensuring viable salmonid populations.

5. *The DEIS/DEIR fails to accurately assess impacts to salmon because it uses flawed temperature thresholds and flawed models*

Finally, the DEIS/DEIR generally relies on outdated, inaccurate models to assess impacts to salmon, and fails to utilize more accurate and updated models, particularly with respect to the adverse effects of water temperature on salmon. For instance, the DEIS/DEIR relies on flawed temperature thresholds and models analyzing potential effects of water temperature on egg and juvenile salmon survival, which have been shown to be highly inaccurate. While the DEIS/DEIR uses Reclamation models to assess temperature impacts on salmon, *see* DEIS/DEIR at 12B-10, NMFS' 2017 WaterFix Biological Opinion states that the Reclamation Egg Mortality

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to analyze Tisdale Weir flows and floodplain inundation frequency and extent, as part of its analysis of effects on salmon.

Model "is based on a relationship between temperature and Chinook salmon egg mortality that likely substantially underestimates actual mortality in the field." NMFS 2017 at 450. The biological opinion rejects use of that model to assess potential temperature impacts to winter run Chinook salmon, spring run Chinook salmon, or fall run Chinook salmon, and only uses it to assess potential impacts to late fall run Chinook salmon because results from more accurate models (the Southwest Fishery Science Center's temperature-dependent egg mortality model) were not available. *Id*.; *see* NMFS 2017 (Revised Shasta RPA, documenting significant flaws with Reclamation temperature mortality models and showing estimated temperature dependent mortality by year, which is significantly higher than that estimated in the DEIS/DEIR using the Reclamation models). The DEIS/DEIR should be revised to use the Southwest Fishery Science Center's temperature-dependent egg mortality model to assess temperature effects on salmon.

Equally important, the DEIS/DEIR relies on flawed temperature thresholds to assess impacts to salmon. *Compare* DEIS/DEIR, Appendix 12D, at 12D-5 (using 56, 58, 60 and 62 degree temperature thresholds for impacts on salmon spawning and egg incubation) *with* NMFS 2017 (Revised Shasta RPA, using Martin et al 2017 temperature threshold of 53.7 degrees). The DEIS/DEIR must be revised to use accurate temperature thresholds and models in order to accurately assess potential impacts to salmon.

6. The DEIS/DEIR must be revised to consider feasible mitigation measures to address the significant adverse impacts from proposed operations

Taken together, proposed operations analyzed in the DEIS/DEIR will have significant, adverse effects on fall run Chinook salmon, spring run Chinook salmon, winter run Chinook salmon, and other salmonids. The proposed operations will reduce Sacramento River flows in ways that will reduce survival of salmon, will reduce inundation of floodplains that will harm salmon, and will increase predation and impingement mortality that harms salmon. Even if each of these effects individually only reduces survival by a few percentage points, cumulatively they result in a significant reduction in survival, which could be fatal for several salmon runs that are at high risk of extinction.

The DEIS/DEIR must consider alternative operational scenarios that include the base flows and bypass flows recommended by CDFW and NMFS, including minimum bypass flows of 14,000 cfs at Wilkins Slough during the months of November to May. Because proposed operations would reduce survival of salmon, causing a significant adverse impact to species listed under CESA, the DEIS/DEIR must consider feasible mitigation measures, including these minimum bypass flows.

C. <u>The DEIS/DEIR fails to accurately assess environmental impacts to longfin smelt</u>

The DEIS/DEIR improperly concludes that proposed operations will not cause a significant adverse effect to longfin smelt because it assumes that changes less than 5 percent are not significant. However, as discussed above, this arbitrary threshold results in the DEIS/DEIR failing to identify an impact that constitutes a mandatory finding of significance under CEQA, because the modeling used in the DEIS/DEIR demonstrates that proposed operations will reduce the abundance of this CESA-listed species below self-sustaining levels.

In addition, the analysis of impacts to longfin smelt in the DEIS/DEIR is flawed because: (1) it fails to consider existing life cycle models that more accurately assess impacts, and which consider the effects of prior stock abundance in assessing the effects of flow; and (2) it fails to consider the effects of reduced outflow on meeting flow thresholds necessary to achieve a 50 percent chance of positive population growth. The DEIS/DEIR also fails to consider feasible mitigation measures that would avoid or reduce these significant impacts.

First, reliance on the Kimmerer 2009 equation to analyze impacts to longfin smelt from reduced flow underestimates adverse impacts to longfin smelt from reduced Delta outflow during the winter and spring months. Because it does not consider the effects of prior stock abundance, the Kimmerer et al. (2009) regression relationships will show that years with the same winter-spring X2 produce the same estimate of longfin smelt abundance, regardless of the abundance in previous years. However, more recent published scientific studies demonstrate that prior stock abundance has a significant effect on abundance in subsequent years (stock-recruit effect). *See* Nobriga and Rosenfield 2016. Because longfin smelt population size in any given year is affected by both Delta outflow and abundance of the previous generation, the sequence of annual winter-spring Delta outflow conditions has a large impact on population abundance – for example, several dry years in a row can produce abundance declines that cannot be reversed by occasional wet years. The Kimmerer 2009 regression therefore leads to overestimation of longfin smelt abundance when wet years follow dry years and underestimates environmental impacts of the alternatives on longfin smelt. As a result, the DEIS/DEIR significantly underestimates the adverse effects on abundance from reduced Delta outflow caused by proposed operations. Given that longfin smelt abundance has already declined by 99 percent over the past several decades, further declines in the abundance of the species would cause a mandatory finding of significance and are inconsistent with the requirements of CESA. As a result, CDFW recently concluded that WaterFix must not result in any reduction in abundance of this species, and prohibited that project from reducing Delta outflow during the months of March to May, unless Delta outflows exceeds 44,500 cfs. *See supra* note 11.[14] CDFW recommended a similar mitigation measure for Sites Reservoir operation. *See* Exhibit 1.

Similarly, the SWRCB's final scientific basis report for the Phase 2 update of the Bay-Delta Water Quality Control Plan concluded that average Delta outflow of 42,800 cfs during the January to June time period is necessary to achieve a 50 percent chance of positive population

[14] Unfortunately, CDFW's CESA findings demonstrate that WaterFix will reduce the abundance of longfin smelt, in large part because WaterFix will reduce Delta outflow during the winter months. Separately, CDFW has submitted written comments to the SWRCB confirming that Delta outflow during the January to June period is the appropriate time period to analyze impacts to longfin smelt and to ensure adequate Delta outflows to protect the species.

growth, and determined that such flows would be protective of longfin smelt. SWRCB 2017 at 3-56, 3-60. The DEIS/DEIR should be revised to analyze whether proposed operations would reduce the frequency of achieving this flow threshold.

Because the proposed operations would result in significant adverse impacts on longfin smelt, the DEIS/DEIR must consider feasible mitigation measures. The DEIS/DEIR should be revised to consider a mitigation measure that would only allow diversions to storage when Delta outflows are in excess of 42,800 cfs during the months of January, February and June, and in excess of 44,500 cfs during the March through May time period. This proposed mitigation measure would also provide significant benefits to other species, including salmon and sturgeon, whose survival and abundance is dependent on Sacramento River flows and/or Delta outflows.

D. The DEIS/DEIR fails to accurately assess environmental impacts to Delta smelt

The DEIS/DEIR fails to accurately assess potential impacts of operations on Delta smelt because it fails to consider the effects of reduced Delta outflow during the winter and spring months on the survival and abundance of Delta smelt. The DEIS/DEIR appropriately acknowledges that increases in outflow during the summer and fall months benefit Delta Smelt,[15] as recent scientific information from CDFW, FWS, and the Interagency Ecological Program have shown. However, the DEIS/DEIR does not analyze how reductions in Delta outflow during the spring, summer or fall, as a result of proposed operations, would reduce the survival and abundance of Delta Smelt, despite recent scientific information from FWS and other agencies documenting this effect.[16] The DEIS/DEIR should be revised to consider these studies and evaluate whether the proposed operations would reduce spring Delta outflow, thereby harming delta smelt.

VII. The DEIS/DEIR Fails to Accurately Assess Environmental Impacts to Terrestrial Biological Resources

A. The DEIS/DEIR inappropriately defers formulation of mitigation measures and fails to adequately describe mitigation for potentially significant impacts to terrestrial species

[15] However, while the DEIS/DEIR claims that shifting X2 0.5 or 1 km east during the winter or spring would not have an effect on longfin smelt, due to the arbitrary 5 percent and 10 percent thresholds, the DEIS/DEIR concludes that shifts in X2 of 0.5 or 1 km west could have a beneficial effect on Delta Smelt.

[16] *See, e.g.*, Interagency Ecological Program, Management, Analysis, and Synthesis Team: An Updated Conceptual Model of Delta Smelt Biology 2015, available online at: http://www.water.ca.gov/iep/docs/Delta_Smelt_MAST_Synthesis_Report_January%202015.pdf; email from Leo Polansky to Doug Obegi dated September 29, 2017, available online at: https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/california_waterfix/exhibits/docs/NRDC_TBI_DOW/NRDC-37.pdf. These documents are incorporated by reference.

The DEIS/DEIR makes clear that proposed project is likely to have significant, negative impacts on a substantial number of terrestrial species, including golden eagles, bald eagles, Western pond turtles, and giant garter snakes, among many others. Because the impacts to these species are potentially significant, the EIS/EIR must describe feasible mitigation measures that could minimize the significant adverse impacts. CEQA Guidelines § 15126.4(a)(1). Generally, the formulation of mitigation measures may not be deferred until a later time. *Id.* § 15126.4(a)(1)(B). If an agency chooses to defer formulation of specific measures in a CEQA document, it must "commit itself to specific performance criteria for evaluating the efficacy of the measures implemented." *POET, LLC v. California Air Res. Bd.*, 217 Cal. App. 4th 1214, 737-38 (2013). As explained further below, the DEIS/DEIR fails to meet these standards because it provides vague descriptions of mitigation measures with a promise of future formulation, but fails to include any performance criteria for the ultimate evaluation of those measures.

The general mitigation measure ("Mitigation Measure Wild-1b") suffers from precisely this flaw. Instead of providing a specific mitigation plan, it merely promises future consultation with specific state and federal agencies, and indicates that compensation ratios will follow "appropriate protocols":

> For unavoidable Project footprint impacts, suitable habitat shall be identified in coordination and consultation with USFWS, CDFW, and the USACE and appropriate actions/agreements developed ranging from on-site restoration, enhancement, acquisition of conservation easements, land purchases, or mitigation bank credit acquisition. Compensation of such habitat lands shall occur per all appropriate protocols (including replacement ratios) for each such species.

DEIS/DEIR at 14-128 to 129. This vague promise of future formulation is insufficient to provide the public with any reasonable assurance that the proposed project's significant wildlife impacts will be properly mitigated because it lacks specific performance criteria or other measures that could be used to evaluate the mitigation measures' efficacy. While the DEIS/DEIR proposes additional mitigation measures for some species, several animals, like the western pond turtle, are entirely dependent on Mitigation Measure Wild-1b. *See* DEIS/DEIR at 14-138 (describing avoidance measures and stating "[l]oss of western pond turtle habitat would be compensated for with through the implementation of Mitigation Measure Wild-1b identified above"); *see also, e.g.*, DEIS/DEIR at 14-138 (mitigation for western yellow-billed cuckoo provided exclusively under Mitigation Measure Wild-1b); DEIS/DEIR at 14-137 (mitigation for loss of grassland habitat for western burrowing owls provided exclusively under Mitigation Measure Wild-1b). Further, while USFWS and CDFW may have clearly-defined mitigation protocols for some species, we do not believe such protocols exist for all species that the project will impact. If agencies have multiple, potentially conflicting guidelines, it is unclear which protocols they would follow. Because Mitigation Measure Wild-1b defers formulation of specific mitigation measures for admittedly significant impacts and lacks meaningful performance criteria, it is unlawful and must be substantially modified in the revised and recirculated DEIS/DEIR.

Several of the species-specific mitigation measures also unlawfully defer formulation of mitigation measures, creating concern that the project's significant wildlife impacts will not be adequately mitigated. For example, for giant garter snakes, the DEIS/DEIR states that "[p]ermanent loss of GGS habitat will be compensated at a ratio and at a manner agreed upon in consultation with the USFWS. Compensation may include preservation and enhancement of existing populations, restoration or creation of suitable habitat, or purchase of credits at a regulatory agency approved mitigation bank in a sufficient quantity to compensate for the effect." DEIS/DEIR at 14-134. The mitigation measure fails to define what "a sufficient quantity to compensate" for the impacts means, and does not provide any performance standards. Further, formulating mitigation based on consultation with only USFWS is inadequate because giant garter snakes are also listed under CESA, and the state law includes a more stringent standard—i.e., minimize and fully mitigate—than the federal ESA.

The DEIS/DEIR similarly defers mitigation for golden eagle habitat loss, fails to provide any performance standards, and fails to include a requirement for consultation with CDFW. DEIS/DEIR at 14-135 ("The specific methods for mitigating the loss of the annual grassland habitat shall be determined in consultation with USFWS."). This is legally inadequate and must be remedied in the revised DEIS/DEIR. Similar problems exist for other species-specific mitigation measures. *See, e.g.*, DEIS/DEIR at 14-137 (burrowing owl mitigation "will include the creation of artificial burrows in adjacent suitable habitat as determined appropriate by a qualified biologist in consultation and coordination with CDFW and USFWS").

The DEIS/DEIR also inappropriately defers formulation of mitigation for impacts to giant garter snakes caused by modifications to the GCID main canal. The giant garter snake mitigation measure—Mitigation Measure Wild-2d—states that "[c]onstruction activity within giant garter snake habitat shall be conducted between May 1 and October 1. If work outside of this time period is necessary, USFWS's Sacramento Fish and Wildlife Office shall be contacted to determine if additional protection measures are necessary." DEIS/DEIR at 14-133. Conducting work between May 1 and October 1 is important because giant garter snakes are active during that period, and therefore more likely to move away from construction equipment. However, the DEIS/DEIR states that "[t]he GCID Main Canal is typically out of service each year between early January 7 and late February for maintenance. Construction activities would be scheduled during this maintenance period whenever possible." DEIS/DEIR at 3-64. The project description thus indicates that, in contrast to the time period specified in Mitigation Measure Wild-2d, modifications to the GCID main canal would occur during the giant garter snake's inactive season. This is particularly problematic because the proposed modifications include lining the earthen canal, and the earthen canal is likely to include burrows used by giant garter snakes during their winter inactive period. All modifications to the GCID canal should occur during the time period prescribed in the giant garter snake mitigation measure—between May 1 and October 1. If that is not possible, it is not appropriate to defer formulation of mitigation measures related to construction during the inactive season because construction during that time is foreseeable based on the project description. Rather, Mitigation Measure Wild-2d should be modified to specify avoidance, minimization, and mitigation measures appropriate for significant impacts to giant garter snakes caused by construction during the snakes' inactive period.

Proposed mitigation measures for temporary impacts to giant garter snake habitat are also inadequate. According to the DEIS/DEIR, giant garter snakes are known to use rice fields within the construction disturbance area, and construction of the Delevan Pipeline will cause temporary impacts to 1,358.9 acres of rice habitat. DEIS/DEIR at 14-96, 14-99. The DEIS/DEIR acknowledges that "[f]allowing of rice fields would not only temporarily remove giant garter snake habitat, but could also have adverse effects on the reproduction, recruitment, and survival of the species that could continue beyond the 2-year construction schedule." DEIS/DEIR at 14-99. The document concludes that loss of fresh emergent wetland habitat along with "the extensive temporary loss of rice habitat" will have a potentially significant impact on giant garter snakes. DEIS/DEIR at 14-99.

In spite of these admittedly significant impacts, the DEIS/DEIR fails to include adequate mitigation measures. First, the document relies on inappropriate mitigation guidelines. It states that "[p]rotective actions and mitigation measures shall comply with the USFWS's Programmatic Biological Opinion (USFWS, 1997), or USFWS mitigation guidelines current at the time of the surveys." DEIS/DEIR at 14-132. However, the referenced biological opinion states that it is intended to be used for projects "with relatively small effects on the giant garter snake and its habitat," including "permanent impacts of less than 3.00 acres (1.21 hectares) and temporary impacts of less than 20.00 acres (8.09 hectares) of giant garter snake habitat."[17] Here, in contrast, construction of the Delevan Pipeline is expected to cause temporary impacts to more than 1,358 acres of giant garter snake habitat and permanent impacts to additional habitat acreage. Reliance the 1997 Programmatic Biological Opinion is clearly improper, and the DEIS/DEIR's reference to other "USFWS mitigation guidelines current at the time of the surveys" does not cure the problem because it fails to allow for any assessment of the appropriateness of whatever mitigation guidelines may be used in the future. Further, because giant garter snakes are listed under both CESA and the federal ESA, an exclusive focus on USFWS mitigation guidelines is inappropriate and CDFW should also play a role in formulating appropriate mitigation.

Second, the DEIS/DEIR does not clearly indicate how temporary loss of rice habitat will be compensated.[18] In light of the extent of temporary habitat loss (more than 1,358 acres), the

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[17] U.S. Fish and Wildlife Service, 1997 Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter, and Yolo Counties, at p. 1, available at http://www.water.ca.gov/fishpassage/docs/butte/butte_app_K.pdf

[18] Though this discussion focuses on mitigation for impacts to giant garter snakes, the DEIS/DEIR indicates that up to 196 species may be found within rice habitat in the Extended

substantial duration of the loss (at least two years), and the seriousness of the impacts (adverse effects on reproduction, recruitment, and survival), the temporary impacts must be fully mitigated. However, Mitigation Measure Wild-2d only explicitly discusses compensation with respect to permanent impacts. *See* DEIS/DEIR at 14-133 ("Permanent loss of GGS habitat will be compensated at a ratio and at a manner agreed upon in consultation with the USFWS."). The DEIS/DEIR's one statement regarding compensation for lost rice habitat is inadequate and confusing. It states that "[m]itigation for rice habitat would already be partially compensated for by implementation of the mitigation measures for loss of wildlife habitat types described above." DEIS/DEIR at 14-133. To the extent this statement means that loss of rice habitat will be compensated for by implementation of the avoidance and minimization measures discussed in the bullet points that precede the statement, it is incorrect because those measures do not include any compensation for the lost habitat. To the extent it means that loss off rice habitat will be compensated by mitigation already being provided for the loss of other habitat types, the statement improperly suggests that mitigation acres will be double counted. The final EIS/EIR must clearly explain how impacts to giant garter snakes from a two-year loss of rice habitat will be fully mitigated, including appropriate compensation.[19]

B. <u>The DEIS/DEIR's reliance on old information renders its assessment of impacts to terrestrial species unreliable</u>

Field surveys are critical for understanding the presence and distribution of wildlife within the project area, and for determining whether the proposed project is likely to impact terrestrial species. Yet the DEIS/DEIR relies upon extremely dated survey information. The document explains that "[i]nitial field surveys were conducted within the Primary Study Area from 1998 to 2004 at all Project facility locations, then again in 2010 to 2011 at newly proposed Project facility locations." DEIS/DEIR at 14-16. This means that for the inundation area and other large swaths of land, field surveys that the impacts analysis relies upon are between 14 and 20 years old. Particularly in light of climate change, there is a substantial risk that the information regarding species' presence and distribution derived from the survey data is no longer accurate.[20]

Study Area. DEIS/DEIR at 14-3. Many of these species will be impacted by fallowing and construction associated with the Delevan Pipeline, and significant impacts to all of these species must be mitigated.

[19] As a point of reference, the inappropriately relied upon 1997 Programmatic Biological Opinion indicates that temporary impacts to giant garter snake habitat lasting two seasons should be compensated by restoration plus 1:1 replacement. For temporary impacts lasting more than two seasons, compensation must be restoration plus 2:1 replacement. *See* http://www.water.ca.gov/fishpassage/docs/butte/butte_app_K.pdf at p. 7.

[20] Field survey information regarding the presence of wetlands and other waters within the Primary Study Area is similarly outdated. According to the DEIS/DEIR, wetlands and other waters within the inundation area were surveyed during 1998 and 1999. DEIS/DEIR at 15-5. Because of changing hydrology and land use, there is a substantial risk that this old survey data no longer provides accurate information regarding the distribution of wetlands and other waters within the project area.

The DEIS/DEIR's discussion of bald eagles illustrates the problem. According to the document, "[d]uring initial field surveys, no nests, adult pairs, or nesting behavior were observed at any Project facility location. However, during subsequent visit to the Primary Study Area a nesting pair of bald eagles was observed at the proposed Golden Gate Dam site." DEIS/DEIR at 14-26. While the species was absent during the initial surveys, it was later found to be present within the project area. As this example suggests, the old survey data is not reliable. Particularly for smaller, more elusive species like California red-legged frogs, California tiger salamanders, giant garter snakes, vernal pool fairy shrimp, vernal pool tadpole shrimp, and ringtails, reliance on decades old survey data likely creates an unrealistic picture of their presence and distribution, and an inaccurate assessment of the project's impacts.[21]

The DEIS/DEIR recognizes that the survey data may not accurately represent species presence and distribution, but fails to remedy the problem. According to the document, "[i]t is recognized that [t]he distribution of special-status species or important habitat features (e.g., nest sites) may change during the period prior to construction, which could influence the location and extent of mitigation. Accordingly prior to construction, additional special-status species surveys will be conducted as necessary in consultation with USFWS and CDFW." DEIS/DEIR at 14-17; *see also* Mitigation Measure Wild-1a (requiring preconstruction surveys). While it is helpful that the DEIS/DEIR recognizes the need to update information regarding species presence and distribution prior to construction, deferring additional survey work until after the EIS/EIR is finalized significantly undermines the accuracy and informational value of the environmental document, and makes it difficult for the public to assess and compare the environmental impacts of the proposed alternatives.

Accordingly, to ensure the EIS/EIR's analysis of impacts to terrestrial species is accurate and meaningful, we recommend that the lead agencies conduct additional field surveys and make the information from the additional field surveys available in the revised and recirculated DEIS/DEIR. Additional field surveys are particularly important for species like California red-legged frogs and California tiger salamanders, which have potentially suitable habitat within the Primary Study Area, but which were not found during the initial field surveys. Without additional field surveys for these and other species, conclusions regarding the absence of significant impacts are unsubstantiated and unreliable.

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[21] In addition to relying on old field survey data, the DEIS/DEIR makes unsubstantiated assertions about the quality of some habitat types within the Primary Study Area. For example, with respect to habitat for conservancy fairy shrimp, vernal pool tadpole shrimp, and vernal pool fairy shrimp, the DEIS/DEIR states that "[t]he quality of potential habitat found within the proposed reservoir footprint is marginal. Many of the pools do not remain ponded for entire seasons, and some potential habitats do not pond at all." DEIS/EIR at 14-24. The revised and recirculated DEIS/DEIR should include source information for this and similar assertions, and to the extent the conclusions regarding habitat quality are based on old field survey information, the lead agencies should conduct additional follow-up field studies.

C. The DEIS/DEIR's assessment of impacts to wildlife refuges is inadequate

Wildlife refuges in the Central Valley provide some of the region's last-remaining wetland habitats, and are essential for the health of Pacific Flyway birds, ESA-listed species like giant garter snakes, and many other creatures. We are concerned about several flaws in the DEIS/DEIR's analysis of impacts to Central Valley refuges.

First, the DEIS/DEIR states that "[t]he project would replace at least some volume of Level 4 water supplies with a more reliable water supply than interim water transfers, but would not change the volume of water delivered to the refuges under either Level 2 or Level 4." DEIS/DEIR at 14-52. However, the Water Storage Investment Project ("WSIP") application for the Sites Reservoir project indicates that the project will provide 19,000 acre feet of Level 4 refuge water in drier years, and 33,000 acre feet of Level 4 refuge water in average years.[22] This is a major inconsistency that raises questions about both the accuracy of the water supply related information in the DEIS/DEIR, and the project's ability to provide the Level 4 water supplies proposed in the project's WSIP application.

Second, the DEIS/DEIR fails to adequately assess the risks to wildlife from siting overhead power lines along the northern edge of Delevan National Wildlife Refuge ("Delevan NWR"). For its assessment of Alternative A, which proposes to site the power lines adjacent to Delevan NWR, the DEIS/DEIR merely states that "[t]he eastern end of the Sites/Delevan Overhead Power Line would be located adjacent to the Delevan NWR, and could, therefore, disrupt a migratory corridor by causing collisions." DEIS/DEIR at 14-103. This cursory analysis fails to answer many critical questions. For example, how many birds utilize Delevan NWR each year and how many could be impacted by the proposed power lines? What species are likely to be impacted? Are collisions likely to cause mortality? Are there particular risks for birds traveling between Delevan NWR and Sacramento NWR, and how frequent is such travel? Are there risks to birds that make daily trips between Delevan NWR and other wildlife refuges in the Sacramento Valley and nearby rice fields? Without answers to these and other questions, it is impossible for the public to understand the impacts that Alternative A could have to migratory and resident birds that utilize Delevan NWR and other nearby refuges. This shortcoming is particularly problematic because other alternatives propose different configurations for overhead power lines that could reduce the likelihood of bird strikes, but without an adequate assessment of the potential impacts from Alternative A, the public and decision makers will be unable to assess the comparative benefits of the other proposed alternatives. We believe an adequate assessment of potential impacts to birds from the Sites/Delevan Overhead Power Line will reveal that siting the power lines away from Delevan NWR and along existing power line corridors, as

[22] *See* Sites WSIP Application Executive Summary at p. 4, available at https://cms.capitoltechsolutions.com/ClientData/SitesProject/Uploads/SitesExecutiveSummary_Final_August2017.pdf

appears to be proposed in Alternative D, will substantially reduce wildlife impacts, and we urge the lead agencies to include such an assessment in the revised DEIS/DEIR.

Third, the DEIS/DEIR contains almost no information regarding the possibility of construction-related impacts to wildlife that reside within and migrate to and from Delevan NWR. This omission is surprising and problematic given that construction of the Delevan Pipeline is expected to take two years and will occur along the entire northern edge of the refuge. The DEIS/DEIR acknowledges, for example, that there is suitable nesting habitat for tricolored blackbirds within Delevan NWR along the proposed Delevan Pipeline route, but fails to discuss the impacts that noise and other aspects of pipeline construction could have on tricolored blackbirds within the refuge. *See* DEIS/DEIR at 14-28 and 14-95 to 100. The revised DEIS/DEIR should provide substantially more information regarding potential impacts to Delevan NWR from construction of the Delevan Pipeline, the Sites/Delevan Overhead Power Line, and associated project facilities. Among other information, the expended discussion should address potential impacts to the area in the northern part of Delevan NWR that serves as a sanctuary from hunting. It should also address how construction will be timed to minimize disturbance at the refuge, particularly with respect to the hunting season when sanctuary areas in the northern part of the refuge are critical for Pacific Flyway birds.

Fourth, the DEIS/DEIR fails to discuss potential impacts to private lands surrounding Sacramento Valley wildlife refuges that are enrolled in USFWS and NRCS easement programs. According to the final recovery plan for the giant garter snake, "about 2,226 hectares (5,500 acres) of private lands are enrolled in our wetland easement program in the area north and south of Delevan NWR."[23] Several important NRCS wetland easements also exist within the project area. Impacts to these lands could cause significant impacts to sensitive wildlife, and must be disclosed and analyzed in the revised and recirculated DEIS/DEIR. Among other things, the final EIS/EIR must identify wetland easements in the Primary Study Area, describe any construction-related impacts to those properties, and analyze potential impacts to birds that must cross new power lines to move to and from refuges and easement properties.

Fifth, the list of wildlife refuges on page 15-2 of the DEIS/DEIR is incomplete. Among other omissions, the list fails to include Sutter NWR and Colusa NWR, both of which are located near the proposed new reservoir in the Sacramento Valley. Including a meaningful discussion of potential water supply impacts to Sutter NWR is particularly important because this Sacramento Valley refuge continues to struggle from inadequate water supplies, particularly during dry years.

[23] FWS Recovery Plan for the Giant Garter Snake (2017) at II-5, available at https://ecos.fws.gov/docs/recovery_plan/20170928_Signed%20Final_GGS_Recovery_Plan.pdf.

D. The DEIS/DEIR's analysis of impacts to giant garter snakes is inadequate

On September 28, 2017, USFWS finalized a recovery plan for the threatened giant garter snake. The DEIS/DEIR includes information from the 1999 draft recovery plan and must be updated to reflect information included in the final recovery plan. *See* DEIS/DEIR at 14-13. Importantly, the Primary Study Area lies within the Colusa Basin Recovery Unit, and the recovery plan describes specific recovery criteria for that unit. *See* Final GGS Recovery Plan at II-15 to 16. The revised DEIS/DEIR should describe how the proposed project could impede recovery efforts, and also explain how mitigation for giant garter snake impacts will advance the goals that the final recovery plan establishes.

There are several additional problems with the DEIS/DEIR's analysis of impacts to giant garter snakes that need to be remedied. First, the DEIS/DEIR indicates that the proposed modifications to the GCID Main Canal Facilities would temporarily disturb 3.1 acres within the existing canal. DEIS/DEIR at 14-91. However, the proposed modification includes lining 200 feet of earthen canal that currently provides habitat for giant garter snakes, which will permanently eliminate burrows and other habitat that is suitable for use during the snake's dormant period. Accordingly, this impact must be considered permanent and must be mitigated accordingly.

Second, there appear to be impacts to giant garter snake habitat that are not accounted for in Chapter 14. In particular, Chapter 15 describes the possibility of significant impacts to agricultural ditches and canals:

> A total of approximately 42 acres (24 miles) of waters could be permanently lost or adversely affected through construction of the buried pipelines and other activities associated with construction of the Delevan and TRR pipelines, TRR Pipeline Road, and Delevan Pipeline Electrical Switchyard. All affected waters consist of agricultural ditches and canals between 3 and 30 feet in width. If the water was not redirected back into the farmers' irrigation systems so that the water would still be available for surrounding fields, temporary or permanent disruption of most of these canal waters by the pipelines would represent a hydrological interruption and would be a potentially significant impact . . . .

DEIS/DEIR at 15-36 to 37. To the extent these agricultural ditches and canal are associated with rice fields, they are likely to provide habitat for giant garter snakes, and we were unable to identify a discussion of these potential impacts in Chapter 14. If these impacts are already addressed within Chapter 14, we request that you identify the relevant discussion. If the impacts are not discussed in Chapter 14, we request that you address these potentially significant impacts to giant garter snakes in Chapter 14, including a discussion of appropriate mitigation.

Third, the DEIS/DEIR fails to discuss potentially significant impacts to giant garter snakes from possible construction of a temporary bypass channel for the GCID main canal. As a part of the project description, the DEIS/DEIR explains that:

> If construction activities are required outside of the maintenance period, a temporary bypass channel would be built around the constructions site to allow diversion water to flow past and maintain regular canal operation. The temporary bypass channel would be constructed within the existing GCID right-of-way using a combination of excavation, earth embankment, and sheetpile walls to isolate the construction site from the canal. After completion of construction, the temporary bypass would be filled in, earthen embankments and sheetpile walls would be removed, and the area would be restored to preconstruction conditions.

DEIS/DEIR at 3-64. As discussed above, it is likely that construction on the GCID main canal will have to occur outside of the winter maintenance period because of increased likelihood of giant garter snake impacts during this time. It therefore seems likely that the briefly referenced temporary bypass channel may be constructed, and the channel's potentially significant impacts to giant garter snakes and other species must be identified and fully mitigated.

Fourth, the DEIS/DEIR inappropriately concludes that there will be no impacts to special status species from construction of the proposed Terminal Regulating Reservoir ("TRR") and related facilities. The document explains that construction of the TRR and associated facilities would result in permanent loss of 120.9 acres of rice habitat and temporary disturbance of 13.6 acres of rice habitat. DEIS/DEIR at 14-93. Yet it concludes that there will not be significant impacts to special status wildlife because "[n]o special status species were observed within the vicinity of the proposed construction footprint of the TRR or associated facilities." DEIS/DEIR at 14-94. Giant garter snakes, however, are known to inhabit rice fields throughout the project area, and the lack of observation of this elusive species does not indicate its absence. The DEIS/DEIR must discuss impacts to giant garter snakes from the permanent loss and temporary disturbance of rice habitat within in the footprint of the TRR and related facilities, and must propose appropriate mitigation for this significant impact.

VIII. The DEIS/DEIR Fails to Adequately Analyze Cumulative Impacts, and it Fails to Disclose that the Project is Likely to Result in Cumulatively Significant Adverse Impacts to Aquatic Resources

Finally, Chapter 35 of the DEIS/DEIR fails to adequately analyze cumulative impacts because it fails to consider the cumulative reductions in Sacramento River flows and Delta outflows that would result from the proposed project, California WaterFix, and several other water storage and diversion projects that the Bureau of Reclamation is currently evaluating. It completely ignores the fact that the Bureau of Reclamation has finalized NEPA analysis, including CALSIM modeling, for the California WaterFix project and Shasta Lake Water Resources Investigation, and has prepared draft NEPA analysis including CALSIM modeling for other proposed water storage projects. The failure to quantitatively consider the cumulative effect of these projects, using the existing CALSIM modeling, is inappropriate and violates NEPA and CEQA. These projects cumulatively would significantly reduce flows in the Sacramento River and significantly reduce Delta outflow, harming longfin smelt, Delta smelt, spring run Chinook salmon, winter run Chinook salmon, fall run Chinook salmon, and other species. Moreover, MBK engineers has prepared CALSIM modeling of a suite of water storage projects and the California WaterFix project, which also shows these projects have the potential to significantly reduce Delta outflow and significantly reduce Sacramento river flows.[24] However, the DEIS/DEIR ignores all of this modeling and instead assumes that certain other planning processes will result in increased flows that offset or mitigate these impacts. *See* DEIS/DEIR at 35-22 to 35-23. This is improper. At a minimum, Chapter 35 of the DEIS/DEIR should be revised to include modeling of the cumulative effects of the action alternatives with the California WaterFix project and Shasta Lake Water Resources Investigation on Sacramento River flows and Delta outflows.

IX. The DEIS/DEIR's Presentation of Information is Flawed and Obscures Potentially Significant Environmental Impacts

A. <u>The DEIS/DEIR labels results for "existing conditions" in a confusing, inconsistent and misleading manner</u>

Chapter 2 reveals no differences between NAA and baseline, and defines them as equal to each other. It is therefore confusing when differences appear elsewhere in the DEIS/DEIR. Appendix 12F is one section of the DEIS/DEIR where this change between Existing Conditions/Baseline and NAA is evident, but poorly labeled. The methodology in this section is inadequately described, since there is no description of what the alternatives are being compared to in the first table for each reservoir (Tables 12F-1a, 12F-2a, 12F-3a, 12F-4a, 12F-5a), or what the assumptions for the baseline are. The first tables for each reservoir in Appendix 12F show changes in the NAA, but nowhere does it describe changes from what.

For example, the NAA itself causes reservoirs to be 6 feet lower (than baseline) in many years, usually in May and June. For June, the percentage of time that the reservoirs are six or more feet lower (than baseline): Trinity 25%, Shasta 83%, Oroville 55%, Folsom 21%. San Luis is more than six feet lower almost all the time (96-99% of time) April-June. Big April-June drawdowns appear to be planned for San Luis under NAA, and the proposed Sites Reservoir project doesn't appear to change that.

Similarly, Appendix 6A tables showing "existing condition" in comparison to the NAA are confusing, since no explanation of "Existing Conditions" is given. Each table caption reminds the reader that the NAA represents "Existing Conditions/No Project/No Action Condition" in the DEIS/DEIR, but fails to describe the existing condition shown by the tables. If the term "existing condition," when not referring to the NAA, is describing the Existing Conditions under

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[24] This study is available online at: https://www.acwa.com/wp-content/uploads/2017/06/2017-06-05-ACWA-Integrated-Storage-Final-Report.pdf and is incorporated by reference. Figure 6 estimates that these projects would reduce Sacramento River flows by 0.9 million acre feet per year on average, including reduced flows in dry (0.5 MAF) and critical years (0.1 MAF).

the administrative draft EIR, or under CALSIM II modeling, then the text should be modified to read "Existing Condition-NODOS" or "Existing Condition-CALSIM 2010" or in some similar way identify that these tables refer to modeling assumptions from a former Administrative Draft EIR. Appendix 6D is another location where Existing Conditions are described for model results. Since results for existing conditions exist, that condition should be compared to all the alternatives so as not to hide cumulative impacts, and to avoid confusion.

B. <u>The DEIS/DEIR includes misleading and inaccurate descriptions of model results</u>

The DEIS/DEIR provides misleading and inaccurate descriptions of model results, as the following examples demonstrate:

- Page 6-50: States September-June Delta outflow would be similar to NAA, and increase in July-August. This is misleading because it implies an overall increase in Delta outflow would occur, yet this is not the case. The only decrease described is January-March in Dry and Critical years, however this text contradicts the SW-33-7 tables/figures with modeling results that show December-March reductions in median years, reductions in some months of all year types, and reductions in all months at times outside of June-August. In addition to these averages, the exceedance tables show reductions in Delta outflow in all months at certain times.
- Pages 6-50 and 6-51: State that OMR Reverse flows would be larger September-November of all years and November, January, August-September of Dry and Critical years with Sites, but compliant with regulatory criteria. This is inaccurate and should be revised to reflect the modeling results in tables/figures SW-35-7, which show more negative OMR in July-November of most years. Also, as we state elsewhere, regulatory criteria are changing, and compliance with current inadequate regulations does not necessarily indicate a lack of impact.
- Table 7-4: Should say "< 56" and "< 68" (less than), instead of > (greater than).
- Page 7-44: Salinity at Rock Slough in AN years November-December would increase up to 16.5 percent, however this impact is not identified as significant. This fails to use the DEIS/DEIR's own criteria of >10 percent changes being significant.
- Chapter 7: Under the action alternatives, X2 is described as similar to NAA, however model results in the exceedance tables in Appendix 6B show increases up to 5 km. In the driest February, X2 increasing from 83 km to 87 km would result in a significant impact on estuarine habitat that must be mitigated.
- Appendix 6B: Monthly results sorted by exceedance probability showing differences between the NAA and the alternatives may be mixing years and hiding larger variation in year to year results. While the display of total amounts is helpful, the proper way to display the absolute difference would be to subtract the results sorted by year prior to ordering by exceedance. In this way, the differences in each year can be evaluated.

C. <u>Unexplained model results and confusing sentences require further explanation</u>

Below are examples of model results and text that require additional explanation in order for the public and decisionmakers to understand:

- Page 6-38: The last paragraph is difficult to understand. Why would the delivery of water from Sites Reservoir to SOD users cause San Luis Reservoir storage to decrease June-December?
- Page 6-44: Why are there Clear Creek flow increases in July?
- Page 6-46: The short phrases explaining increases/decreases in flow are generally inadequate. For example, downstream of Delevan Pipeline, "[i]n July through November under Alternatives A, B, C, and D flows would increase as compared to the Existing Conditions/No Project/No Action Condition due to increased Shasta Lake releases to stabilize flows." The location where flows need stabilizing and the reason flow stabilization would result in flow increases from Shasta is never explained.
- Appendix 6B: Results labeled "Funks" should be changed to "Holthouse" to avoid confusion.
- Appendix 6C-1: Mentions the concept of "excess flow." This term should be defined in terms of flow that is in excess of that needed to maintain downstream ecosystems, and not in terms of current regulations, as existing regulations result in instream flows that demonstrably fail to adequately protect fish and wildlife.
- Page 25-41: Cites a 12-41 inch sea level rise, but doesn't say what period the sea level rise is projected over.

D. <u>The modeling results make clear that proposed operations would result in ecosystem degradation and omits consideration of opportunities to improve environmental conditions</u>

Sites Reservoir is touted as a project that would provide public benefits, however the priority operations on 6A-15 are water supply-focused and would cause significant impacts to fish, wildlife and aquatic ecosystems. The operations criteria on page 6A-23 only show releases to the river in summer given one-way operation of the pipeline. This is a missed opportunity. For instance, the reservoir could be used to improve the Sacramento River hydrograph if releases in other months were considered.

Table 3-24 as well as model results in Appendix 6B indicate an operation with limited ecosystem benefits and a missed opportunity. Decreases in Sacramento River flows in the winter/spring, and increased flows from June-October, are generally inconsistent with reducing the impairment of the Sacramento River hydrograph, which would generally require reducing summer flows and increasing winter/spring flows. Improving the spring-summer hydrograph to be more reflective of unimpaired runoff patterns (high flows in early spring declining through early summer) could deliver significant benefits to the riparian systems of the Sacramento River. Currently, the spring-summer hydrograph in the Sacramento River is reversed, with April-May flows rising instead of falling; combined with Army Corps and private riprap projects, this has prevented riparian growth and regeneration since about 1974. For instance, a 2002 study by The Nature Conservancy showed that providing adequate flows to restore riparian growth and regeneration near Hamilton City would take little or no additional water in wet years, 6 percent on average, and would mainly require reshaping the hydrograph to fix these problems.[25]

June-September Delevan pipeline flows would augment an already augmented summer period in the Sacramento River, potentially worsening ecological conditions in a river ecosystem adapted to lower flows during these months.[26]

At the TCC Intake at Red Bluff, diversions exceeding 1,000 cfs in up to 60 percent of Januaries and Februaries in Alternative A (and 2000 cfs in January-March for Alternative B) would cause a significant impact in Below Normal year types, reducing Sacramento River flows when higher flows are needed to help outmigrating salmon and higher Delta outflows are needed for maintaining the health of the estuary. At the GCC Intake at Hamilton City, large diversions April-May also miss the opportunity to lessen the impairment of the hydrograph in the spring months. While the diversions in the driest years are reduced compared to the NAA (although not in April in Alternative B), the operation of Sites Reservoir could be used to improve this further by focusing diversions on the augmented flows of the July-September period, when upstream reservoir releases almost always cause flows to be well above what the natural flows would be.

Sites Reservoir end of month storage for Alternative A shows October-March increases in storage to over 1 MAF almost independent of year type in Above Critical water years. For Alternatives A and B the greatest increases in storage are in Dry years. November to March diversions on the Sacramento River are already at an ecological tipping point, with river flows at Ord Ferry currently averaging near 75 percent of unimpaired flow. Below 75 percent of unimpaired flow, ecosystem impacts generally increase.[27] Increasing diversions in drier water year types runs counter to the goal of benefitting the ecosystem.

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[25] A Pilot Investigation of Cottonwood Recruitment On The Sacramento River M. D. Roberts, D. R. Peterson, D. E. Jukkola, V. L. Snowden, The Nature Conservancy, Sacramento River Project, May 2002, available at http://www.sacramentoriver.org/forum/scripts/library/file.php?file_id=36.

[26] While increased Delta outflow during the summer would benefit Delta smelt, increased flows in the Sacramento River appear unlikely to provide benefits for native fish species in the riverine environment.

[27] Richter, B. D., M. M. Davis, C. Apse, and C. Konrad. 2011. A presumptive standard for environmental flow protection. River Research and Applications 28:1312-1321. *See also* State Water Resources Control Board. 2010. Development of Flow Criteria for the Sacramento- San Joaquin Delta Ecosystem. Prepared Pursuant to the Sacramento-San Joaquin Delta Reform Act of 2009, available at http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/deltaflow/docs/final_rpt080310.pdf.

Increased diversions from the already-reduced December-March period are very problematic except under very high flow conditions, both in the Sacramento River and in terms of reduced Delta outflows December-March. These will result in significant impacts that could be addressed with more beneficial operations.

X. Conclusion

As explained above, the DEIS/DEIR contains substantial flaws and inaccuracies, fails to disclose significant impacts, and fails to consider reasonable mitigation measures. The DEIS/DEIR should be revised to address these issues and recirculated for public comment.

Thank you for considering these comments. Please feel free to contact us with any questions, or to further discuss the proposed project.

Sincerely,

Doug Obegi
Natural Resources Defense Council

Rachel Zwillinger
Defenders of Wildlife

Gary Bobker
The Bay Institute

Noah Oppenheim
Pacific Coast Federation of Fishermen's Associations
Institute for Fisheries Resources

John Rose
Center for Biological Diversity

John McManus
Golden Gate Salmon Association

Appendix 3

SITES JPA – CDFW
Coordination Meeting #3

Wednesday, June 13, 2017
12:00-1:30 PM
Somach Simmons and Dunn Conference Room
500 Capitol Mall, Sacramento
(LUNCH PROVIDED)

AGENDA

1. Introductions

2. Brief Summary/Discussion of May 30 meeting

3. Preliminary Results of Requested Diversion Modeling Scenarios

4. Prop 1 Application Discussion - Water Commission's process - (regulations operative March 7, 2017)

   a. Benefits based on:
      - Unique climate change scenario
      - Regulatory baseline is existing conditions (as of Nov 21, 2016)
      - DFW's Evaluation of Relative Environmental Values
      - Economic value of environmental benefits to calculate benefit-cost ratio

   b. Schedules: (Applications due Aug 14, 2017)
      - Commission's decision-making & funding
      - Authority's schedule for completion of EIR/S and acquire permits

5. Identify process to reconcile Water Commission's process with DFW's processes.

6. Concepts of how Sites fits into Settlement Discussions

7. Schedule Next Meeting

Working Draft - Preliminary Assessment of

CDFW's Proposed Bypass Flow Criteria for the Sites Reservoir Project

June 13, 2017

This preliminary assessment provides average annual Sites Project diversion results for a range of CDFW suggested bypass flow criteria. Results are preliminary and subject to change.

These criteria specify the amount of storm event flow that must be present at a given location in the system before Sites diversions can occur upstream. These criteria are **not** minimum flow criteria that that must be met or supplemented by the Sites Project.

The analysis included evaluation of eight sensitivity runs under current conditions using the DWR Delivery Capability Report (DCR 2015) CalSim II model with the WSIP implementation of the Sites Project (Alternative D) as the base case. The sensitivity runs include interpretations of three flow criteria proposed by CDFW:

- Diversion restrictions to maintain Tisdale Weir spills up to 5,000 cfs
- Increasing Wilkins Slough bypass flows requirements from 8,000 cfs to 14,000 cfs in November through May
- Delta Outflow criteria of 44,500 cfs in March, April, and May.

In addition, a sensitivity run with no monthly pulse bypass flow requirement was conducted to assess the impact the current monthly pulse bypass flow criteria has on average annual diversions to Sites Reservoir.

Results of the analyses are summarized and presented in the table and figures below.

Summary

The base case DCR2015 current conditions model run with Alternative D shows an average annual diversion to sites Reservoir of 514 TAF/year, as show in the table below. Alternative D includes a bypass flow criteria of 5,000 cfs at Wilkens Slough consistent with the project description in the EIS/R. There is no Tisdale Weir or Delta Outflow criteria above D-1641 specified in Alternative D.

Adding the Tisdale Weir spill criteria reduces the annual average diversion to Sites Reservoir by about 12 TAF/year, the smallest impact on Sites fills of all of the sensitivity runs.

Increasing the Wilkins Slough bypass flow criteria from 5,000 cfs to 8,000 cfs reduces average annual diversions by 45.7 TAF/year, a reduction of about 9%. Increasing the Wilkins Slough bypass flow criteria in 2,000 cfs increments from 8,000 cfs to 14,000 cfs reduces average annual Sites fills by additional increments of approximately 9%.

The addition of the Delta Outflow criteria of 44,500 cfs in March through May reduces average annual diversions by 72.6 TAF/year.

The combination of the Tisdale, Wilkins Slough (8,000 cfs), and Delta Outflow criteria reduce annual average Sites diversions by 24% or 124 TAF/year.

The elimination of the monthly pulse bypass flow requirement included in Alternative D resulted in an increase in average annual diversions to Sites Reservoir of about 10 TAF/Year.

Sensitivity Analysis

The runs are defined as follows:

1. **DCR2015** = Base Case (DCR2015 With Alternative D Project)

2. **No Pulse Bypass Flow** = "DCR2015" + No Monthly Pulse Bypass Flow Criteria
3. **Tisdale** = "DCR2015" + Tisdale Weir Spill Criteria
4. **Wilkins8k** = "DCR2015" + Wilkins Slough winter Bypass Flow of 8,000 cfs
5. **Wilkins10k** = "DCR2015" + Wilkins Slough winter Bypass Flow of 10,000 cfs
6. **Wilkins12k** = "DCR2015" + Wilkins Slough winter Bypass Flow of 12,000 cfs
7. **Wilkins14k** = "DCR2015" + Wilkins Slough winter Bypass Flow of 14,000 cfs
8. **DO Criteria** = "DCR2015" + Delta Outflow flow of 44,500 cfs in March, April, and May
9. **DO+T+W8k** = Combination of Delta Outflow 44,500 cfs + Tisdale + "Wilkins Slough 8,000 cfs

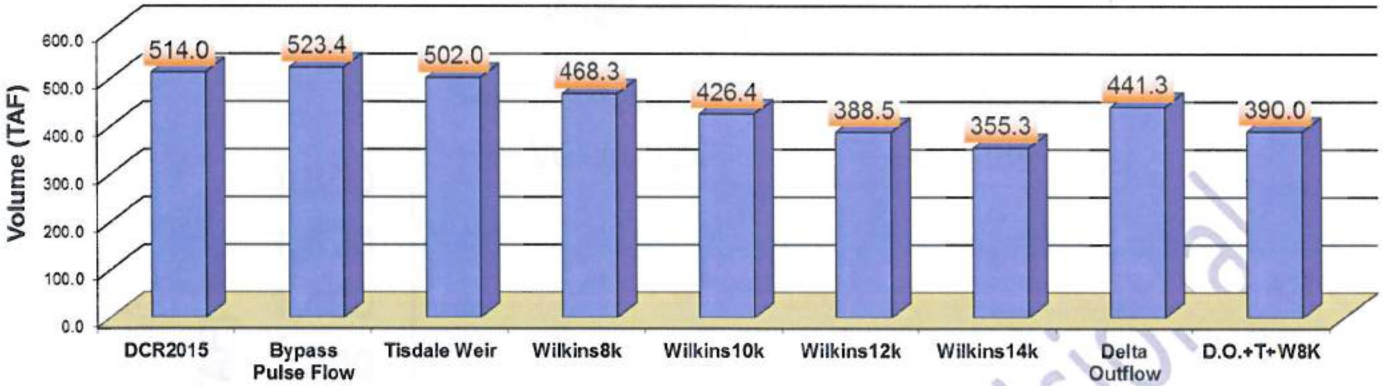
The summary table, bar chart, and exceedance figures below present the preliminary results of the analysis.

October-September

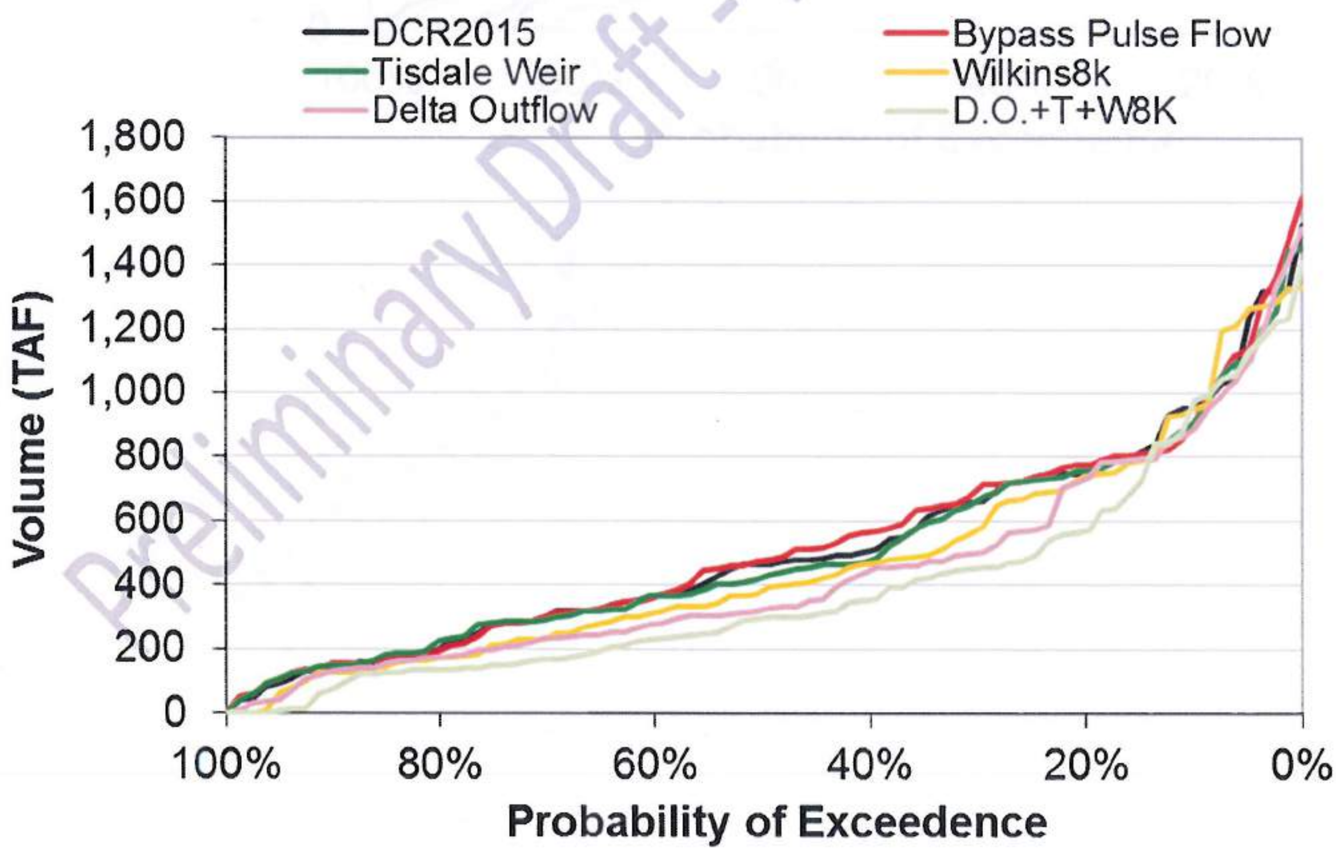
Total Average Annual Diversion to Sites Reservoir

Volume (TAF)		Difference from Previous	Difference from DCR2015 with Alternative D
DCR2015 with Alternative D	514.0		
Eliminate Monthly Bypass Pulse Flow	523.4	9.5	9.5
Tisdale Weir	502.0	-21.4	-11.9
Wilkins8k	468.3	-33.7	-45.7
Wilkins10k	426.4	-41.9	-87.5
Wilkins12k	388.5	-37.9	-125.5
Wilkins14k	355.3	-33.2	-158.7
Delta Outflow Criteria 44,500 cfs March – May	441.3	86.1	-72.6
Delta Outflow +Tisdale +Wilkins Slough 8,000 cfs	390.0	-51.3	-123.9

Total Average Annual Diversion to Sites Reservoir



Total Average Annual Diversion to Sites Reservoir



Modeling Assumptions for Sites Reservoir Intakes (Oct-Jun)

The following assumptions were developed by CDFW for a modeling exercise to evaluate the ability of Sites Reservoir to operate while ensuring species specific habitat needs and protection are met in the Sacramento River and Delta. It is assumed that these Sacramento River and Net Delta Outflow Index criteria will be met during the specified timeframes prior to and during Sites Reservoir operations. Results from this modeling exercise are intended to support the evaluation of project alternatives and their ability to contribute to ecosystem benefits.

<u>Sacramento River Assumptions</u>

- No pumping at TCCA facility until January
- No pumping until after first initial pulse flow greater than or equal to 15,000 cfs at Wilkins Slough for five consecutive days
- Wilkins Slough bypass flow requirement of 15,000 cfs
- Colusa bypass flow requirement of 29,500 cfs

<u>Habitat and Species Protection</u>

- No pumping at TCCA facility until January
    - The majority of winter-run pass this facility as very small fry.
    - 99% of downstream juvenile winter-run passage is typically completed by the end of December each year (Poytress et al. 2014).

- No pumping until after first initial pulse flow greater than or equal to 15,000 cfs at Wilkins Slough for five consecutive days.
    - The first major pulse flow past Wilkins Slough has been correlated with peak winter-run passage at the Knights Landing rotary screw traps.
    - Substantial increases in cumulative catch of winter-run at Knights Landing have been observed and correspond to a flow threshold of approximately 14,000 cfs at Wilkins Slough (del Rosario et al. 2013).

- 15,000 cfs Wilkins Slough bypass flow requirement.
    - Based on flow survival relationships of juvenile salmonids in the Sacramento River.
    - Increased emigration has also been observed at Knights Landing when flows increase.

- 29,500 cfs Colusa bypass flow requirement.
    - There is substantial benefit to providing floodplain rearing habitat in the Sutter Bypass.
        - This flow rate should provide at 5,000 cfs spill at Tisdale Weir (CDEC data and linear regression analysis of COL and TIS) to provide floodplain rearing habitat in the Sutter Bypass.
    - Based on flow survival relationships of juvenile salmonids in the Sacramento River.

Net Delta Outflow Index Assumptions

Month	W	AN	BN	D	C
Oct	12,400 (74km)	7,100 (81km)	D-1641	D-1641	D-1641
Nov	12,400 (74km)	7,100 (81km)	D-1641	D-1641	D-1641
Dec	**11,400**	**5,000**	D-1641	D-1641	D-1641
Jan	**25,000**				
Feb					
Mar	**44,500**		**25,000**	**11,400**	**11,400**
Apr					
May					
Jun	D-1641 or **11,400 (74km)**[1]	D-1641 or **11,4000 (74km)**[1]	D-1641 or **11,400 (74km)**[1]	D-1641	D-1641

Habitat and Species Protection	
D-1641	Existing SWRCB D-1641 requirements
BiOp RPA	Existing Fall X2 requirements (Delta Smelt) FWS BiOp
Delta Smelt	Holds LSZ around suitable abiotic habitat for spawning and rearing
Longfin Smelt	Protects flows for LFS abundance
Sturgeon	Protects attraction flows

[1] Whichever flow value is higher

Appendix 4

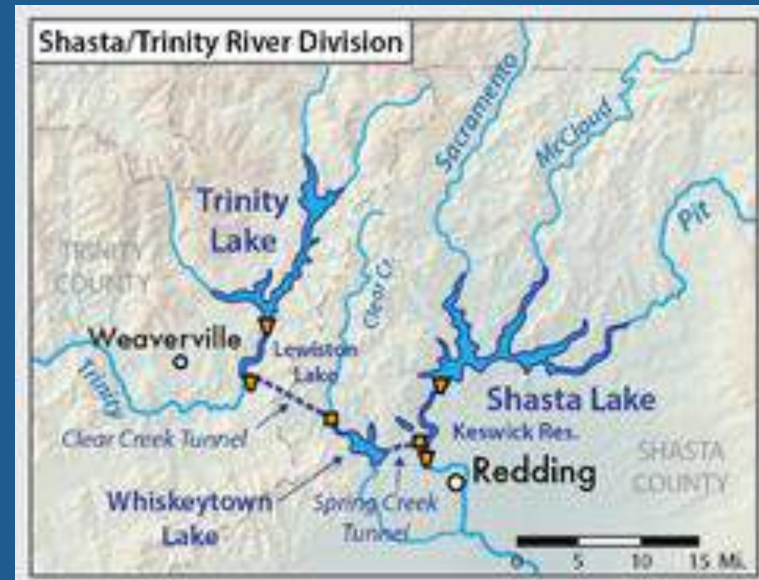
NOAA FISHERIES
West Coast Region

Sacramento River
Ecological Flow Thresholds for Salmonids Workshop

Brycen Swart
September 29, 2016

Sacramento River

Shasta Division
Central Valley Project



Regulatory Context

- 2009
  - Biological Opinion on the CVP/SWP Long-term Water Operations (OCAP)
  - Jeopardy Determination
  - Shasta Division RPA actions address storage requirements, temperature compliance, drought contingencies, and re-introduction but not flows
- 2016
  - Shasta Division RPA Adjustment – RPA actions are not avoiding jeopardy
  - CVP/SWP Long-term Operations Re-initiation
- SWRCB – Bay-Delta Water Quality Control Plan

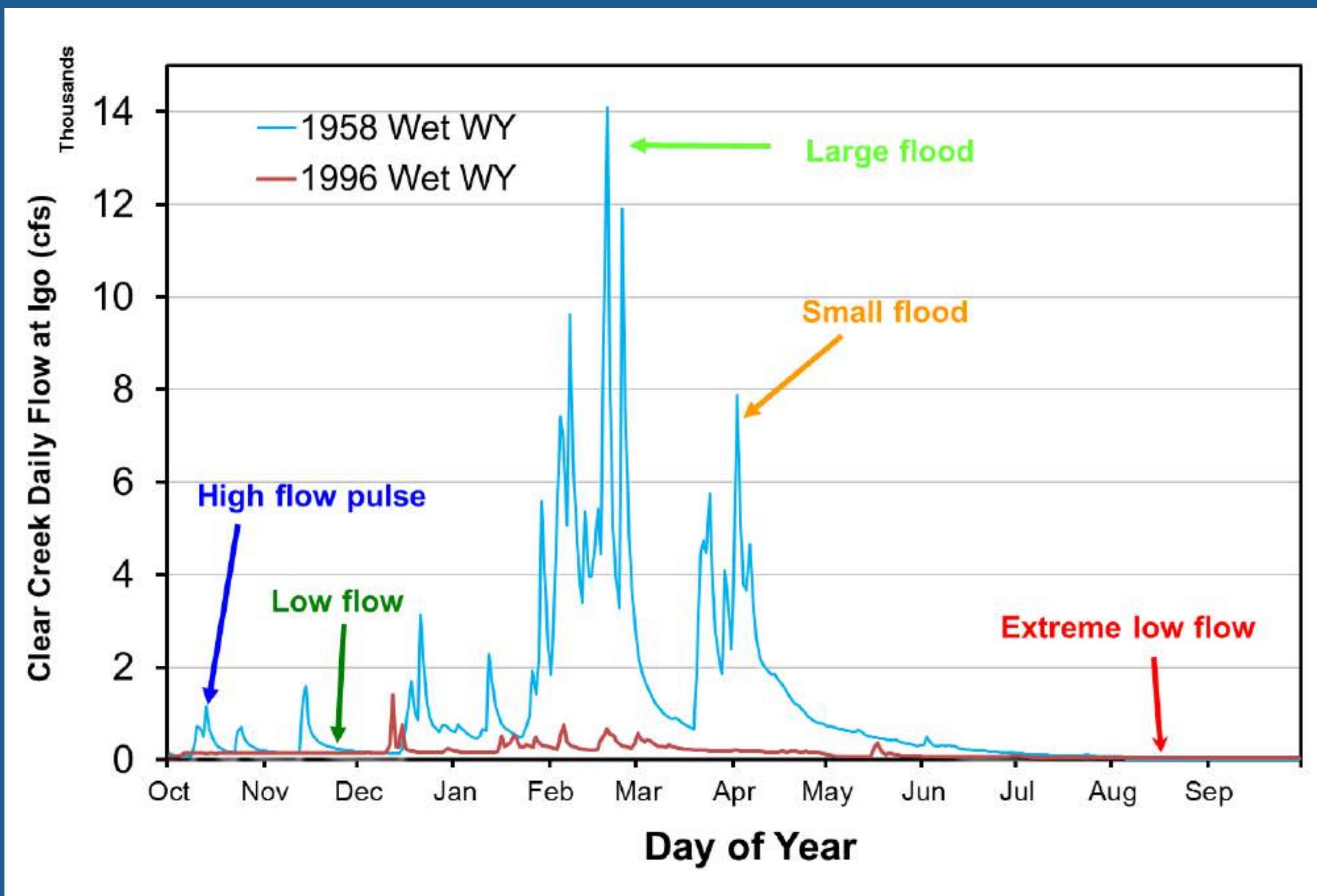
Current Flow Management

Minimum Flow Requirements

Period	Reclamation-CDFW MOA (1960)		Water Rights 90-5 (1990)	NMFS BiOp (1993)
Water Year Type	**Normal**	**Critically Dry**	**Normal**	**All**
January 1–February 28(29)	2,600	2,000	3,250	3,250
March 1–March 31	2,300	2,300	2,300	3,250
April 1–April 30	2,300	2,300	2,300	No Requirement
May 1–August 31	2,300	2,300	2,300	No Requirement
September 1–September 30	3,900	2,800	3,250	No Requirement
October 1–November 30	3,900	2,800	3,250	3,250
December 1–December 31	2,600	2,000	3,250	3,250

Flow Regime Approach

Mimic “natural”, climatically-driven variability of flows from year to year and from season to season



- Magnitude
- Timing
- Duration
- Frequency
- Rate of change

Principles for Flow Regime Approach

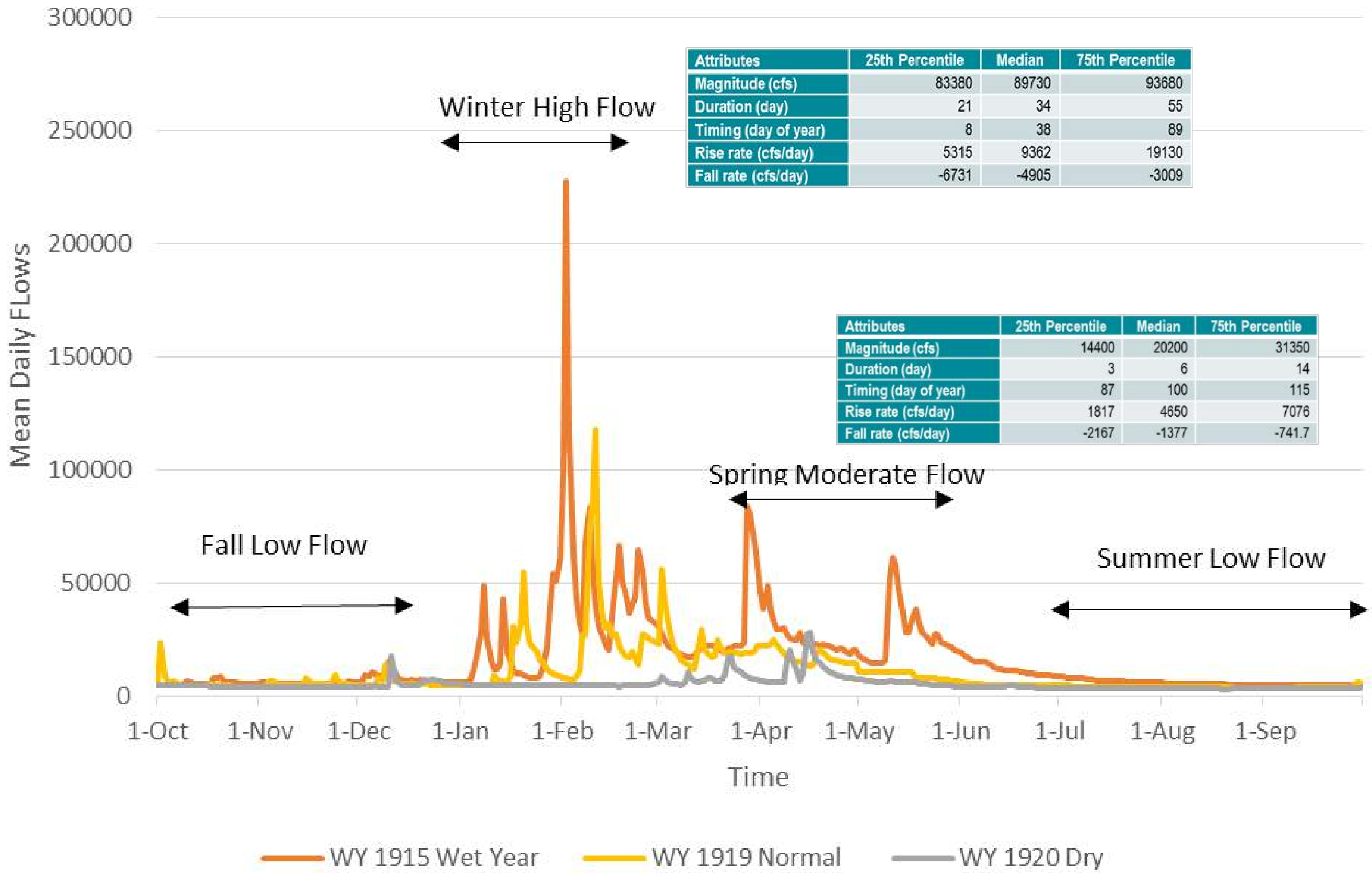
- Flow determines the extent and type of physical habitat, which in turn determines the types of living organisms in that habitat.
- Aquatic species have evolved in such a way as to be well adapted to the natural flow regime to which they have been historically exposed.
- Maintenance of natural patterns of high flows, low flows and flow variation is essential to the viability of native riverine species.
- The alteration of flow regimes contributes to the invasion and success of exotic (non-native) species in rivers.

(Bunn and Arthington, 2002)

Implementing Flow Regime Approach

- Collect flow data and analyze them
- If there is a period of time when flows were measured before major human modifications occurred, that time period is used to set the baseline or natural, unmanaged flow conditions.
- If no such data exists, use other data (e.g., similar unimpacted rivers or unimpaired flow) to establish historic conditions.
- Set recommended flows throughout the year, providing flow recommendations for each hydrologic season (e.g. low flow, snowmelt, rainy season).

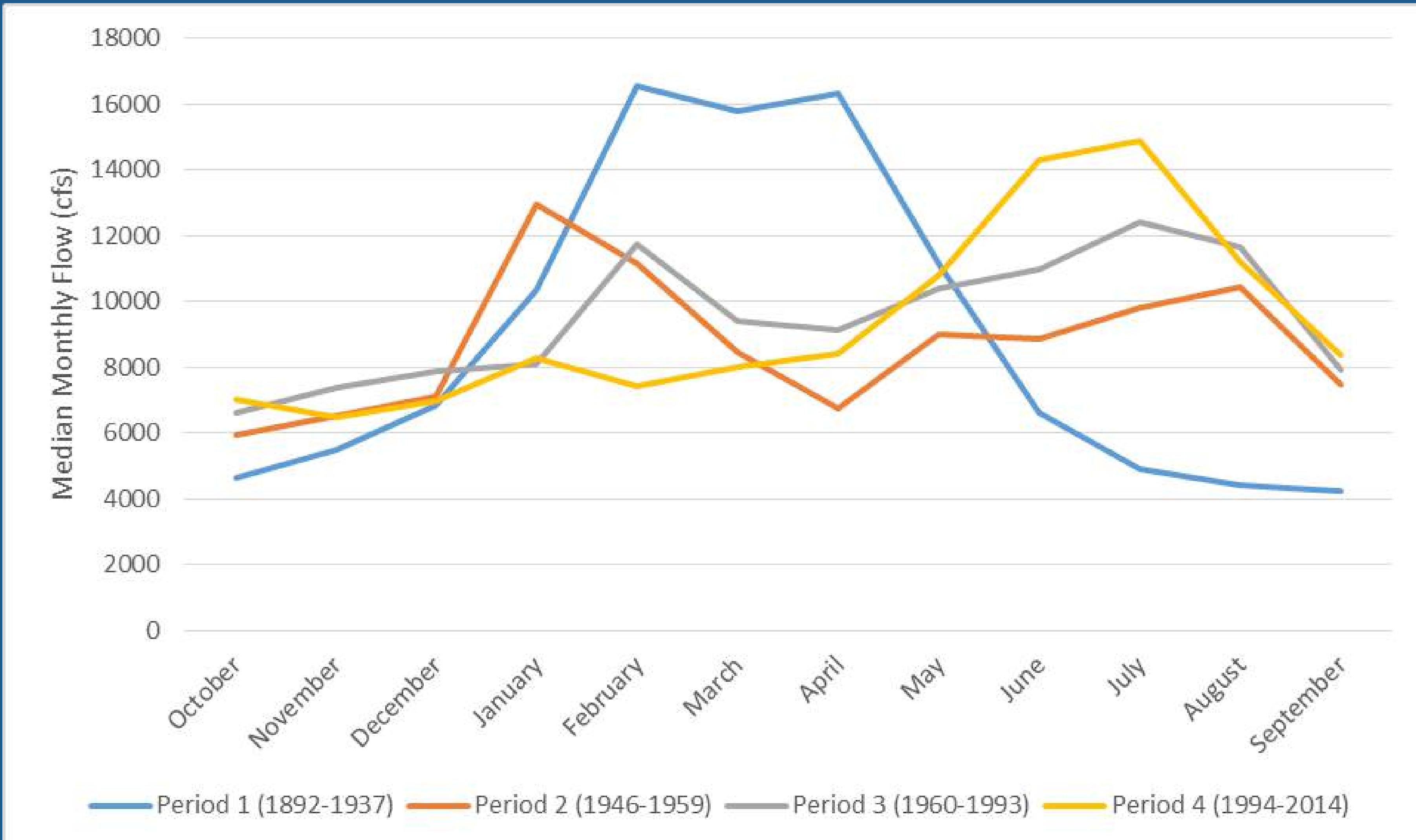
Pre-Dam Natural Flow



Attributes	25th Percentile	Median	75th Percentile
Magnitude (cfs)	83380	89730	93680
Duration (day)	21	34	55
Timing (day of year)	8	38	89
Rise rate (cfs/day)	5315	9362	19130
Fall rate (cfs/day)	-6731	-4905	-3009

Attributes	25th Percentile	Median	75th Percentile
Magnitude (cfs)	14400	20200	31350
Duration (day)	3	6	14
Timing (day of year)	87	100	115
Rise rate (cfs/day)	1817	4650	7076
Fall rate (cfs/day)	-2167	-1377	-741.7

Median Monthly Flows



Changes in Flood Flows

Period	1.5-Year Flood	2-Year Flood	5-Year Flood	10-Year Flood
Period 1 (1892-1937)	89730	130000	153000	206000
Period 2 (1946-1959)	54600	85700	97400	125000
Period 3 (1960-1993)	50500	77500	101000	123000
Period 4 (1994-2014)	41400	73200	88800	105000
% Reduction (P1 and P2)	39%	34%	36%	39%
% Reduction (P1 and P3)	44%	40%	34%	40%
% Reduction (P1 and P4)	54%	44%	42%	49%

Changes in Spring Pulse Flows

Attributes	Period 1 (1892-1937)	Period 2 (1946-1959)	Period 3 (1960-1993)	Period 4 (1994-2014)
Magnitude (cfs)	20200	14800		
Duration (day)	6	2		
Timing (day of year)	100	112		
Frequency (per year)	1.5	1	0	0
Rise rate (cfs/day)	4650	2715		
Fall rate (cfs/day)	-1377	-2788		

Environmental Thresholds and Requirements

	Magnitude	Duration	Timing	Frequency	Source
Bed Mobilization	24,000 - 120,000	12 hour peak flow	Between Feb 20 - March 20	3 to 4 years	Cain 2008, DWR 2001, Kondolf 2000, Stillwater 2006
Bank Erosion and Channel Migration	15,000 - 60,000	?	Prior to late March	2 to 4 years	Stillwater 2007, Larsen 2007
Floodplain Inundation and Rearing Habitat Flows	>25,000	30 - 60 days	Feb 15 to April 30	Dry to Wet Water Year Types	Harrell 2008, DWR 2008
Riparian Flows	23,000 - 30,000	72 day recession period	April to May	Above Normal and Wet Years	Roberts 2003, Kondolf 2007, Cain 2008

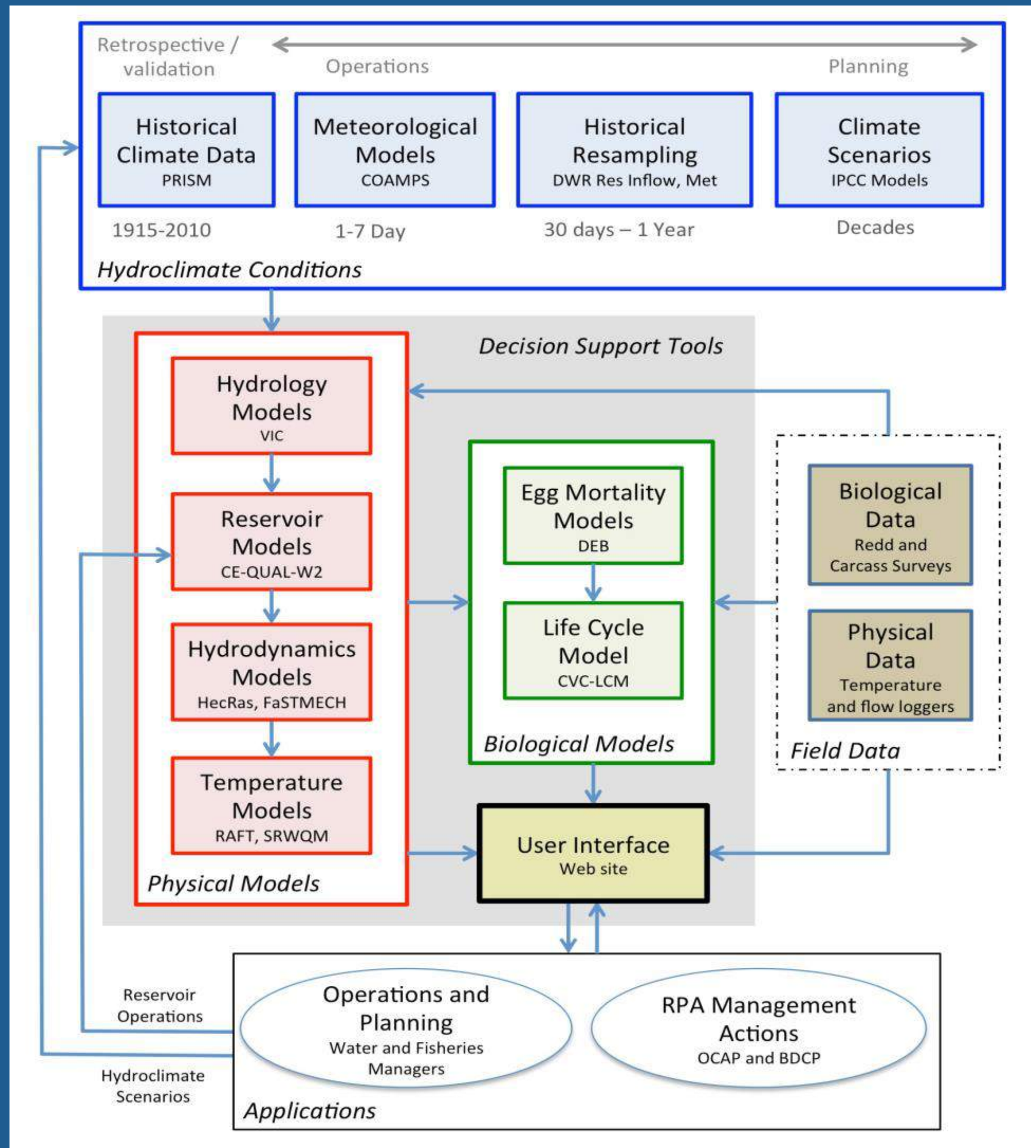
Potential Flow Recommendations

		Water Year Type				
	Timing	Critical	Dry	Below Normal	Above Normal	Wet
Bed Mobilization	Mid Feb – Mid Mar		35,000	65,000	85,000	105,000
Floodplain Inundation	Feb - Apr (45 days)			25,000	35,000	45,000
Riparian Establishment Flow	Apr				23,000	37,000
Fall Base Flow	Sep - Nov	5,250	5,250	5,250	5,250	5,250
Winter Base Flow	Dec - Feb	4,500	6,000	6,500	7,000	8,000
Spring Base Flow	Mar - May	10,000	12,000	12,500	14,000	14,000
Summer Base Flow	Jun - Aug	8,000	8,000	8,000	8,000	8,000

Next Steps

- Incorporate regression analysis of salmonid abundance with instream flow
- Refine flow recommendations
- CALSIM, SRWQM, and RAFT modeling

Validation



Retrospective / validation
Operations
Planning
Historical Climate Data
PRISM
Meteorological Models
COAMPS
Historical Resampling
DWR Res Inflow, Met
Climate Scenarios
IPCC Models
1915-2010
1-7 Day
30 days – 1 Year
Decades
Hydroclimate Conditions
Decision Support Tools
Hydrology Models
VIC
Reservoir Models
CE-QUAL-W2
Hydrodynamics Models
HecRas, FaSTMECH
Temperature Models
RAFT, SRWQM
Physical Models
Egg Mortality Models
DEB
Life Cycle Model
CVC-LCM
Biological Models
Biological Data
Redd and Carcass Surveys
Physical Data
Temperature and flow loggers
Field Data
User Interface
Web site
Reservoir Operations
Hydroclimate Scenarios
Operations and Planning
Water and Fisheries Managers
RPA Management Actions
OCAP and BDCP
Applications

Thanks! Any Questions?

Appendix 5

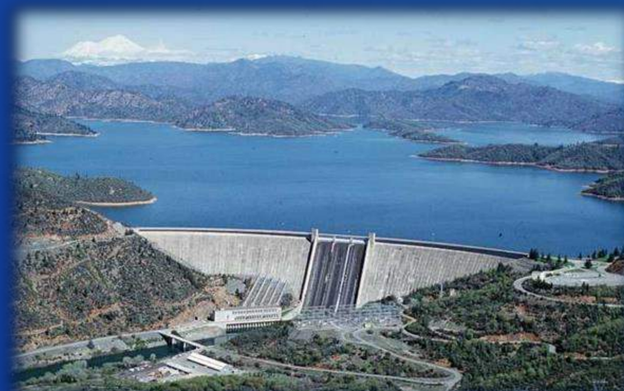
RECLAMATION

Managing Water in the West

NMFS – Reclamation Stakeholder Workshop #3

Shasta RPA Draft Proposed Amendment

June 22, 2017



U.S. Department of the Interior
Bureau of Reclamation

Introductions

Workshop Objectives

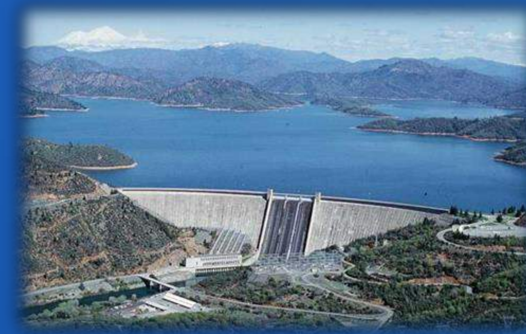
Provide status updates, discuss, and receive input on:

1. Temperature management for the 2017 Sacramento River temperature management season

2. System-wide analyses of draft proposed amendment (issued January 19, 2017) to the Reasonable and Prudent Alternative of the 2009 NMFS Biological Opinion for the long-term operation of the Central Valley and State Water Projects related to Shasta Reservoir operations

RECLAMATION

Workshop Agenda



- Introductions
- Meeting Purpose
- Update/Discussion on 2017 Temperature Management
- Update/Discussion on System-Wide Evaluations of Draft Proposed Shasta RPA
- Next Steps in System-Wide Evaluations of Draft Proposed Shasta RPA
- Discussion Q&A

RECLAMATION

Proposed Ground Rules

- Participate!
- Be respectful
- Help us stay on track
- Speak into microphone
- Take comments in batches – in room then on phone
- Cell phones off/silent
- For those on phone – please mute phones and don’t place the call on hold (sometimes creates background music)

RECLAMATION

2017 Sacramento River Temperature Management

RECLAMATION

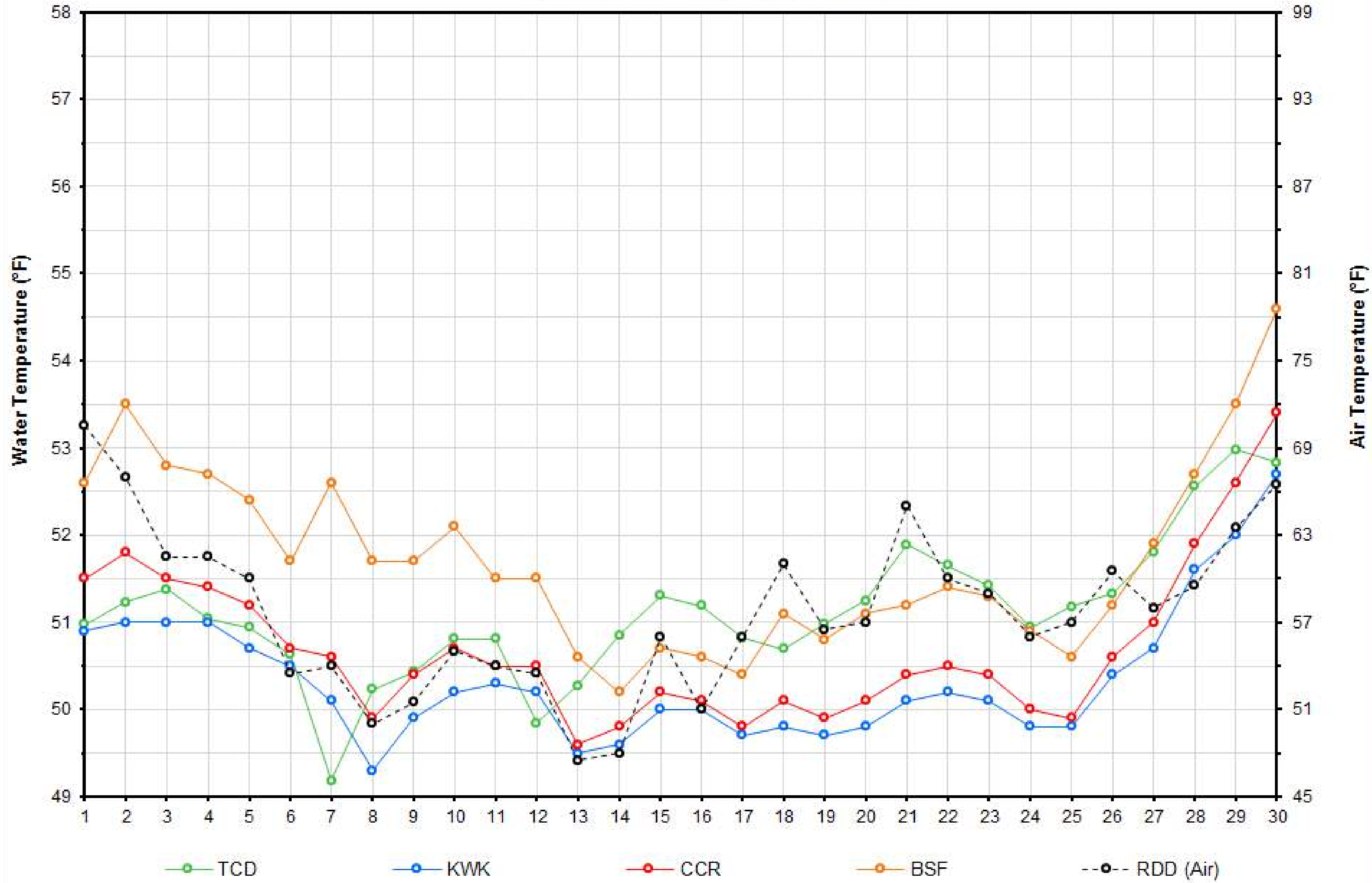
Sacramento River Temperature Management Planning

- Sacramento River Temperature Management required under:
  - SWRCB Order 90-5
    - Meet temperatures of 56° F DAT at compliance location
  - NMFS 2009/2011 BiOp, Action I.2.4
    - Development of annual plan
    - 56° F DAT at compliance location between Balls Ferry and Bend Bridge May 15 – Oct 31

2017 Plan

- Compliance
  - 56° F DAT; Balls Ferry
  - May 15 – Oct 31
- Target (Operational Study)
  - 53° F DAT as surrogate to 55° F 7DADM
  - CCR Gage as surrogate to most downstream redd
    - Subject to further discussion and analysis if most downstream redd ends up significantly farther downstream
  - May 15/onset of spawning through emergence
    - Subject to further discussion and analysis if late emergence has potential to cause impacts to future cold water pool and/or significant fall run dewatering risk
  - Offramp if significant impacts

April Mean Daily Temperatures

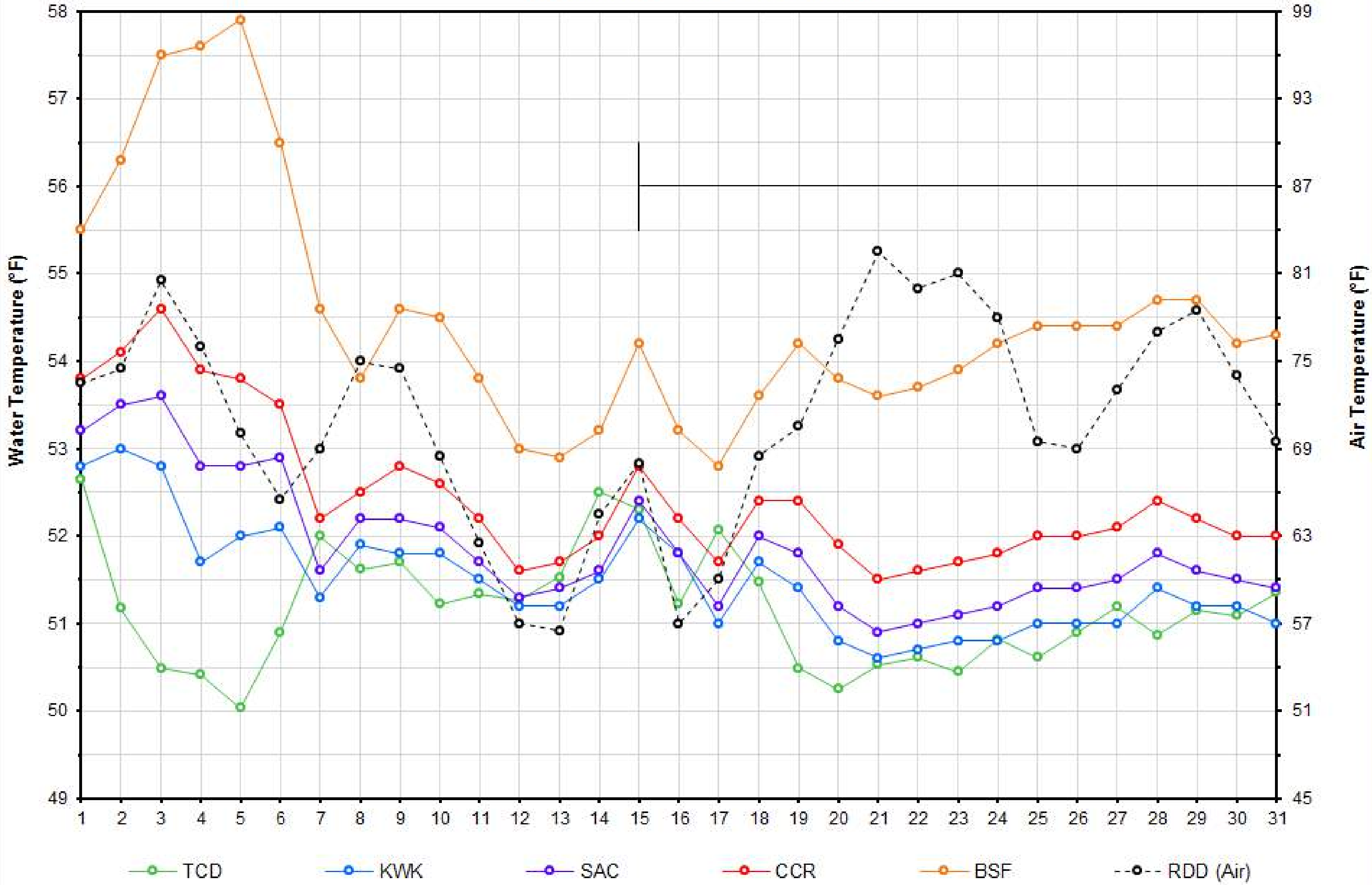


Station Details		
Code	Body of Water	Location
TCD	N/A	Shasta Power Plant
KWK	Sacramento River	0.8 miles downstream of Keswick Dam
CCR	Sacramento River	9.7 miles downstream of Keswick Dam
BSF	Sacramento River	25 miles downstream of Keswick Dam

Temperature Control Point		
Point	Temp. (°F)	Date Range
BSF	56.0	06/17/16 - Current

RECLAMATION

May Mean Daily Temperatures



Station Details		
Code	Body of Water	Location
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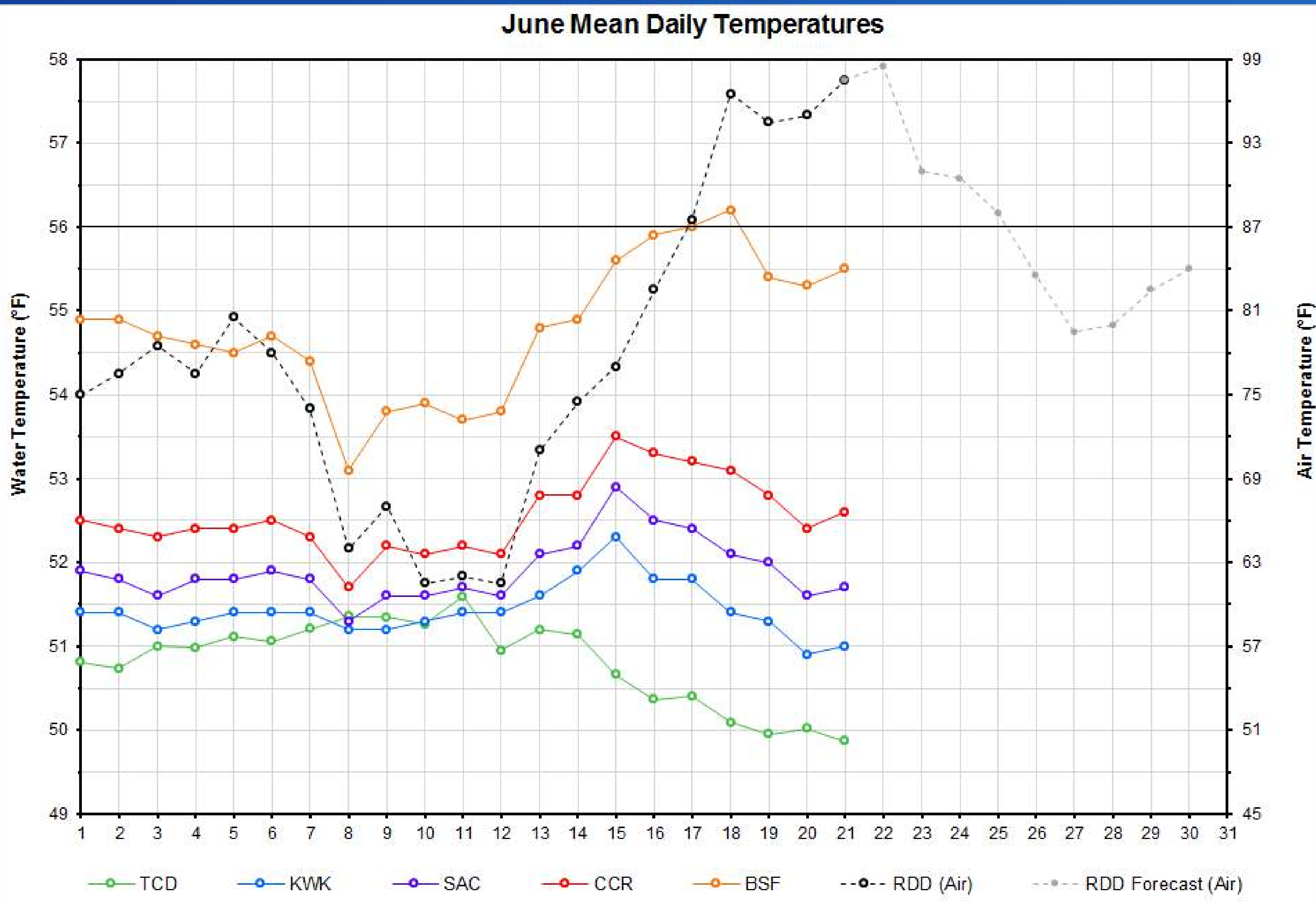
KWK	Sacramento River	0.8 miles downstream of Keswick Dam
CCR	Sacramento River	9.7 miles downstream of Keswick Dam
BSF	Sacramento River	25 miles downstream of Keswick Dam

Temperature Control Point		
Point	Temp. (°F)	Date Range
BSF	56.0	06/17/16 - Current

RECLAMATION

June Mean Daily Temperatures



Station Details

Code	Body of Water	Location
TCD	N/A	Shasta Power Plant
KWK	Sacramento River	0.8 miles downstream of Keswick Dam
CCR	Sacramento River	9.7 miles downstream of Keswick Dam
BSF	Sacramento River	25 miles downstream of Keswick Dam

Temperature Control Point

Point	Temp. (°F)	Date Range
BSF	56.0	06/01/17 - Current

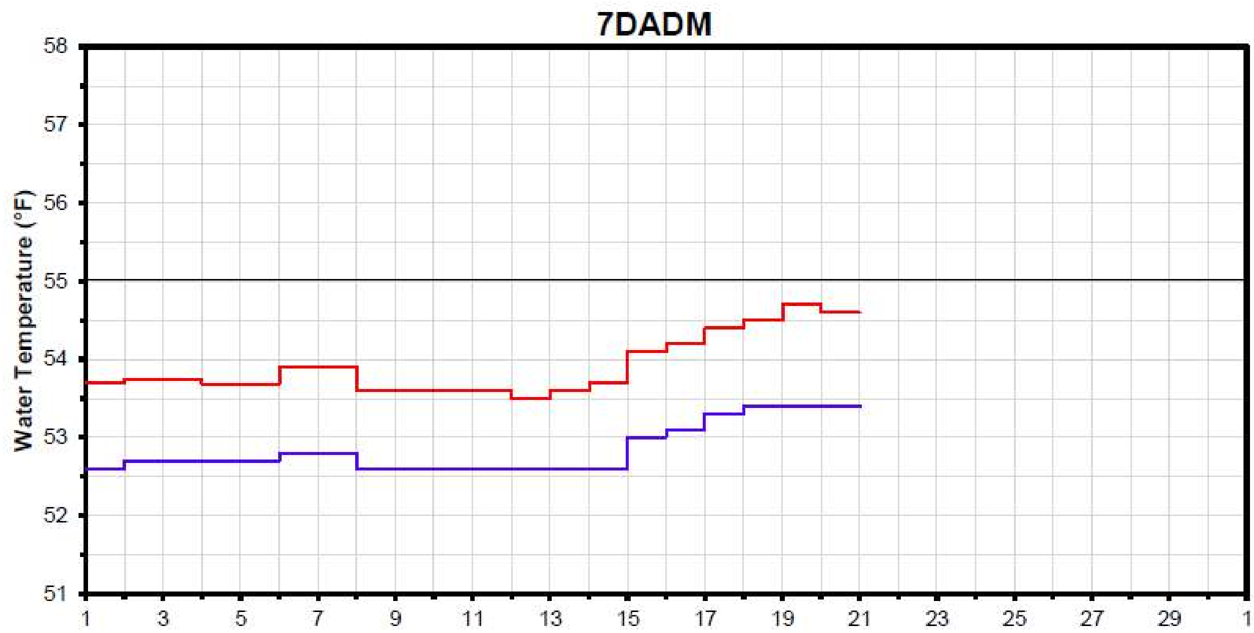
RECLAMATION

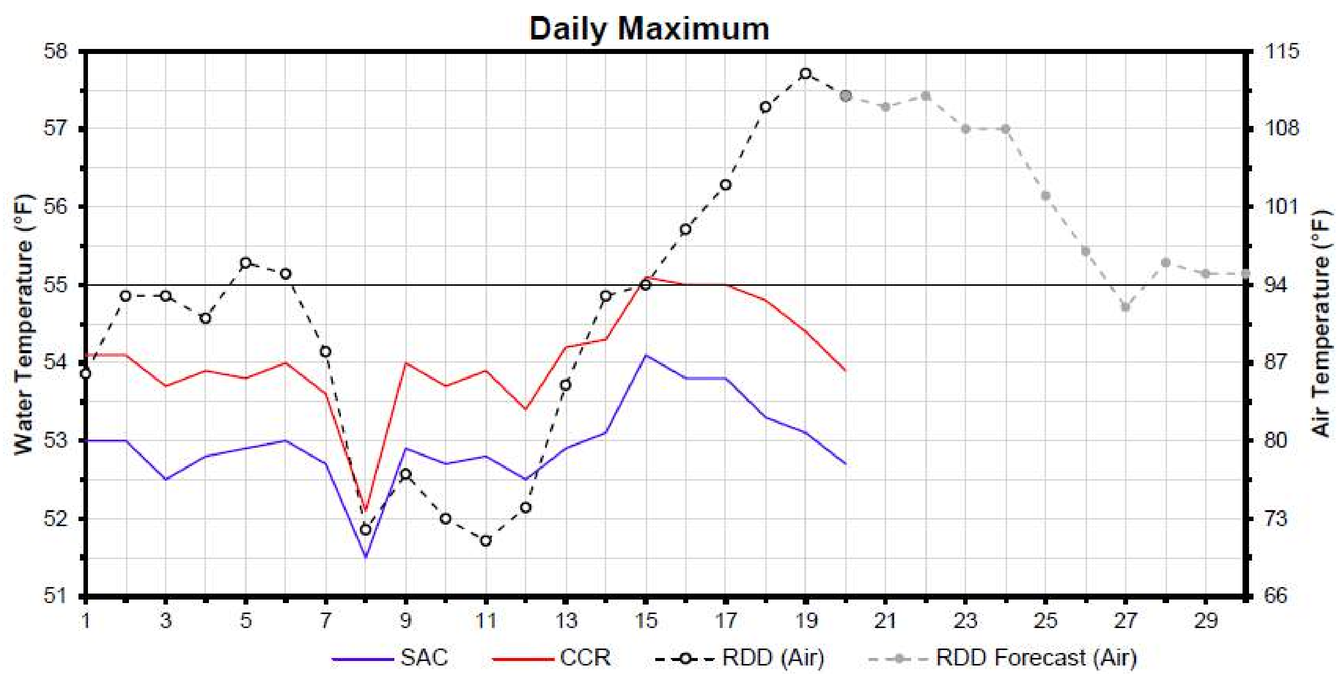
DATE	Daily Max		7DADM[1]		DAT[2]
	SAC	CCR	SAC	CCR	BSF
06/01	53.0	54.1	52.6	53.7	54.9
06/02	53.0	54.1	52.7	53.7	54.9
06/03	52.5	53.7	52.7	53.7	54.7
06/04	52.8	53.9	52.7	53.7	54.6
06/05	52.9	53.8	52.7	53.7	54.5
06/06	53.0	54.0	52.8	53.9	54.7
06/07	52.7	53.6	52.8	53.9	54.4
06/08	51.5	52.1	52.6	53.6	53.1
06/09	52.9	54.0	52.6	53.6	53.8
06/10	52.7	53.7	52.6	53.6	53.9
06/11	52.8	53.9	52.6	53.6	53.7
06/12	52.5	53.4	52.6	53.5	53.8
06/13	52.9	54.2	52.6	53.6	54.8
06/14	53.1	54.3	52.6	53.7	54.9
06/15	54.1	55.1	53.0	54.1	55.6
06/16	53.8	55.0	53.1	54.2	55.9
06/17	53.8	55.0	53.3	54.4	56.0
06/18	53.3	54.8	53.4	54.5	56.2
06/19	53.1	54.4	53.4	54.7	55.4
06/20	52.7	53.9	53.4	54.6	55.3
06/21					
06/22					
06/23					
06/24					
06/25					
06/26					
06/27					
06/28					
06/29					
06/30					
-					

Notes

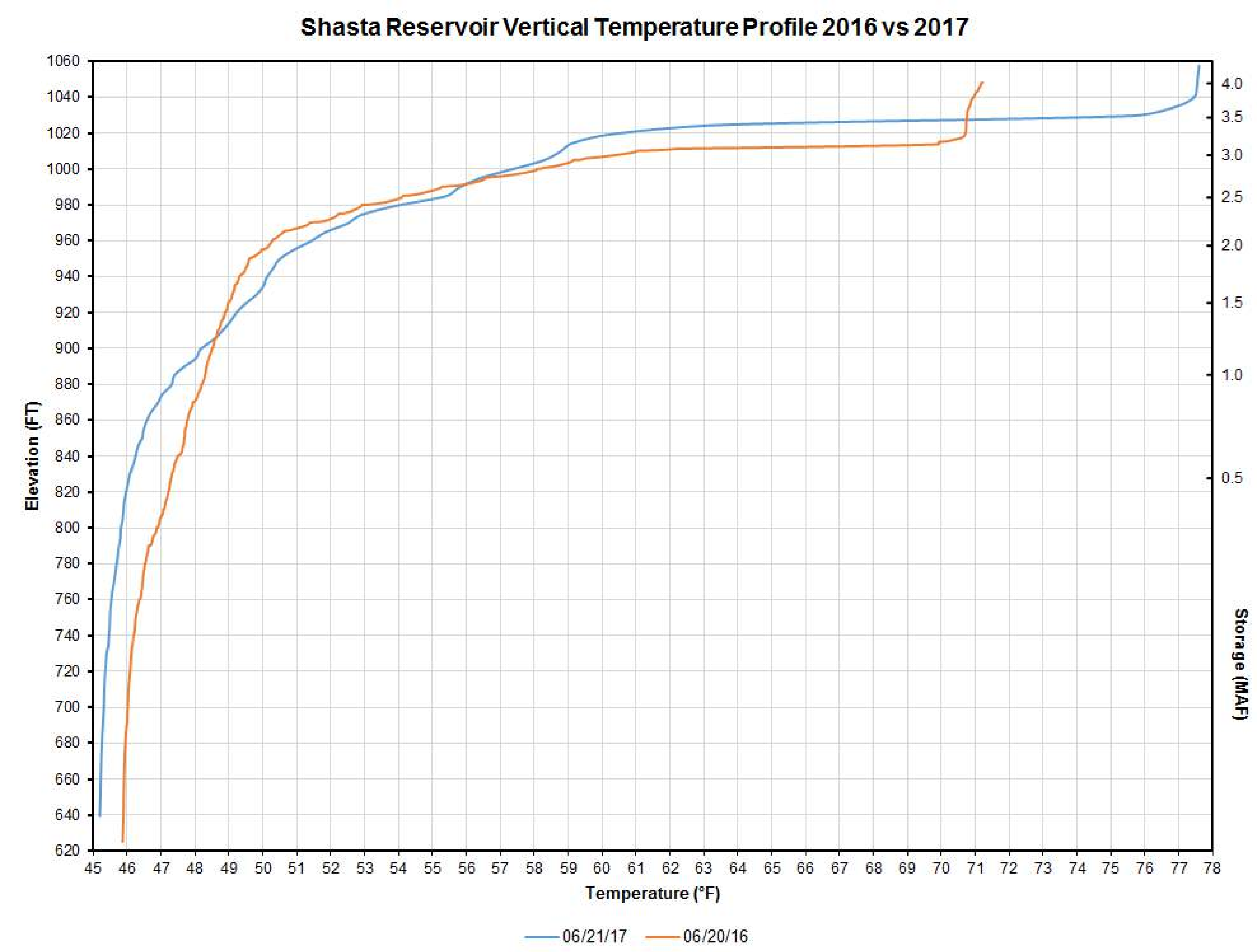
[1] 7DADM = 7-Day Average Daily Maximum

[2] DAT = Daily Average Temperature





RECLAMATION



RECLAMATION

2017 Temperature Management

- Next Steps
  - Continue operational study
  - Continue to gather, analyze, and assess data
    - 2017
    - 2016
    - Previous Years

RECLAMATION

Discussion

System-Wide Evaluations of Draft Proposed Amendment

RECLAMATION

Storage and Flow Targets/Restrictions

- Spring/Fall Storage Targets
  - Vary by water year type
    - Spring storage: ranges between 3.5 to 4.2 MAF
    - Fall storage: ranges between 1.9 to 3.2 MAF
- Spring Flow Restrictions
  - Vary by water year type
    - April flow: ranges between 4,000 to 8,000 cfs
    - May flow: ranges between 7,500 to 12,000 cfs
    - (June through October forecast flow run scenario)
- Action I.2.1
- Action I.2.3
  - Actions I.2.3.A-C

RECLAMATION

Analyses – Storage and Flow Targets/Restrictions

- CalSim analysis
  - Feasibility of targets/restrictions
  - Impacts/changes to other parts of the CVP/SWP system required to meet targets/restrictions

Analyses – Storage and Flow Targets/Restrictions

- Initial CalSim sensitivity analysis
  - Two scenarios – both use ELT Climate Change (Q5):
    - "Current Ops"
    - "NMFS Amendment"

RECLAMATION

Analyses – Two Scenarios

- "Current Ops"
  - Attempts to replicate some reduced deliveries to help protect storage
  - Does not implement reductions to D-1641 requirements in extreme drought conditions (potential refinement for ongoing studies)
- "NMFS Amendment"
  - No specific logic that guarantees Shasta storage levels
  - Allows for any shortage allocation necessary in attempt to meet proposed operational objectives
    - Not a policy or necessarily realistic strategy, but used to test ability to reach targets under essentially any supply condition
  - Shasta-Folsom balance adjusted to target "Current Ops" range of conditions

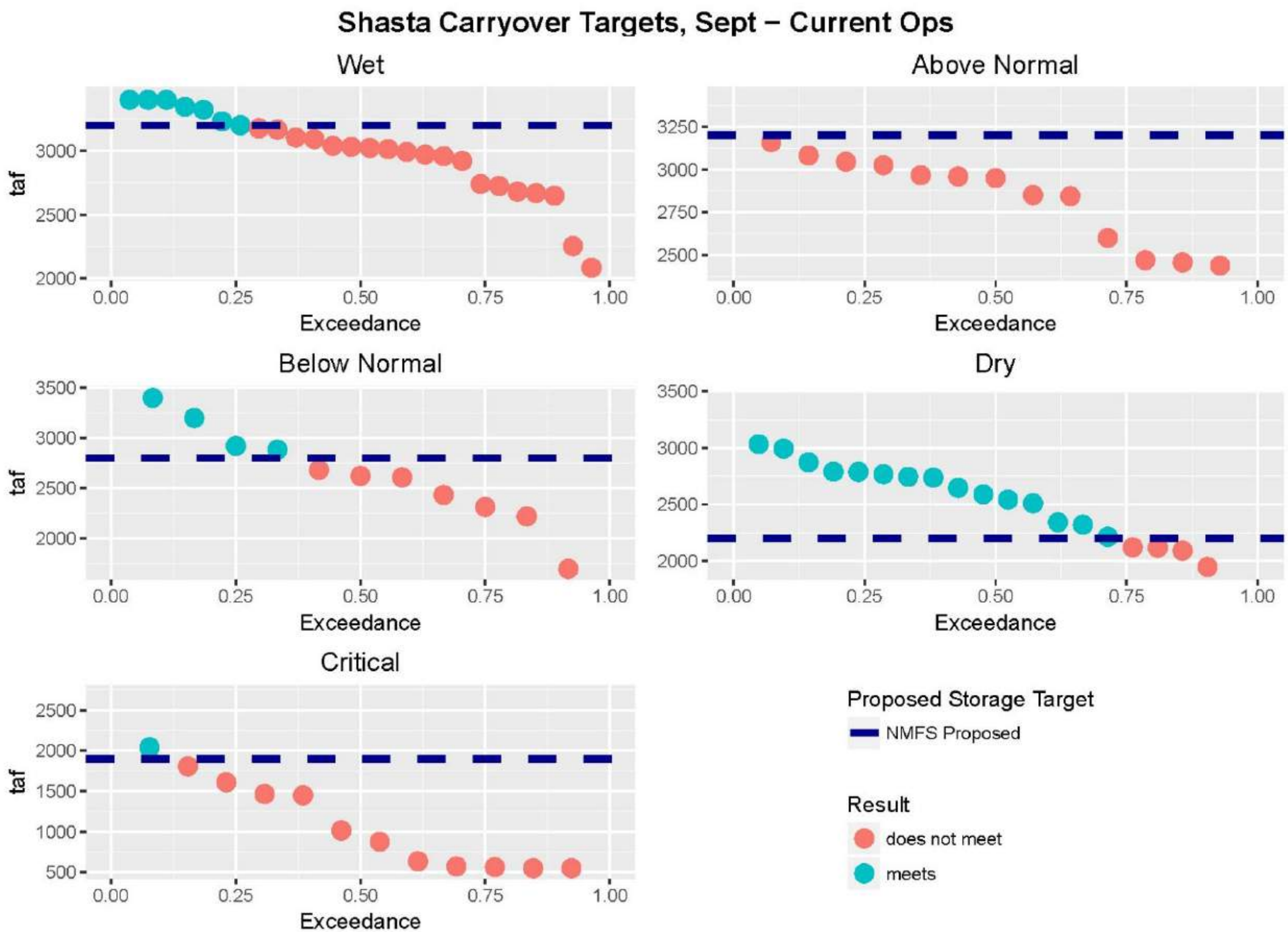
RECLAMATION

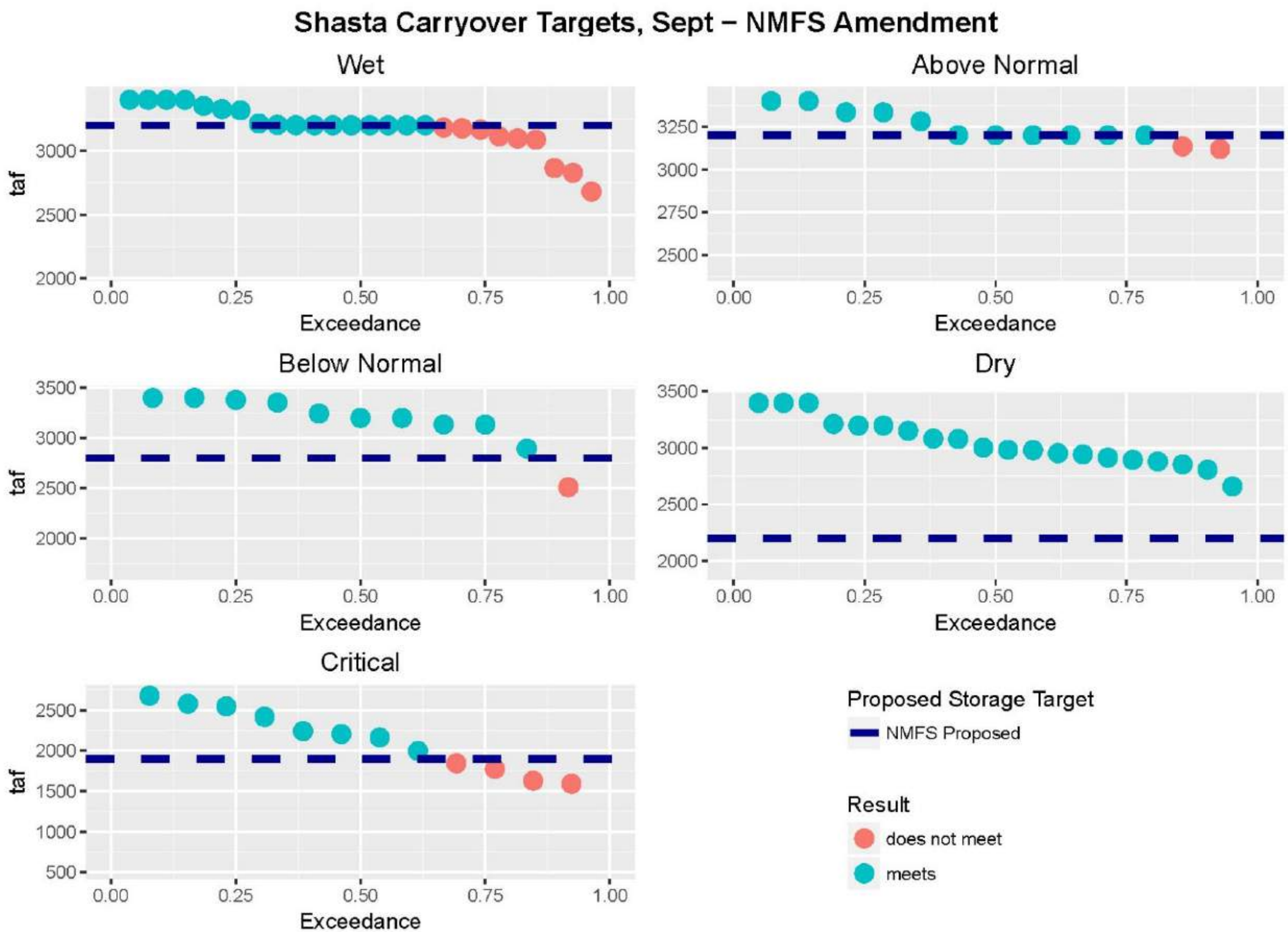
Analyses – Fall Storage Targets

- Draft Proposed September Storage Targets
  - Critically dry: 1.9 MAF
  - Dry: 2.2 MAF
  - Below Normal: 2.8 MAF
  - Above Normal: 3.2 MAF
  - Wet: 3.2 MAF

Analyses – Fall Storage Targets

- Compliance under “Current Ops”
- Compliance with modified CVP delivery allocation
  - Allocations consider fall storage target in computing CVP delivery capability


Shasta Carryover Targets, Sept – Current Ops
Wet
Above Normal
Below Normal
Dry
Critical
taf
Exceedance
0.00
0.25
0.50
0.75
1.00
2000
2500
3000
3500
2750
3250
500
1000
1500
Proposed Storage Target
NMFS Proposed
Result
does not meet
meets


Shasta Carryover Targets, Sept – NMFS Amendment
Wet
Above Normal
Below Normal
Dry
Critical
taf
Exceedance
0.00
0.25
0.50
0.75
1.00
2000
2500
3000
2750
3250
3500
500
1000
1500
Proposed Storage Target
NMFS Proposed
Result
does not meet
meets

June-Sept Sacramento Controls for years not meeting September target version: NMFS Amendment

Year	WY Type	May Target	Met May Target?	Sept Target Diff	Month Fell Below Sept Target	June		July		August		Sept			Max Fill	Max Fill Month
1924	Crit	3500	-654	-272	8	NDO	WS	NDO	WQ	NDO	WQ	NDO	RV		3429	3
1931	Crit	3500	-775	-124	8	NDO		NDO		NDO	WQ	NDO	WS	RV	3171	3
1934	Crit	3500	-584	-309	8	X2		NDO		NDO	WQ	NDO	RV		3123	3
1977	Crit	3500	-913	-57	8	NDO		NDO		NDO	WQ	NDO	K	RV	2838	10
1939	BN	4200	-587	-288	7	NDO	WQ	NDO	WQ		WQ	NDO			3900	3
1928	AN	4200	Yes	-80	9	X2	WQ	NDO	WQ	NDO	WS			X2	4510	4
1940	AN	4200	Yes	-65	8	X2	WS	NDO	WQ	NDO	WS			X2	4251	5
1938	Wet	4200	Yes	-103	9		WS	NDO	WS	NDO	WS			X2	4552	5
1953	Wet	4200	Yes	-24	9		FC	NDO		NDO	WQ			X2	4552	5
1956	Wet	4200	Yes	-34	9		WS	NDO	WS	NDO	FC			X2	4552	5
1958	Wet	4200	Yes	-18	9		FC	NDO	FC	NDO	FC			X2	4552	2
1963	Wet	4200	Yes	-335	9	X2	WS	NDO	WQ	NDO	WS			X2	4552	5
1970	Wet	4200	-98	-520	8	X2	WQ	NDO	WQ	NDO	WS			X2	4109	4
1984	Wet	4200	Yes	-87	9	X2		NDO	WQ	NDO	FC			X2	4552	5
1986	Wet	4200	-324	-112	8	EI	WS	NDO	WQ	NDO	WS			X2	3876	5
1997	Wet	4200	-274	-373	9	X2	WS	NDO	WQ	NDO	WS			X2	4038	4

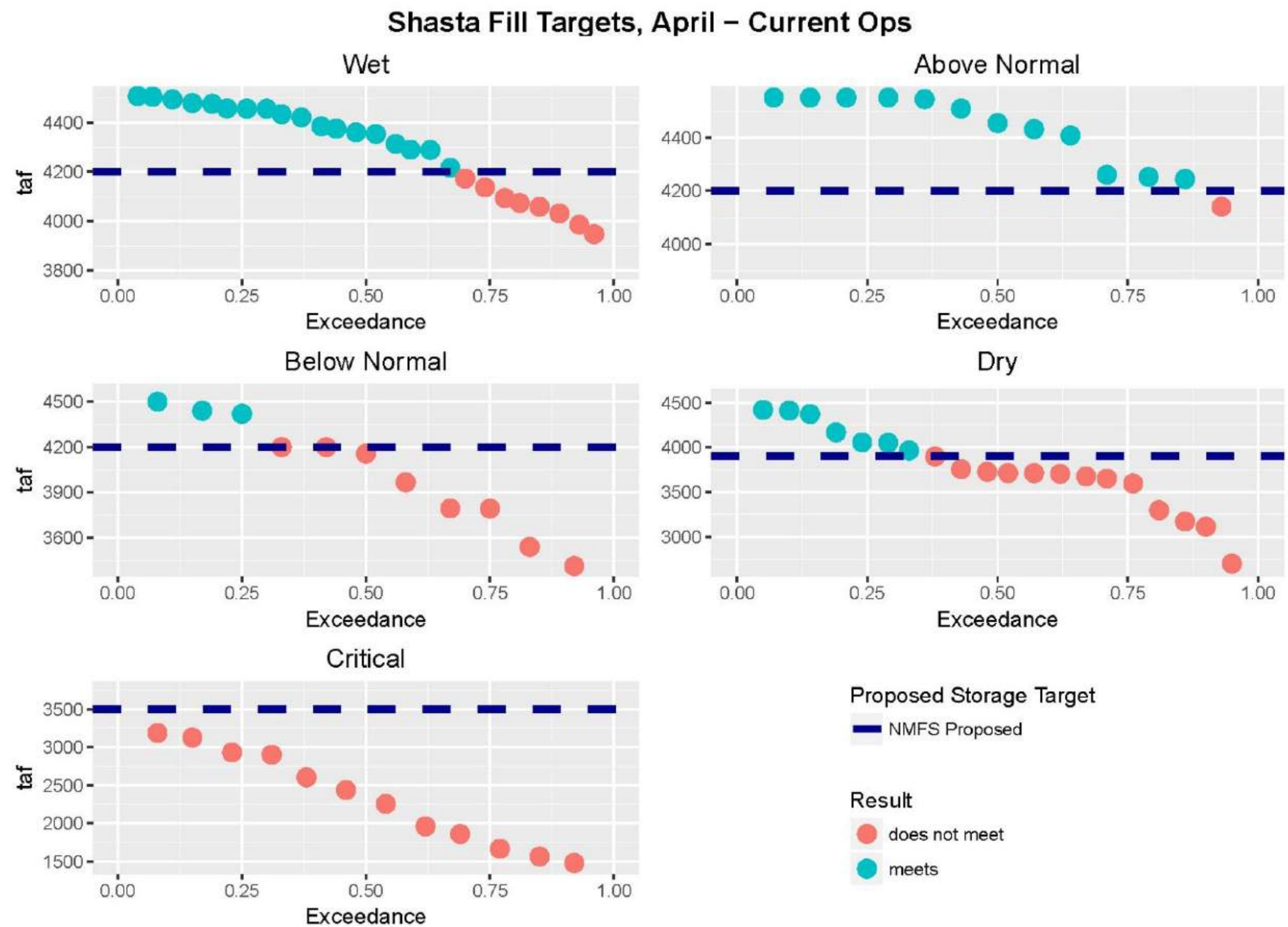
WS	Wilkins Slough
RV	Rio Vista
FC	Flood Control
X2	Fall X2

Analyses – Spring Storage Targets

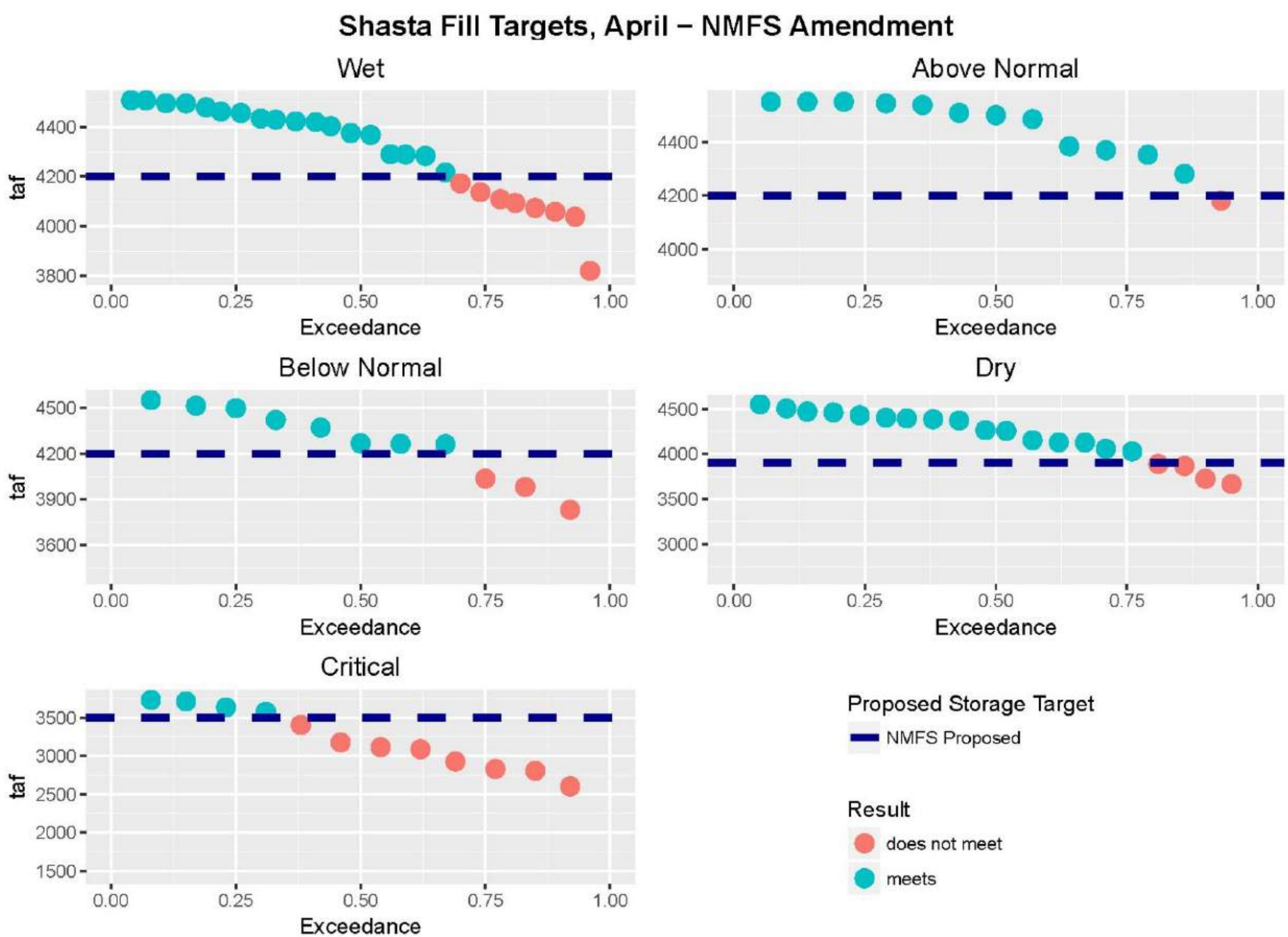
- Draft Proposed Spring Storage Targets
  - Critically dry: 3.5 MAF
  - Dry: 3.9 MAF
  - Below Normal: 4.2 MAF
  - Above Normal: 4.2 MAF
  - Wet: 4.2 MAF

Analyses – Spring Storage Targets

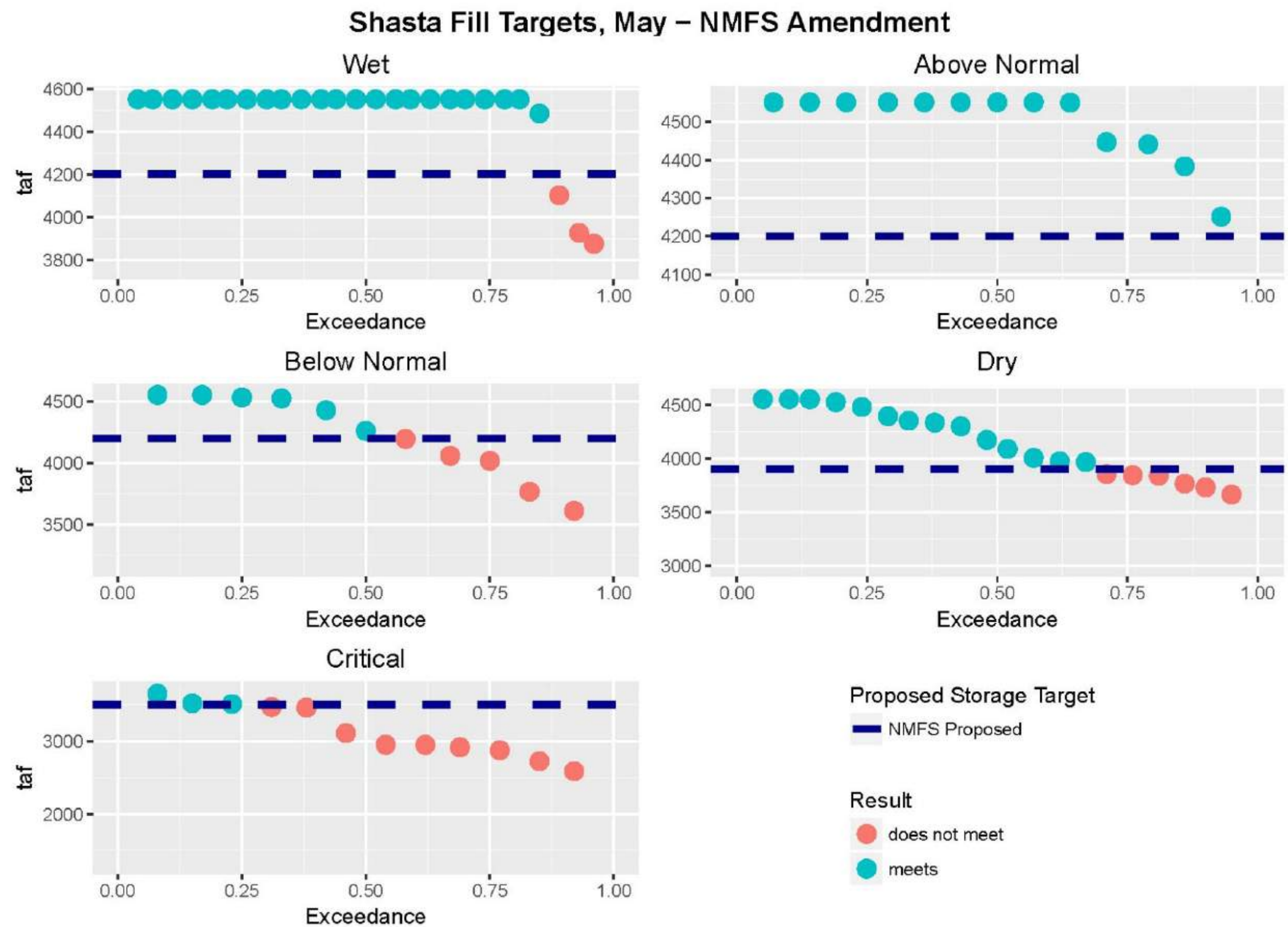
- Compliance under "Current Ops"
- Compliance with modified CVP delivery allocation
  - No specific effort to modify October-March operations
  - Demonstrates ability to fill given September target



Shasta Fill Targets, April – Current Ops
Wet
Above Normal
Below Normal
Dry
Critical
taf
Exceedance
0.00
0.25
0.50
0.75
1.00
3800
4000
4200
4400
3600
3900
4500
3000
3500
1500
2000
2500
Proposed Storage Target
NMFS Proposed
Result
does not meet
meets


Shasta Fill Targets, April – NMFS Amendment
Wet
Above Normal
Below Normal
Dry
Critical
taf
Exceedance
0.00
0.25
0.50
0.75
1.00
3800
4000
4200
4400
3600
3900
4500
3000
3500
1500
2000
2500
Proposed Storage Target
NMFS Proposed
Result
does not meet
meets


Shasta Fill Targets, May – Current Ops
Wet
Above Normal
Below Normal
Dry
Critical
taf
Exceedance
0.00
0.25
0.50
0.75
1.00
4600
4400
4200
4000
3800
4500
4300
4100
3500
3000
2000
Proposed Storage Target
NMFS Proposed
Result
does not meet
meets


Shasta Fill Targets, May – NMFS Amendment
Wet
Above Normal
Below Normal
Dry
Critical
taf
Exceedance
0.00
0.25
0.50
0.75
1.00
4600
4400
4200
4000
3800
4500
4300
4100
3500
3000
2000
Proposed Storage Target
NMFS Proposed
Result
does not meet
meets

Oct-May Sacramento Controls for years not meeting May target version: NMFS Amendment

Year	WY Type	Prev. WY Type	Met Prev Sept Target?	May Fill Target	May Target Diff	Oct			Nov		Dec		Jan		Feb		Mar		Apr		May		Max Fill	Max Fill Month
1924	Crit	BN	Yes	3500	-624	NDO			NDO	WS	NDO	K	WQ	K		K	X2	K	X2	WS	NDO	WS	3429	3
1931	Crit	Dry	Yes	3500	-775	NDO	WS	RV	NDO		NDO	K	WQ	K		K		K	X2		NDO	WS	3171	3
1932	Crit	Crit	No	3500	-551	NDO	WS	RV	NDO	K	WQ	K		K		K		K		WS		WS	2949	5
1933	Crit	Crit	Yes	3500	-550	NDO	WS	RV	NDO	WS	WQ/NDO	K		K		K		K	X2	K	X2	WS	2950	5
1934	Crit	Crit	Yes	3500	-584	NDO	WS	RV	NDO	K		K		K		K	X2	K	X2	WS	X2	WS	3123	3
1977	Crit	BN	Yes	3500	-913	NDO			NDO		NDO	K	WQ/NDO	K	X2	K	X2		X2		NDO	WS	2838	10
1991	Crit	Crit	Yes	3500	-388	NDO		RV	NDO	RV	WQ/NDO	K	NDO	K	WQ/X2			K		K		WS	3114	4
1992	Crit	Crit	Yes	3500	-31	NDO	WS	RV	NDO	RV	WQ/NDO	K	WQ	K	WQ	K	WQ	K		K	X2	WS	3712	4
1994	Crit	AN	Yes	3500	-41	X2			X2		EI/NDO	K	WQ	K		K		K		WS		WS	3752	3
1944	Dry	Wet	Yes	3900	-169	X2			X2		EI/NDO	K		K		K		K		WS	WQ	WS	3731	5
1947	Dry	AN	Yes	3900	-55	X2	WS		X2			K		K		K		K		WS	WQ/X2		4154	4
1964	Dry	Wet	No	3900	-134	X2		K	X2		EI	K		K	EI	K	EI	K	WQ/X2	WS	WQ/X2	WS	3990	3
1976	Dry	Wet	Yes	3900	-235	X2			X2		EI	K		K		K		K	WQ	WS	WQ/NDO		3889	4
1987	Dry	Wet	No	3900	-45	X2		K	X2		NDO	K		K		K		K	X2	WS	WQ/X2		4149	3
2001	Dry	AN	Yes	3900	-60	X2			X2		NDO			K		K		K		WS	WQ/X2		4059	4
1923	BN	Wet	Yes	4200	-141	X2						K		K		K		K		K		WS	4265	4
1936	BN	Dry	Yes	4200	-182	NDO			NDO	K	NDO	K	WQ	K		FC		K		K		WS	4036	4
1939	BN	Wet	No	4200	-587	X2	WS		X2		EI/NDO	K		K		K		K	X2		WQ/NDO		3900	3
1959	BN	Wet	No	4200	-5	X2			X2		EI/NDO	K		FC		FC	EI	K	X2	WS	WQ/X2		4262	4
1985	BN	Wet	No	4200	-433	X2		K		FC		FC		K		K		K		WS	X2		3981	4
1970	Wet	Wet	Yes	4200	-98	X2			X2			FC		FC		FC		K		WS	WQ/X2		4109	4
1986	Wet	BN	Yes	4200	-324	NDO			NDO	K	WQ	K		FC		FC		FC		K		WS	3876	5
1997	Wet	Wet	Yes	4200	-274	X2		WS	X2	FC		FC		FC		K		K		WS	WQ	WS	4038	4

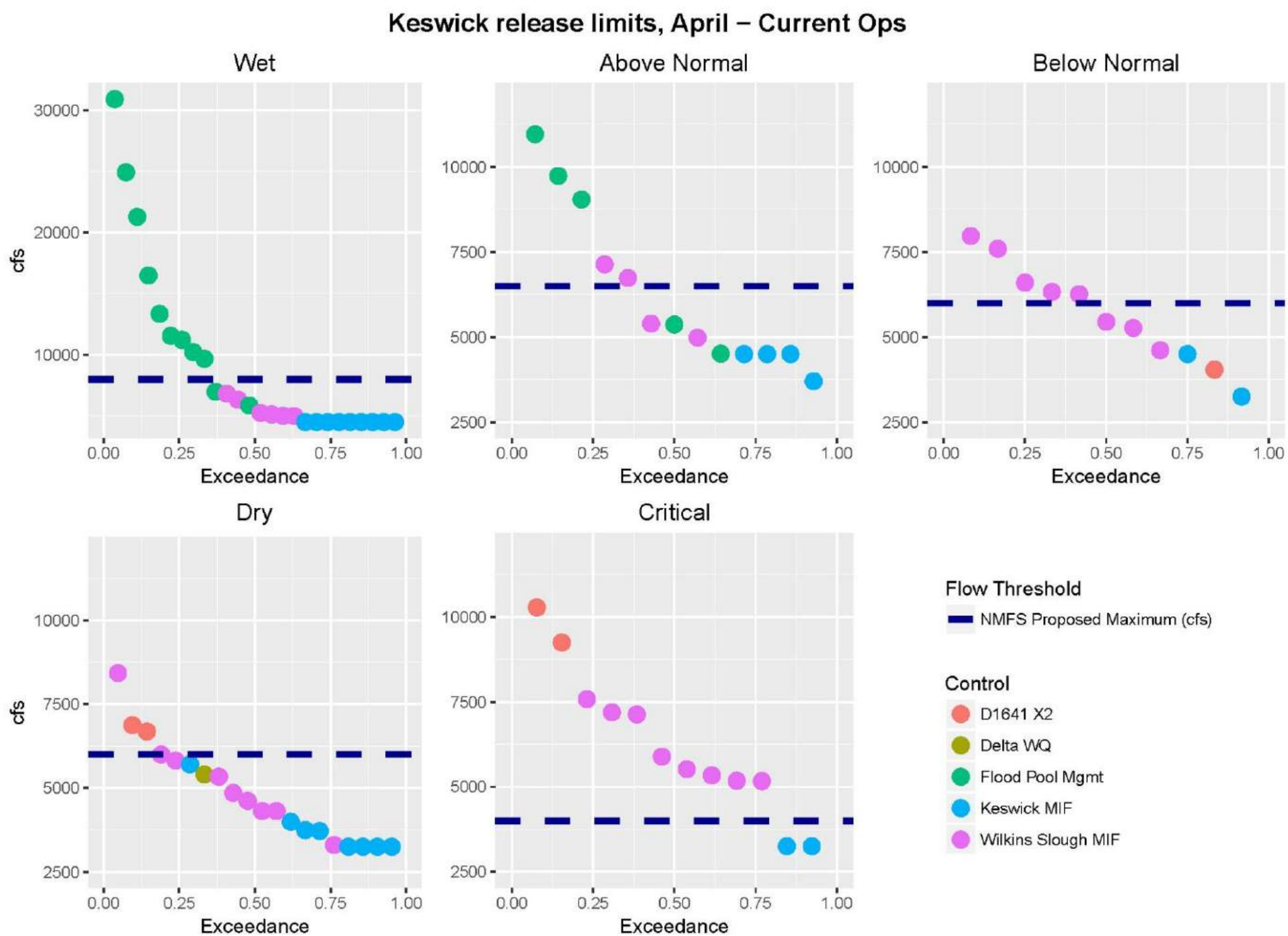
Analyses – Spring Release Limits

- Draft Proposed Spring Release Limits
  - April:
    - Critically Dry: 4,000 cfs
    - Dry: 6,000 cfs
    - Below Normal: 6,000 cfs
    - Above Normal: 6,500 cfs
    - Wet: 8,000 cfs
  - May:
    - Critically Dry: 7,500 cfs
    - Dry: 8,000 cfs
    - Below Normal: 9,000 cfs
    - Above Normal: 11,000 cfs
    - Wet: 12,000 cfs

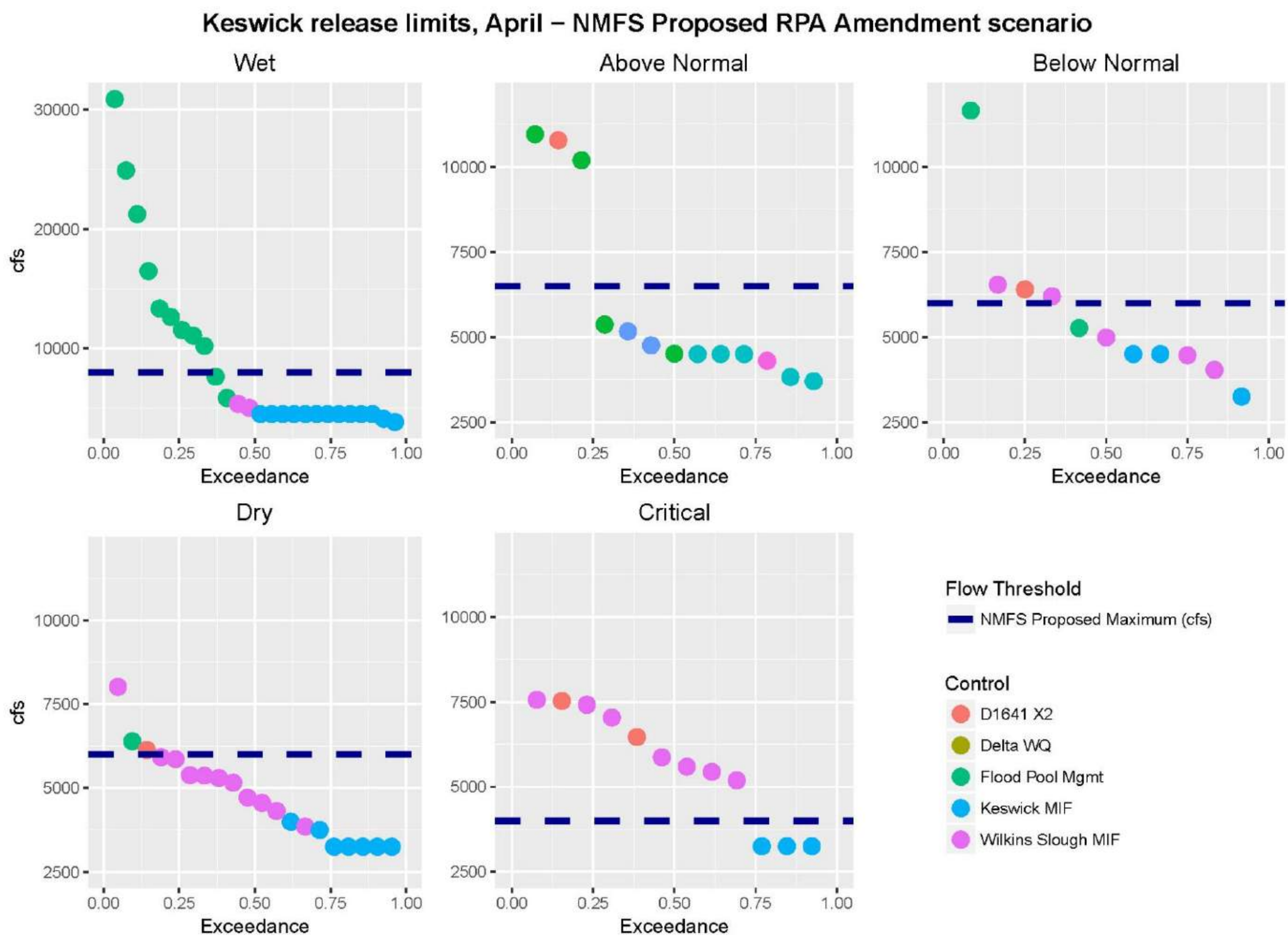
RECLAMATION

Analyses – Spring Release Limits

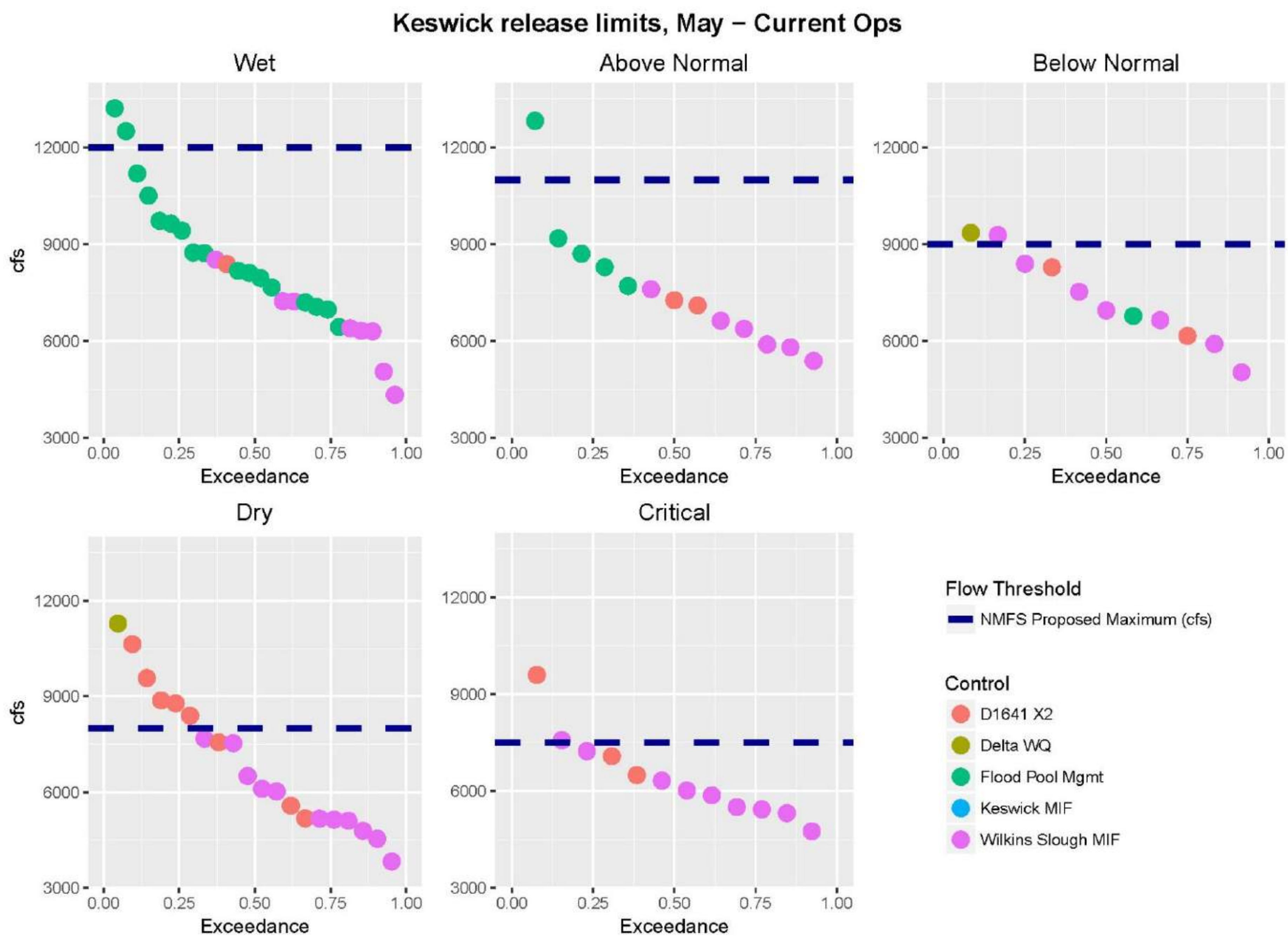
- Compliance under “Current Ops”
- Compliance with modified CVP delivery allocation
  - No specific limits set on releases
  - Operation affected solely by allocation and storage conditions



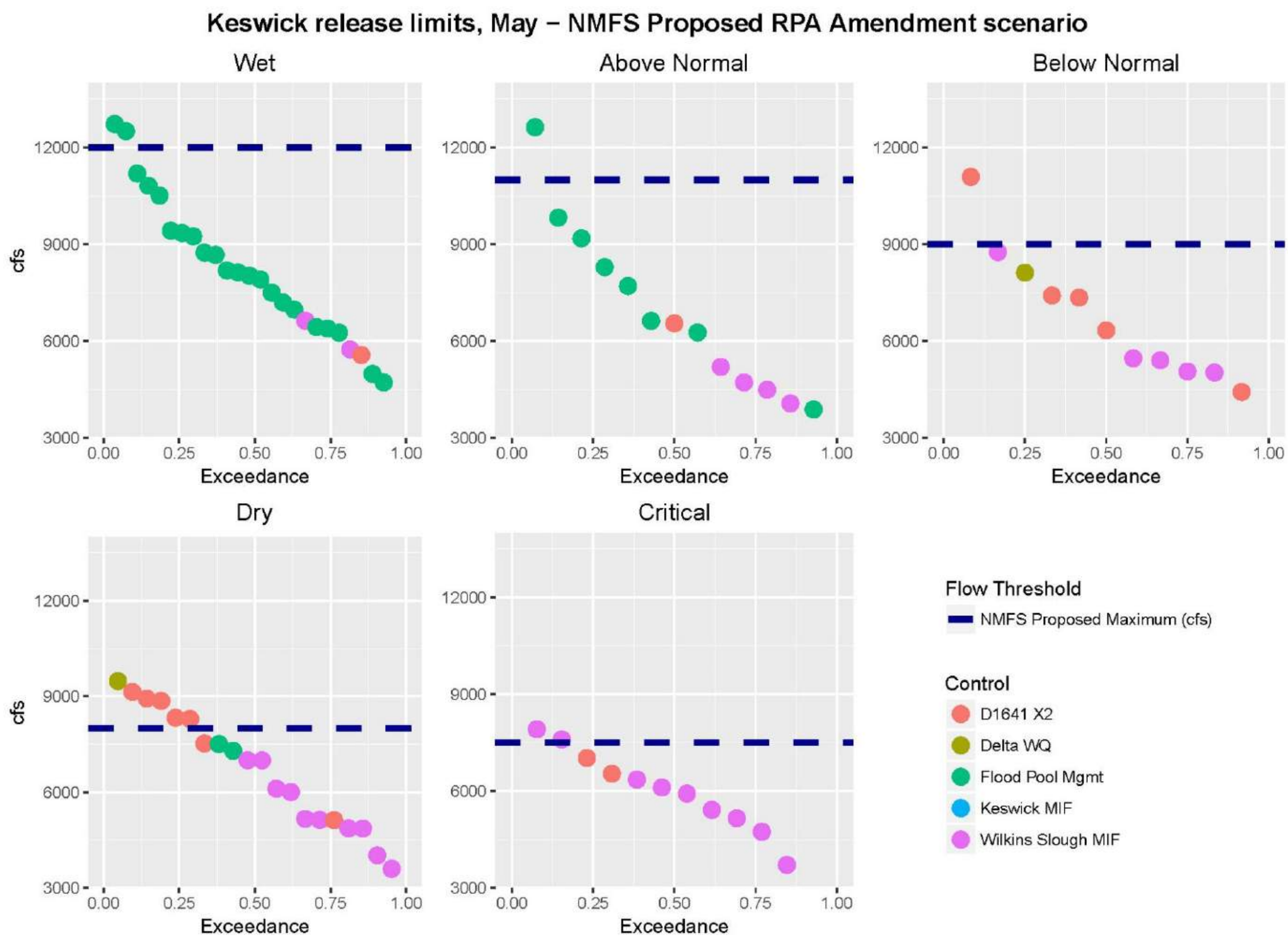
Keswick release limits, April – Current Ops
Wet
Above Normal
Below Normal
Dry
Critical
cfs
Exceedance
Flow Threshold
NMFS Proposed Maximum (cfs)
Control
D1641 X2
Delta WQ
Flood Pool Mgmt
Keswick MIF
Wilkins Slough MIF



Keswick release limits, April – NMFS Proposed RPA Amendment scenario
Wet
Above Normal
Below Normal
Dry
Critical
cfs
30000
20000
10000
7500
5000
2500
0.00
0.25
0.50
0.75
1.00
Exceedance
Flow Threshold
NMFS Proposed Maximum (cfs)
Control
D1641 X2
Delta WQ
Flood Pool Mgmt
Keswick MIF
Wilkins Slough MIF



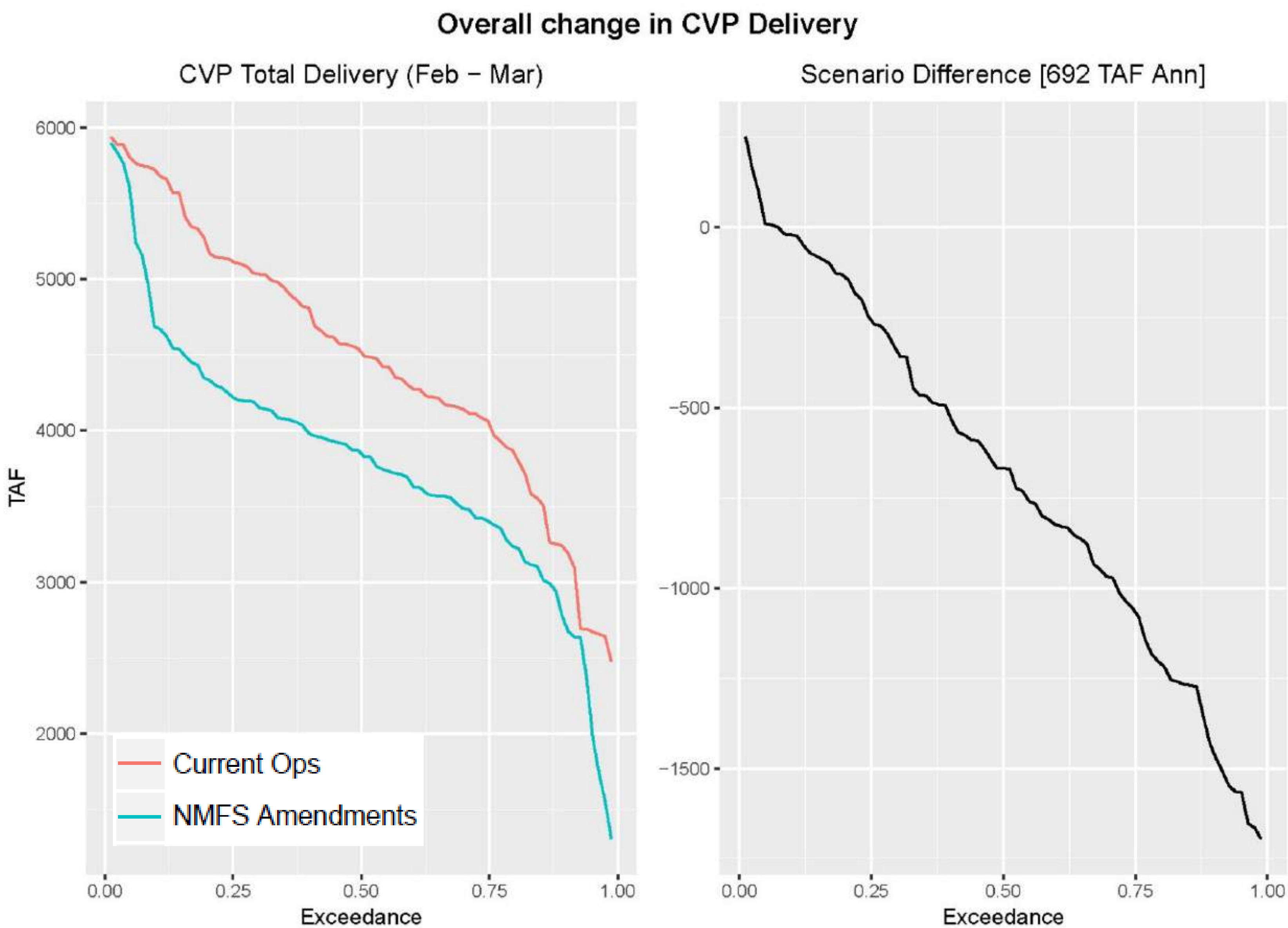
Keswick release limits, May – Current Ops
Wet
Above Normal
Below Normal
Dry
Critical
cfs
3000
6000
9000
12000
0.00
0.25
0.50
0.75
1.00
Exceedance
Flow Threshold
NMFS Proposed Maximum (cfs)
Control
D1641 X2
Delta WQ
Flood Pool Mgmt
Keswick MIF
Wilkins Slough MIF



Keswick release limits, May – NMFS Proposed RPA Amendment scenario
Wet
Above Normal
Below Normal
Dry
Critical
cfs
Exceedance
3000
6000
9000
12000
0.00
0.25
0.50
0.75
1.00
Flow Threshold
NMFS Proposed Maximum (cfs)
Control
D1641 X2
Delta WQ
Flood Pool Mgmt
Keswick MIF
Wilkins Slough MIF

Analyses – Effects on Other System Operations

- Folsom Storage
- Delta Outflow
- SWP Operations
- CVP Delivery



Overall change in CVP Delivery
CVP Total Delivery (Feb – Mar)
Scenario Difference [692 TAF Ann]
TAF
6000
5000
4000
3000
2000
0
-500
-1000
-1500
0.00
0.25
0.50
0.75
1.00
Exceedance
Current Ops
NMFS Amendments

Discussion

Next Steps

System-Wide Evaluations of Draft Proposed Amendment

RECLAMATION

Analyses – Storage and Flow Targets/Restrictions

- Further refinements to CalSim analysis
  - Refinements to storage target accomplishment
  - Refinements to impact distribution
  - Additional QA/QC

Temperature Compliance (location/value/metric)

- 55° F 7DADM and/or 53° F DAT at CCR (May 15->)
  - Action I.2.3.A-C
  - Action I.2.4
- 61° F 7DADM and/or 58° F DAT at Jellys Ferry (March 1 – May 15)
  - Action I.2.3

RECLAMATION

Analyses – Temperature Compliance (location/value/metric)

- HEC-5Q analysis
  - Feasibility/frequency
    - Existing
    - In conjunction with storage/flow targets/restrictions
  - Potential impacts of meeting the requirements (requires additional formulation)
- Data from 2016/2017/Previous Years

RECLAMATION

Analyses – Biological Impacts

- SacPas, SAIL, MAST
  - Potential biological impacts on other species residing in other components of system
    - Sacramento/American salmon, steelhead, Delta smelt, others

RECLAMATION

Biological Objectives

- Temperature-dependent mortality objectives
  - Varies by water year type
    - 3% to 30%
  - Action I.2.1

RECLAMATION

Analyses – Biological Objectives

- Analyses into feasibility based on outputs of CalSim/HEC-5Q model runs

Analyses – Others

- Wilkins Slough Operations
  - Action I.4
  - Discussions with SRSC/North-of-Delta water users
- Others?

Discussion

Next Steps

- Previous Meeting Notes
- Future Workshops
  - September 21 – Status/Updates

RECLAMATION

Appendix 6

January 13, 2018

Sites Project Authority
EIR-EIS-Comments@SitesProject.org

Re: Comments on Draft Environmental Impact Report/Draft Environmental Impact Statement for the Sites Reservoir Project

Dear Sir or Madam:

The California Sportfishing Protection Alliance (CSPA), AquAlliance and the California Water Impact Network respectfully submit the following comments on the Draft Environmental Impact Report/Draft Environmental Impact Statement (DEIR/DEIS) for the Sites Project. The Project proposes to construct a Sites Reservoir and associated facilities west of Maxwell, CA.

I. Summary of Comments

On February 23, 2017, CSPA submitted comments on scoping for the Sites Project. CSPA's scoping comments are attached as an attachment to the present comments on the DEIR/DEIS. CSPA's scoping comments focused primarily on the need for the DEIR/DEIS to clearly describe operation of the proposed Project and to analyze the impact of this proposed operation. Unfortunately, the DEIR/DEIS did not adopt the approaches that CSPA recommended in comments on scoping. The DEIR/DEIS does not describe proposed Project operations or governance. It does not analyze alternative operational scenarios or analyze their impacts. It does not analyze operations under alternative regulatory constraints, such as constraints more stringent than existing regulatory constraints for the Sacramento River and the Bay-Delta estuary, but relies on constraints under Water Rights Decision 1641 (D-1641) and under Biological Opinions for the Long-Term Operation of the State Water Project and the Central Valley Project.

For these and other reasons, the DEIR/DEIS is deficient and must be recirculated.

II. The DEIR/DEIS does not contain an adequate description of the Project.

A. The DEIR/DEIS does not describe who will operate the Project.

The DEIR/DEIS does not describe who will operate the Project. It does not describe how operators will make decisions about operations, and to whom operators will be accountable.

Project proponents have stated in their advocacy for the Project that the Project will allow greater flexibility for operation of the State Water Project (SWP) and Central Valley Project (CVP). However, the DEIR/DEIS does not describe how operators will integrate the operation of Sites Reservoir with the operation of the State Water Project and Central Valley Project. The DEIR/DEIS does not describe how operators of Sites Reservoir would coordinate their decisionmaking with that of SWP and CVP operators. The DEIR/DEIS does not describe whether there would be overlap in operations personnel between Sites Reservoir operators and SWP and CVP operators. The DEIR/DEIS does not propose rules by which Sites Reservoir operators and SWP and CVP operators would divide the authority to allocate water stored in Sites Reservoir. It is in fact entirely unclear whether Sites operators would have any independent ability to prioritize uses of water stored in Sites Reservoir over uses to meet regulatory requirements of the SWP and CVP.

Pages 3-109 and 3-110 of the DEIR/DEIS provide a litany of potential operations and tells us that "cooperative operational strategies could improve ecosystem conditions by … [o]perating in a flexible manner to support storage and associated releases that could be adaptively managed to support operational actions found to produce the greatest benefits over time." Similar to the constructs that many proponents of Sites Reservoir have criticized in documents supporting the California WaterFix and the State Water Board's update of the Bay-Delta Water Quality Control Plan, the DEIR/DEIS relies on a vague process to be developed and staffed in the future to describe and evaluate the operations that provide alleged benefits. The DEIR/DEIS does not describe the personnel or lines of accountability of these "adaptive managers" any more than it describes them for project operators.

B. The DEIR/DEIS does not describe operating rules for the Project.

Table 3-24 in Chapter 3 of the DEIR/DEIS describes general types of project operations. These include:

1. Providing storage to "supplement" deliveries to Tehama-Colusa Canal CVP contractors and to Glenn-Colusa Canal and RD108 Settlement Contractors. It is unclear whether this means that overall contract amounts would be increased or whether this is exclusively a matter of firming up reliability for these water users. It is also unclear whether this would facilitate water transfers by these entities. The DEIR/DEIS does not provide any rules for prioritizing this type of operation or quantification of this proposed operation (e.g. additional acre-feet delivered to different categories of water users).
2. Increasing deliveries to wildlife refuges both north and south of Delta. The DEIR/DEIS does not provide any rules for prioritizing this type of operation or any quantification of this proposed operation.
3. Increasing the water supply reliability of CVP contractors (generally) and SWP contractors. The DEIR/DEIS does not provide any rules for prioritizing this type of operation or any quantification of this proposed operation.
4. Releasing water for Delta water quality. The DEIR/DEIS does not describe the rules by which operators of Sites Reservoir will assure that the water quality of releases made for water quality purposes will not degrade actually water quality in the

Sacramento River or the Delta, thermally or in terms of biological or chemical contaminants.

The DEIR/DEIS states on p. 3-102: "Providing water to improve storage conditions in CVP and SWP facilities is a primary objective of the proposed alternatives." The DEIR/DEIS describes many of the objectives of Project operation as offsets for water otherwise delivered or not delivered by the SWP and/or the CVP. However, the DEIR/DEIS does not describe rules that will assure that those offsets assure environmental benefits under operations not within the control of the Sites project operators. For example, where a proposed benefit of the Sites project is increased carryover storage in an SWP or CVP reservoir, the DEIR does not describe the operating rules for the SWP or CVP under which this ascribed benefit will assure carryover storage and not just enable increased SWP and/or CVP deliveries north or south of Delta. The DEIR/DEIS does not describe who will compose those rules, who will enforce those rules and how that entity will enforce them, and what entity or entities will be the subject of the conditions in those rules.

Absent such rules, the interaction of Project operation with the operation of SWP and CVP facilities, including Trinity, Shasta, Oroville, Folsom, and San Luis reservoirs, is completely speculative, nothing more than possible operations. The fact is that the SWP and CVP today could operate existing facilities to more consistently meet existing operational requirements or to meet more environmentally protective requirements. But the SWP and CVP do not. The objective opportunity to create environmental benefits does not in itself create those benefits. Equally, the impacts of Project operation in combination with the operation of SWP and CVP facilities are completely speculative and hypothetical.

Table 3-24 in Chapter 3 of the DEIR/DEIS also describes an "Ecosystem Enhancement Storage Account" and various potential environmental benefits of this construct. The DEIR/DEIS provides no rules for this concept either. Is the account one acre-foot out of two acre-feet stored? Out of ten? Out of a hundred? The DEIR/DEIS provides no clue. There is also no commitment of where the water will eventually go. For all the reader knows, the "environmental" benefit may simply a means of claiming a flow benefit incidental to moving more water south of Delta, like the previous "Environmental Water Account" that allowed north of Delta water rights holders to sell export water at subsidized rates.

In the absence of rules to protect water quality in the Sacramento River and the Delta from degradation by releases from Sites Reservoir, the DEIR/DEIS falls back on averaging monthly model output, for instance for temperature: "As shown in Appendix 7F Sites Reservoir Discharge Temperature Modeling, Table ST-4a, releases from Sites Reservoir would not increase water temperatures in the Sacramento River downstream of the facility during the summer and fall in most years/months." (DEIR/DEIS, p. 12-109). Because generally on a modeled average monthly basis there is no change in temperature, the DEIR/DEIS concludes that there is no impact and no need for mitigation. By averaging away and thus understating the impact, the DEIR/DEIS eliminates the need for mitigation. The correct way to approach the impact would be to make operating rules that did not allow discharges from Sites to the Sacramento River that would degrade water quality or water temperature within defined numeric values.

The averaging of thermal impacts becomes even more problematic in considering the likely need to limit pumpback power operations during hot times of year. The DEIR/DEIS informs the reader: "Potential temperature changes within conveyance features that would convey water to and from the Sites Reservoir were not taken into account when computing the inflow temperatures and the resulting blended Sacramento River temperatures." (DEIR/DEIS, p. 7F-3). Pumpback operations between Holthouse Reservoir and Sites Reservoir could have a substantial thermal effect on the water temperatures in both reservoirs. Depending on the discharge point into Sites Reservoir, pumpback operations could cause thermal mixing of water relatively deep in the reservoir that would otherwise presumably be relatively cold. It is likely that analysis of thermodynamics within Sites Reservoir, within Holthouse Reservoir, and between the two reservoirs could reveal the need to modify design and/or to limit pumpback operations. However, the analysis to support such decisions is not present in the DEIR/DEIS.

III. The DEIR/DEIS does not contain a sufficient range of alternatives.

The DEIR/DEIS proposes and evaluates operation of the Project exclusively under existing flow constraints at Red Bluff (3250 cfs minimum bypass requirement), Hamilton City (4000 cfs minimum bypass requirement), and Wilkins Slough (5000 cfs minimum bypass requirement). (DEIR/DEIS, p. 3-106.) The DEIR/DEIS proposes a bypass flow requirement at Freeport "designed to protect and maintain existing downstream water uses and water quality in the Delta." (*Id*.) This limited evaluation does not consider more environmentally protective bypass flow requirements. This limited evaluation therefore does not provide the reader or the decision maker with sufficient information to analyze different potential flow constraints for project diversions. It also does not allow analysis of the costs and benefits of the Project under different flow constraints. Such analysis is critical to an evaluation of whether the Project is in the public interest as well as an evaluation of potential tradeoffs between developmental and public trust values.

The limited evaluation of the Project under existing flow constraints and levels of protection also renders the cumulative effects analysis inadequate. Construction of the Project based exclusively on economics and hydrology that assume existing regulatory constraints would literally cast in concrete a new rationale to maintain the existing inadequate Sacramento River and Delta flow and water quality constraints. The Project could become a partially or even fully stranded asset if flow or water quality requirements became more stringent or were more stringently enforced. This potential new economic reality would cascade into a new, multi-billion-dollar rationale for maintaining existing inadequate flow and water quality protections.

The DEIR/DEIS should have included an alternative in which the Project is constructed and operated in conjunction with the proposed Delta tunnels ("California WaterFix"). The DEIR/DEIS does not include such an alternative. The DEIR/DEIS thus fails to describe how the tunnels would affect water availability for the Project, water deliveries from the Project (amount and destination), and operation of the Project. The DEIR/DEIS does not describe how much of the Project's water supply benefits would be applied to water users south of the Delta with and without the Delta tunnels. The DEIR/DEIS also does not analyze potential conflicts with WaterFix over available water supply.

The DEIR/DEIS does not describe how climate change will affect Project operations and how Project operations under changed climate conditions will alter Project impacts. The DEIR/DEIS instead improperly substitutes modeling output for this analysis.

IV. The DEIR/DEIS does not adequately describe the portion of the regulatory setting that deals with water rights.

The DEIR/DEIS flies past the discussion of water rights to support the Project with the perfunctory statement: "The Authority intends to apply for water rights consistent with the application filed on September 30, 1977 (#25517). This application is under the control of the SWRCB and is expected to be treated as a 'State Filing' under California Water Code 10500." (DEIR/DEIS, p. 4-15). The DEIR/DEIS does not propose any specifics for this water right, including rate of diversion, annual maximum diversion to storage, or season of diversion. Presumably, the Sites Authority would hold the water right, but the DEIR/DEIS does not specify the water right holder. The Authority discusses and appears prepared to claim priority over SWP and CVP exports pursuant to county of origin and related statutes that the DEIR/DEIS describes in general (DEIR/DEIS, p. 4-17), but the DEIR/DEIS is not specific on this point. The DEIR/DEIS is equally silent on how any county, area, or watershed of origin water right could be applied to storage of water for Project partners or contractors west or south of Delta, outside the area of origin.

Section 4.3.3 of the DEIR/DEIS discusses the water rights of the SWP and CVP generally, but does not discuss whether (and if so how) the Project would utilize SWP and CVP water rights. The DEIR/DEIS does not analyze whether or how the Department of Water Resources and/or the Bureau of Reclamation would modify SWP and/or CVP water rights to make use of Project facilities. The priority dates on SWP and CVP water right permits, and the enormous face value of these permits, have the potential to greatly affect the timing and amount of diversion to storage in Sites Reservoir. Understanding who holds the water rights to water stored in Sites Reservoir is also important in order to understand the timing, amount and duration of releases from Sites Reservoir. On these issues, the DEIR/DEIS is silent.

The DEIR/DEIS does not disclose whether the Project will store contract water for the SWP or the CVP, and if so, what the patterns of diversion and release of such contract water would be. Understanding this issue is also important in order to understand reservoir operations.

V. The DEIR/DEIS does not disclose how the Project will facilitate water transfers and does not disclose the impacts of such transfers.

The Project if constructed will allow the storage of water under various instruments, including water for CVP Settlement Contractors, CVP contract water, and water for Project beneficiaries out of the area pursuant to water rights or contracts that at this time are unknown. The availability of Project storage is highly likely to facilitate a net increase in the transfer of water originating in the Sacramento Valley.

Rather than disclosing this facilitation and the impacts of increased water transfers, the DEIR/DEIS contains a perfunctory dismissal of the cumulative effect of water transfers: "The conditions for each water transfer would be determined on a case-by-case basis." (DEIR/DEIS, p. 35-12). The DEIR/DEIS then states existing protections will prevent impacts from groundwater substitution transfers, with no real foundation or analysis.

VI. The DEIR/DEIS does not disclose reduction of the frequency, magnitude and duration of floodplain inundation as a significant impact and does not propose specific mitigation.

Appendix 12N of the DEIR/DEIS summarizes in table form the frequency, magnitude and duration of inundation of the Sutter and Yolo bypasses, comparing the Project alternatives with the No Action Alternative. In spite of the reductions under all Project alternatives compared with the No Action Alternative, the DEIR/DEIS does not identify these reductions as a significant impact. The reduction in frequency, magnitude and duration of inundation of the Sutter and Yolo bypasses is a significant impact. The DEIR/DEIS should have identified it as such and proposed specific mitigation, such as releases from Sites Reservoir to, at minimum, maintain level of inundation equal to the levels under the No Action Alternative.

VII. Conclusion

Thank you very much for the opportunity to comment on the Draft Environmental Impact Report/Draft Environmental Impact Statement (DEIR/DEIS) for the Sites Project.

Respectfully submitted,

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Attachment 1

Comments of the California Sportfishing Protection Alliance
on the January 23, 2017 Supplemental Notice of Preparation of an
Environmental Impact Report for the Sites Reservoir Project

February 23, 2017

California Sportfishing Protection Alliance

"An Advocate for Fisheries, Habitat and Water Quality"

Chris Shutes, Water Rights Advocate
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Web: www.calsport.org

February 23, 2017

Sites Project Authority
ScopingComments@sitesproject.org

Re: Comments on January 23, 2017 Supplemental Notice of Preparation of an Environmental Impact Report for the Sites Reservoir Project

Dear Sir or Madam:

The California Sportfishing Protection Alliance respectfully submits the following comments on scoping for the proposed construction of Sites Reservoir and associated facilities, as described in the January 23, 2017 Supplemental Notice of Preparation of an Environmental Impact Report for the Sites Reservoir Project, issued by the Sites Project Authority. Our comments are organized by number as a series of recommendations. The numeric designation is for ease of reference, and does not reflect any particular priority. Though we attempt to organize related issues sequentially, many issues have multiple facets, and we may not have reflected their connection to other issues in our comments.

1. The DEIR must describe who will operate the project. It must describe how operators will make decisions about operations, and to whom operators will be accountable.

2. The DEIR must describe how operators will integrate the operation of the reservoir with the operation of the State Water Project and Central Valley Project. The DEIR must analyze impacts of project operation on the operation of SWP and CVP facilities, including Trinity, Shasta, Oroville, Folsom, and San Luis Reservoirs, and describe how the project will affect storage in these facilities.

3. The DEIR must describe any proposed offsets by which the project would deliver water north of Delta in lieu of deliveries from Lake Shasta, Oroville Reservoir or Folsom Reservoir.

4. To the degree that any ascribed environmental benefits of the project are the result of offsets for water otherwise delivered or not delivered by the SWP and/or the CVP, the DEIR must disclose how those offsets assure environmental benefits under operations not within the control of the Sites project operators. For example, if a proposed benefit of the Sites project is increased carryover storage in an SWP or CVP reservoir, the DEIR must describe how this ascribed benefit will assure carryover storage and not just enable increased SWP and/or CVP deliveries north or south of Delta. The DEIR must describe

the rules that will assure the ascribed benefit, who will compose those rules, who will enforce those rules and how that entity will enforce them, and what entity or entities will be the subject of the conditions in those rules.

5. The DEIR must not claim that the project will provide environmental benefits because it will provide the objective opportunity to create environmental benefits. It must describe the precise mechanisms by which the project will provide and assure environmental benefits. The DEIR must specifically identify any ascribed environmental benefits by location, time, and species habitat.

6. The DEIR must carefully and clearly explain how environmental benefits that proponents ascribe to the project are not existing requirements, particularly unmet requirements of the SWP and/or CVP.

7. The DEIR must describe operational alternatives for the project under a variety of dry, average and wet water year conditions.

8. The DEIR must describe how climate change will affect project operations and how project operations under changed climate conditions will alter project impacts.

9. The DEIR must describe how the project will operate during high runoff conditions, and how it will manage sediment load into and through project facilities.

10. The DEIR must describe the performance (water availability, water deliveries, water for ascribed environmental benefits) of the project under multiple flow requirements both for the Sacramento River and Delta outflow, including constraints more stringent than D-1641, Water Rights Order 90-05, and other currently applicable requirements. The DEIR must clearly describe proposed bypass flow requirements for the project.

11. The DEIR must analyze a reasonable range of alternatives that are sufficiently distinct from one another. We recommend that the DEIR evaluate an alternative that includes a smaller reservoir than the proposed project, water supply priority to local investors and local water delivery, and a new intake/outfall on the Sacramento River. We also recommend that the DEIR analyze a maximum environmental benefits alternative that includes limited reservoir size, limited diversions, prioritization of offstream storage for existing north of Delta irrigation over other consumptive uses, release of reservoir water to augment flows for floodplain inundation at the top of the Yolo Bypass, specific, quantified benefits to waterfowl, and other environmental benefits that project proponents may identify.

12. The DEIR must include an alternative in which the project is constructed and operated in conjunction with the proposed Delta tunnels. It must describe how the tunnels would affect water availability for the project, water deliveries from the project (amount and destination), and operation of the project. The DEIR must describe how much of the project's water supply benefits would be applied to water users south of the Delta and what kind of quantified net environmental benefits the project would provide with and

without the Delta tunnels. The DEIR should analyze potential conflicts with WaterFix, especially over available water supply.

13. The DEIR must describe the water rights that will apply to the project, and who will own them. The DEIR must provide the priority date of the water rights and all sources of water. The DEIR must describe whether those rights will involve assignment of state filings and/or carry area of origin priority. The DEIR must describe how any regional priority will apply to water that is sold out of the area, particularly south or west of Delta.

14. The DEIR must describe whether the project will store any water pursuant to CVP and/or SWP contracts, and whether the project will assume or involve additions or changes to CVP and/or SWP water rights to facilitate storage in project facilities or to facilitate CVP and/or SWP deliveries from project facilities.

15. The DEIR must describe how the project will incentivize or facilitate water transfers from Sacramento Valley water rights holders or CVP and/or SWP contract holders to other entities. The DEIR must identify the likely recipients of such transfers by geographic region and by the types of water rights and/or contracts the recipients hold. The DEIR must disclose impacts of any such transfers, including impacts to Sacramento Valley groundwater.

16. The DEIR must identify the actual project investors and beneficiaries. It must describe how much the beneficiaries will contribute to project cost and how much water they will be assured on what schedule in return for their investment. The DEIR must describe how obligations to out-of-area investors will be prioritized in relation to local uses.

17. The DEIR must describe the complete regulatory setting, including contingencies should a preferred regulatory approach or outcome prove infeasible. The DEIR must describe all permits and approvals necessary to complete the project and bring it on line, and how proponents will sequence proceedings to obtain such permits and approvals.

18. It came to our attention during a scoping meeting that proponents are considering ownership of hydroelectric facilities by the Bureau of Reclamation, thus avoiding the need for an operating license from the Federal Energy Regulatory Commission. The DEIR must describe the legal basis for such a scenario in which ownership of hydropower infrastructure by a federal entity, without ownership of discharging or receiving waters, qualifies for exemption from regulation by FERC, including any precedent for such a regulatory arrangement. Such analysis should consider who proponents propose will operational control of the project and who proponents propose as the financial beneficiaries of hydropower operations.

19. The DEIR must describe the hydropower component of the project, including pumping operations to fill the reservoir and pumpback operations more strictly for hydropower (pumped storage) generation.

20. The DEIR must describe the thermal impacts of pumpback operations, particular during the summer, and evaluate limitations on the season of pumpback operations.

21. The DEIR must quantify the amount of water that the project will reliably produce on an annual basis under a variety of bypass flow and other physical and regulatory scenarios.

22. The DEIR must describe the hydrological impacts of project diversions on the Sacramento River and on Delta inflow and outflow.

23. The DEIR must disclose the water quality impacts of the project, including impacts in the Sacramento River and the Delta resulting from diversions to storage, impacts of releases from storage, and water quality in the reservoir. The water quality analysis must pay particular attention to water temperature, algal blooms, and mercury and other heavy metals.

24. The DEIS must describe all release points from the proposed reservoir and describe how the project will release water for environmental or water supply benefits without adversely affecting water quality. This DEIR should break down this analysis by month and water year type.

25. The DEIR must describe the thermal hydrodynamics of the proposed Sites reservoir, and in particular the seasonal stratification of the reservoir or absence of such stratification. The DEIR must describe how inputs and withdrawals from Sites reservoir will seasonally affect the thermal hydrodynamics of the reservoir, including the effects of pumpback hydropower operations. The DEIR must describe the thermal interaction of canal operations on the thermal hydrodynamics of all project facilities. The DEIR must describe proposed and other feasible facilities that would allow thermal management of project facilities and of discharges from them.

26. The DEIR must describe any alternative means to remove water from the project reservoir other than the primary proposed set of pipes and pump stations. The DEIR must describe the impacts of such alternative removal, or the absence of such alternative, from the perspective of flood control, public safety, and biological impairment, as well as from the perspective of water supply and environmental benefits.

27. The DEIR must describe whether the project will redivert water from the Trinity River, and if so must describe the resulting impacts to the Trinity and Sacramento rivers the Shasta-Trinity Division of the CVP.

28. The DEIR must assess impacts of Sacramento River diversions and other project operations on threatened and endangered species and their habitat, including winter-run and spring-run Chinook salmon, steelhead, green sturgeon, Sacramento splittail, Delta smelt, bank swallow, yellow-billed cuckoo, Swainson's hawk, valley elderberry longhorn beetle, giant garter snake, and others.

29. The DEIR must assess impacts of Sacramento River diversions and other project operations on non-listed species, including fall-run Chinook salmon, white sturgeon, and striped bass.

30. The DEIR must assess impacts on habitat and species within the footprint of the reservoir and other project facilities (dams, canals, pumps, and power lines), including impacts on the protected golden eagle, bald eagle, Swainson's hawk, giant garter snake, burrowing owl, tricolored blackbird, loggerhead shrike, western pond turtle, pallid bat, American badger, valley elderberry longhorn beetle, and at least 12 rare or sensitive native plants.

31. The DEIR must detail impacts on cultural resources in the reservoir and facility footprints, including prehistoric and historic sites.

32. The DEIR must analyze the potential for reservoir-induced seismicity and must disclose public safety issues associated with reservoir-induced earthquakes on nearby unreinforced masonry structures must be examined in the report. The DEIR must also disclose the vulnerability of the project to earthquakes, including all local faults and known historical seismic activity, and must describe how project design will protect the project from failure in the event of a major earthquake in the vicinity of the project.

33. The DEIR must describe the zone of inundation in the event of partial or complete dam failure, and describe the impacts of such potential inundation.

34. The DEIR must base its analysis on transparent modeling to assess impacts on flow, water temperature, and water quality. The DEIR must employ and make available a public platform water balance model with a daily timestep to evaluate project operations and hydrological impacts.

Thank you very much for the opportunity to comment on the Supplemental Notice of Preparation of an Environmental Impact Report for the Sites Reservoir Project.

Respectfully submitted,

Chris Shutes
Water Rights Advocate
California Sportfishing Protection Alliance

Appendix 7

4314 Tuliyani Drive
Chico, CA 95973
October 1, 2017

AquaAlliance
Barbara Vlamis, Executive Director
P.O. Box 4024
Chico, CA 95927

Since your organization has expressed interest in the proposed Sites Reservoir project west of Maxwell, California, I am providing to you the comments that I have submitted in response to the Draft Environmental Impact Report/Environmental Impact Statement for the Sites Reservoir Project, State Clearinghouse #2001112009.

The draft EIR/EIS fails to discuss the high concentrations of a number of metals in the source waters to the proposed project, and, even more important, does not discuss water quality in the proposed reservoir. Water quality in the proposed reservoir will mimic that of the source waters, and hence the reservoir will have concentrations of a large number of metals that exceed many water quality criteria and standards. The high concentrations of metals likely to occur in the proposed reservoir will impact most, if not all, beneficial uses of the proposed project, including agricultural water supply, wildlife and fisheries, and drinking water supplies for communities that divert water from the Sacramento River, making the project potentially infeasible.

I am qualified to provide these comments since my background is in water quality, as former Chief of the Water Quality and Biology Section of the Northern District of DWR in Red Bluff.

If you have any questions, please contact me via email at chicojerry@yahoo.com.

Sincerely,

Jerry Boles

Jerry Boles

4314 Tuliyani Drive
Chico, CA 95973
November 17, 2017

Bureau of Reclamation
Attn: Michael Dietle
Draft EIR/EIS Comments
2800 Cottage Way, W-2830
Sacramento, CA 95825

Sites Project Office
Attn: Rob Thomson
Draft EIR/EIS Comments
P.O. Box 517
Maxwell, CA 95955

I am providing to you my comments in response to the Draft Environmental Impact Report/Environmental Impact Statement for the Sites Reservoir Project, State Clearinghouse #2001112009.

The draft EIR/EIS fails to discuss the high concentrations of a number of metals in the source waters to the proposed project, and, even more important, does not discuss water quality in the proposed reservoir. Water quality in the proposed reservoir will mimic that of the source waters, and hence the reservoir will have concentrations of a large number of metals that exceed many water quality criteria and standards. The high concentrations of metals likely to occur in the proposed reservoir will impact most, if not all, beneficial uses of the proposed project, including agricultural water supply, wildlife and fisheries, and drinking water supplies for communities that divert water from the Sacramento River, making the project potentially infeasible.

The water quality section (Chapter 7) must be completely rewritten with an objective analysis of the data and potential adverse impacts to water quality both within the reservoir and to downstream resources in the Sacramento River. Subsequently, the aquatic biological resources (chapter 12), terrestrial biological resources (chapter 14), recreation resources (chapter 21), public health and environmental hazards (chapter 28), and cumulative impacts (chapter 35) sections of the draft EIR/EIS must reassess impacts from the adverse water quality expected from the proposed project. Following these re-analyses, re-circulation of the draft EIR/EIS is necessary with appropriate disclosure information about the potential impacts from metals to water quality and its effects on agricultural water supply, wildlife and fisheries, and drinking water supplies.

I am qualified to provide these comments since my background is in water quality, as former Chief of the Water Quality and Biology Section of the Northern District of DWR in Red Bluff.

If you have any questions, please contact me via email at chicojerry@yahoo.com.

Sincerely,

Jerry Boles

Comments on Draft EIR Sites Reservoir Project: Chapter 7 Surface Water Quality

An EIR is supposed to be a disclosure document that provides information on the benefits as well as potential impacts from a proposed project. Section 7 - Surface Water Quality does not disclose potential significant adverse issues which have serious ramifications for the viability of the proposed project, but rather ignores or misconstrues available data and reports to incorrectly conclude that there are no significant water quality impacts associated with the proposed project. The EIR claims to have evaluated post-project impacts to the Sacramento River, but there are no analyses provided that indicate that this was done. It is apparent that the preparers of the EIR failed to examine or simply ignored the available data that would show potential significant adverse impacts from the proposed project.

The analyses in Section 7 completely left out any evaluation or projection of water quality that may result in Sites Reservoir from diverting high winter flows from the Sacramento River. The EIR fails to point out that due to metals loads in the various source waters, water in the proposed reservoir may not be suitable for the beneficial uses stated for the proposed project, including enhanced water management flexibility, agricultural and urban water supply, water quality improvement, and ecosystem improvement for fish protection, habitat management, and other environmental needs.

A factual evaluation of the available data is presented below, which shows significant potential adverse impacts associated with the proposed project. Some comments on specific sections of Chapter 7 of the EIR are also presented.

<u>Available Data</u>

The EIR cites the DWR Water Data Library (WDL) online database as the source for water quality data used to determine impacts from the proposed project. However, very limited data from the WDL are available for evaluating water quality in source waters for the proposed project. The major source water for the proposed project is the Sacramento River, with potential diversion occurring at the Tehama-Colusa Canal, Glenn-Colusa Irrigation District Main Canal, and at Moulton Weir.

The Sacramento River below the Red Bluff Diversion Dam monitoring station of DWR provides information on the quality of water that would be diverted to the proposed project through the Tehama-Colusa Canal. Metals data are available in the WDL for the Sacramento River below the Red Bluff Diversion Dam beginning in February 2006 (Table 1). However, only 33 samples have been collected since 2006, and only nine of these were from the months in which higher flows most typically occur (December through March) and from which diversions to the proposed project would occur.

Cottonwood Creek contributes the most significant input to the Sacramento River during high runoff events. The Chico-Enterprise Record in an editorial published December 28, 2016 underscored the impact of tributaries on water quality in the Sacramento River. The newspaper stated that of the 100,000 cfs flowing in the river earlier in the month, only 5,000 cfs was coming from Keswick Dam below Shasta Dam – the rest of the 100,000 cfs (95,000 cfs) was coming from tributaries downstream from Keswick Dam, of which Cottonwood Creek provides the dominant flows.

Data from Cottonwood Creek near Cottonwood are even more sporadic than those for the Sacramento River. Data are available for this station in WDL beginning in October 2004, with only seven samples collected from the Cottonwood Creek monitoring station since 2006, and only four of which were collected during the months of expected higher flows of December through March (Table 2). Data available in the WDL show that only one sample was collected (March 2006) during the same period from both Cottonwood Creek and the Sacramento River below the Red Bluff Diversion Dam since 2006. This one sample shows that metal loads in the Sacramento River are similar to those found in Cottonwood Creek, showing that Cottonwood Creek significantly affects water quality in the Sacramento River. Water quality in Cottonwood Creek will have a significant impact on diversions to the proposed reservoir and water quality data from Cottonwood Creek can be used to approximate and supplement data from the Sacramento River, though the total number of samples from both sites combined are still exceptionally low for a project of this magnitude and potential for adverse effects.

The water quality monitoring station on the Sacramento River at Hamilton City is just downstream from the GCID Main Canal. Data from the WDL is somewhat more extensive at the Hamilton City monitoring site, with metals data available in the WDL beginning in late 2003 to early 2017, though still sporadic with only 78 samples collected in the span of a little more than 13 years (159 months), and only 23 of those collected sometime during the months of expected higher flows of December through March (Table 3). Samples were collected in each of these months only twice, with the rest of the samples during these months only collected in February months each year since 2008.

The WDL shows that metals data are available for the Sacramento River opposite Moulton Weir monitoring station from mid 2003 to early 2011, for a total of 80 samples, with 27 of those from the expected higher flow months (Table 4).

Water quality sampling during the expected months of higher flows of December through March did not target high flow periods (the periods during which diversions to the proposed project would occur) but were based on a rigid and fixed monthly or semi-monthly schedule. Monitoring did not provide any information on the variation in concentrations of metals over the runoff hydrograph. Even higher concentrations of metals would likely occur during the higher flow periods during these months, but were not targeted by the limited monitoring. The relatively low number of samples and lack of samples targeting critical flows (i.e., high runoff events) are nonetheless sufficient to indicate potential significant adverse water quality impacts with the proposed project. These data illustrate the need to collect additional data during appropriate time periods (i.e., during the high flow periods when diversions from the Sacramento River would be occurring) and re-evaluate the potential adverse water quality impacts from the proposed project.

Data Analyses

Some of the analytical results shown in the WDL for metals are reported as "dissolved" and other results as "total" (or total recoverable). "Total" concentrations, which include both dissolved and particulate forms of an analyte, are probably a better representation for the concentrations of metals that will affect water quality in the proposed reservoir. As well, the State Water Resources Control Board makes no distinction between dissolved or total recoverable concentrations when considering whether a criterion is exceeded (SWRCB 2011). The proposed reservoir will thermally stratify and will also be biologically productive due to nutrients brought in from source waters. This in-situ productivity, as well as organic material brought in with the source waters, will result in anoxic conditions (i.e., lack of oxygen) in the hypolimnion (i.e., bottom water layer). While dissolved forms of metals are generally the most bioavailable, the particulate fraction of total recoverable forms will undergo chemical transformation to dissolved forms under the anoxic conditions expected in the hypolimnion of the proposed reservoir. Transformed metals will be mixed throughout the reservoir water column during turnover events, or released downstream with anoxic water from the lower depths during the summer months.

Data from the WDL (Table 1) show that aluminum, arsenic, cadmium, chromium, iron, lead, manganese, and mercury in water samples from the Sacramento River below the Red Bluff Diversion Dam exceed various criteria and standards established to protect beneficial uses, including drinking water, public health, taste and odor for agriculture, and freshwater organisms, which includes fish. Maximum concentrations of some of these metals are many times higher than the corresponding criteria or standard. For example, aluminum, in addition to exceeding the SWRCB Basin Plan Primary Maximum Contaminant Level (MCL) for drinking water by one and half times, also exceeds the secondary drinking water standard in the Basin Plan by seven times and the US Environmental Protection Agency Secondary MCL by 30 times. Even the minimum concentration of arsenic reported in WDL exceeds by more than 10 times nearly all the criteria and standards for protection of human health. The least reported concentration of cadmium from river water samples exceed by five times the incremental cancer risk for drinking water. The least concentration of chromium reported in WDL exceeds the California Public Health Goal by 16 times and incremental cancer risk for drinking water by five times. The maximum concentration of iron that was reported in WDL exceeds the secondary drinking water maximum concentration level in the Basin Plan, as well as National Recommended Water Quality Criteria for taste and odor or welfare by nearly three times. The maximum concentration of lead that was reported exceeds the California Public Health Goal and California Proposition 65 maximum allowable dose level for reproductive toxicity by over four times. The maximum reported concentration of manganese exceeds the National Recommended Water Quality Criteria for taste and odor or welfare by one and a half times. The maximum concentration reported for mercury exceeds the National Recommended Water Quality Criteria for Freshwater Aquatic Life Continuous Concentration by nearly four times, and the Freshwater Aquatic Life Maximum Concentration by two times. An additional concern with these metals is that some metals are taken up by crops (such as arsenic by rice), making the crops potentially unsuitable for consumption. Plant uptake of metals in the water supply not only affect crops grown for human consumption, but also plants grown for support of wildlife, such as in refuges.

Similarly, data from the WDL for Cottonwood Creek near Cottonwood show that aluminum, arsenic, cadmium, iron, lead, manganese, and nickel exceed various criteria and standards established to protect beneficial uses (Table 2). Similar to the Sacramento River, maximum concentrations of some of these metals are many times higher than the corresponding criteria or standards. Aluminum concentrations exceed the Basin Plan drinking water primary standard MCL by 14 times, the secondary drinking water secondary standard MCL by 70 times, the California Public Health Goal by over 20 times, the National Academy of Sciences Health Advisory and Agriculture Water Quality Goals for taste and odor threshold by nearly three times, the National Recommended Water Quality Criteria for human health and welfare for water and fish consumption by nearly 30 times, and the National Recommended Water Quality Criteria for freshwater aquatic life maximum concentration by 20 times. As with the Sacramento River, even the minimum concentration of arsenic reported in WDL exceeds nearly all the criteria and standards for protection of human health by up to 167 times. The minimum concentration of cadmium reported exceeds the incremental cancer risk for drinking water by over three times, while the maximum concentration is over twice as high as the California Public Health Goal. As with the Sacramento River, the California Public Health Goal is exceeded by the least concentration of chromium reported by 16 times and the incremental cancer risk for drinking water by five times. Iron exceeds the Basin Plan drinking water standard secondary MCL by over five times, the Agricultural Water Quality Goals for taste and odor threshold by nearly five times, the National Recommended Water Quality Criteria for taste and odor or welfare by 78 times, and the National Recommended Water Quality Criteria for freshwater aquatic life maximum concentration by over 23 times. Reported lead concentrations are two and a half times higher than the California Public Health Goal, up to twice as high as the California Proposition 65 maximum allowable dose level for reproductive toxicity, and almost twice as high as the incremental cancer risk estimate for drinking water. Manganese concentrations reported from Cottonwood Creek exceed the Basin Plan Drinking Water Standards secondary MCL by a factor of 10, are nearly twice as high as the USEPA Health Advisory for drinking water, three times as high as the Agricultural Water Quality Goals for taste and odor threshold, and over 10 times higher than the National Recommended Water Quality Criteria for taste and odor or welfare. Reported maximum mercury concentrations exceed the National Recommended Water Quality Criteria for Freshwater Aquatic Life Continuous Concentration by nearly two times, while even the lowest reported concentration is nearly equal to the recommended criterion. Nickel exceeds the California Public Health Goal by nearly five times.

The GCID Main Canal intake is slightly upstream from the Sacramento River at Hamilton City water quality monitoring station. Therefore, water quality in the GCID Main Canal will be similar to that found at the Sacramento River at Hamilton City monitoring station. Metals data for this monitoring station can be found in the WDL from November 2003 to February 2017. Similar to the upstream monitoring station on the

Sacramento River below Red Bluff, the Sacramento River at Hamilton City water quality monitoring station has been identified to contain high levels of aluminum, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, silver, and zinc (Table 3), which exceed a large number of criteria and standards similar to those upstream at the monitoring station below the Red Bluff Diversion Dam.

High levels of metals have also been identified at the water quality monitoring station opposite the Moulton Weir, including aluminum, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, silver, and zinc (Table 4). As with the water quality monitoring station on the Sacramento River below the Red Bluff Diversion Dam, concentrations of metals from the Sacramento River monitoring station at the Moulton Weir exceed a large number of water quality criteria designed to protect beneficial uses.

As discussed earlier, Cottonwood Creek is the major source of water to the Sacramento River during higher flow periods, but other tributaries also contribute high levels of metals to the Sacramento River. In addition, local creeks directly tributary to the proposed reservoir, such as Funks Creek and Stone Corral Creek, also carry metals concentrations that will contribute to the metals loading. Leaching from soils beneath the reservoir will also contribute additional metals, as well as nutrients.

The Basin Plan lists other chemicals that adversely affect water quality in the Sacramento River, including chlorpyrifos and diazinon. The California State Water Resources Control Board lists a number of other "constituents of concern" in the study area, including chlordane, DDT, mercury, PCBs, and dieldrin. In addition, sewer outfalls from the cities of Redding and Red Bluff contribute other contaminants, such as pharmaceuticals, to the Sacramento River. No information is provided in the EIR about effects to the proposed project from these chemical contaminants.

Discussion

The data in the WDL for the Sacramento River and Cottonwood Creek demonstrate that high concentrations of metals can be expected during the high flow months of winter (December through March) when diversions would be occurring to the proposed Sites Reservoir. Higher concentrations of metals are likely during the higher flows that can occur during these months. Such higher flows were not targeted by the limited sampling effort presented in the WDL. The high concentrations of metals in the source water will adversely impact water quality in the proposed reservoir for most, if not all, the proposed beneficial uses of the stored water.

Some metals from both the Sacramento River and Cottonwood Creek, whose concentrations did not exceed criteria in the limited sampling effort, had concentrations that nearly exceed the criteria and standards. These and other metals whose concentrations did not exceed the criteria may have higher concentrations during the higher flow periods that the proposed project would be diverting. Again, these higher flow periods were not targeted during the limited sampling effort.

Even some of the minimum concentrations of metals found in the source waters exceed criteria and standards, which means that the source waters never meet these goals and standards – the criteria are always exceeded and the water is never suitable for the beneficial use or uses the criteria or standards were designed to protect. Water quality in the proposed reservoir for these parameters will exceed the criteria and standards all the time.

Since water quality in the proposed reservoir will reflect that of the source waters, the reservoir will have concentrations of numerous metals, including aluminum, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, silver, and zinc, that exceed a number of criteria and standards developed to protect beneficial uses. In addition, other metals that may not exceed criteria and standards in the source waters may adversely affect reservoir water quality due to synergistic effects. The State Water Resources Control Board (SWRCB 2011) states that "when multiple constituents have been found together in groundwater or surface waters, their combined toxicity should be evaluated" and that "theoretical risks from chemicals found together in a water body shall be considered additive for all chemicals having similar toxicologic effects or having carcinogenic effects." Thus, the adverse effects from the metals delivered to the proposed reservoir from the source waters may have an even greater adverse impact and pose an unacceptable level of risk. Beneficial uses potentially impacted by metals in the proposed reservoir include agricultural water supply (direct toxicity or uptake by crops making the crops unsuitable for use), wildlife (such as fish-eating birds), fisheries, recreation (including sport fishing and water contact activities such as swimming), and drinking water supplies for communities that divert water from the Sacramento River.

Releases from the proposed reservoir would occur during the summer when metals concentrations in the Sacramento River are much lower due to the majority of flow being from Shasta Reservoir, with much better water quality, though still carrying a metals load. High metals concentrations in the proposed reservoir releases could adversely affect water quality in the Sacramento River during the summer months by increasing metals loads beyond acceptable limits and adversely impact beneficial uses.

Though high concentrations of metals that exceed water quality criteria exist in source waters to the proposed project, they cannot be regulated by governmental entities since they are natural occurrences. However, once contained artificially in a reservoir, they are subject to jurisdictional control by regulatory agencies. Any releases of water from the proposed reservoir will likely be subject to review by water quality regulatory agencies to ensure that such releases do not adversely affect downstream resources due to the heavy metals loads in the releases. The SWRCB has an antidegradation policy that prohibits discharges that would degrade water quality to a level below water quality objectives because no capacity would exist for degradation that will be caused by the next downstream or downgradient uses – the ability to beneficially use the water would have been impaired, even though water quality objectives would not yet have been exceeded (SWRCB 2011). The contribution of additional metal loads from releases from the proposed Sites Reservoir during the summer could cause concentrations of metals in the Sacramento River to exceed criteria and standards or at least be subject to the antidegradation policy due to an incremental increase in metals in the Sacramento River from the proposed project. Thus, the proposed project may face prohibition of releases if stored water does not meet water quality criteria or standards or if releases can cause criteria or standards to be exceeded by downstream inputs (i.e., antidegradation poicy).

During dry years, the adverse impacts associated with the project can be expected to be even greater. Flows in the Sacramento River from upstream reservoirs on the Sacramento River (i.e., Shasta Reservoir, Whiskeytown Reservoir) will be minimized during the winter months in an effort to restore water storage levels in those reservoirs. Likewise, during wet or even normal runoff years, releases from the upstream reservoirs during the winter will be curtailed during high runoff periods to prevent downstream flooding. In any of these scenarios, tributary influences, such as Cottonwood Creek, on water quality in the Sacramento River will be much greater. The proposed project would still attempt to capture as much runoff from the Sacramento River as possible, but the water diverted to the proposed project will have even greater concentrations of metals due to the majority of flow being from tributary streams (e.g., Cottonwood Creek) during dry and possibly even wet or normal runoff years.

Similarly, during the summer in dry years, releases from upstream reservoirs (i.e., Shasta Reservoir, Whiskeytown Reservoir) will be minimized. Releases to the Sacramento River from the proposed project will have a greater impact on water quality in the Sacramento River due to less dilution being available due to curtailed flows in the river from upstream reservoirs (i.e., Shasta and Whiskeytown reservoirs).

Conclusion

The proposed project is, at best, premature. Little or no data have been collected to determine the metals loads in the higher flows of the Sacramento River that would be diverted to the proposed reservoir. An extremely small amount of data have been collected during the months in which higher flows can be expected (December through March), but higher flows during these months were not targeted in the water quality sampling. None the less, the limited data presented in the WDL show high concentrations of a number of metals which exceed numerous water quality criteria and standards in the source waters for the proposed reservoir. Extremely high concentrations of metals are present in the small streams in the reservoir footprint, which occur due to the nature of the soils in the area of the proposed reservoir. Sites Reservoir would inundate these soils resulting in leaching of metals and further incremental loading of metals to the proposed reservoir. There is no discussion in the EIR about the potential impacts of metals leaching from the soils that would be inundated by the proposed reservoir. Prior to moving forward with the project, much additional data are needed during the high flow periods in which diversions would occur from the Sacramento River, metals loading from the smaller tributaries that flow directly into the proposed reservoir, and effects from leaching of metals from soils inundated by the proposed reservoir.

The limited data that are available are sufficient to show that water quality in the proposed reservoir will have concentrations of a large number of metals that exceed many water quality criteria and standards, including those established for the protection of agricultural water supply, wildlife and fisheries, and drinking water. Metals bioaccumulation in the reservoir food web could produce adverse impacts to fish-eating birds and other animals, as well as humans, and adversely affect any potential recreational benefit from the project. Releases from the proposed reservoir could adversely affect downstream resources, including agricultural water supply, wildlife and fisheries, and drinking water supplies for communities that divert water from the Sacramento River.

Also, the EIR does not discuss the physical conditions that can be expected to occur in the proposed reservoir. Like other nearby reservoirs, the proposed reservoir will thermally stratify during the summer months, with a warm upper water layer and a cooler lower water layer. The proposed reservoir will also be biologically productive due to nutrients brought in with source waters. The biological productivity will lead to anoxic conditions (i.e., lack of oxygen) in the hypolimnion (i.e., bottom water layer). Depending on the depth from which downstream releases are made from the proposed reservoir, water released will either be warm and unsupportive of cold water fisheries in the Sacramento River (i.e., migrating salmon) or cooler but devoid of oxygen. As releases from the reservoir progress during the summer, or in years in which the reservoir is not completely filled, the reservoir will be warm from surface to bottom as the cooler lower water strata is depleted from releases or wind mixing of the upper warm water layer. Under these conditions, only warm water would be available for release from the proposed reservoir, which would not be supportive of the cold water fishery in the Sacramento River.

An EIR is a disclosure document meant to disclose pertinent project information to planners, regulatory agencies, and other interested parties and the public. This EIR did not disclose the potential impacts from metals, other contaminants, nor the physical conditions likely to exist in the proposed reservoir. The little analyses presented in the EIR misconstrues, misinterprets, and ignores water quality data that amply demonstrate significant potential adverse impacts from the proposed project. The water quality section (Chapter 7) must be completely rewritten with an objective analysis of the data and potential adverse impacts to water quality both within the reservoir and to downstream resources in the Sacramento River. Subsequently, the aquatic biological resources (chapter 12), terrestrial biological resources (chapter 14), recreation resources (chapter 21), public health and environmental hazards (chapter 28), and cumulative impacts (chapter 35) sections of the EIR must reassess impacts from the adverse water quality expected from the proposed project. Whether any of the projected beneficial uses from the proposed project can be realized, and its feasibility to meet project objectives, purpose, and need, also needs to be reconsidered in light of the potential significant adverse water quality impacts from metals. Following these re-analyses, re-circulation of the EIR is necessary with appropriate disclosure information about the potential impacts from metals to water quality and its effects on agricultural water supply, wildlife and fisheries, and drinking water supplies for communities that divert water from the Sacramento River.

EIR Needs:

- Obtain additional metals data from source waters targeting high flows from which diversions would occur
- Provide information on the water quality impacts from other chemical contaminants that adversely affect water quality in the Sacramento River (including chlorpyrifos, diazinon, chlordane, DDT, mercury, PCBs, and dieldrin) and contaminants in sewer outfalls (such as pharmaceuticals) and other discharges (such as industrial discharges)
- Evaluate the contributions of metals from local tributaries (i.e., Funks Creek and Stone Corral Creek) to the proposed reservoir
- Provide information on the contribution from leaching of metals from the inundation area of the proposed reservoir
- Evaluate effects of metals to beneficial uses within the proposed reservoir
    - fisheries,
    - wildlife (including state and federal species listed as threatened or endangered),
    - recreation
- Evaluate effects of metals to beneficial uses due to releases from the reservoir
    - agricultural supply water,
    - effects of metals on crops including incorporation of metals by crops (e.g., arsenic uptake in rice),
    - effects of metals on plants grown for support of wildlife (such as in wildlife refuges),
    - drinking water supplies,
    - fisheries,
    - wildlife (including state and federal species listed as threatened or endangered),
- Evaluate combined toxicity of multiple metals
- Evaluate contributions of metals in reservoir releases related to the SWRCB antidegradation policy
- Evaluate impacts from mercury bioaccumulation in aquatic life (especially fish) in the proposed reservoir, and effects to wildlife that feed on fish from the reservoir and recreational opportunities (i.e., sport fishing)
- Evaluate physical conditions expected in the reservoir, including thermal stratification and hypolimnetic anoxia, and effects on reservoir and downstream aquatic resources
- Conduct re-analysis of impacts due to metals, other contaminants, and physical conditions in the proposed reservoir on:
    - water quality (chapter 7),
    - aquatic biological resources (chapter 12),
    - terrestrial biological resources (chapter 14),
    - recreation resources (chapter 21),

- public health and environmental hazards (chapter 28), and
- cumulative impacts (chapter 35).

Comments on Specific Sections of EIR

7.2.1.5 Other Heavy Metals

"In addition to mercury and selenium, other heavy metals, including cadmium, copper, and zinc, impair beneficial uses of water bodies. Cadmium, copper, and zinc enter the water bodies with the sediment from eroded soils and discharges from abandoned mines, and in stormwater runoff from municipal areas (SWRCB, 2011a). The primary source in the Central Valley appears to be tailing piles located at abandoned mine sites. Many of these mines are located upstream of reservoirs; therefore, the sediment that includes the heavy metal constituents is generally captured upstream of the dam. Heavy metals appear to cause health concerns in aquatic resources and in humans that consume the fish from these water bodies."

Abandoned mines, which contribute heavy metals to area streams, are also found downstream from Shasta and Keswick dams. In addition, natural erosion and soil leaching also contribute to metals loads found in area streams, such as Cottonwood Creek, which make up the bulk of the flow in the Sacramento River during high runoff events during which flows would be diverted to the proposed reservoir. It is not that "heavy metals appear to cause health concerns in aquatic resources and humans," it is well known that they do.

7.2.4 Primary Study Area
7.2.4.1 Overview and Methodology

"DWR began monthly sampling of streams in the Primary Study Area in 1997, including physical parameters, nutrients, minerals, and metals in the water column (DWR, 2012), as well as mercury analysis of sport fish tissues collected from nearby existing reservoirs, including East Park, Stony Gorge, and Black Butte (DWR, 2007a). Routine water quality monitoring by DWR was periodically suspended due to funding limitations during portions of 2008 and 2009, and ended following the January 2010 monitoring run. Sampling results were then compared to Central Valley Basin Plan water quality criteria (CVRWQCB, 2011) (Appendix 7A California State Water Resources Control Board Constituents of Concern of Water Bodies in the Study Area) and USEPA ambient water quality criteria to prevent nuisance algal growth in streams (USEPA, 2001b)."

DWR does not indicate any data for metals in its Water Data Library until 2006 for the Sacramento River below the Red Bluff Diversion Dam, and 2003 for the Sacramento River at Hamilton City and opposite the Moulton Weir, as well as Stone Corral Creek. Funding for water quality monitoring by DWR was curtailed shortly after the 1997 date indicated in the EIR, after the project manager in the Red Bluff office was informed of potential adverse impacts from metals by the then Chief of the Water Quality and Biology Section. If additional data are available, that data should be made available in the WDL so that reviewers of this EIR can verify claims about lack of water quality issues made in the EIR. However, the data that are in the WDL adequately demonstrate significant adverse water quality issues with the proposed project. Any additional data that has not been shared will just confirm these issues.

Appendix 7A - California State Water Resources Control Board Constituents of Concern of Water Bodies in the Study Area – lists a large number of parameters for which no information is contained in this EIR. For example, chlorpyrifos, diazinon, chlordane, DDT, mercury, PCBs, and dieldrin are constituents of concern from Keswick Dam to the Delta. The EIR should assess how these constituents will impact water quality in the proposed reservoir.

7.2.4.2 East Park and Stony Gorge Reservoirs

"East Park and Stony Gorge reservoirs were sampled during the summer of 2000 to evaluate the extent of mercury contamination in fish because these reservoirs are representative of conditions that could be expected in the proposed Sites Reservoir. DWR analyses of total recoverable mercury indicate that levels in samples collected near the bottom of the water column at Stony Gorge and Black Butte reservoirs, exceeded the California Toxics Rule for protection of human health.

Fish tissue samples were collected by DWR from East Park and Stony Gorge reservoirs during 2000 to 2001. Neither catfish nor bass composites collected from East Park Reservoir exceeded the OEHHA screening value or USEPA criterion, although mercury levels in the small-sized bass approached these values, and a very large channel catfish that was analyzed individually contained tissue mercury at over twice the level of the screening value and criterion limits. Mercury concentrations in tissues of channel catfish collected from Stony Gorge Reservoir contained levels less than the screening value and criterion (DWR, 2007a)."

Mercury sampling in fish from East Park and Stony Gorge reservoirs was conducted to contribute to the knowledge of mercury contamination in a number of northern California lakes and reservoirs, not simply because these reservoirs are representative of conditions that could be expected in the proposed Sites Reservoir, though they well might. As noted, the bass from East Park Reservoir that were used for the composite analysis were small in size (about one foot long), yet approached the screening value and criterion. Larger fish can be expected to exceed these values since mercury is accumulated and magnified in fish tissues. The large catfish which contained mercury at over twice the screening value and criterion is probably representative of mercury concentrations that can be found in this species.

The EIR fails to mention that mercury contamination exceeded the screening value and criterion in a relatively small largemouth bass collected from Stony Gorge Reservoir. Though the catfish analyzed from Stony Gorge Reservoir did not exceed the screening value and criterion, the cited report states that "larger channel catfish from Stony Gorge Reservoir, therefore, may be expected to contain mercury concentrations that exceed the screening value and criterion."

Since mercury contamination in excess of criteria occurs in lakes that the EIR states are representative of conditions that could be expected in the proposed Sites Reservoir, the EIR should discuss the probability of mercury contamination in the proposed reservoir and ramifications to recreational fishing and wildlife that would consume fish from the reservoir.

7.2.4.3 Salt Lake

"Saline water has been observed to seep from underground salt springs in the vicinity of the Salt Lake fault along the slopes above the valley and along the valley floor within the proposed inundation area of Sites Reservoir. These areas are generally located in the Funks Creek watershed. The water from the underground springs accumulates along the trough of the valley and forms Salt Lake (USGS, 1915). The size of Salt Lake and adjacent seasonal brackish wetlands varies with time. The wetted area appears to vary from 0 to 30 acres. The deeper water appears to be approximately 15 acres based on observations in 2017. The depth of the water has not been monitored.

Salt Lake was only sampled on a few occasions from 1997 to 1998. In August 1997, the Salt Lake was dry. In September 1997, the springs were bubbling and the EC was 194,100 micromhos per centimeter (µmhos/cm) as compared to 3,490 µmhos/cm for the nearby Stone Corral Creek. In January 1998, there was less than 1 cfs of flow from the springs, and the EC was 7,200 µmhos/cm as compared to 540 µmhos/cm for the nearby Stone Corral Creek. From these samples, it was found that waters from this location are extremely high in minerals. The EC value on one occasion reached 194,100 micromhos per centimeter. The TDS measurement at this time was 258,000 mg/L. EC, TDS, sodium, and boron exceeded all Central Valley Basin Plan criteria. A few metals also were noted at very high concentrations (aluminum, iron, and manganese) and exceeded all criteria, and a few others exceeded some criteria (arsenic, copper, lead, and nickel). Levels of ammonia and orthophosphate also were noted at high levels and exceeded criteria. Temperatures from this site were variable, and probably depend on seasonal conditions. Concentrations present in water from this site likely depend on the season and flow."

Though the EIR states that water quality data used in the analyses are available in the WDL, data for Salt Lake could not be found. However, the EIR states that several metals (aluminum, iron, and manganese) were found in concentrations that exceed all Basin Plan criteria, while others (arsenic, copper, lead, and nickel) exceed some criteria. These metals from the springs feeding Salt Lake will add to the metals load in the proposed reservoir.

7.2.4.4 Funks Creek

"Funks Creek originates at approximately 850 feet elevation in the foothills west of Antelope Valley. The banks of this intermittent stream are heavily eroded and the gravel bed is highly disturbed and compacted by cattle. Along the north end of Antelope Valley, Funks Creek receives underground drainage from Salt Lake. Funks Creek widens as it cuts through Logan Ridge and enters the western side of the Sacramento Valley, although flows are still intermittent. Approximately 1 mile downstream of Logan Ridge, Funks Creek is impounded by Funks Reservoir. This reservoir is fed mainly from waters of the Tehama-Colusa Canal. Downstream of the reservoir, Funks Creek is bordered by agricultural lands, and much of this reach is channelized before emptying into Stone Corral Creek. This portion of Funks Creek likely has some flow year round, due to leakage from the dam at Funks Reservoir.

DWR observed aluminum, arsenic, copper, iron, manganese, mercury, nickel, and phosphorus in Funks Creek at the Glenn-Colusa Irrigation District (GCID) Main Canal station during intermittent water quality sampling. The concentrations appeared to be higher during and immediately following storm events."

As with Salt Lake, data for Funks Creek could not be found in the WDL. The data used in the analyses in the EIR must be made available for review. It is likely that the reported metals exceed various criteria, as with Salt Lake, and thus add to the metals load in the proposed reservoir.

7.2.4.5 Stone Corral Creek

"Stone Corral Creek originates at approximately 700 feet elevation in the foothills west of Antelope Valley. As the intermittent stream flows into the grasslands of Antelope Valley, the channel is narrow and the banks eroded. The much larger Antelope Creek flows into Stone Corral Creek from the south near the town of Sites. Stone Corral Creek flows through the gap in the foothills and into the western Sacramento Valley.

DWR observed aluminum, arsenic, copper, iron, manganese, nickel, and phosphorus during intermittent sampling in Stone Corral Creek near Sites station during intermittent water quality sampling. The concentrations appeared to be higher during and immediately following storm events."

Data for Stone Corral Creek are available in the WDL. These data show that not only are high concentrations of aluminum, arsenic, copper, iron, manganese, and nickel present, as reported in the EIR, but also cadmium, chromium, lead, mercury, selenium, silver, and zinc, as well as boron (Table 5). The EIR does not disclose the fact that, not only are the concentrations higher during and immediately following storm events, the resulting metals concentration in Stone Corral Creek exceed a large number of criteria and standards including those to protect drinking water, public health, freshwater aquatic life, and agricultural uses. These metals will also contribute to the metals load in the proposed reservoir.

The metals concentrations found in Stone Corral Creek, Salt Lake, and Funks Creek are a result of leaching from the soils through which these water bodies flow. Inundation of these soils by the proposed reservoir will result in an additional metals load to the reservoir.

7.2.4.6 *Tehama-Colusa Canal*

"The intake for the Tehama-Colusa Canal occurs at the southeast end of the City of Red Bluff at River Mile (RM) 243. The intake occurs downstream of the mouth of Red Bank Creek. The Tehama-Colusa Canal is approximately 111 miles long and extends from Red Bluff in Tehama County to downstream of Dunnigan in Yolo County. Funks Reservoir is approximately 66 canal miles downstream of the intake at the Sacramento River.

DWR observed aluminum, arsenic, cadmium, and iron during intermittent sampling in the Tehama-Colusa Canal downstream of the siphon under Stony Creek during intermittent water quality sampling."

The intake for the Tehama-Colusa Canal is at the Sacramento River below Red Bluff Diversion Dam water quality monitoring station. Therefore, water quality in the Tehama-Colusa Canal will be exactly that found at the Sacramento River below Red Bluff Diversion Dam monitoring station. Data for this monitoring station can be found in the WDL.

This is another example where the EIR is less than forthcoming. Not only are aluminum, arsenic, cadmium, and iron present in water diverted from the river into the canal, but, as discussed earlier, so are chromium, copper, lead, manganese, mercury, nickel, selenium, and zinc (Table 1). The highest concentrations were found during the higher flow months (December through March). As discussed earlier, many of these metals exceed a large number of criteria and standards, including those developed to protect drinking water, public health, freshwater aquatic life, and agricultural uses. Water quality in the proposed reservoir will reflect that in the Sacramento River below the Red Bluff Diversion Dam and other source waters, and exceed many of the criteria developed to protect beneficial uses of the water.

7.2.4.7 *Glenn-Colusa Irrigation District Main Canal*

"The intake for the GCID Main Canal is on a side channel off the Sacramento River at RM 205.5, north of the town of Hamilton City. GCID's Hamilton City pump station, located at the intake, diverts water into the GCID Main Canal from the Sacramento River for distribution within the GCID service area. The canal is an unlined earthen channel that stretches approximately 65 miles from the system diversion point near Hamilton City to its downstream southern terminus at the CBD near Williams, in Colusa County.

DWR observed aluminum, arsenic, cadmium, copper, iron, mercury, manganese, and phosphorus during intermittent sampling in the GCID Main Canal intake during intermittent water quality sampling."

The intake for the GCID Main Canal is slightly upstream from the Sacramento River at Hamilton City water quality monitoring station. Therefore, water quality in the GCID Main Canal will be similar to that found at the Sacramento River at Hamilton City monitoring station. Data for this monitoring station can be found in the WDL.

Not only are aluminum, arsenic, cadmium, copper, iron, manganese, and mercury present in the Sacramento River in the vicinity of the diversion into the GCID Main Canal, but so are chromium, lead, nickel, selenium, silver, and zinc (Table 3). Aluminum, arsenic, cadmium, iron, lead, manganese, mercury, and nickel are present in concentrations that exceed various criteria and standards. The highest concentrations are generally found during the higher flow months of December through March, when the proposed project may be diverting water from this area of the Sacramento River.

7.2.4.9 *Sacramento River Opposite Moulton Weir*

"DWR monitored water quality at the Sacramento River along the western bank opposite Moulton Weir station from 2000 to 2010. The water quality samples included aluminum, arsenic, copper, iron, mercury, manganese, lead, and phosphorus. Total aluminum levels in the Sacramento River at this location frequently exceeded aquatic life criteria during associated high flow conditions in the river, but rarely exceeded drinking water criteria and the agricultural goal. Arsenic levels exceeded human toxicity thresholds in all samples collected, and the criterion for protection of aquatic life for cadmium was occasionally exceeded. Copper levels frequently exceeded hardness-dependent aquatic life protection criteria during high flow conditions in the river, and iron levels frequently exceeded drinking water and aquatic life protection criteria, as well as the agricultural goal during the same river conditions. Dissolved iron levels exceeded the Central Valley Basin Plan level occasionally. Mercury levels approached, but did not exceed, the CTR criterion during the highest flows in the river. Manganese levels

occasionally exceeded drinking water standards and the agricultural goal, and lead levels rarely exceeded drinking water criteria. All samples contained total phosphorus at levels at or above the recommended criteria range to prevent nuisance algal growth in streams."

Monitored metals also included cadmium, chromium, nickel, selenium, silver, and zinc (Table 4). Contrary to the statement in the EIR, aluminum concentrations frequently exceed drinking water criteria and on several occasions the agricultural goal during the high flow months of December through March. With reported concentrations up to 38 ug/L, mercury not only approached but greatly exceeded the California Toxics Rule (CTR) criterion (0.05 ug/L) for sources of drinking water as well as the National Recommended Water Quality for freshwater aquatic life continuous concentration (0.77 ug/L) and maximum concentration (1.8 ug/L). Reported lead concentrations frequently exceed the California Public Health Goal of 0.02 ug/L, and had a median value of 0.058 ug/L. Reported nickel concentrations also exceed the California Public Health Goal.

Environmental Impacts/Environmental Consequences

7.3.1 Section 303 Evaluation Criteria and Significance Thresholds

"Significance criteria represent the thresholds that were used to identify whether an impact would be potentially significant. Appendix G of the CEQA Guidelines suggests the following evaluation criteria for water quality:

Would the Project:

- *Violate any water quality standards or waste discharge requirements?*
- *Create or contribute runoff water that would exceed the capacity of existing or planned stormwater*

  drainage systems or provide substantial additional sources of polluted runoff?

- *Otherwise substantially degrade water quality?*

  The evaluation criteria used for this impact analysis represent a combination of the Appendix G criteria and professional judgment that considers current regulations, standards, and/or consultation with agencies, knowledge of the area, and the context and intensity of the environmental effects, as required pursuant to NEPA. For the purposes of this analysis, an alternative would result in a potentially significant impact if it would cause the following:

* *A violation of any water quality standard or waste discharge requirement, or otherwise substantially degrade water quality*

If a water quality constituent declines under the action alternatives as compared to the Existing Conditions/No Project/No Action Condition, the changes are not considered to be adverse.

Qualitative Analysis of Constituents

The qualitative analysis of changes in other constituents (e.g., mercury, selenium, nutrients) was based upon an analysis of potential changes in loadings from sources of the constituent and related changes in flows that would occur from implementation of the Project as compared to the Existing Conditions/ No Project/No Action Condition. For example, the qualitative analysis of changes in mercury is based upon changes in flow patterns from the major sources of mercury in the Sacramento River watershed (e.g., tributaries to the Sacramento River)."

What the heck does this last paragraph mean? It makes absolutely no sense. The analysis of potential impacts should be based on an assessment of the expected water quality in the proposed reservoir, whether that water quality exceeds any criteria or standards, and the adverse effects that would occur if criteria or standards are exceeded, both within the reservoir and in downstream areas subject to releases from the reservoir.

7.3.4 Section 303 Impacts Associated with Alternative A

Shasta Lake and Sacramento River from Shasta Lake and Keswick Reservoir to Freeport

Impact SW Qual-1: A Violation of Any Water Quality Standard or Waste Discharge Requirement, or Otherwise Substantially Degrade Surface Water Quality

Mercury and Other Heavy Metals

"As described in Section 7.2, the sources of mercury and other heavy metals in Shasta Lake are located upstream of the lake and accumulate within Shasta Lake. Mercury in the Sacramento River downstream of Keswick Reservoir is generated along the tributaries to the Sacramento River. The generation rate and the accumulation rates of mercury and other heavy metals in Shasta Lake or along the Sacramento River would not be affected by implementation of Alternative A because there would be no new facilities constructed upstream of Shasta Lake or along the tributaries. Operations of Shasta Lake under Alternative A, as reflected by end-of-month Shasta Lake storage, would be similar to conditions under the Existing Conditions/No Project/No Action Condition, as described in Chapter 6 Surface Water Resources."

Accumulation of mercury would indeed be affected by Alternative A (and all the other alternatives) since water from the Sacramento River, containing mercury concentrations in excess of various criteria, would be diverted into the proposed reservoir. Releases from the reservoir could adversely affect downstream resources and beneficial uses due to the mercury contained in the reservoir. In addition, fisheries, wildlife, and recreation that utilize the reservoir could be adversely affected from mercury accumulation in the reservoir food web.

Summary

"Concentrations of mercury, other heavy metals, and salinity would be similar in the Sacramento River under Alternative A as compared to the Existing Conditions/No Project/No Action Condition; therefore, there would **be no impact** related to these constituents."

Again, there are potential very significant adverse impacts associated with diverting water from the Sacramento River during higher flow periods to the proposed reservoir. The Sacramento River contains concentrations of a large number of metals, including aluminum, arsenic, cadmium, chromium, iron, lead, manganese, and mercury, that significantly exceed various criteria and standards designed to protect beneficial uses. Water in the reservoir will reflect that of the water diverted from the Sacramento River and will also exceed a number of criteria developed to protect beneficial uses. The metals may adversely affect aquatic resources in the reservoir and terrestrial resources that may utilize the reservoir (such as fish-eating birds), as well as reservoir recreation.

The metals in releases from the reservoir may adversely affect downstream resources, including drinking water supply, agricultural supply, wildlife, and fisheries, and may violate the SWRCB antidegradation policy. These are definite "impacts related to these constituents," contrary to what is stated above in this EIR. All the alternatives suffer from the exact same significant adverse impacts due to metals in the source waters.

7.4 Mitigation Measures

"Because no potentially significant direct water quality impacts were identified, no mitigation is required or recommended."

The EIR failed to identify any impacts, though significant potential adverse impacts are painfully obvious. The EIR completely ignores any assessment of the proposed project – Sites Reservoir, as well as any assessment of the adverse impacts the reservoir may pose to beneficial uses within the reservoir (i.e., fisheries, wildlife, recreation) and those adverse impacts attributable to releases from the reservoir (i.e., drinking water supply, agricultural water supply, fisheries, wildlife, recreation). As shown throughout this discussion, a number of metals significantly exceed water quality criteria and standards in the water sources to the proposed reservoir. The EIR completely ignores potential chemical contaminants (such as chlorpyrifos, diazinon, chlordane, DDT, mercury, PCBs, and dieldrin). Water quality in the reservoir will reflect that of the source waters. Therefore, the reservoir will contain a number of metals, including aluminum, arsenic, cadmium, chromium, iron, lead, manganese, and mercury, and possibly other chemical contaminants that exceed a number of water quality criteria designed to protect beneficial uses. Both water resources within the reservoir and downstream resources that receive reservoir releases may be adversely affected by the metals and chemical contaminants. The EIR also fails to address the physical properties that will exist in the reservoir (such as thermal stratification and hypolimnetic anoxia), and how they will affect both reservoir and downstream resources. The EIR needs to address how these significant adverse impacts are going to be mitigated.

References

SWRCB 2011. State Water Resources Control Board. A Compilation of Water Quality Goals. 16th Edition. April 2011.

Table 1. Sacramento River below Red Bluff Diversion Dam, Part 1 of 2

Station Name	Sample Date	Dissolved Aluminum µg/L	Total Aluminum µg/L	Dissolved Arsenic µg/L	Total Arsenic µg/L	Dissolved Cadmium µg/L	Total Cadmium µg/L	Dissolved Chromium µg/L	Total Chromium µg/L	Dissolved Copper µg/L	Total Copper µg/L	Dissolved Iron µg/L	Total Iron µg/L
SACRAMENTO R BL RED BLUFF DIV DM	2/21/06 10:45	131	154	0.702	0.789	0.013	0.016	0.57	0.98	1.08	1.21	75	162
SACRAMENTO R BL RED BLUFF DIV DM	3/1/06 11:09	1459	2240	0.857	1.06	0.017	0.055	2.75	6.1	2.59	6.09	878	2854
SACRAMENTO R BL RED BLUFF DIV DM	4/18/06 9:25	462	729	0.874	0.951	<0.1	<0.1	0.55	1.57	2.36	3.42	277	677
SACRAMENTO R BL RED BLUFF DIV DM	5/16/06 6:45	131	206	0.915	0.959	<0.1	<0.1	0.55	0.58	1.45	1.84	86.8	161
SACRAMENTO R BL RED BLUFF DIV DM	6/26/06 10:05	220	399	1.04	1.09	<0.1	<0.1	0.67	0.98	1.12	1.6	66.2	233
SACRAMENTO R BL RED BLUFF DIV DM	7/25/06 8:20	318	794	1.03	1.1	<0.1	<0.1	1	1.31	1.31	2.18	82	323
SACRAMENTO R BL RED BLUFF DIV DM	8/31/06 13:30	194	278	0.884	0.993	<0.1	<0.1	1.1	1.37	1.07	1.55	132	259
SACRAMENTO R BL RED BLUFF DIV DM	9/21/06 7:15	320	730	0.9	0.933	<0.1	<0.1	0.65	1.01	1.03	1.67	85.3	300
SACRAMENTO R BL RED BLUFF DIV DM	10/25/06 12:30	84.1	214	0.917	0.964	<0.1	<0.1	0.61	0.89	1.28	1.6	51	218
SACRAMENTO R BL RED BLUFF DIV DM	12/13/06 9:20	1238	2010	0.977	1.22	<0.1	<0.1	0.61	1.56	2.3	3.91	235	621
SACRAMENTO R BL RED BLUFF DIV DM	1/10/07 12:25	41.7	91.4	1.42	1.5	<0.1	<0.1	0.55	0.59	0.92	1.01	34.9	54.3
SACRAMENTO R BL RED BLUFF DIV DM	2/26/07 10:45	212	327	0.929	0.987	<0.1	<0.1	1.2	1.61	2.55	2.8	293	376
SACRAMENTO R BL RED BLUFF DIV DM	3/21/07 10:30	9.58	51	1.41	1.46	<0.1	<0.1	0.44	0.59	1.47	1.74	21.5	85.5
SACRAMENTO R BL RED BLUFF DIV DM	4/17/07 10:30	12.3	41	1.53	1.62	<0.1	<0.1	0.45	0.58	1.71	1.93	13.4	51.1
SACRAMENTO R BL RED BLUFF DIV DM	5/29/07 9:45	5.52	15.9	1.68	1.87	<0.1	<0.1	0.53	0.59	1.27	1.53	4.2	32.2
SACRAMENTO R BL RED BLUFF DIV DM	6/26/07 9:45	5.47	56.6	1.59	1.72	<0.1	<0.1	0.55	0.74	1.1	1.41	12.3	75.5
SACRAMENTO R BL RED BLUFF DIV DM	7/18/07 10:10	6.45	50.2	1.63	1.73	<0.1	<0.1	0.5	0.62	0.88	1.25	4.5	73.4
SACRAMENTO R BL RED BLUFF DIV DM	8/27/07 12:10	14.2	26.6	1.55	1.75	<0.1	<0.1	0.47	0.6	0.75	0.97	8.8	33.8
SACRAMENTO R BL RED BLUFF DIV DM	9/12/07 10:40	2.04	24	1.4	1.59	<0.1	<0.1	0.42	0.55	0.67	0.82	3.8	24.6
SACRAMENTO R BL RED BLUFF DIV DM	10/30/07 10:40	5.66	34.5	1.5	1.64	<0.1	<0.1	0.42	0.46	0.99	1.14	12	73
SACRAMENTO R BL RED BLUFF DIV DM	11/26/07 13:40	1.11	18	1.96	2.01	<0.1	<0.1	0.5	0.52	0.66	0.92	5.5	51.2
SACRAMENTO R BL RED BLUFF DIV DM	1/22/08 8:40	6.82	284	1.5	1.71	<0.1	<0.1	0.53	1.15	1.45	2.04	9.5	259
SACRAMENTO R BL RED BLUFF DIV DM	2/26/08 10:40	14.2	846	0.799	0.932	<0.1	<0.1	0.33	2.49	1.97	3.88	24.6	790
SACRAMENTO R BL RED BLUFF DIV DM	3/25/08 7:25	2.25	35	1.31	1.37	<0.1	<0.1	0.42	0.55	1.7	2.09	7.8	62
SACRAMENTO R BL RED BLUFF DIV DM	4/22/08 13:55	4.86	89.3	1.58	1.63	<0.1	<0.1	0.43	0.51	1.63	1.84	9.1	94.6
SACRAMENTO R BL RED BLUFF DIV DM	7/23/08 13:50	2.29	84.5	1.5	1.55	<0.1	<0.1	0.44	0.56	0.9	1.14	7.1	72.4
SACRAMENTO R BL RED BLUFF DIV DM	4/21/09 13:20	6.61	107	1.73	2.06	<0.1	<0.1	0.39	0.65	2.53	2.72	21.6	144
SACRAMENTO R BL RED BLUFF DIV DM	5/27/09 14:30	5.07	89.8	1.27	1.32	<0.1	<0.1	0.39	0.54	1.82	1.95	7.4	87.8
SACRAMENTO R BL RED BLUFF DIV DM	6/24/09 14:00	12.5	66.4	1.26	1.28	<0.1	<0.1	0.39	0.5	1.68	1.72	8.9	72.1
SACRAMENTO R BL RED BLUFF DIV DM	7/27/09 14:07	9.61	168	1.49	1.56	<0.1	<0.1	0.49	0.79	1.11	1.51	11.2	130
SACRAMENTO R BL RED BLUFF DIV DM	8/25/09 9:55	2.86	80.4	1.18	1.25	<0.1	<0.1	0.39	0.54	0.91	1.08	5.8	71.9
SACRAMENTO R BL RED BLUFF DIV DM	9/23/09 8:50	4.04	72.6	1.27	1.33	<0.1	<0.1	0.38	0.48	1.04	1.09	9.6	79.8
SACRAMENTO R BL RED BLUFF DIV DM	10/26/09 13:15	7.2	87.1	1.44	1.52	<0.1	<0.1	0.44	0.6	1.26	1.49	16.1	84.8
	Maximum	1459	2240	1.96	2.06	0.017	0.055	2.75	6.1	2.59	6.09	878	2854
	Median	9.61	89.8	1.31	1.37	0.015	0.0355	0.5	0.6	1.27	1.6	13.4	87.8
	Minimum	1.11	15.9	0.702	0.789	0.013	0.016	0.33	0.46	0.66	0.82	3.8	24.6
SWRCB Basin Plan - Drinking Water Standards -Primary MCL		1000		10									
SWRCB Basin Plan - Drinking Water Standards -Secondary MCL		200										300	
Cal EPA/OEHHA - California Public Health Goal				0.004				0.02					
USEPA Secondary MCL		50											
Cal EPA - One in a million incremental cancer risk estimate for drinking water				0.023		0.0023		0.07					
USEPA Health Advisory for drinking water				0.02									
California Proposition 65 Safe Harbor Level - Max. Allowable dose level for reproductive toxicity				0.05									
Agriculture Water Quality Goals - Taste and odor threshold													
National Recommended WQ Criteria - Taste and Odor or Welfare												300	
National Recommended WQ Criteria - Human Health and Welfare protection - water and fish consumption				0.018									
National Recommended WQ Criteria - Freshwater Aquatic Life Continuous		87										1000	
National Recommended WQ Criteria - Freshwater Aquatic Life Maximum		750											

Table 1. Sacramento River below Red Bluff Diversion Dam, Part 2 of 2

Station Name	Sample Date	Dissolved Lead µg/L	Total Lead µg/L	Dissolved Manganese µg/L	Total Manganese µg/L	Total Mercury ng/L	Dissolved Nickel µg/L	Total Nickel µg/L	Dissolved Selenium µg/L	Total Selenium µg/L	Dissolved Zinc µg/L	Total Zinc µg/L
SACRAMENTO R BL RED BLUFF DIV DM	2/21/06 10:45	<0.045	0.049	2.37	5.71	N/A	1.53	1.62	<0.149	0.15	1.45	1.89
SACRAMENTO R BL RED BLUFF DIV DM	3/1/06 11:00	0.274	1.1	13.5	78.9	N/A	2.84	8.57	<0.149	0.16	4.49	13.2
SACRAMENTO R BL RED BLUFF DIV DM	4/18/06 9:25	0.086	0.271	6.94	19.6	N/A	1.69	2.84	0.24	0.31	2.95	5.81
SACRAMENTO R BL RED BLUFF DIV DM	5/16/06 6:45	<0.04	0.075	1.64	7.63	N/A	1.14	1.34	<0.2	<0.2	0.49	1.78
SACRAMENTO R BL RED BLUFF DIV DM	6/26/06 10:05	<0.04	0.092	1.1	7.92	N/A	1.6	2.1	<0.2	<0.2	0.72	2.31
SACRAMENTO R BL RED BLUFF DIV DM	7/25/06 8:20	<0.04	0.15	1.49	11.7	1.7	1.8	3.01	<0.2	0.26	1.02	4.39
SACRAMENTO R BL RED BLUFF DIV DM	8/21/06 13:30	<0.04	0.102	1.65	5.98	0.89	1.84	2.55	<0.2	<0.2	1.51	3.22
SACRAMENTO R BL RED BLUFF DIV DM	9/21/06 7:15	<0.04	0.102	1.88	12.8	1.4	1.88	2.85	<0.2	0.24	1.18	5.92
SACRAMENTO R BL RED BLUFF DIV DM	10/25/06 12:30	<0.04	0.1	0.91	6.93	0.58	1.78	2.19	<0.2	0.26	0.69	4.16
SACRAMENTO R BL RED BLUFF DIV DM	12/13/06 9:20	0.103	0.546	3.08	38.6	0.84	1.3	2.32	<0.2	0.24	2.07	9.17
SACRAMENTO R BL RED BLUFF DIV DM	1/10/07 12:25	<0.04	<0.04	1.37	3.13	0.59	0.97	1.02	<0.2	<0.2	0.71	2.82
SACRAMENTO R BL RED BLUFF DIV DM	2/26/07 10:45	0.149	0.234	6.41	10.2	2.6	1.14	1.49	0.2	0.28	3.09	5.68
SACRAMENTO R BL RED BLUFF DIV DM	3/21/07 10:30	<0.04	0.04	1.27	4.8	0.9	0.84	0.97	<0.2	0.2	0.38	3.58
SACRAMENTO R BL RED BLUFF DIV DM	4/17/07 10:30	<0.04	<0.04	1.71	5.08	1.2	0.57	0.72	<0.2	<0.2	0.48	3.46
SACRAMENTO R BL RED BLUFF DIV DM	5/29/07 9:45	<0.04	<0.04	0.39	2.95	N/A	0.65	0.76	<0.2	0.23	0.31	3.01
SACRAMENTO R BL RED BLUFF DIV DM	6/26/07 9:45	<0.04	0.058	3.41	7.57	0.74	0.97	1.22	<0.2	0.25	1.19	4.35
SACRAMENTO R BL RED BLUFF DIV DM	7/18/07 10:10	<0.04	<0.04	0.2	4.47	0.98	0.76	1.08	<0.2	<0.2	0.31	3.37
SACRAMENTO R BL RED BLUFF DIV DM	8/27/07 12:10	<0.04	<0.04	0.33	3.8	N/A	1.25	1.4	<0.2	0.23	2	2.22
SACRAMENTO R BL RED BLUFF DIV DM	9/12/07 10:40	<0.04	0.058	0.18	3	0.58	0.89	1	<0.2	<0.2	0.5	2.34
SACRAMENTO R BL RED BLUFF DIV DM	10/30/07 10:40	<0.04	0.052	0.19	4.66	0.48	0.92	1.2	<0.2	<0.2	0.71	3.12
SACRAMENTO R BL RED BLUFF DIV DM	11/26/07 13:40	<0.04	0.078	0.32	4.71	1.2	0.63	0.93	<0.2	<0.2	0.34	2.59
SACRAMENTO R BL RED BLUFF DIV DM	1/22/08 8:40	<0.04	0.13	0.73	12.9	N/A	0.91	1.08	<0.2	<0.2	1.33	4.99
SACRAMENTO R BL RED BLUFF DIV DM	2/26/08 10:40	<0.04	0.388	0.68	23.4	N/A	1.58	3	<0.2	0.21	0.97	6.85
SACRAMENTO R BL RED BLUFF DIV DM	3/25/08 7:25	<0.04	<0.04	0.36	6.12	N/A	0.71	0.95	<0.2	0.25	0.44	3.11
SACRAMENTO R BL RED BLUFF DIV DM	4/22/08 13:55	<0.04	0.051	1.48	5.43	N/A	0.72	0.88	0.25	0.26	1.11	3.47
SACRAMENTO R BL RED BLUFF DIV DM	7/23/08 13:50	<0.04	<0.04	0.26	4.64	0.65	1.2	1.24	<0.2	<0.2	0.51	2.87
SACRAMENTO R BL RED BLUFF DIV DM	4/21/09 13:20	<0.04	0.073	0.57	5.35	N/A	0.8	0.88	<0.2	<0.2	1.07	4.06
SACRAMENTO R BL RED BLUFF DIV DM	5/27/09 14:30	<0.04	<0.04	0.43	2.32	N/A	0.82	0.96	<0.2	<0.2	0.48	2.28
SACRAMENTO R BL RED BLUFF DIV DM	6/24/09 14:00	<0.04	<0.04	0.3	3.26	N/A	0.91	1.05	0.23	0.27	1.25	3.27
SACRAMENTO R BL RED BLUFF DIV DM	7/27/09 14:07	<0.04	0.063	1.86	6.71	N/A	1.17	1.24	<0.2	<0.2	1.32	4.09
SACRAMENTO R BL RED BLUFF DIV DM	8/25/09 9:55	<0.04	<0.04	0.35	4.54	N/A	1.13	1.21	<0.2	<0.2	0.81	2.67
SACRAMENTO R BL RED BLUFF DIV DM	9/23/09 8:50	<0.04	<0.04	0.32	4.77	N/A	1.01	1.16	<0.2	<0.2	0.63	2.79
SACRAMENTO R BL RED BLUFF DIV DM	10/26/09 13:15	<0.04	0.076	2.55	7.5	N/A	0.97	1.03	<0.2	<0.2	0.94	3.12
	Maximum	0.274	1.1	13.5	78.9	2.6	2.84	8.57	0.25	0.31	4.49	13.2
	Median	0.126	0.085	1.1	5.71	0.89	1.01	1.21	0.235	0.245	0.94	3.27
	Minimum	0.086	0.04	0.18	2.32	0.43	0.57	0.72	0.2	0.15	0.31	1.78
SWRCB Basin Plan - Drinking Water Standards -Primary MCL												
SWRCB Basin Plan - Drinking Water Standards -Secondary MCL					50							
Cal EPA/OEHHA - California Public Health Goal			0.2									
USEPA Secondary MCL												
Cal EPA - One in a million incremental cancer risk estimate for drinking water												
USEPA Health Advisory for drinking water												
California Proposition 65 Safe Harbor Level - Max. Allowable dose level for			0.25									
Agriculture Water Quality Goals - Taste and odor threshold												
National Recommended WQ Criteria - Taste and Odor or Welfare					50							
National Recommended WQ Criteria - Human Health and Welfare protection -												
National Recommended WQ Criteria - Freshwater Aquatic Life Continuous						0.77						
National Recommended WQ Criteria - Freshwater Aquatic Life Maximum						1.4						

Table 2. Cottonwood Creek near Cottonwood, Part 1 of 2

Station Name	Sample Date	Dissolved Aluminum µg/L	Total Aluminum µg/L	Dissolved Arsenic µg/L	Total Arsenic µg/L	Dissolved Cadmium µg/L	Total Cadmium µg/L	Dissolved Chromium µg/L	Total Chromium µg/L	Dissolved Copper µg/L	Total Copper µg/L	Dissolved Iron µg/L	Total Iron µg/L
COTTONWOOD C NR COTTONWOOD	10/5/04 11:30	5.21	10.5	0.662	0.668	<0.011	<0.008	0.65	0.68	0.47	0.58	10.2	39
COTTONWOOD C NR COTTONWOOD	11/8/04 11:20	3.98	6.42	0.684	0.723	<0.008	<0.007	1.51	1.75	0.48	0.72	3.6	26
COTTONWOOD C NR COTTONWOOD	12/7/04 10:40	7.02	31.3	0.524	0.612	<0.012	0.081	2.04	2.33	0.66	0.7	<4.5	42
COTTONWOOD C NR COTTONWOOD	1/10/05 7:35	208	448	0.517	0.549	<0.011	<0.007	1.73	1.9	1.29	1.67	137	522
COTTONWOOD C NR COTTONWOOD	2/2/05 13:00	37.1	157	0.396	0.417	<0.011	<0.066	1.05	1.14	0.83	0.85	57.1	218
COTTONWOOD C NR COTTONWOOD	3/10/05 13:50	34.7	95.6	0.46	0.468	<0.033	<0.011	1.6	1.63	0.5	0.67	13.7	128
COTTONWOOD C NR COTTONWOOD	4/19/05 8:10	40.2	88	0.413	0.484	<0.022	<0.009	1.02	1.52	0.42	0.59	29.3	114
COTTONWOOD C NR COTTONWOOD	5/10/05 11:20	1358	14345	0.863	3.04	<0.058	0.085	2.94	36.5	4.43	39.2	953	23594
COTTONWOOD C NR COTTONWOOD	6/28/05 7:30	63.9	86.1	0.455	0.465	<0.009	<0.012	1.7	1.14	0.42	0.46	23.8	62.6
COTTONWOOD C NR COTTONWOOD	7/26/05 6:45	1.55	7.51	0.682	0.72	<0.011	<0.004	0.47	0.78	0.48	0.52	<1.51	8.6
COTTONWOOD C NR COTTONWOOD	8/22/05 11:45	2.65	32.9	0.657	0.691	<0.009	<0.009	1.7	1.98	0.5	0.54	<4.16	72.4
COTTONWOOD C NR COTTONWOOD	9/26/05 11:20	10.2	152	0.779	0.795	0.003	0.016	1.03	1.1	1.03	1.28	20.2	294
COTTONWOOD C NR COTTONWOOD	10/24/05 8:30	12.9	47.2	0.705	0.708	<0.009	<0.009	0.9	0.99	0.57	0.69	17.8	83.7
COTTONWOOD C NR COTTONWOOD	11/14/05 9:00	5.42	11.9	0.537	0.579	<0.009	<0.009	0.9	0.91	0.6	0.62	9	26.2
COTTONWOOD C NR COTTONWOOD	12/15/05 9:15	4.38	10.2	0.343	0.434	<0.005	0.007	1.04	1.24	0.41	0.41	<1.51	17.2
COTTONWOOD C NR COTTONWOOD	1/24/06 9:10	202	380	0.42	0.46	0.009	0.015	1.71	2.26	0.75	1.22	123	512
COTTONWOOD C NR COTTONWOOD	3/1/06 9:15	2533	3739	0.889	1.16	0.009	0.023	8.2	15.7	3.22	7.63	1760	5793
COTTONWOOD C NR COTTONWOOD	4/24/06 10:03	151	1225	0.394	0.569	<0.1	<0.1	1.11	4.58	0.6	2.63	122	1174
COTTONWOOD C NR COTTONWOOD	8/16/06 11:00	1.91	20.8	0.703	0.806	<0.1	<0.1	0.33	0.35	0.73	0.84	7.2	29.5
COTTONWOOD C NR COTTONWOOD	11/14/06 9:05	24.8	75.7	0.467	0.594	<0.1	<0.1	0.54	0.68	0.51	0.61	37.4	96.2
COTTONWOOD C NR COTTONWOOD	12/6/06 13:20	4.8	6.62	0.438	0.539	<0.1	<0.1	0.45	1.14	0.5	0.54	6.1	11.7
COTTONWOOD C NR COTTONWOOD	2/20/07 8:45	47.5	52.3	0.3	0.344	<0.1	<0.1	1.38	1.91	0.57	0.62	35.2	50.4
	Maximum	2533	14345	0.889	3.04	0.009	0.085	8.2	36.5	4.43	39.2	1760	23594
	Mean	18.85	64	0.5205	0.5865	0.009	0.0195	1.08	1.38	0.57	0.68	26.55	78.05
	Minimum	1.55	6.42	0.3	0.344	0.003	0.007	0.33	0.35	0.41	0.41	3.6	8.6
SWRCB Basin Plan - Drinking Water Standards -Primary MCL		1000											
SWRCB Basin Plan - Drinking Water Standards -Secondary MCL		200										300	
Cal EPA/OEHHA - California Public Health Goal		600				0.04		0.02					
USEPA Secondary MCL													
Cal EPA - One in a million incremental cancer risk estimate for drinking water				0.023		0.0023		0.07					
USEPA Health Advisory for drinking water				0.02									
California Proposition 65 Safe Harbor Level - Max. Allowable dose level for reproductive toxicity				0.05									
National Academy of Sciences Health Advisory		5000											
Agriculture Water Quality Goals - Taste and odor threshold		5000										5000	
National Recommended WQ Criteria - Taste and Odor or Welfare												300	
National Recommended WQ Criteria - Human Health and Welfare protection - water and fish consumption		87		0.018									
National Recommended WQ Criteria - Freshwater Aquatic Life		750										1000	
National Recommended WQ Criteria - Freshwater Aquatic Life													

Table 2. Cottonwood Creek near Cottonwood, Part 2 of 2

Station Name	Sample Date	Dissolved Lead µg/L	Total Lead µg/L	Dissolved Manganese µg/L	Total Manganese µg/L	Total Mercury ng/L	Dissolved Nickel µg/L	Total Nickel µg/L	Dissolved Selenium µg/L	Total Selenium µg/L	Dissolved Silver µg/L	Total Silver µg/L	Dissolved Zinc µg/L	Total Zinc µg/L
COTTONWOOD C NR COTTONWOOD	10/5/04 11:30	0.008	<0.017	2.58	11.3	N/A	1.34	1.34	0.18	<0.204	<0.077	<0.054	0.19	0.42
COTTONWOOD C NR COTTONWOOD	11/8/04 11:20	<0.001	0.008	3.06	4.36	N/A	0.86	1.53	0.33	0.35	<0.006	<0.063	0.05	0.09
COTTONWOOD C NR COTTONWOOD	12/7/04 10:40	0.012	0.028	0.46	4.09	N/A	1.07	1.2	<0.163	0.28	<0.011	<0.04	0.31	0.65
COTTONWOOD C NR COTTONWOOD	1/10/05 7:35	0.048	0.166	1.79	12.6	N/A	1.59	2.61	0.74	0.81	<0.003	0.006	0.55	1.58
COTTONWOOD C NR COTTONWOOD	2/2/05 13:00	0.017	0.063	2.87	7.91	N/A	1.41	1.93	<0.222	0.18	<0.001	<0.002	0.22	0.73
COTTONWOOD C NR COTTONWOOD	3/10/05 13:50	0.008	0.044	0.79	4.71	N/A	1.28	1.64	<0.245	0.32	<0.001	<0.036	0.16	0.44
COTTONWOOD C NR COTTONWOOD	4/19/05 8:10	0.015	0.034	1.51	5.07	N/A	0.98	1.47	0.31	0.44	<0.003	<0.005	0.2	0.53
COTTONWOOD C NR COTTONWOOD	5/18/05 11:20	0.475	7.26	8.76	563	N/A	3.38	57.9	<0.399	0.39	0.039	0.101	3.31	72
COTTONWOOD C NR COTTONWOOD	6/28/05 7:30	<0.009	<0.027	3.47	3.93	N/A	0.66	1.16	<0.14	<0.354	<0.002	<0.027	0.14	0.36
COTTONWOOD C NR COTTONWOOD	7/26/05 6:45	<0.019	<0.063	0.32	2.51	N/A	0.43	0.82	<0.145	<0.176	<0.002	<0.04	<0.083	0.15
COTTONWOOD C NR COTTONWOOD	8/22/05 11:45	<0.004	0.024	1.05	13.7	N/A	0.79	1.07	<0.227	<0.227	<0.001	<0.001	0.18	0.56
COTTONWOOD C NR COTTONWOOD	9/26/05 11:20	0.006	0.111	0.76	24.9	N/A	1.31	2.36	0.17	0.19	<0.003	<0.003	0.88	1.97
COTTONWOOD C NR COTTONWOOD	10/24/05 8:30	0.008	0.028	1.93	15.4	N/A	1.18	1.45	0.11	0.19	<0.002	<0.002	0.31	0.48
COTTONWOOD C NR COTTONWOOD	11/14/05 9:00	0.01	0.017	1.78	5.95	N/A	1.37	1.38	<0.186	<0.186	<0.009	<0.009	0.39	0.71
COTTONWOOD C NR COTTONWOOD	12/15/05 9:15	0.006	0.008	0.79	2.59	N/A	1.41	1.48	0.16	0.29	<0.001	<0.001	<0.177	<0.177
COTTONWOOD C NR COTTONWOOD	1/24/06 9:10	0.033	0.146	6.19	16.7	N/A	1.95	3.38	0.23	0.28	<0.005	<0.005	0.43	1.44
COTTONWOOD C NR COTTONWOOD	3/1/06 9:15	0.491	1.53	30.8	138	N/A	7.35	20.9	<0.149	0.15	<0.009	<0.009	3.64	13.6
COTTONWOOD C NR COTTONWOOD	4/24/06 10:03	0.04	0.444	2.06	40.8	N/A	1.51	6.9	0.21	0.32	<0.03	<0.03	0.47	4.32
COTTONWOOD C NR COTTONWOOD	8/16/06 11:00	<0.04	<0.04	1.13	5.41	0.72	1.14	1.32	0.42	0.6	<0.03	<0.03	0.14	0.73
COTTONWOOD C NR COTTONWOOD	11/14/06 9:05	<0.04	<0.04	4.82	10.7	N/A	1.56	1.77	0.56	0.63	<0.03	<0.03	<0.1	1.07
COTTONWOOD C NR COTTONWOOD	12/6/06 13:20	<0.04	<0.04	2.55	4.44	N/A	0.87	1.24	0.33	0.59	<0.03	<0.03	0.79	2.02
COTTONWOOD C NR COTTONWOOD	2/20/07 8:45	<0.04	<0.04	5	5.57	1.2	0.16	1.66	0.35	0.51	<0.03	<0.03	0.18	1.65
	Maximum	0.491	7.26	30.8	563	1.2	7.35	57.9	0.74	0.81	0.039	0.101	3.64	72
	Mean	0.0135	0.044	1.995	6.93	0.96	1.295	1.505	0.31	0.32	0.039	0.0535	0.31	0.73
	Minimum	0.006	0.008	0.32	2.51	0.72	0.16	0.82	0.11	0.15	0.039	0.006	0.05	0.09
SWRCB Basin Plan - Drinking Water Standards -Primary MCL														
SWRCB Basin Plan - Drinking Water Standards -Secondary MCL				50										
Cal EPA/OEHHA - California Public Health Goal		0.2					12							
USEPA Secondary MCL														
Cal EPA - One in a million incremental cancer risk estimate for drinking w		4.1												
USEPA Health Advisory for drinking water				300										
California Proposition 65 Safe Harbor Level - Max.														
Allowable dose level for reproductive toxicity		0.25												
National Academy of Sciences Health Advisory														
Agriculture Water Quality Goals - Taste and odor threshold				200										
National Recommended WQ Criteria - Taste and Odor or Welfare				50										
National Recommended WQ Criteria - Human Health and Welfare														
National Recommended WQ Criteria - Freshwater Aquatic Life						0.77								
National Recommended WQ Criteria - Freshwater Aquatic Life						1.4								

Table 3. Sacramento River at Hamilton City, Part 1 of 2

Station Name	Sample Date	Dissolved Aluminum µg/L	Total Aluminum µg/L	Dissolved Arsenic µg/L	Total Arsenic µg/L	Dissolved Cadmium µg/L	Total Cadmium µg/L	Dissolved Chromium µg/L	Total Chromium µg/L	Dissolved Copper µg/L	Total Copper µg/L	Dissolved Iron µg/L	Total Iron µg/L
SACRAMENTO R A HAMILTON CITY	11/25/03 9:10	N/A	12.8	N/A	1.93	N/A	<0.005	N/A	0.63	N/A	[illegible]	N/A	[illegible]
SACRAMENTO R A HAMILTON CITY	3/8/04 14:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	[illegible]
SACRAMENTO R A HAMILTON CITY	5/20/04 15:00	N/A	110	N/A	1.81	N/A	0.011	N/A	0.84	N/A	1.57	N/A	[illegible]
SACRAMENTO R A HAMILTON CITY	8/12/04 10:20	N/A	189	N/A	1.36	N/A	0.016	N/A	[illegible]	N/A	[illegible]	N/A	[illegible]
SACRAMENTO R A HAMILTON CITY	10/5/04 10:05	14.5	113	1.3	1.32	<0.011	<0.008	0.9	0.95	0.72	1.43	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	11/9/04 11:40	23.6	36.1	2.49	2.52	<0.008	<0.007	1	1	0.83	1.77	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	12/7/04 10:40	2.54	12.5	2.38	2.54	<0.012	0.034	0.54	0.84	0.56	0.74	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	1/10/05 12:15	352	413	1.48	1.55	<0.011	<0.007	1.06	1.41	1.93	2.45	225	44
SACRAMENTO R A HAMILTON CITY	2/2/05 7:55	77.5	163	1.42	1.51	<0.011	<0.066	1.67	1.88	1.51	1.73	71.5	[illegible]
SACRAMENTO R A HAMILTON CITY	3/10/05 7:30	11	75.7	2.03	2.08	<0.033	<0.011	1.29	1.39	1.09	1.37	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	4/20/05 12:00	15.9	39.3	1.99	2.09	<0.022	<0.009	1.02	1.03	1.13	1.25	15.1	[illegible]
SACRAMENTO R A HAMILTON CITY	5/19/05 9:30	1075	6686	1.66	3.17	<0.058	0.076	2.69	18.9	3.11	18.7	726	[illegible]
SACRAMENTO R A HAMILTON CITY	6/28/05 7:15	106	121	1.37	1.58	<0.009	<0.012	0.52	1.1	1.35	1.2	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	7/26/05 12:45	1.65	31.4	1.31	1.34	<0.011	0.007	0.63	[illegible]	0.75	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	8/23/05 11:20	14.1	44.8	1.39	1.47	<0.009	0.016	0.46	[illegible]	0.86	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	9/27/05 10:00	27.7	98.8	1.41	1.43	0.007	0.011	0.54	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	10/25/05 12:40	30.9	61.6	1.54	1.56	<0.009	<0.009	0.63	[illegible]	1	1.1	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	11/15/05 11:00	30.8	67.6	1.84	1.92	<0.009	0.014	0.79	[illegible]	1.07	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	12/14/05 11:45	6.67	36.7	1.94	2.1	<0.005	0.008	0.79	[illegible]	0.81	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	1/4/06 7:30	866	3462	1.61	2.35	0.014	0.092	2.61	9.71	2.47	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	1/24/06 7:30	359	709	1.41	1.49	0.011	0.042	1.51	[illegible]	1.62	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	2/21/06 12:45	222	733	1.3	1.47	0.014	0.029	1.18	[illegible]	1.12	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	3/1/06 7:30	2887	4955	1.36	1.85	0.021	0.087	4.99	[illegible]	4.26	[illegible]	1773	[illegible]
SACRAMENTO R A HAMILTON CITY	4/17/06 6:00	914	2219	1.06	1.47	<0.1	<0.1	1.69	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	5/17/06 6:40	163	285	1.42	1.57	<0.1	<0.1	0.59	0.74	1.25	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	6/27/06 6:30	200	398	1.27	1.4	<0.1	<0.1	0.74	[illegible]	1.09	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	7/25/06 5:40	255	570	1.24	1.32	<0.1	<0.1	0.92	[illegible]	1.14	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	8/22/06 6:40	195	298	1.12	1.15	<0.1	<0.1	0.67	[illegible]	1.09	1.41	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	9/20/06 6:30	591	882	1.12	1.23	<0.1	<0.1	0.61	[illegible]	1.07	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	10/24/06 7:00	36.8	201	0.859	1.37	<0.1	<0.1	0.56	[illegible]	0.75	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	12/12/06 6:40	131	505	1.98	2.33	<0.1	<0.1	0.52	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	1/9/07 7:15	61.6	138	2.08	2.23	<0.1	<0.1	0.56	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	2/26/07 14:00	478	657	1.31	1.42	<0.1	<0.1	1.81	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	3/20/07 6:50	16.1	91.6	2.17	2.36	<0.1	<0.1	0.41	[illegible]	1.22	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	4/17/07 7:30	12.8	52	1.93	1.94	<0.1	<0.1	0.43	[illegible]	1.54	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	5/29/07 12:15	3.21	37.2	1.9	2.11	<0.1	<0.1	0.52	[illegible]	1.26	[illegible]	4.6	[illegible]
SACRAMENTO R A HAMILTON CITY	6/26/07 12:30	6.11	50.1	1.6	1.67	<0.1	<0.1	0.52	[illegible]	1.07	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	7/18/07 7:00	10.8	114	1.62	1.69	<0.1	<0.1	0.47	0.84	1.15	[illegible]	6.2	[illegible]
SACRAMENTO R A HAMILTON CITY	8/28/07 7:05	18.4	49.2	1.37	1.58	<0.1	<0.1	0.45	[illegible]	0.92	[illegible]	6.2	[illegible]
SACRAMENTO R A HAMILTON CITY	9/13/07 7:55	2.26	37.9	1.47	1.55	<0.1	<0.1	0.45	[illegible]	0.63	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	11/7/07 10:30	0.83	10.5	1.96	2.06	<0.1	<0.1	0.4	[illegible]	0.63	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	2/20/08 12:15	5.62	85.8	2.04	2.27	<0.1	<0.1	0.49	[illegible]	1.09	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	5/6/08 13:05	2.94	85.3	2.14	2.16	<0.1	<0.1	0.35	[illegible]	1.43	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	8/6/08 9:40	2.82	70	1.6	1.68	<0.1	<0.1	0.42	0.54	0.56	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	11/5/08 7:20	10.2	95.6	2.06	2.17	<0.1	<0.1	0.31	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	2/24/09 10:40	51.1	3110	1.62	4.07	<0.1	<0.1	0.47	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	5/5/09 8:50	14.7	439	1.83	2.05	<0.1	<0.1	0.55	[illegible]	1.74	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	8/11/09 8:40	2.75	35.1	1.31	1.35	<0.1	<0.1	0.36	[illegible]	0.88	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	11/3/09 7:50	2.94	47	1.87	1.94	<0.1	<0.1	0.38	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	2/2/10 8:45	12	340	1.37	1.43	<0.1	<0.1	0.36	[illegible]	1.76	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	5/4/10 7:45	10.2	160	1.31	1.85	<0.1	<0.1	0.47	[illegible]	1.56	2.3	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	8/3/10 11:00	7.55	24	1.4	1.42	<0.1	<0.1	0.47	0.58	1.29	1.35	10.4	[illegible]
SACRAMENTO R A HAMILTON CITY	11/2/10 8:30	4.63	67.4	1.97	2.06	<0.1	<0.1	0.66	[illegible]	1.35	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	2/1/11 9:30	5.73	53.6	1.9	1.96	<0.1	<0.1	0.43	[illegible]	1.29	[illegible]	12	[illegible]
SACRAMENTO R A HAMILTON CITY	5/3/11 8:55	1	24.6	1.6	1.73	<0.1	<0.1	0.45	[illegible]	1.4	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	8/2/11 8:10	116	159	1.41	1.45	<0.1	<0.1	0.65	[illegible]	1.11	1.56	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	11/1/11 8:45	56	91.5	1.21	1.58	<0.1	<0.1	0.64	[illegible]	0.95	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	1/31/12 8:25	178	276	2.04	2.2	<0.1	<0.1	0.57	[illegible]	1	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	5/8/12 8:30	88.3	125	2.11	2.64	<0.1	<0.1	[illegible]	[illegible]	1.6	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	8/7/12 8:00	10	28.6	1.25	1.28	<0.1	<0.1	0.39	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	11/6/12 9:35	11.6	12.5	2.09	2.17	<0.1	<0.1	0.48	[illegible]	0.65	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	2/6/13 9:15	3.6	127	1.98	2	<0.1	<0.1	0.32	[illegible]	1.1	[illegible]	8.2	[illegible]
SACRAMENTO R A HAMILTON CITY	5/7/13 8:05	19.2	29.5	1.74	1.77	<0.1	<0.1	0.53	[illegible]	1.07	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	8/6/13 7:30	1.05	20	1.18	1.48	<0.1	<0.1	0.45	[illegible]	0.53	0.86	4.3	[illegible]
SACRAMENTO R A HAMILTON CITY	11/5/13 9:10	1.69	24.4	2.06	2.17	<0.1	<0.1	0.39	[illegible]	0.5	0.87	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	2/4/14 9:05	0.19	6.03	2.7	2.88	<0.1	<0.1	0.52	[illegible]	0.72	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	5/6/14 8:30	4.3	37.2	2.36	2.5	<0.1	<0.1	0.37	[illegible]	1.48	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	8/12/14 9:50	1.91	18.7	1.93	2.12	<0.1	<0.1	0.44	[illegible]	0.72	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	11/5/14 8:50	2.57	82.4	2.05	2.12	<0.1	<0.1	0.48	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	2/10/15 9:30	21.2	1960	1	2.14	<0.1	<0.1	0.33	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	5/11/15 10:00	21.9	42.4	1.76	1.81	<0.1	<0.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	8/11/15 10:20	13.4	32.2	1.65	1.72	<0.1	<0.1	0.53	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	11/4/15 11:27	12.6	189	2.43	2.61	<0.1	<0.1	0.43	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	2/3/16 12:10	39.7	352	1.26	1.49	<0.1	<0.1	0.44	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	5/9/16 12:15	42.5	183	2.05	2.38	<0.1	<0.1	0.41	[illegible]	1.75	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	8/8/16 8:15	45	100	1.32	1.42	<0.1	<0.1	0.43	0.55	1.26	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	11/7/16 11:00	35.3	78	1.97	2.1	<0.1	<0.1	0.41	[illegible]	1.06	[illegible]	[illegible]	[illegible]
SACRAMENTO R A HAMILTON CITY	2/6/17 13:00	136	1020	1.16	1.67	<0.1	<0.1	0.57	[illegible]	[illegible]	5.78	[illegible]	[illegible]
	Maximum	2887	6686	2.7	4.07	0.021	0.092	4.99	18.9	4.26	18.7	1773	[illegible]
	Median	16	91.5	1.615	1.81	0.014	0.016	0.51	0.76	1.115	1.49	25.3	[illegible]
	Minimum	0.19	6.03	0.859	1.15	0.007	0.007	0.3	0.41	0.5	0.74	2.3	[illegible]

Water Quality Standard	Aluminum	Arsenic	Cadmium	Chromium	Iron
SWRCB Basin Plan - Drinking Water Standards -Primary MCL	1000				
SWRCB Basin Plan - Drinking Water Standards -Secondary MCL	200				300
Cal EPA/OEHHA - California Public Health Goal	600	0.004		0.02	
USEPA Secondary MCL	50				
Cal EPA - One in a million incremental cancer risk estimate for drinking water		0.023	0.0023	0.37	
USEPA Health Advisory for drinking water		0.02			
USEPA IRIS Reference Dose Drinking Water Health Advisories		2.1			
California Proposition 65 Safe Harbor Level - Max. Allowable dose level for reproductive toxicity		0.05			
Agriculture Water Quality Goals - Taste and odor threshold	5000				5000
California Toxics Rule Sources of Drinking Water					
National Academy of Sciences Drinking Water Health Advisories	5000				
National Recommended WQ Criteria - Taste and Odor or Welfare					300
National Recommended WQ Criteria - Human Health and Welfare protection water and fish consumption		0.018			
National Recommended WQ Criteria - Freshwater Aquatic Life Continuous Concentration	87				1000
National Recommended WQ Criteria - Freshwater Aquatic Life Maximum Concentration	750				

Table 3. Sacramento River at Hamilton City, Part 2 of 2

Station Name	Sample Date	Dissolved Lead µg/L	Total Lead µg/L	Dissolved Manganese µg/L	Total Manganese µg/L	Total Mercury ng/L	Dissolved Nickel µg/L	Total Nickel µg/L	Dissolved Selenium µg/L	Total Selenium µg/L	Dissolved Silver µg/L	Total Silver µg/L	Dissolved Zinc µg/L	Total Zinc µg/L
SACRAMENTO R A HAMILTON CITY	11/25/03 9:10	N/A	0.118	N/A	1.61	N/A	N/A	1.26	N/A	<0.061	N/A	<0.012	N/A	1.25
SACRAMENTO R A HAMILTON CITY	3/8/04 13:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SACRAMENTO R A HAMILTON CITY	5/20/04 15:00	N/A	0.027	N/A	6.14	N/A	N/A	1.31	N/A	0.12	N/A	<0.034	N/A	1.93
SACRAMENTO R A HAMILTON CITY	8/12/04 10:20	N/A	0.08	N/A	6.88	N/A	N/A	1.84	N/A	0.28	N/A	<0.145	N/A	2.07
SACRAMENTO R A HAMILTON CITY	10/5/04 10:05	0.018	0.067	1.13	6.34	N/A	1.25	1.62	<0.144	<0.204	<0.077	<0.054	0.48	1.56
SACRAMENTO R A HAMILTON CITY	11/9/04 11:40	0.004	0.024	1.55	5.42	N/A	1.11	1.33	<0.149	0.25	<0.006	<0.063	0.52	0.88
SACRAMENTO R A HAMILTON CITY	12/7/04 10:40	<0.01	0.011	0.2	1.8	N/A	0.57	0.59	<0.163	0.28	<0.011	<0.04	0.35	0.44
SACRAMENTO R A HAMILTON CITY	1/10/05 12:15	0.064	0.168	2.22	12.4	N/A	1.39	1.98	0.3	0.34	<0.003	<0.002	1.54	3.1
SACRAMENTO R A HAMILTON CITY	2/2/05 7:35	0.029	0.084	2.54	10.6	N/A	1.02	1.53	<0.222	0.27	0.002	0.003	0.95	1.36
SACRAMENTO R A HAMILTON CITY	3/10/05 7:30	0.008	0.049	0.98	6.37	N/A	0.87	1.24	<0.245	<0.19	<0.001	<0.036	0.36	1.76
SACRAMENTO R A HAMILTON CITY	4/20/05 12:00	0.01	0.023	3.12	6.03	N/A	0.76	0.94	0.14	0.35	<0.003	<0.005	0.41	0.75
SACRAMENTO R A HAMILTON CITY	5/19/05 9:30	0.202	3.24	7.33	272	N/A	2.75	30.7	<0.399	<0.317	0.018	0.041	2.46	35
SACRAMENTO R A HAMILTON CITY	6/28/05 7:15	<0.009	<0.027	4.71	5.17	N/A	0.95	1.41	<0.14	<0.354	<0.002	<0.027	0.8	1.55
SACRAMENTO R A HAMILTON CITY	7/26/05 12:45	<0.019	<0.063	0.16	2.07	N/A	0.85	0.95	<0.145	<0.176	<0.002	<0.04	0.36	0.85
SACRAMENTO R A HAMILTON CITY	8/23/05 11:20	<0.004	0.048	0.58	3.38	N/A	0.81	1.16	<0.227	0.29	<0.001	<0.001	0.27	1.99
SACRAMENTO R A HAMILTON CITY	9/27/05 10:00	<0.004	0.047	0.51	4.61	N/A	0.99	1.35	0.23	0.23	<0.003	<0.003	0.38	1.56
SACRAMENTO R A HAMILTON CITY	10/25/05 12:40	0.011	0.028	0.69	2.88	N/A	1.13	1.22	0.11	0.23	<0.002	<0.002	0.52	1.93
SACRAMENTO R A HAMILTON CITY	11/15/05 11:00	0.04	0.047	0.98	4.81	N/A	1.02	1.24	<0.186	<0.186	<0.009	<0.009	0.56	1.25
SACRAMENTO R A HAMILTON CITY	12/14/05 11:45	0.003	0.023	0.53	4.17	N/A	0.9	1.09	<0.149	0.15	<0.001	<0.001	0.5	0.93
SACRAMENTO R A HAMILTON CITY	1/4/06 7:30	0.191	1.89	9.75	134	N/A	2.67	15.4	<0.149	0.22	<0.001	0.021	2.24	70.8
SACRAMENTO R A HAMILTON CITY	1/24/06 7:30	0.062	0.306	9.24	32.4	N/A	1.68	3.32	<0.186	0.19	<0.005	<0.005	1.55	4.71
SACRAMENTO R A HAMILTON CITY	2/21/06 12:45	0.046	0.299	5.83	27.5	N/A	1.53	3.32	<0.149	0.3	<0.009	<0.009	1	3.74
SACRAMENTO R A HAMILTON CITY	3/1/06 7:30	0.648	2.04	23.2	146	N/A	4.69	15.7	<0.149	0.29	<0.009	<0.009	5.79	21.7
SACRAMENTO R A HAMILTON CITY	4/17/06 6:00	0.188	1.01	9.56	70.9	N/A	2.31	8.07	0.23	0.27	<0.03	<0.03	2.57	12.5
SACRAMENTO R A HAMILTON CITY	5/17/06 6:40	<0.04	0.1	2.1	10.1	N/A	1.12	1.46	<0.2	<0.2	<0.03	<0.03	0.67	1.78
SACRAMENTO R A HAMILTON CITY	6/27/06 6:30	<0.04	0.079	0.69	8.87	N/A	1.29	1.87	<0.2	<0.2	<0.03	0.063	0.41	1.71
SACRAMENTO R A HAMILTON CITY	7/25/06 5:40	<0.04	0.094	1.01	9.35	1.8	1.7	2.5	<0.2	<0.2	<0.03	<0.03	0.77	2.04
SACRAMENTO R A HAMILTON CITY	8/22/06 6:40	<0.04	0.077	1.6	7.18	0.89	1.7	2.33	0.25	0.26	<0.03	<0.03	1.02	1.94
SACRAMENTO R A HAMILTON CITY	9/20/06 6:30	<0.04	0.111	2.01	14.2	1.5	1.67	2.76	0.23	0.26	<0.03	<0.03	0.65	4.79
SACRAMENTO R A HAMILTON CITY	10/24/06 7:00	<0.04	0.078	0.87	9.44	0.28	1.01	2.02	0.25	0.28	<0.03	<0.03	0.16	3.3
SACRAMENTO R A HAMILTON CITY	12/12/06 6:40	<0.04	0.186	1.04	16.9	0.72	0.96	1.75	0.25	0.29	<0.03	<0.03	0.55	4.77
SACRAMENTO R A HAMILTON CITY	1/9/07 7:15	<0.04	<0.04	2.22	5.24	0.68	1.01	1.08	<0.2	<0.2	<0.03	<0.03	0.64	2.57
SACRAMENTO R A HAMILTON CITY	2/26/07 14:00	0.262	0.581	10.3	28.8	2.8	2.22	2.99	<0.2	0.23	<0.03	<0.03	3.68	8.39
SACRAMENTO R A HAMILTON CITY	3/20/07 6:50	<0.04	0.056	2.01	8.22	1.6	0.85	1.22	<0.2	<0.2	<0.03	<0.03	0.31	2.82
SACRAMENTO R A HAMILTON CITY	4/17/07 7:30	<0.04	<0.04	3.44	8.78	1	0.8	0.9	0.24	0.33	<0.03	<0.03	0.4	2.84
SACRAMENTO R A HAMILTON CITY	5/29/07 12:15	<0.04	0.044	0.36	5.99	N/A	0.8	1.04	<0.2	0.22	<0.03	<0.03	0.55	2.86
SACRAMENTO R A HAMILTON CITY	6/26/07 12:30	<0.04	0.066	2.52	7.29	0.59	0.9	1.12	<0.2	0.21	<0.03	<0.03	0.73	3.38
SACRAMENTO R A HAMILTON CITY	7/18/07 7:00	<0.04	0.07	0.21	7.42	1.3	0.88	1.27	<0.2	<0.2	<0.03	<0.03	0.3	3.87
SACRAMENTO R A HAMILTON CITY	8/28/07 7:05	<0.04	<0.04	0.46	5.33	N/A	1.07	1.22	<0.2	<0.2	<0.03	<0.03	2	2.29
SACRAMENTO R A HAMILTON CITY	9/13/07 7:55	<0.04	0.055	0.33	4.66	1.7	0.89	1.02	<0.2	<0.2	<0.03	2.11	0.36	<0.1
SACRAMENTO R A HAMILTON CITY	11/7/07 10:30	<0.04	<0.04	0.08	3.01	0.32	0.58	0.82	<0.2	<0.2	<0.03	<0.03	0.17	7.09
SACRAMENTO R A HAMILTON CITY	2/20/08 12:15	<0.04	0.041	0.7	8.15	N/A	0.88	0.95	<0.2	0.22	<0.03	<0.03	0.71	3.31
SACRAMENTO R A HAMILTON CITY	5/6/08 13:05	<0.04	0.061	0.27	8.38	N/A	1	1.12	<0.2	<0.2	<0.03	<0.03	0.22	3.21
SACRAMENTO R A HAMILTON CITY	8/6/08 9:40	<0.04	0.044	0.39	4.98	N/A	1.04	1.2	<0.2	<0.2	<0.03	<0.03	0.45	2.43
SACRAMENTO R A HAMILTON CITY	11/5/08 7:20	<0.04	0.09	0.35	10.4	N/A	1.22	1.6	<0.2	<0.2	<0.03	<0.03	0.93	3.51
SACRAMENTO R A HAMILTON CITY	2/24/09 10:40	<0.04	1.47	1.28	101	N/A	2.59	11	0.2	0.25	<0.03	<0.03	0.52	16.3
SACRAMENTO R A HAMILTON CITY	5/5/09 8:50	<0.04	0.289	0.53	17.7	N/A	0.85	1.76	<0.2	<0.2	<0.03	<0.03	1.07	6.22
SACRAMENTO R A HAMILTON CITY	8/11/09 8:40	<0.04	<0.04	0.22	2.36	N/A	0.74	0.84	<0.2	<0.2	<0.03	<0.03	0.45	2.26
SACRAMENTO R A HAMILTON CITY	11/3/09 7:50	<0.04	0.071	0.38	7.29	N/A	0.74	0.93	<0.2	<0.2	<0.03	<0.03	0.65	3.08
SACRAMENTO R A HAMILTON CITY	2/2/10 8:45	<0.04	0.188	1.01	17.1	N/A	1.78	2.08	<0.2	<0.2	<0.03	<0.03	1.39	5.43
SACRAMENTO R A HAMILTON CITY	5/4/10 7:45	<0.04	0.11	0.52	14	N/A	0.79	1.32	<0.2	<0.2	<0.03	<0.03	0.62	2.91
SACRAMENTO R A HAMILTON CITY	8/3/10 11:00	<0.04	<0.04	0.62	4.15	N/A	0.85	1.11	<0.2	<0.2	<0.03	<0.03	0.62	2.51
SACRAMENTO R A HAMILTON CITY	11/2/10 8:30	<0.04	0.09	0.73	12.5	N/A	1.34	1.82	<0.2	0.228	<0.03	<0.03	2.32	3.39
SACRAMENTO R A HAMILTON CITY	2/1/11 9:30	<0.04	<0.04	0.67	6.4	N/A	0.71	0.9	<0.2	<0.2	<0.03	<0.03	0.76	2.68
SACRAMENTO R A HAMILTON CITY	5/3/11 8:55	<0.04	<0.04	0.49	5.05	N/A	0.6	0.65	<0.2	<0.2	<0.03	<0.03	0.28	0.51
SACRAMENTO R A HAMILTON CITY	8/2/11 8:10	<0.04	0.061	1.47	6.39	N/A	1.1	1.37	<0.2	<0.2	<0.03	<0.03	0.77	1.69
SACRAMENTO R A HAMILTON CITY	11/1/11 8:45	<0.04	<0.04	1.44	4.4	N/A	1.37	1.68	<0.2	<0.2	<0.03	<0.03	0.59	2.11
SACRAMENTO R A HAMILTON CITY	1/31/12 8:25	<0.04	<0.04	1.87	9.58	N/A	0.68	1.11	<0.2	<0.2	<0.03	<0.03	1.17	2.32
SACRAMENTO R A HAMILTON CITY	5/8/12 8:30	<0.04	<0.04	5.73	7.97	N/A	0.68	0.79	<0.2	<0.2	<0.03	<0.03	0.48	1.79
SACRAMENTO R A HAMILTON CITY	8/7/12 8:00	<0.04	<0.04	0.41	2.81	0.8	0.79	1.36	<0.2	<0.2	<0.03	<0.03	0.41	1.83
SACRAMENTO R A HAMILTON CITY	11/6/12 9:35	<0.04	<0.04	2.19	3.12	3.4	0.96	1.08	<0.2	<0.2	<0.03	<0.03	0.67	1.34
SACRAMENTO R A HAMILTON CITY	2/6/13 9:15	<0.04	<0.04	0.35	5.45	1.3	0.44	0.65	<0.2	<0.2	<0.03	<0.03	0.93	1.45
SACRAMENTO R A HAMILTON CITY	5/7/13 8:05	<0.04	<0.04	1.2	3.14	0.9	0.85	1.03	<0.2	<0.2	<0.03	<0.03	0.52	1.11
SACRAMENTO R A HAMILTON CITY	8/6/13 7:30	<0.04	<0.04	0.12	2.4	0.6	1.27	1.63	<0.2	<0.2	<0.03	<0.03	<0.1	1.09
SACRAMENTO R A HAMILTON CITY	11/5/13 9:10	<0.04	<0.04	0.58	3.53	<0.5	0.6	0.89	<0.2	<0.2	<0.03	<0.03	0.45	1.16
SACRAMENTO R A HAMILTON CITY	2/4/14 9:05	<0.04	<0.04	0.35	2.17	0.8	0.54	0.69	<0.2	0.21	<0.03	<0.03	0.21	0.97
SACRAMENTO R A HAMILTON CITY	5/6/14 8:30	<0.04	<0.04	0.74	6.62	2.5	0.47	0.7	<0.2	<0.2	<0.03	<0.03	0.38	1.24
SACRAMENTO R A HAMILTON CITY	8/12/14 9:50	<0.04	<0.04	0.99	2.82	N/A	0.76	0.84	<0.2	<0.2	<0.03	<0.03	0.37	0.74
SACRAMENTO R A HAMILTON CITY	11/5/14 8:50	<0.04	0.173	0.79	9.23	N/A	1.58	7.22	<0.2	<0.2	<0.03	<0.03	0.37	34
SACRAMENTO R A HAMILTON CITY	2/10/15 9:30	<0.04	1.52	0.96	59.6	29.1	1.36	6.88	0.26	0.31	<0.03	0.037	0.38	13.9
SACRAMENTO R A HAMILTON CITY	5/11/15 10:00	<0.04	0.048	1.15	6.15	1.1	0.92	1.27	<0.2	<0.2	<0.03	<0.03	0.62	1.37
SACRAMENTO R A HAMILTON CITY	8/11/15 10:20	<0.04	<0.04	0.91	3.21	4.4	0.88	1.36	0.34	0.35	<0.03	<0.03	<0.1	0.4
SACRAMENTO R A HAMILTON CITY	11/4/15 11:27	<0.04	<0.04	1.16	2.67	<0.5	0.66	0.92	<0.2	<0.2	<0.03	<0.03	0.5	1.06
SACRAMENTO R A HAMILTON CITY	2/3/16 12:10	<0.04	0.204	0.62	17.7	3.5	1.26	2.47	0.21	0.28	<0.03	<0.03	0.75	2.08
SACRAMENTO R A HAMILTON CITY	5/9/16 12:15	<0.04	0.194	2.28	16.8	N/A	1.05	1.78	<0.2	<0.2	<0.03	<0.03	0.49	3.45
SACRAMENTO R A HAMILTON CITY	8/8/16 8:15	<0.04	0.046	0.24	4.35	N/A	1.29	1.63	<0.2	0.21	<0.03	<0.03	0.84	1.48
SACRAMENTO R A HAMILTON CITY	11/7/16 11:00	<0.04	<0.04	0.41	2.91	N/A	1.12	1.46	<0.2	<0.2	<0.03	<0.03	0.75	1.36
SACRAMENTO R A HAMILTON CITY	2/6/17 13:00	<0.04	0.945	3.35	43	N/A	1.08	5.36	0.36	0.37	<0.03	<0.03	0.86	9.16
	Maximum	0.648	3.24	23.2	272	29.1	4.69	30.7	0.36	0.37	0.018	2.11	5.79	35
	Median	0.043	0.0795	0.97	6.4	1.2	0.995	1.32	0.24	0.26	0.01	0.039	0.575	2.1
	Minimum	0.003	0.011	0.08	1.61	0.28	0.44	0.59	0.11	0.12	0.002	0.003	0.16	0.4

Criteria	Dissolved Lead	Total Lead	Dissolved Manganese	Total Manganese	Total Mercury	Dissolved Nickel	Total Nickel	Dissolved Selenium	Total Selenium	Dissolved Silver	Total Silver	Dissolved Zinc	Total Zinc
SWRCB Basin Plan - Drinking Water Standards - Primary MCL													
SWRCB Basin Plan - Drinking Water Standards - Secondary MCL				50									
Cal EPA OEHHA - California Public Health Goal		0.2					12						
USEPA Secondary MCL													
Cal EPA - One in a million incremental cancer risk estimate for drinking water		0.2											
USEPA Health Advisory for drinking water													
USEPA IRIS Reference Dose Drinking Water Health Advisories													
California Proposition 65 Safe Harbor Level - Max Allowable dose level for reproductive toxicity		0.25											
Agriculture Water Quality Goals - Taste and odor threshold				200									
California Toxics Rule Sources of Drinking Water					0.05								
U.S. Nat. Academy of Sciences Drinking Water Health Advisories													
National Recommended WQ Criteria - Taste and Odor or Welfare				50									
National Recommended USEPA Criteria - Human Health and Welfare protection - [illegible]													
National Recommended WQ Criteria - Freshwater Aquatic Life Continuous Concentration					0.77								
National Recommended WQ Criteria - Freshwater Aquatic Life Maximum Concentration					1.4								

Table 4. Sacramento River op Moulton Weir, Part 1 of 2

Station Name	Sample Date	Dissolved Aluminum µg/L	Total Aluminum µg/L	Dissolved Arsenic µg/L	Total Arsenic µg/L	Dissolved Cadmium µg/L	Total Cadmium µg/L	Dissolved Chromium µg/L	Total Chromium µg/L	Dissolved Copper µg/L	Total Copper µg/L	Dissolved Iron µg/L	Total Iron µg/L
SACRAMENTO R OPP MOULTON WR	5/14/03 14:15	22.6	584	1.46	1.67	0.01	0.078	1.34	2.25	0.93	3.17	4.1	813
SACRAMENTO R OPP MOULTON WR	6/10/03 9:00	15.8	180	1.83	1.88	<0.031	<0.031	0.84	0.91	0.71	1.52	<2.08	214
SACRAMENTO R OPP MOULTON WR	7/10/03 10:40	36.4	116	1.58	1.69	<0.031	<0.009	0.65	0.53	1.29	[illegible]	12.3	[illegible]
SACRAMENTO R OPP MOULTON WR	8/13/03 11:45	4.42	215	1.45	1.5	<0.004	<0.049	0.77	0.95	0.79	1.15	<2.45	[illegible]
SACRAMENTO R OPP MOULTON WR	9/3/03 12:30	5.01	304	1.43	1.51	<0.01	<0.01	0.73	1.02	1.29	[illegible]	[illegible]	[illegible]
SACRAMENTO R OPP MOULTON WR	10/8/03 12:40	33.5	117	0.879	1.3	<0.011	0.009	0.17	0.78	0.97	[illegible]	[illegible]	[illegible]
SACRAMENTO R OPP MOULTON WR	11/5/03 11:00	64	131	1.47	1.63	<0.02	<0.004	<0.209	1.1	1.06	[illegible]	[illegible]	[illegible]
SACRAMENTO R OPP MOULTON WR	12/8/03 10:45	1193	3448	1.63	2.84	0.019	0.175	2.23	9.75	4.25	[illegible]	[illegible]	[illegible]
SACRAMENTO R OPP MOULTON WR	1/6/04 9:30	262	1248	1.73	2.13	<0.008	0.045	1.04	4.50	2.21	[illegible]	[illegible]	[illegible]
SACRAMENTO R OPP MOULTON WR	2/4/04 12:20	1614	1950	1.04	1.44	<0.011	0.037	2.17	5.11	3.82	6.17	[illegible]	2743
SACRAMENTO R OPP MOULTON WR	2/17/04 12:00	2521	8733	1.59	2.8	<0.015	0.232	9.17	24.8	7.64	27.7	[illegible]	13632
SACRAMENTO R OPP MOULTON WR	3/8/04 11:40	184	1478	1.44	1.83	0.011	0.053	0.8	4.53	1.93	6.39	135	2135
SACRAMENTO R OPP MOULTON WR	4/7/04 9:45	26.9	160	1.61	1.74	0.009	0.013	0.54	1.16	1.46	1.99	16.6	233
SACRAMENTO R OPP MOULTON WR	5/5/04 11:00	6.14	289	1.77	1.83	0.004	0.027	0.74	1.8	0.78	2.83	<3.73	336
SACRAMENTO R OPP MOULTON WR	6/9/04 10:00	185	302	1.75	1.84	0.011	0.013	0.6	1.53	1.65	2.43	123	349
SACRAMENTO R OPP MOULTON WR	7/29/04 10:40	100	155	1.4	1.43	0.005	0.011	0.83	0.91	1.06	1.74	52.7	162
SACRAMENTO R OPP MOULTON WR	10/5/04 11:00	14.3	89	1.22	1.34	<0.011	<0.008	0.8	0.94	0.73	1.26	9.8	110
SACRAMENTO R OPP MOULTON WR	11/9/04 13:00	20	76.2	2.34	2.4	<0.008	<0.007	0.9	0.93	0.89	1.38	[illegible]	59.5
SACRAMENTO R OPP MOULTON WR	12/7/04 10:20	3.4	82.6	2.25	2.27	<0.017	<0.034	1.45	1.03	0.89	[illegible]	[illegible]	[illegible]
SACRAMENTO R OPP MOULTON WR	1/10/05 11:00	459	1259	1.36	1.6	<0.011	<0.007	1.31	3.41	7.41	[illegible]	304	1240
SACRAMENTO R OPP MOULTON WR	2/2/05 12:25	170	582	1.51	1.58	<0.011	<0.066	2.02	2.55	1.7	[illegible]	[illegible]	[illegible]
SACRAMENTO R OPP MOULTON WR	3/10/05 14:45	10.2	133	1.91	1.97	<0.033	<0.011	1.52	1.74	1.17	1.62	13	222
SACRAMENTO R OPP MOULTON WR	4/20/05 10:50	20.7	130	1.97	2.07	<0.022	<0.009	1.08	1.32	1.16	[illegible]	[illegible]	[illegible]
SACRAMENTO R OPP MOULTON WR	5/19/05 11:15	314	5936	1.34	3.07	<0.058	0.138	1.37	14	1.81	20.9	196	9104
SACRAMENTO R OPP MOULTON WR	6/28/05 15:05	103	126	1.42	1.65	<0.009	<0.012	0.62	1.1	1.32	1.34	96.3	148
SACRAMENTO R OPP MOULTON WR	7/26/05 11:00	7.14	197	1.45	1.46	0.007	0.014	0.49	0.98	0.93	1.42	<3.27	270
SACRAMENTO R OPP MOULTON WR	8/23/05 9:30	8.08	84.1	1.52	1.57	<0.009	<0.009	0.5	0.59	0.89	1.08	<4.16	140
SACRAMENTO R OPP MOULTON WR	9/28/05 8:30	17.3	82.5	1.41	1.46	0.007	0.017	1	1.31	0.88	1.36	10.6	125
SACRAMENTO R OPP MOULTON WR	10/25/05 10:30	21.8	190	1.5	1.52	0.013	0.019	0.57	1.08	1.06	1.59	11.8	258
SACRAMENTO R OPP MOULTON WR	11/14/05 12:00	18.3	297	1.93	2.16	0.012	0.033	0.79	1.35	1.22	2.34	15.9	453
SACRAMENTO R OPP MOULTON WR	12/14/05 11:40	9.4	71.4	1.84	2.04	0.01	0.017	0.77	1.03	0.92	1.24	5.2	114
SACRAMENTO R OPP MOULTON WR	1/4/06 10:40	2779	4845	1.84	2.53	0.024	0.096	6.91	14.1	5.21	14.3	2020	6095
SACRAMENTO R OPP MOULTON WR	1/24/06 13:10	413	1419	1.45	1.85	0.013	0.062	1.53	4.53	1.77	5.63	284	2610
SACRAMENTO R OPP MOULTON WR	2/22/06 11:40	263	848	1.37	1.68	0.018	0.05	1.26	2.94	1.15	3.79	126	1199
SACRAMENTO R OPP MOULTON WR	3/1/06 12:10	4357	6132	1.58	1.09	0.029	0.105	6.31	11.4	5.76	11.8	2570	7522
SACRAMENTO R OPP MOULTON WR	4/17/06 11:10	1232	2222	1.06	1.56	<0.1	<0.1	2.35	5.88	2.73	7.06	240	[illegible]
SACRAMENTO R OPP MOULTON WR	5/17/06 11:35	129	511	1.48	1.64	<0.1	<0.1	0.31	1.24	1.18	2.32	96.3	640
SACRAMENTO R OPP MOULTON WR	6/27/06 10:25	47.7	677	1.37	1.67	<0.1	<0.1	1.22	2.05	1.04	1.78	31.7	392
SACRAMENTO R OPP MOULTON WR	7/26/06 8:20	228	793	1.28	1.38	<0.1	<0.1	0.5	1.39	1.22	2.3	10.9	436
SACRAMENTO R OPP MOULTON WR	8/22/06 10:50	157	272	1.1	1.16	<0.1	<0.1	0.61	0.93	1.11	1.44	11	271
SACRAMENTO R OPP MOULTON WR	9/20/06 11:35	351	633	1.06	1.15	<0.1	<0.1	0.35	1.23	1.07	1.6	50.9	286
SACRAMENTO R OPP MOULTON WR	10/24/06 12:15	31.7	226	1.23	1.44	<0.1	<0.1	0.66	1.09	1.29	1.55	58.7	208
SACRAMENTO R OPP MOULTON WR	12/12/06 12:35	103	1584	2.6	2.74	<0.1	<0.1	0.49	3.25	1.44	2.66	133	593
SACRAMENTO R OPP MOULTON WR	1/9/07 13:00	81.8	284	1.93	2.11	<0.1	<0.1	1.36	1.74	1.02	1.4	55.9	257
SACRAMENTO R OPP MOULTON WR	2/27/07 10:00	457	524	1.27	1.38	<0.1	<0.1	1.31	2.02	2.93	3.62	464	829
SACRAMENTO R OPP MOULTON WR	3/20/07 11:15	17.6	96.9	2.13	2.36	<0.1	<0.1	0.49	0.72	1.18	1.59	26.2	166
SACRAMENTO R OPP MOULTON WR	4/18/07 10:15	16.6	105	1.9	1.98	<0.1	<0.1	0.45	0.76	1.53	2.13	15.1	139
SACRAMENTO R OPP MOULTON WR	5/30/07 9:00	3.42	99.8	2.07	2.22	<0.1	<0.1	0.5	0.94	1.28	2.09	4.7	177
SACRAMENTO R OPP MOULTON WR	6/27/07 8:00	5.35	110	1.66	1.75	<0.1	<0.1	0.5	0.95	1.09	[illegible]	15.4	[illegible]
SACRAMENTO R OPP MOULTON WR	7/19/07 10:05	6.46	107	1.77	1.81	<0.1	<0.1	0.47	0.86	1.02	1.45	4.4	[illegible]
SACRAMENTO R OPP MOULTON WR	8/28/07 10:40	1.04	34.3	1.69	1.72	<0.1	<0.1	0.42	0.59	0.86	1.01	2.7	51.4
SACRAMENTO R OPP MOULTON WR	9/13/07 11:40	2.77	33.8	1.44	1.61	<0.1	<0.1	0.46	0.57	0.81	0.88	5.4	76.1
SACRAMENTO R OPP MOULTON WR	10/31/07 10:55	2.04	41.1	2.18	2.23	<0.1	<0.1	0.4	0.59	0.81	1.13	9.1	112
SACRAMENTO R OPP MOULTON WR	11/27/07 11:50	0.87	27.8	2.27	2.44	<0.1	<0.1	0.48	0.54	0.78	0.9	7.3	65.7
SACRAMENTO R OPP MOULTON WR	1/23/08 12:40	3.9	218	2.63	2.75	<0.1	<0.1	0.54	1.47	1.12	1.59	5.2	275
SACRAMENTO R OPP MOULTON WR	2/27/08 10:50	10.4	1710	1.06	1.73	<0.1	<0.1	0.41	6.45	2.06	6.7	20.4	1852
SACRAMENTO R OPP MOULTON WR	3/26/08 10:10	2	56.4	2.27	2.36	<0.1	<0.1	0.42	0.73	1.26	1.61	4.9	121
SACRAMENTO R OPP MOULTON WR	4/23/08 10:30	4.59	121	2.14	2.2	<0.1	<0.1	0.43	0.68	1.35	1.95	5	188
SACRAMENTO R OPP MOULTON WR	7/24/08 11:15	2.02	67.8	1.65	1.78	<0.1	<0.1	0.41	0.6	1.07	1.25	5.1	92.9
SACRAMENTO R OPP MOULTON WR	4/22/09 11:10	3.89	66.2	2.14	2.29	<0.1	<0.1	0.38	0.58	1.67	2.11	10.3	98.6
SACRAMENTO R OPP MOULTON WR	5/28/09 12:15	2.79	86.6	1.89	1.97	<0.1	<0.1	0.35	0.57	1.81	1.96	8.6	65.8
SACRAMENTO R OPP MOULTON WR	6/25/09 9:25	3.27	101	1.43	1.52	<0.1	<0.1	0.36	0.61	1.37	1.7	6.1	125
SACRAMENTO R OPP MOULTON WR	7/28/09 10:30	7.77	142	1.39	1.53	<0.1	<0.1	0.45	0.59	1.07	1.5	12.3	150
SACRAMENTO R OPP MOULTON WR	8/27/09 9:30	1.66	30.7	1.19	1.24	<0.1	<0.1	0.35	0.46	0.88	[illegible]	[illegible]	49.2
SACRAMENTO R OPP MOULTON WR	9/24/09 9:50	2.09	35.9	1.34	1.36	<0.1	<0.1	0.34	0.45	0.96	[illegible]	3.3	40.2
SACRAMENTO R OPP MOULTON WR	10/27/09 11:40	5.31	98.5	1.76	1.85	<0.1	<0.1	0.39	0.54	1.04	1.5	13.2	127
SACRAMENTO R OPP MOULTON WR	11/18/09 11:30	2.56	60	1.94	2.14	<0.1	<0.1	0.4	0.7	0.98	1.42	8	124
SACRAMENTO R OPP MOULTON WR	12/9/09 8:15	1.73	25.8	2.53	2.64	<0.1	<0.1	0.43	0.53	0.92	1.02	3.1	52.2
SACRAMENTO R OPP MOULTON WR	1/26/10 8:45	87.7	3953	1.3	2.43	<0.1	0.144	0.59	14.7	3.45	20.3	114	4760
SACRAMENTO R OPP MOULTON WR	3/2/10 13:15	13.9	793	1.15	1.51	<0.1	<0.1	0.39	3.19	1.56	4.3	29.5	947
SACRAMENTO R OPP MOULTON WR	3/24/10 7:10	1.83	54.6	1.72	1.76	<0.1	<0.1	0.53	0.65	0.95	1.29	5.6	94.2
SACRAMENTO R OPP MOULTON WR	4/21/10 7:00	3.67	780	1.45	1.69	<0.1	<0.1	0.46	3.47	1.43	3.93	6.3	1018
SACRAMENTO R OPP MOULTON WR	5/26/10 7:00	3.46	49.6	1.2	1.26	<0.1	<0.1	0.4	0.54	1.61	1.75	1.4	69.7
SACRAMENTO R OPP MOULTON WR	6/30/10 7:00	6.01	52.4	1.28	1.46	<0.1	<0.1	0.35	0.51	1.17	1.46	5.5	73.0
SACRAMENTO R OPP MOULTON WR	7/28/10 8:40	3.8	29	1.4	1.45	<0.1	<0.1	0.44	0.56	1.33	1.03	5.8	68.8
SACRAMENTO R OPP MOULTON WR	8/31/10 10:10	6.25	34.7	1.22	1.24	<0.1	<0.1	0.27	0.5	1.19	1.26	3.5	70.2
SACRAMENTO R OPP MOULTON WR	10/26/10 8:00	12.9	682	1.55	3.49	<0.1	<0.1	0.42	3.17	1.79	3.95	25.6	535
SACRAMENTO R OPP MOULTON WR	11/30/10 8:50	4.11	48.3	1.67	1.89	<0.1	<0.1	0.38	0.73	1.19	1.29	6.9	75.2
SACRAMENTO R OPP MOULTON WR	12/13/10 11:20	2.71	93.3	1.46	1.52	<0.1	<0.1	0.14	0.91	1.21	1.06	9.3	151
SACRAMENTO R OPP MOULTON WR	1/18/11 10:45	6.13	500	1.48	1.6	<0.1	<0.1	0.47	2.3	1.45	2.77	34.3	547
	Maximum	4357	8733	2.63	3.49	0.029	0.232	9.17	24.8	7.64	27.7	2570	13632
	Median	14.1	148.5	1.505	1.735	0.011	0.041	0.55	1.035	1.185	1.67	15.4	203
	Minimum	0.87	25.8	0.879	1.15	0.004	0.009	0.17	0.45	0.71	0.86	1.4	38.2

Criteria	Aluminum	Arsenic	Cadmium	Iron
SWRCB Basin Plan - Drinking Water Standards -Primary MCL	1000			
SWRCB Basin Plan - Drinking Water Standards -Secondary MCL	200			300
Cal EPA/OEHHA - California Public Health Goal	600	0.004	0.04	
USEPA Secondary MCL	50			
Cal EPA - One in a million incremental cancer risk estimate for drinking water		0.023	0.0023	
USEPA Health Advisory for drinking water		0.02		
USEPA IRIS Reference Dose Drinking Water Health Advisories		2.1		
California Proposition 65 Safe Harbor Level - Max. Allowable dose level for reproductive toxicity		0.05		
Agriculture Water Quality Goals - Taste and odor threshold	5000			5000
California Toxics Rule Sources of Drinking Water				
National Academy of Sciences Drinking Water Health Advisories	5000			
National Recommended WQ Criteria - Taste and Odor or Welfare				300
National Recommended WQ Criteria - Human Health and Welfare protection - water and fish consumption		0.018		
National Recommended WQ Criteria - Freshwater Aquatic Life Continuous Concentration	87			1000
National Recommended WQ Criteria - Freshwater Aquatic Life Maximum Concentration	750			

Table 4 - Sacramento River op Moulton Weir, Part 2 of 2

Station Name	Sample Date	Dissolved Lead µg/L	Total Lead µg/L	Dissolved Manganese µg/L	Total Manganese µg/L	Total Mercury ng/L	Dissolved Nickel µg/L	Total Nickel µg/L	Dissolved Selenium µg/L	Total Selenium µg/L	Dissolved Silver µg/L	Total Silver µg/L	Dissolved Zinc µg/L	Total Zinc µg/L
SACRAMENTO R OPP MOULTON WR	5/14/03 14:15	<0.025	0.299	0.17	20.7	N/A	0.65	3.17	0.11	0.2	<0.025	<0.273	0.4	4.5
SACRAMENTO R OPP MOULTON WR	6/10/03 9:00	<0.017	0.068	0.14	7.15	N/A	0.52	1.38	0.18	<0.296	<0.001	<0.253	0.3	1.5
SACRAMENTO R OPP MOULTON WR	7/10/03 10:40	0.012	0.055	2.05	5.66	N/A	0.92	1.26	<0.129	0.17	<0.011	<0.123	0.35	1.6
SACRAMENTO R OPP MOULTON WR	8/13/03 11:45	<0.003	0.124	0.48	9.98	N/A	0.95	1.8	<0.163	0.21	<0.015	<0.122	0.46	2.24
SACRAMENTO R OPP MOULTON WR	9/3/03 12:30	<0.007	0.183	0.1	18.6	N/A	1.1	2.29	<0.21	0.26	<0.144	<0.144	0.41	3.16
SACRAMENTO R OPP MOULTON WR	10/8/03 12:40	0.028	0.085	4.96	9.5	N/A	1.16	1.64	<0.327	<0.162	<0.01	<0.131	0.62	1.47
SACRAMENTO R OPP MOULTON WR	11/5/03 11:00	0.029	0.057	6.6	8.03	N/A	1.33	1.61	0.17	0.22	<0.02	<0.04	0.9	3.3
SACRAMENTO R OPP MOULTON WR	12/8/03 10:45	0.385	2.93	9.6	218	N/A	3.19	15.7	0.12	0.28	0.037	0.049	10.4	31.6
SACRAMENTO R OPP MOULTON WR	1/6/04 9:30	0.085	0.877	4.62	52.9	N/A	1.53	7.62	0.1	<0.248	<0.007	<0.014	0.9	10.9
SACRAMENTO R OPP MOULTON WR	2/4/04 12:20	0.306	1.2	11.3	83.1	N/A	3.16	8.72	0.11	<0.282	<0.015	0.088	4.09	14.4
SACRAMENTO R OPP MOULTON WR	2/17/04 12:00	0.677	4.8	31.2	381	N/A	6.92	44.5	<0.121	0.26	<0.016	0.06	7.53	56.8
SACRAMENTO R OPP MOULTON WR	3/8/04 11:40	0.054	0.541	3.02	59.7	N/A	1.28	7.41	0.2	0.31	0.04	<0.065	1.04	10.6
SACRAMENTO R OPP MOULTON WR	4/7/04 9:45	<0.022	0.09	2.06	10	N/A	1.14	1.76	<0.112	0.53	0.02	<0.031	0.5	1.54
SACRAMENTO R OPP MOULTON WR	5/5/04 11:00	<0.007	0.13	1.58	12.3	N/A	0.87	2.16	<0.166	0.23	<0.001	<0.044	0.19	2.57
SACRAMENTO R OPP MOULTON WR	6/9/04 10:00	0.082	0.112	4.82	10.2	N/A	1.3	1.99	<0.121	<0.226	<0.014	<0.081	1.22	2.38
SACRAMENTO R OPP MOULTON WR	7/29/04 10:40	0.017	0.059	1.81	4.98	N/A	1.02	1.46	0.15	0.27	<0.008	<0.067	0.47	1.31
SACRAMENTO R OPP MOULTON WR	10/5/04 11:00	0.011	0.049	2.04	7.22	N/A	1.16	1.44	<0.144	<0.204	<0.077	<0.054	0.45	1.09
SACRAMENTO R OPP MOULTON WR	11/9/04 13:00	0.008	0.04	1.69	8.14	N/A	1.09	2.24	<0.149	0.19	<0.006	<0.063	0.46	0.89
SACRAMENTO R OPP MOULTON WR	12/7/04 10:20	<0.01	0.054	0.68	7.19	N/A	0.61	0.84	<0.163	0.37	<0.011	<0.04	0.2	0.88
SACRAMENTO R OPP MOULTON WR	1/10/05 11:00	0.091	0.609	2.64	43.2	N/A	1.79	6.19	0.31	0.46	0.005	0.01	1.11	7.93
SACRAMENTO R OPP MOULTON WR	2/2/05 12:25	0.058	0.404	2.79	23.2	N/A	1.45	4.05	<0.222	0.36	0.002	0.007	0.77	4.12
SACRAMENTO R OPP MOULTON WR	3/10/05 14:45	0.011	0.094	0.78	7.17	N/A	0.83	1.6	<0.245	0.29	<0.001	<0.036	0.24	1.26
SACRAMENTO R OPP MOULTON WR	4/20/05 10:50	0.021	0.079	2.74	10.8	N/A	0.8	1.42	0.25	0.28	<0.003	<0.005	0.56	1.37
SACRAMENTO R OPP MOULTON WR	5/19/05 11:15	0.04	3.35	2.73	268	N/A	1.38	31.5	<0.399	<0.317	<0.009	0.045	1.14	39.4
SACRAMENTO R OPP MOULTON WR	6/28/05 15:05	<0.009	0.041	4.35	4.85	N/A	0.72	1.18	0.31	0.38	<0.002	<0.027	1	1.28
SACRAMENTO R OPP MOULTON WR	7/26/05 11:00	<0.018	0.039	0.63	7.35	N/A	0.69	1.55	<0.222	<0.222	<0.013	<0.013	0.55	1.86
SACRAMENTO R OPP MOULTON WR	8/23/05 9:30	<0.004	0.045	0.66	5.73	N/A	0.69	1.11	<0.227	<0.227	<0.001	<0.001	0.14	0.88
SACRAMENTO R OPP MOULTON WR	9/28/05 8:30	<0.004	0.048	0.45	4.75	N/A	0.88	1.25	0.18	0.22	<0.003	<0.003	0.23	1.13
SACRAMENTO R OPP MOULTON WR	10/25/05 10:30	0.021	0.114	1.28	10.6	N/A	1.04	1.77	<0.063	0.18	<0.002	<0.002	0.53	1.81
SACRAMENTO R OPP MOULTON WR	11/14/05 12:00	0.013	0.212	1.27	26.9	N/A	1.04	2.36	<0.186	<0.186	<0.009	<0.009	0.73	3.62
SACRAMENTO R OPP MOULTON WR	12/14/05 11:40	0.008	0.079	0.68	6.17	N/A	1.05	1.33	<0.149	0.19	<0.001	<0.001	0.66	1.78
SACRAMENTO R OPP MOULTON WR	1/4/06 10:40	0.626	2.64	24.9	164	N/A	5.91	22.2	<0.149	0.15	0.011	0.028	4.66	22.9
SACRAMENTO R OPP MOULTON WR	1/24/06 13:10	0.105	0.749	13.6	60.3	N/A	1.78	6.85	0.23	0.28	<0.005	<0.005	1.54	9.49
SACRAMENTO R OPP MOULTON WR	2/22/06 11:40	0.058	0.538	6.68	40.1	N/A	1.44	4.63	0.16	0.23	<0.009	<0.009	0.83	5.22
SACRAMENTO R OPP MOULTON WR	3/1/06 12:10	0.852	2.81	35.8	207	N/A	6.24	19.6	<0.149	0.2	<0.009	<0.009	7.67	27.9
SACRAMENTO R OPP MOULTON WR	4/17/06 11:10	0.271	1.27	13.8	83.2	N/A	2.88	9.26	<0.2	0.22	<0.03	<0.03	2.99	12.8
SACRAMENTO R OPP MOULTON WR	5/17/06 11:35	<0.04	0.183	2.83	19.1	N/A	1.08	2.15	0.22	0.26	<0.03	<0.03	0.39	2.53
SACRAMENTO R OPP MOULTON WR	6/27/06 10:25	<0.04	0.133	0.32	13.6	N/A	1	2.08	<0.2	<0.2	<0.03	0.066	0.19	2.06
SACRAMENTO R OPP MOULTON WR	7/26/06 8:20	<0.04	0.149	1.11	14	1.6	1.26	2.6	<0.2	<0.2	<0.03	<0.03	0.69	2.39
SACRAMENTO R OPP MOULTON WR	8/22/06 10:50	<0.04	0.081	1.89	8.01	0.67	1.38	2.05	0.21	0.26	<0.03	<0.03	0.55	1.5
SACRAMENTO R OPP MOULTON WR	9/20/06 11:35	<0.04	0.096	2.46	11.8	1.5	1.42	2.26	<0.2	<0.2	<0.03	<0.03	0.54	8.42
SACRAMENTO R OPP MOULTON WR	10/24/06 12:15	<0.04	0.105	2.1	12.3	0.39	1.45	2.03	<0.2	0.21	<0.03	<0.03	0.16	3.71
SACRAMENTO R OPP MOULTON WR	12/12/06 12:35	<0.04	0.264	3.24	22	1.8	2.21	2.82	<0.2	<0.2	<0.03	<0.03	1.65	6.62
SACRAMENTO R OPP MOULTON WR	1/9/07 13:00	<0.04	0.067	2.75	11	1.5	1.08	1.61	<0.2	<0.2	<0.03	<0.03	0.52	3.05
SACRAMENTO R OPP MOULTON WR	2/27/07 10:00	0.254	0.501	10.7	24.6	0.95	2.31	2.83	<0.2	<0.2	<0.03	<0.03	3.33	7.25
SACRAMENTO R OPP MOULTON WR	3/20/07 11:15	<0.04	0.071	2.35	9.98	1.7	0.85	1.21	<0.2	0.31	<0.03	<0.03	0.36	2.78
SACRAMENTO R OPP MOULTON WR	4/18/07 10:15	<0.04	0.078	3.59	11.1	1.3	0.79	1.17	<0.2	<0.2	<0.03	<0.03	0.46	3.33
SACRAMENTO R OPP MOULTON WR	5/30/07 9:00	<0.04	0.147	0.45	12.5	N/A	0.73	1.32	<0.2	<0.2	<0.03	<0.03	0.2	3.66
SACRAMENTO R OPP MOULTON WR	6/27/07 8:00	<0.04	0.092	5.8	12.7	1.1	0.79	1.19	<0.2	<0.2	<0.03	<0.03	0.49	3.4
SACRAMENTO R OPP MOULTON WR	7/19/07 10:05	<0.04	0.066	0.22	8.58	0.98	0.56	1.2	<0.2	<0.2	<0.03	<0.03	0.28	3.2
SACRAMENTO R OPP MOULTON WR	8/28/07 10:40	<0.04	<0.04	0.21	4.92	N/A	0.89	1.02	<0.2	<0.2	<0.03	<0.03	0.46	1.99
SACRAMENTO R OPP MOULTON WR	9/13/07 11:40	<0.04	0.051	0.22	4.64	0.9	0.91	0.95	<0.2	<0.2	<0.03	<0.03	0.46	2.04
SACRAMENTO R OPP MOULTON WR	10/31/07 10:55	<0.04	0.054	0.23	8.41	0.77	1.09	1.2	<0.2	<0.2	<0.03	<0.03	0.31	2.42
SACRAMENTO R OPP MOULTON WR	11/27/07 11:50	<0.04	0.082	0.31	5.67	0.75	0.89	0.92	<0.2	<0.2	<0.03	<0.03	0.29	2.33
SACRAMENTO R OPP MOULTON WR	1/23/08 12:40	<0.04	0.134	1.7	16.3	N/A	1.17	1.49	<0.2	<0.2	<0.03	<0.03	0.77	3.76
SACRAMENTO R OPP MOULTON WR	2/27/08 10:50	<0.04	0.979	0.79	61.7	N/A	1.98	8.93	0.32	0.45	<0.03	<0.03	0.46	11
SACRAMENTO R OPP MOULTON WR	3/26/08 10:10	<0.04	0.061	0.55	11.3	N/A	1	1.13	0.28	0.29	<0.03	<0.03	0.2	2.39
SACRAMENTO R OPP MOULTON WR	4/23/08 10:30	<0.04	0.095	4.21	14.4	N/A	0.92	1.36	<0.2	0.25	<0.03	<0.03	0.66	3.67
SACRAMENTO R OPP MOULTON WR	7/24/08 11:15	<0.04	0.048	0.28	5.01	38	0.65	0.85	0.24	0.28	<0.03	<0.03	0.3	2.53
SACRAMENTO R OPP MOULTON WR	4/22/09 11:10	<0.04	0.057	0.53	9.11	N/A	0.82	0.92	<0.2	0.23	<0.03	<0.03	0.28	2.66
SACRAMENTO R OPP MOULTON WR	5/28/09 12:15	<0.04	0.062	0.41	7.18	N/A	0.78	0.89	<0.2	<0.2	<0.03	<0.03	0.53	2.72
SACRAMENTO R OPP MOULTON WR	6/25/09 9:25	<0.04	0.094	0.33	6.95	N/A	0.93	1.06	0.23	0.26	<0.03	<0.03	0.94	4.54
SACRAMENTO R OPP MOULTON WR	7/28/09 10:30	<0.04	0.062	1.39	7.1	N/A	1.02	1.06	<0.2	<0.2	<0.03	<0.03	0.47	2.72
SACRAMENTO R OPP MOULTON WR	8/27/09 9:30	<0.04	<0.04	0.36	2.63	N/A	0.78	0.86	<0.2	<0.2	<0.03	<0.03	0.33	1.79
SACRAMENTO R OPP MOULTON WR	9/24/09 9:50	<0.04	<0.04	0.33	4.98	N/A	0.84	0.96	<0.2	<0.2	<0.03	<0.03	0.33	1.99
SACRAMENTO R OPP MOULTON WR	10/27/09 11:40	<0.04	0.117	4.35	12.7	N/A	0.94	1.13	<0.2	<0.2	<0.03	<0.03	0.57	2.83
SACRAMENTO R OPP MOULTON WR	11/18/09 11:30	<0.04	0.07	0.44	7.87	N/A	0.89	0.99	<0.2	<0.2	<0.03	<0.03	0.32	2.59
SACRAMENTO R OPP MOULTON WR	12/9/09 8:15	<0.04	<0.04	0.32	7.77	N/A	0.57	0.71	<0.2	<0.2	<0.03	<0.03	0.5	2.41
SACRAMENTO R OPP MOULTON WR	1/26/10 8:45	0.077	4.39	1.92	204	N/A	3.62	25.6	0.23	0.26	<0.03	0.071	0.59	35.9
SACRAMENTO R OPP MOULTON WR	3/2/10 13:15	<0.04	0.604	0.96	45.5	N/A	2.53	4.77	0.24	0.27	<0.03	<0.03	0.84	7.53
SACRAMENTO R OPP MOULTON WR	3/24/10 7:10	<0.04	0.05	0.58	7.08	N/A	0.71	0.8	<0.2	<0.2	<0.03	<0.03	0.23	2.29
SACRAMENTO R OPP MOULTON WR	4/21/10 7:00	0.313	0.56	0.44	37.7	N/A	0.72	4.76	<0.2	0.21	<0.03	<0.03	0.24	7.17
SACRAMENTO R OPP MOULTON WR	5/26/10 7:00	0.048	0.05	0.32	4.64	N/A	0.6	0.73	<0.2	<0.2	<0.03	<0.03	0.42	2.29
SACRAMENTO R OPP MOULTON WR	6/30/10 7:00	<0.04	<0.04	0.28	5.87	N/A	0.73	0.87	<0.2	<0.2	<0.03	<0.03	0.56	2.17
SACRAMENTO R OPP MOULTON WR	7/28/10 8:40	<0.04	0.066	0.33	5.81	N/A	0.86	1.01	<0.2	<0.2	<0.03	<0.03	0.73	2.23
SACRAMENTO R OPP MOULTON WR	8/31/10 10:10	<0.04	0.043	0.5	6.58	N/A	0.8	1.04	<0.2	<0.2	<0.03	<0.03	0.51	1.99
SACRAMENTO R OPP MOULTON WR	10/26/10 8:00	<0.04	0.566	2.25	34	N/A	1.45	3.88	<0.2	0.27	<0.03	<0.03	1.3	6.87
SACRAMENTO R OPP MOULTON WR	11/30/10 8:50	<0.04	0.046	0.58	6.62	N/A	1.33	1.37	<0.2	<0.2	<0.03	<0.03	1.15	2.82
SACRAMENTO R OPP MOULTON WR	12/13/10 11:20	<0.04	0.149	0.6	11.3	N/A	0.62	1.12	<0.2	<0.2	<0.03	<0.03	0.13	2.89
SACRAMENTO R OPP MOULTON WR	1/18/11 10:45	<0.04	0.399	0.83	24.2	N/A	0.88	2.81	<0.2	0.22	<0.03	0.042	1.03	4.83
	Maximum	0.852	4.8	35.8	381	38	6.92	44.5	0.32	0.53	0.04	0.088	10.4	56.8
	Median	0.058	0.095	1.335	10.7	1.1	1.01	1.52	0.215	0.26	0.0155	0.047	0.515	2.09
	Minimum	0.008	0.039	0.1	2.63	0.39	0.52	0.71	0.1	0.15	0.002	0.007	0.13	0.88
SWRCB Basin Plan - Drinking Water Standards, Primary MCL														
SWRCB Basin Plan - Drinking Water Standards, Secondary MCL					50									
Cal EPA OEHHA - California Public Health Goal			0.02					12						
US EPA Secondary MCL														
Cal EPA - One-in-a-million incremental cancer risk estimate for drinking water			4.1											
US EPA Health Advisory for drinking water					300									
US EPA [illegible] Drinking Water Health Advisories														
California Proposition 65 Safe Harbor Level - Max. Allowable dose level for reproductive toxicity			0.025											
Agriculture Water Quality Goals - Taste and odor threshold					200									
California Toxics Rule Sources of Drinking Water						0.05								
National Academy of Science: Drinking Water Health Advisories														
National Recommended WQ Criteria - Taste and Odor or Welfare					50									
National Recommended WQ Criteria - Human Health and Welfare protection - water and fish consumption														
National Recommended WQ Criteria - Freshwater Aquatic Life Continuous Concentration						0.77								
National Recommended WQ Criteria - Freshwater Aquatic Life Maximum Concentration						1.4								

Table 5. Stone Corral C nr SI, Part 1 of 2

Station Name	Sample Date	Dissolved Aluminum µg/L	Total Aluminum µg/L	Dissolved Arsenic µg/L	Total Arsenic µg/L	Dissolved Boron mg/L	Dissolved Cadmium µg/L	Total Cadmium µg/L	Dissolved Chromium µg/L	Total Chromium µg/L	Dissolved Copper µg/L	Total Copper µg/L	Dissolved [illegible] µg/L	Total [illegible] µg/L
STONE CORRAL C NR SI	5/27/98 10:20	N/A	N/A	N/A	N/A	0.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	3/5/01 15:45	N/A	N/A	N/A	N/A	<0.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	4/9/01 9:00	N/A	N/A	N/A	N/A	0.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	2/20/02 11:30	N/A	N/A	N/A	N/A	0.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	3/7/02 9:30	N/A	N/A	N/A	N/A	0.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	3/18/02 11:20	N/A	N/A	N/A	N/A	0.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	4/10/02 16:45	N/A	N/A	N/A	N/A	0.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	5/13/02 8:45	N/A	N/A	N/A	N/A	0.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	12/18/02 15:15	N/A	N/A	N/A	N/A	0.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	1/9/03 12:15	N/A	N/A	N/A	N/A	0.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	1/23/03 10:50	N/A	N/A	N/A	N/A	0.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	2/6/03 10:00	N/A	N/A	N/A	N/A	0.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	3/11/03 14:25	N/A	N/A	N/A	N/A	0.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	3/17/03 11:45	N/A	N/A	N/A	N/A	0.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	4/8/03 13:10	N/A	N/A	N/A	N/A	0.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	4/28/03 11:00	N/A	N/A	N/A	N/A	0.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	5/14/03 12:40	3.68	51.9	1.94	2.34	0.6	0.079	0.03	8.1	6.51	4.46	4.69	<3.31	59.5
STONE CORRAL C NR SI	1/6/04 11:30	143	559	1.4	1.45	0.2	<0.008	<0.016	3.4	3.64	2.25	5.26	[illegible]	[illegible]
STONE CORRAL C NR SI	2/4/04 13:00	1399	2065	1.34	1.46	0.2	<0.011	0.016	2.76	3.06	4.71	4.75	[illegible]	[illegible]
STONE CORRAL C NR SI	2/17/04 13:30	1280	6149	1.26	1.91	<0.1	<0.015	0.025	5.74	11	5.45	11.9	[illegible]	[illegible]
STONE CORRAL C NR SI	3/8/04 12:45	42.5	55.5	0.719	0.97	0.3	0.006	0.013	1.67	1.86	1.56	[illegible]	[illegible]	[illegible]
STONE CORRAL C NR SI	4/7/04 10:15	4.17	49.5	1.01	1.27	0.4	<0.005	<0.006	3.6	3.62	2.36	[illegible]	[illegible]	[illegible]
STONE CORRAL C NR SI	5/5/04 11:50	1.75	3.71	2.21	2.25	0.6	0.011	0.021	[illegible]	6.43	3.18	[illegible]	[illegible]	[illegible]
STONE CORRAL C NR SI	10/5/04 14:30	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	11/8/04 9:50	5.18	19.8	8.84	9.86	1	0.187	0.195	7	7.37	3	[illegible]	[illegible]	[illegible]
STONE CORRAL C NR SI	12/7/04 12:45	21.9	134	5.05	5.2	0.6	0.176	0.36	[illegible]	8.43	3.75	[illegible]	[illegible]	[illegible]
STONE CORRAL C NR SI	1/10/05 13:30	458	1369	1.06	1.23	0.2	0.035	0.037	2.74	3.67	2.72	[illegible]	[illegible]	[illegible]
STONE CORRAL C NR SI	2/2/05 10:45	121	182	1.19	1.19	0.3	0.104	0.524	[illegible]	2.87	1.84	[illegible]	[illegible]	[illegible]
STONE CORRAL C NR SI	3/10/05 13:00	4.5	23.6	1.19	1.26	<0.1	0.082	0.33	3.29	3.72	1.86	[illegible]	[illegible]	[illegible]
STONE CORRAL C NR SI	4/19/05 7:20	4.24	4.98	1.25	1.36	0.5	0.028	0.031	4.9	4.93	1.79	2.56	[illegible]	[illegible]
STONE CORRAL C NR SI	5/19/05 9:50	2.52	6.37	1.65	1.8	0.4	<0.058	<0.015	3.17	4.86	1.93	2.69	[illegible]	[illegible]
STONE CORRAL C NR SI	6/28/05 13:30	4	4.44	2.01	2.57	0.7	0.036	0.04	[illegible]	4.4	2.21	3.3	[illegible]	[illegible]
STONE CORRAL C NR SI	7/24/05 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	8/22/05 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	9/26/05 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	10/24/05 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	11/14/05 9:35	2.27	2.66	8.32	8.66	0.8	<0.009	<0.009	[illegible]	3.87	4	[illegible]	[illegible]	[illegible]
STONE CORRAL C NR SI	12/14/05 10:15	2.94	3.44	6.79	7.14	0.7	0.013	0.014	[illegible]	8.08	1.88	[illegible]	[illegible]	[illegible]
STONE CORRAL C NR SI	1/24/06 11:45	23.1	28.1	1.76	1.81	0.4	<0.002	<0.002	[illegible]	5.05	1.65	[illegible]	[illegible]	[illegible]
STONE CORRAL C NR SI	2/22/06 9:45	7.08	9.09	1.79	1.84	0.5	<0.009	<0.009	[illegible]	4.93	2.49	[illegible]	[illegible]	[illegible]
STONE CORRAL C NR SI	3/1/06 10:25	1991	2268	1.41	1.49	0.2	0.011	0.051	[illegible]	4.57	5	[illegible]	[illegible]	[illegible]
STONE CORRAL C NR SI	4/17/06 8:30	206	265	0.77	0.774	0.2	<0.1	<0.1	[illegible]	1.42	1.38	[illegible]	[illegible]	[illegible]
STONE CORRAL C NR SI	5/17/06 10:00	2.37	4.04	1.75	1.81	0.4	<0.1	<0.1	[illegible]	4.28	1.78	[illegible]	[illegible]	[illegible]
STONE CORRAL C NR SI	6/27/06 9:00	1.39	34	3.08	3.53	0.6	<0.1	<0.1	1.05	1.48	1.26	[illegible]	[illegible]	[illegible]
STONE CORRAL C NR SI	7/26/06 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	10/24/06 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	12/12/06 10:30	135	598	6.74	9.96	0.8	<0.1	<0.1	5.1	9.05	4.32	6.1	[illegible]	[illegible]
STONE CORRAL C NR SI	1/9/07 11:30	11.1	74.1	5.49	5.7	0.7	<0.1	<0.1	4	4.83	1.82	1.94	42.7	[illegible]
STONE CORRAL C NR SI	2/27/07 8:30	34.6	86.9	3.41	3.86	0.6	<0.1	<0.1	0.98	1.69	3.9	3.96	57.6	[illegible]
STONE CORRAL C NR SI	3/20/07 9:50	5.74	64.1	3.26	3.49	0.7	<0.1	<0.1	0.66	1.03	1.1	1.35	[illegible]	[illegible]
STONE CORRAL C NR SI	4/18/07 8:00	4.48	16.4	4.19	4.38	0.7	<0.1	<0.1	[illegible]	0.97	0.69	[illegible]	[illegible]	[illegible]
STONE CORRAL C NR SI	5/30/07 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	6/28/07 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	9/13/07 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	10/31/07 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	1/23/08 11:30	9.77	3188	1.41	2.23	0.1	<0.1	<0.1	[illegible]	8.39	5.11	15.8	[illegible]	[illegible]
STONE CORRAL C NR SI	2/27/08 10:05	1.94	770	1.12	1.4	0.2	<0.1	<0.1	0.23	1.87	2.49	3.5	[illegible]	[illegible]
STONE CORRAL C NR SI	3/26/08 9:10	0.94	33.5	1.57	2.15	0.4	<0.1	<0.1	0.36	0.49	2.97	3.01	[illegible]	[illegible]
STONE CORRAL C NR SI	4/23/08 9:50	1.73	50.6	2.63	2.97	0.6	<0.1	<0.1	0.55	0.55	3.82	3.86	[illegible]	73.1
STONE CORRAL C NR SI	7/23/08 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	4/22/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	5/28/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	6/25/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	7/28/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	8/27/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	9/24/09 9:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	10/21/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	11/18/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	12/9/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	1/26/10 10:45	27.1	3100	0.682	1.42	0.1	<0.1	<0.1	[illegible]	7.11	3.01	[illegible]	[illegible]	[illegible]
STONE CORRAL C NR SI	3/2/10 12:20	3.64	960	1.16	1.45	0.2	<0.1	<0.1	[illegible]	2.29	2.85	[illegible]	[illegible]	[illegible]
STONE CORRAL C NR SI	3/24/10 9:05	0.66	8.66	1.85	1.87	0.5	<0.1	<0.1	[illegible]	0.47	2.34	[illegible]	[illegible]	[illegible]
STONE CORRAL C NR SI	4/21/10 9:00	3.61	175	0.961	1.12	0.4	<0.1	<0.1	[illegible]	0.73	2.21	2.36	[illegible]	[illegible]
STONE CORRAL C NR SI	5/26/10 8:50	1.45	1.46	4.07	4.12	0.6	<0.1	<0.1	[illegible]	0.68	2.28	2.39	[illegible]	[illegible]
STONE CORRAL C NR SI	6/29/10 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	8/31/10 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	10/26/10 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	11/30/10 10:30	2.35	6.7	6.04	6.24	0.8	<0.1	<0.1	2.2	2.44	2.79	3.04	[illegible]	[illegible]
STONE CORRAL C NR SI	12/13/10 10:10	1.23	2.25	6	6.22	0.7	<0.1	<0.1	3.55	3.73	4.11	4.22	[illegible]	[illegible]
STONE CORRAL C NR SI	1/18/11 12:25	3.06	105	2.07	2.14	0.4	<0.1	<0.1	0.74	0.91	2.82	2.99	[illegible]	[illegible]
	Maximum	1991	6149	8.84	9.96	1	0.187	0.524	8.1	11	5.45	[illegible]	[illegible]	[illegible]
	Median	4.36	50.05	1.775	2.025	0.5	0.0355	0.034	2.75	3.695	2.49	3.14	[illegible]	[illegible]
	Minimum	0.66	1.46	0.682	0.774	0.1	0.006	0.013	0.21	0.47	0.69	0.83	[illegible]	[illegible]

Criteria	Dissolved Aluminum	Total Aluminum	Dissolved Arsenic	Total Arsenic	Dissolved Boron	Dissolved Cadmium	Total Cadmium	Dissolved Chromium	Total Chromium	Dissolved Copper	Total Copper	Dissolved [illegible]	Total [illegible]
SWRCB Basin Plan - Drinking Water Standards -Primary MCL	1000												
SWRCB Basin Plan - Drinking Water Standards -Secondary MCL	200											[illegible]	
Cal EPA/OEHHA - California Public Health Goal	600		0.004			0.04							
USEPA Secondary MCL													
Cal EPA - One in a million incremental cancer risk estimate for drinking water			0.023			0.0023							
USEPA Health Advisory for drinking water	50		0.02										
California Proposition 65 Safe Harbor Level - Max. Allowable dose level for reproductive toxicity			0.05										
California Toxics Rule Sources of Drinking Water													
California Toxics Rule Freshwater Aquatic Life Protection Continuous Concentration													
California Toxics Rule Freshwater Aquatic Life Protection Maximum Concentration													
Agriculture Water Quality Goals - Taste and odor threshold			100		0.7							[illegible]	
California Notification Level - Drinking Water					1								
National Academy of Sciences Health Advisory for Drinking Water	5000												
USEPA IRIS Reference Dose Drinking Water Health Advisory			2.1										
National Recommended WQ Criteria - Taste and Odor or Welfare												[illegible]	
National Recommended WQ Criteria - Human Health and Welfare protection - water and fish consumption													
National Recommended WQ Criteria - Freshwater Aquatic Life Continuous Concentration	87											[illegible]	
National Recommended WQ Criteria - Freshwater Aquatic Life Maximum Concentration	750												

Table 5 Stone Corral C nr SI, Part 2 of 2

Station Name	Sample Date	Dissolved Lead µg/L	Total Lead µg/L	Dissolved Manganese µg/L	Total Manganese µg/L	Total Mercury ng/L	Dissolved Nickel µg/L	Total Nickel µg/L	Dissolved Selenium µg/L	Total Selenium µg/L	Dissolved Silver µg/L	Total Silver µg/L	Dissolved Zinc µg/L	Total Zinc µg/L
STONE CORRAL C NR SI	5/27/98 10:20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	3/5/01 15:45	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	4/9/01 9:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	2/20/02 11:30	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	3/7/02 9:30	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	3/18/02 11:20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	4/10/02 16:45	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	5/13/02 8:45	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	12/18/02 15:15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	1/9/03 12:15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	1/23/03 10:50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	2/6/03 10:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	3/11/03 14:25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	3/17/03 11:45	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	4/8/03 13:10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	4/28/03 11:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	5/14/03 12:40	0.058	0.042	0.17	9.03	N/A	2.57	3.14	7.33	7.37	0.131	<0.197	0.86	1.25
STONE CORRAL C NR SI	1/6/04 11:30	0.036	0.256	9.48	42.9	N/A	2.32	3.56	3.02	3.07	<0.007	<0.014	0.46	2.74
STONE CORRAL C NR SI	2/4/04 13:00	0.266	0.507	13.1	32.3	N/A	3.27	3.79	0.66	1.25	<0.015	0.207	4.24	5.21
STONE CORRAL C NR SI	2/17/04 13:30	0.782	2.91	36.1	203	N/A	3.58	15.8	0.26	0.38	<0.016	0.056	4.53	24.9
STONE CORRAL C NR SI	3/8/04 12:45	0.009	0.094	1.66	3.57	N/A	2.11	2.32	1.34	2.38	0.054	0.09	0.82	1.05
STONE CORRAL C NR SI	4/7/04 10:15	0.05	0.065	1.15	4.6	N/A	2.4	2.58	4.26	4.48	0.03	<0.031	1.3	1.65
STONE CORRAL C NR SI	5/5/04 11:50	0.035	0.038	0.85	2.41	N/A	2.82	2.85	8.2	8.22	0.09	<0.044	1.38	1.4
STONE CORRAL C NR SI	10/5/04 14:30	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	11/8/04 9:50	0.059	0.142	27.2	43.1	N/A	4.98	9.72	30	30.4	0.082	0.107	1.78	1.81
STONE CORRAL C NR SI	12/7/04 12:45	0.244	0.293	2.07	30.6	N/A	3.29	3.49	10.5	10.6	0.05	0.086	0.99	1.44
STONE CORRAL C NR SI	1/10/05 13:30	0.111	0.428	2.61	32.1	N/A	2.24	3.48	1.69	1.84	0.009	0.015	1.46	4.64
STONE CORRAL C NR SI	2/2/05 10:45	0.095	0.117	7.35	19.8	N/A	2.15	2.63	2.32	2.87	0.004	0.007	0.99	1.45
STONE CORRAL C NR SI	3/10/05 13:00	0.05	0.057	1.17	6.21	N/A	1.53	2.29	3	3	<0.001	<0.036	0.73	3.86
STONE CORRAL C NR SI	4/19/05 7:20	0.054	0.147	2.44	3.02	N/A	2.12	2.15	4.22	5.06	<0.003	<0.005	0.81	0.88
STONE CORRAL C NR SI	5/19/05 9:50	0.006	0.038	0.73	2.12	N/A	1.43	2.09	4.07	4.46	<0.009	0.021	0.7	0.74
STONE CORRAL C NR SI	6/28/05 13:30	0.094	0.099	2.4	6.88	N/A	1.96	2.45	5.68	5.9	0.05	0.173	0.91	1.72
STONE CORRAL C NR SI	7/24/05 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	8/22/05 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	9/26/05 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	10/24/05 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	11/14/05 9:35	0.007	0.008	20.3	21.2	N/A	7.73	8.27	20.6	20.7	<0.009	<0.009	1.55	1.57
STONE CORRAL C NR SI	12/14/05 10:15	0.008	0.014	17.1	19	N/A	8	8.64	21.4	22.6	<0.001	0.041	1.04	1.36
STONE CORRAL C NR SI	1/24/06 11:45	0.013	0.021	29.4	32.6	N/A	3.34	3.9	5.53	5.63	<0.005	0.011	0.84	0.87
STONE CORRAL C NR SI	2/22/06 9:45	<0.045	0.009	8.96	13.9	N/A	3.57	3.39	6.31	7.05	<0.009	<0.009	0.91	1.03
STONE CORRAL C NR SI	3/1/06 10:25	0.536	1.38	29.8	46.9	N/A	4.79	5.55	0.8	1.06	<0.009	<0.009	6.47	7.11
STONE CORRAL C NR SI	4/17/06 8:30	0.054	0.089	9.99	14.1	N/A	2.65	3.23	1.75	1.99	<0.03	<0.03	1.27	1.61
STONE CORRAL C NR SI	5/17/06 10:00	<0.04	<0.04	1.65	1.73	N/A	1.59	1.98	5.38	5.93	<0.03	<0.03	0.9	0.93
STONE CORRAL C NR SI	6/27/06 9:00	<0.04	<0.04	8.27	39.4	N/A	2.15	3.46	3.58	3.97	0.087	0.165	0.6	0.64
STONE CORRAL C NR SI	7/26/06 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	10/24/06 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	12/12/06 10:30	<0.04	0.172	18.5	71.3	N/A	4.37	6.92	15.6	21.8	<0.03	<0.03	0.79	3.78
STONE CORRAL C NR SI	1/9/07 11:30	0.2	0.215	32.8	80.2	0.29	3.07	3.23	19.6	20.6	<0.03	<0.03	1.04	2.53
STONE CORRAL C NR SI	2/27/07 8:30	0.05	0.121	28	29.3	N/A	2.59	3.79	9.75	13.7	<0.03	<0.03	1.32	3.01
STONE CORRAL C NR SI	3/20/07 9:50	<0.04	0.062	35.3	89.4	0.92	1.2	1.44	6.1	7.26	<0.03	<0.03	0.97	2.79
STONE CORRAL C NR SI	4/18/07 8:00	0.06	0.068	25.6	41.4	2.3	1.3	1.38	5.73	5.93	<0.03	<0.03	1.03	2.42
STONE CORRAL C NR SI	5/30/07 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	8/28/07 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	9/13/07 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	10/31/07 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	1/23/08 11:30	0.06	2.04	2.41	92.6	N/A	3.43	9.39	0.65	0.9	<0.03	0.033	0.5	16.3
STONE CORRAL C NR SI	2/27/08 10:05	<0.04	0.272	0.54	30.8	N/A	1.66	2.46	2.2	2.5	<0.03	<0.03	0.64	4.66
STONE CORRAL C NR SI	3/26/08 9:10	<0.04	0.064	1.63	27.9	N/A	2.13	3.1	3.53	4.02	<0.03	<0.03	0.8	2.42
STONE CORRAL C NR SI	4/23/08 9:50	0.046	0.059	8.33	19.1	N/A	3.77	3.86	9.54	9.75	<0.03	<0.03	1.28	2.94
STONE CORRAL C NR SI	7/23/08 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	4/22/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	5/28/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	6/25/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	7/28/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	8/27/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	9/24/09 9:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	10/22/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	11/18/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	12/9/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	1/26/10 10:45	<0.04	1.91	1.52	106	N/A	4.36	8.87	0.59	0.63	<0.03	<0.03	0.86	16.1
STONE CORRAL C NR SI	3/2/10 12:20	<0.04	0.438	0.69	46.6	N/A	2.29	2.98	2.02	2.54	<0.03	<0.03	1.08	5.48
STONE CORRAL C NR SI	3/24/10 9:05	<0.04	<0.04	2.65	14.4	N/A	1.57	2.33	4.97	5.56	<0.03	<0.03	1.04	2.44
STONE CORRAL C NR SI	4/21/10 9:00	<0.04	0.087	1.64	12.6	N/A	1.51	1.98	2.93	3	<0.03	<0.03	1.06	2.7
STONE CORRAL C NR SI	5/26/10 8:50	<0.04	<0.04	0.14	1.34	N/A	2	2.06	4.31	4.4	<0.03	<0.03	1.85	2.52
STONE CORRAL C NR SI	6/29/10 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	8/31/10 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	10/26/10 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	11/30/10 10:30	<0.04	<0.04	63.4	75.9	N/A	2.04	2.1	1.36	1.42	<0.03	<0.03	2.7	3.76
STONE CORRAL C NR SI	12/13/10 10:10	<0.04	<0.04	0.29	16	N/A	1.93	2.61	1.74	1.88	0.088	0.12	2.17	2.5
STONE CORRAL C NR SI	1/18/11 12:25	<0.04	0.057	38.2	79.8	N/A	1.25	1.72	3.43	3.5	0.064	0.347	1.42	1.79
	Maximum	0.782	2.91	63.4	203	2.3	8	15.8	30	30.4	0.131	0.347	6.47	24.9
	Median	0.054	0.0965	5	28.6	0.92	2.305	3.12	4.145	4.43	0.059	0.086	1.035	2.43
	Minimum	0.006	0.008	0.14	1.34	0.29	1.2	1.38	0.26	0.38	0.004	0.007	0.46	0.64
SWRCB Basin Plan - Drinking Water Standards - Primary MCL														
SWRCB Basin Plan - Drinking Water Standards - Secondary MCL				50										
Cal EPA OEHHA - California Public Health Goal		0.2					12		30					
US EPA Secondary MCL														
Cal EPA OEHHA one-in-a-million incremental cancer risk estimate for drinking water														
US EPA IRIS drinking water														
California Proposition 65 Safe Harbor Level - Max. Allowable dose level for reproductive tox		0.25												
California Toxics Rule - Sources of Drinking Water						0.05								
California Toxics Rule - Freshwater Aquatic Life Protection Continuous Concentration									5					
California Toxics Rule Freshwater Aquatic Life Protection Maximum Concentration									20					
Agricultural Water Quality Goals - Taste and odor threshold									20					
California Notification Level - Drinking Water														
National Academy of Sciences Health Advisory for Drinking Water														
USEPA IRIS Reference Dose Drinking Water Health Advisory														
National Recommended WQ Criteria - Taste and Odor or Welfare				50										
National Recommended WQ Criteria - Human Health and Welfare protection - water and														
National Recommended WQ Criteria - Freshwater Aquatic Life Continuous Concentration														
National Recommended WQ Criteria - Freshwater Aquatic Life Maximum Concentration														

Appendix 8

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
North Central Region
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916-358-2900
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January 12, 2018

Rob Thomson
Sites Project Authority
P.O. Box 517
Maxwell, CA 95955

Subject: SITES PROJECT
DRAFT JOINT ENVIRONMENTAL IMPACT REPORT/ENVIRONMENTAL IMPACT STATEMENT (DRAFT EIR/EIS) SCH# 2001112009

Dear Mr. Thomson:

The California Department of Fish and Wildlife (CDFW) received and reviewed the Notice of Availability of a Draft EIR/EIS (DEIR/DEIS) from The Sites Project Authority (Authority) for the Sites Project (Project) pursuant the California Environmental Quality Act (CEQA) statute and guidelines.[1]

Thank you for the opportunity to provide comments and recommendations regarding those activities involved in the Project that may affect California fish and wildlife. Likewise, we appreciate the opportunity to provide comments regarding those aspects of the Project for which CDFW, by law, may need to exercise its own regulatory authority under the Fish and Game Code. The Department appreciates that with most large projects there may be a continuing effort to analyze impacts and revise the various project alternatives. The Department remains available for coordination for those purposes.

CDFW ROLE

CDFW is California's **Trustee Agency** for fish and wildlife resources, and holds those resources in trust by statute for all the people of the State. (Fish & G. Code, §§ 711.7, subd. (a) & 1802; Pub. Resources Code, § 21070; CEQA Guidelines § 15386, subd. (a)) CDFW, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species. (Fish & G. Code, § 1802.) Similarly, for purposes of CEQA, CDFW is charged to provide, as available, biological expertise during public agency environmental review efforts, focusing specifically on projects and related activities that have the potential to adversely affect fish and wildlife resources.

CDFW is also submitting comments as a **Responsible Agency** under CEQA. (Pub. Resources Code, § 21069; CEQA Guidelines, § 15381.) CDFW expects it may need to exercise regulatory authority as provided by the Fish and Game Code. As proposed, for example, the Project may be subject to CDFW's lake and streambed alteration regulatory

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[1] CEQA is codified in the California Public Resources Code in section 21000 et seq. The "CEQA Guidelines" are found in Title 14 of the California Code of Regulations, commencing with section 15000.

authority. (Fish & G. Code, § 1600 et seq.) Likewise, to the extent implementation of the Project as proposed may result in "take" as defined by State law of any species protected under the California Endangered Species Act (CESA) (Fish & G. Code, § 2050 et seq.), related authorization as provided by the Fish and Game Code will be required. CDFW also administers the Native Plant Protection Act, Natural Community Conservation Planning Act, and other provisions of the Fish and Game Code that afford protection to California's fish and wildlife resources.

PROJECT DESCRIPTION SUMMARY

The proposed Project facilities would primarily be located in Glenn and Colusa counties, approximately 10 miles west of the town of Maxwell. The Project would include a new off stream surface storage reservoir (Sites Reservoir) with two main dams, up to nine saddle dams, and up to five recreation areas. The Sites Reservoir would be filled through the diversion of Sacramento River flows via two existing diversions/canals (all alternatives) and a proposed new inlet diversion/outlet structure and pipeline (majority of alternatives). The proposed pipeline would allow for Sacramento River diversions for most alternatives, and discharge of water under all alternatives. Water conveyance between the reservoir and the canals and pipeline would be facilitated by two new regulating reservoirs. Pumping/ electrical generating facilities would also be included as part of most alternatives. A new overhead power line would connect the pumping/generating plants and their associated electrical switchyards to an existing overhead power line in the Project area. New roads and a bridge across the proposed Sites Reservoir would be constructed to provide access to the proposed Project facilities and over the proposed reservoir, and some existing roads would be relocated or improved. The Project would require modifications to one of the existing canals and pumping plants.

COMMENTS AND RECOMMENDATIONS

CDFW offers the comments and recommendations below to assist the Authority, as lead agency, in adequately identifying and, where appropriate, mitigating the Project's significant, or potentially significant, direct and indirect impacts on fish and wildlife (biological) resources.

In general, CDFW has identified several areas where additional, clarified, or modified analysis is necessary to allow for a complete analysis and disclosure of the potential impacts of the Project, and where the DEIR/DEIS requires improved, enforceable mitigation measures. The document's disclosure and analysis of impacts to aquatic species is of particular concern to the Department, including an insufficient analysis of the impacts of increased diversions that would occur during Chinook salmon (*Oncorhynchus tshawytscha)* migration periods, smelt analyses that do not appear to reflect proposed Project operations and potential reductions in Delta outflow, and a lack of analysis of potential entrainment and impingement of green sturgeon (*Acipenser medirostris*) and white sturgeon (*Acipenser transmontanus*) at Project intake facilities. CDFW also has concerns about the Project's potential impacts to floodplain habitat downstream of individual diversion facilities and downstream in the Delta. CDFW does not consider proposed bypass flows identified in the DEIR/DEIS to sufficiently minimize or offset these impacts.

Project Description

The project description within an EIR must supply sufficient detail to allow for the evaluation and review of the potential environmental impacts and must address the "whole of the action" with potential to result in direct physical changes to the environment or reasonably foreseeable indirect physical changes in the environment. (CEQA Guidelines, §§ 15124 &15378.) The following comments highlight areas where further detail is necessary to allow for such evaluation.

The proposed inlet/outlet structure for Sites Reservoir would consist of a low-level inlet/outlet structure for emergency drawdown releases, a multi-level inlet/outlet structure tower, two fixed wheel gates to isolate the tunnel, a tower access bridge, and various valves and operators to regulate flows into and out of the reservoir. The DEIR/DEIS assumes that the reservoir outlet structures would allow withdrawal of water from the reservoir over a range of depths to manage release temperatures to match Sacramento River temperatures to the extent possible. However, more information is necessary regarding how the proposed Project operations will impact reservoir water surface elevations and volumetric estimates of cold water pool storage. Without this information, it is not possible to understand how those storage levels interact with the water release locations of the proposed outlet structure tower. CDFW also recommends the inclusion of data that summarize how much water can be released at each port and/or level along the structure tower. Collectively, this information is vital to understanding how or if reservoir release temperatures could be managed to match Sacramento River water temperatures and if the proposed outlet structure is appropriately designed to accomplish this task. To inform the analysis of impacts to aquatic biological resources, the Project Description should include a thorough qualitative discussion of when and from what sources the Project generally acquires (diverts) water throughout the year. This should include a discussion of Sacramento River diversions, capture of flows in the Funks and Stone Corral watersheds, and agricultural return flows otherwise flowing to the Colusa Basin drain.

Hydropower Generation and Transmission

The DEIR/DEIS lists "flexible hydropower generation to support the integration of renewable energy sources" as a secondary objective for the Project and includes hydropower generation in three of the five alternatives for the Project. Specifically, Alternatives A, B, and C all include new hydropower facilities with related overhead power line facilities. Alternative D *could* include new hydropower facilities with related overhead power line facilities; however, these facilities may not be included in the final implementation of Alternative D. Alterative C_1 is identical to Alternative C with respect to facilities and operational assumptions, but assumes no hydropower generation or delayed construction of hydropower facilities to account for potential future power market conditions and anticipated permitting processes. CDFW believes it is reasonably likely that the Authority would install hydropower facilities with related overhead power lines at the Project. As the appropriate State fish and wildlife agency for resource consultation and Federal Power Act Section 10(j) (16 U.S.C. section 803 (j)) purposes, CDFW strongly recommends the DEIR/DEIS describe the potential hydropower facilities in detail to ensure adequate analysis of the impacts of the Projects related to hydropower generation and associated facilities. Additionally, if the Authority intends to pursue hydropower facilities, CDFW recommends the Authority initiate the process to obtain an original license from the Federal Energy Regulatory Commission (FERC) to construct, operate, and maintain a hydroelectric project.

Chapter 3 of the DEIR/DEIS describes the Sites Pumping/Generating Plant that would pump water from the proposed Holthouse Reservoir into the proposed Sites Reservoir and generate electricity during the release of water from Sites Reservoir to Holthouse Reservoir. CDFW is concerned about the potential entrainment of reservoir fish between the two reservoirs during the pumping and release of water. Although the proposed pumps are "fish-friendly" Francis turbines, these pumps do not guarantee survival of all fish that travel through the pumps. Additionally, fish that do survive the turbines may become injured, disoriented, or stressed when they emerge from the turbines and exhibit irregular behavior and be more susceptible to predation or further injury. Chapter 12 of the DEIR/DEIS states that an impact analysis for reservoir fisheries was not completed since no reservoir fishery exists under the Existing Conditions/No Project/No Action Condition. However, the Project proposes to develop and fill the reservoir and develop recreational fishing opportunities, and its diversions from the Sacramento River may result in fish being located in the reservoir. Operation of pumps for hydropower is a part of Project operations and thus the environmental document for the Project must disclose and analyze impacts from those activities. CDFW recommends the Authority include an impact analysis of pump operations in relation to potential entrainment of reservoir fish and consider screening as a mitigation measure to avoid the entrainment and transfer of fish between the two reservoirs during hydropower generation.

Existing Conditions and Project Alternatives

The environmental setting – a description of the physical environmental conditions existing in the vicinity of the Project at the time the notice of preparation is published – will normally constitute the baseline by which a lead agency considers the significance of an environmental impact. (CEQA Guidelines, § 15125, subd. (a).) The existing conditions baseline is the norm from which a deviation should be justified, and caselaw recognizes that complicated modeling introduces inherent uncertainty and makes an analysis less accessible to decision makers and the public. (*Neighbors for Smart Rail v. Exposition Metro Line Construction Authority* (2013) 57 Cal. 4th 439, 454-456.) CDFW recognizes that a lead agency must decide how to most realistically measure existing conditions. However, a hypothetical "maximum permitted operational levels" baseline may be misleading as a basis for comparison, where it is not a realistic assumption. (*Communities for a Better Environment v. South Coast Air Quality Management Dist.* (2010), 48 Cal. 4th 310, 322.)

CDFW is concerned that the analytical approach in the DEIR/DEIS, which relies heavily on 2030 projected conditions, does not present the most realistic measurement of existing conditions and could have misleading or confusing results. The same baseline is not used across all models and analyses, which compounds the potential problems.

The DEIR/DEIS assumes Existing Conditions and the No Project/No Action Alternatives to be the same and, refers to them collectively as the "Existing Conditions/No Project/No Action Condition" throughout the document and does not distinguish between them for the impact analyses. Consequently, the impact analyses compare all Project alternatives to projected future water demands through 2030. These projections also assume Central Valley Project (CVP) and State Water Project (SWP) contractors would use their total contract amounts and that senior water rights users would fully use their water rights – an assumption that does not reflect current conditions.

CDFW is concerned that an environmental baseline that relies on future water demands may obscure the severity of the Project's water operations impacts when compared to actual existing conditions. In addition, the DEIR/DEIS discloses that the CALSIM II, Delta Simulation Model (DSM2), and American River diversion assumptions vary between the Existing Conditions Assumption and the No Action Alternative Assumption. These shifting assumptions prevent a comprehensive and stable understanding of potential Project impacts. CDFW recommends that the DEIR/DEIS provide separate and independent impact analyses of the Existing Conditions and the No Project/No Action Alternatives, and that the Existing Conditions should constitute existing water rights and contract amounts along with existing hydrologic conditions at the time of the release of the Notice of Preparation (NOP) in March 2017. For example, the Project's environmental baseline is more clearly defined in the 2009 National Marine Fisheries Service *Biological Opinion and Conference Opinion on the Long-term Operations of the Central Valley Project and the State Water Project*.

As a means of reducing significant environmental impacts of a project, CEQA requires that an EIR must contain feasible mitigation measures as well as feasible project alternatives that could avoid or substantially lessen the project's significant environmental effects. (Pub. Res. Code, § 21002, 21100(b)(4).) As described by the CEQA Guidelines, an EIR must describe "a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives." (Cal.Code Regs., tit. 14, § 15126.6(a).)

The DEIR/DEIS includes Project features and alternatives that maximize the Project's objectives; however, the DEIR/DEIS does not include potentially feasible alternatives that would avoid or substantially lessen the Project's significant environmental impacts. CDFW continues to recommend that the DEIR/DEIS should include a more robust range of operational alternatives, as discussed in its comments to the NOP, provided on March 21, 2017. Of the five alternatives in the DEIR/DEIS, many of them are similar with respect to water operations (e.g. diversions, bypass criteria, deliveries are the same across alternatives.) CDFW recommends that alternatives should be split into two or more alternatives that encompass the entire range of possible water operations scenarios, including an alternative that minimizes operational impacts through more restrictive bypass flows and diversion criteria.

In addition, to the extent there are distinctions among the five alternatives, the document uses a comparative approach that makes it difficult for the reader to understand in absolute terms the impacts of the Project. For example, the document frequently discusses the similarities between Alternatives C_1 and C, and Alternatives C and D, and often considers them to be the same for the impact analyses. CDFW recommends that a complete assessment of the Project's potential impacts be provided to better understand the ability of Project alternatives to avoid or substantially lessen the Project's potential significant environmental impacts.

Impacts Analysis

Surface Water Resources

The DEIR/DEIS characterizes Project impacts to surface water resources broadly as increased, reduced, or similar when compared to the Existing Conditions/No Project/No Action Condition in Chapter 6. The Project proposes modifications to CVP/SWP operations throughout the Sacramento River watershed and Sacramento-San Joaquin Delta. Generalizations in the analyses make it difficult to understand how the Project will impact surface water resource management, such as cold water storage and the quantities of water that may be released out of reservoir outlets, and the consequent impacts to biological resources. The generalities result because water quantities and Project-generated changes are not disclosed for Existing Conditions, the Action Alternatives and the No Project/No Action Condition for any of the reservoirs, tributaries, or the Delta in the secondary or extended study areas. (See DEIR/DEIS, section 6.3.3.2.) These values are summarized only for CVP and SWP deliveries, Sites Reservoir storage, and inflows at the Delevan pipeline. (See DEIR/DEIS, sections 6.3.3.1 and 6.3.3.3). To enable meaningful review of the Project's impacts to reservoir and tributary management, CDFW recommends that the DEIR/DEIS disclose and analyze water quantity values and the corresponding Project-generated changes for all reservoirs and tributaries in the primary, secondary, and extended study areas under the Existing Conditions, all Action Alternatives, and the No Project/No Action Condition in Chapter 6. CDFW recommends a reporting structure similar to that of Table 6-8, with a caveat that the Existing Conditions and the No Project/No Action Condition should be separated and analyzed independently, as suggested previously. These data summaries will allow the reader to compare Project impacts to surface water resources between the Existing Conditions, all Action Alternatives, and the No Project/No Action Condition.

The DEIR/DEIS surface water resources analysis shows potentially significant impacts to aquatic biological resources because of flow reductions when fish species are present. Specifically, in Dry and Critical water years, flows in the Sacramento River would decrease as a result of the Project in Alternatives A, B, C, and D as compared to the Existing Conditions/No Project/No Action Condition. These decreases would occur: (1) from March through June and in October downstream of Keswick Reservoir; (2) from February through June downstream of the Tehama-Colusa Canal Authority (TCCA) Intake near Red Bluff; (3) from February through April (and March through May in other water years) downstream of Glenn-Colusa Irrigation District (GCID) Main Canal Intake near Hamilton City; and (4) from January through March downstream of Delevan Pipeline Intake/Discharge Facilities. Flows during the springtime (March – May) are critical for juvenile salmonid emigration in the Sacramento River, and especially so in dry and critical years when flows are already low. Decreased flows during this time period as proposed in the Project alternatives will lead to decreased juvenile salmonid survival. In addition, the Project proposes that in all water year types, reservoir releases would generally increase flows in July (and in some reaches June through November) when fish species of concern are least likely to be utilizing that habitat and flows are opposite of the natural hydrology. CDFW recommends evaluation and analysis of an alternative under which operations provide for flows to increase in the Sacramento River in the winter and spring when juvenile salmonids are present.

The DEIR/DEIS states that modeling for the Project's alternatives restricted diversions to limit impacts on out-migrating juvenile fish as a "surrogate" for likely permit conditions. The DEIR/DEIS identifies this diversion limitation as Mitigation Measure Fish 1f in Chapter 12. However, the DEIR/DEIS never evaluates the Project's potential impacts, in comparison to the DEIR/DEIS significance thresholds, without this mitigation measure in place. Further, as discussed in more detail below, CDFW does not consider the short-term and limited pulse flow protections to adequately reduce impacts to migrating juvenile fish.

Surface Water Quality

Similar to surface water resources, it is difficult to understand how the Project will impact surface water quality because the values and corresponding Project-related changes are rarely reported under the Action Alternatives, the Existing Conditions, and the No Project/No Action Condition for reservoirs, tributaries, or the Delta in the primary, secondary and extended study areas in Chapter 7. CDFW recommends that the DEIR/DEIS disclose and analyze water quality values and the corresponding Project-generated changes for all reservoirs and tributaries in the primary, secondary, and extended study areas under the Existing Conditions, the Action Alternatives, and the No Project/No Action Condition in Chapter 7. The reporting structure for each constituent should include a summary by location, water year, and month for the Existing Conditions and corresponding changes to the No Project/No Action Condition and all Action Alternatives.

Water quality analyses depend on models that rely on CALSIM II, for which the output is on a monthly time step. However, daily and weekly changes to water quality can often have lethal or sub lethal effects on aquatic resources, which a monthly time step cannot capture. For full disclosure and analysis of potentially significant impacts, CDFW recommends that the analyses include a daily time series analysis.

Model limitations may also obscure the severity of the Project's temperature impacts to the Sacramento River. The Sites Reservoir discharge temperature model assumes Sites Reservoir is a vertically segmented reservoir with respect to temperature and derives Sites Reservoir inflow temperatures from three intakes; the TCCA Intake, the GCID Intake, and the Delevan Pipeline Intake. The model excludes potential changes in water temperatures within the Delevan Pipeline between Sites Reservoir and the Sacramento river because the DEIR/DEIS assumes significant warming will not occur within the buried Delevan Pipeline. The model also fails to take agricultural runoff into consideration, which may increase the solar radiation potential of the discharged water (Turek 1990). This has the potential to impact water quality in the reservoir and the associated discharge into the Sacramento River (i.e. increased turbidity and water temperatures).

Because of the considerable distance from the intakes to Sites Reservoir, CDFW recommends that the model incorporates water residence times and seasonal ambient warming from the intakes to Sites Reservoir to calculate the Sites Reservoir inflow temperatures. CDFW also recommends water temperatures between the Sites Reservoir outlet and the Sacramento river be included in the model and that the model account for possible thermal effects from power generation at three facilities, pump-back operations, and varying residence times within the Holthouse Reservoir Complex, the Terminal Regulating Reservoir, and over the 13.5 mile pipeline. The refined model should be used for an impact analysis that evaluates all Action Alternatives, not just Alternatives C and D, regardless of their perceived similarities or differences.

The underlying assumption that the Sites Reservoir will become stratified because of warming within the upper layer of the reservoir in the summer months, similar to other large reservoirs in the California Central Valley, warrants additional analysis. Most large reservoirs in the Central Valley receive runoff from snowpack, which is largely absent in the Funks and Stone Corral watersheds. In addition, the proposed Sites Reservoir will be located in a shallow canyon, which will create a wide reservoir with a large surface area making it more vulnerable to mixing from high winds. CDFW recommends further analysis on the stratification potential for Sites Reservoir. Seasonal temperature profiles from nearby reservoirs that lack significant snowpack may be useful for this analysis. In addition, the analysis should consider the effects of highly regulated pumping-generating plants on the development of a thermocline, as discussed under the Project Description subheading, above.

Aquatic Biological Resources

Flow

CDFW considers bypass flow and other fish protection criteria identified in the Project alternatives to be insufficient to reduce potentially significant impacts to less-than-significant levels. At the diversions from the Sacramento river, the DEIR/DEIS proposes bypass flow criteria of 3,250 cfs (Red Bluff), 4,000 cfs (Hamilton City), and 5,000 cfs (Wilkins Slough). Population trends of native anadromous and pelagic fish are steadily declining under existing regulatory conditions and the additional extraction of water at the proposed bypass flow rates would exacerbate the problem. Reduced flow affects habitat use, as indicated by salmon models used in the DEIR/DEIS, but the timing and quantity of flow also influences migration events, predator evasion, and ultimately survival (del Rosario et al. 2013; Michel et al. 2013; Perry et al. 2015; Perry et al. 2016; Johnson et al. 2017). When velocities along migratory corridors are reduced, juvenile outmigration takes longer and smolts face increased predation risk (Anderson et al. 2005; Muthukumarana et al. 2008; Cavallo et al. 2013). The effects of flow on survival from travel time and predation risk are not incorporated into the salmon models used for the DEIR/DEIS and the DEIR/DEIS analysis should disclose and address these effects.

Based on a preliminary review of existing juvenile Chinook survival studies, the correlation between increased juvenile survival and flows at Bend Bridge begins to decline at around 13,000 cfs (Michel et al. 2015, Michel 2016). As a mitigation measure for the Project's potentially significant impacts to fish migration, the DEIR/DEIS identifies short-duration pulse flow protections, limited to only one per month regardless of natural conditions. In light of the best available science regarding juvenile survival and flows, the proposed bypass flows for a short duration pulse flow, representing the sole mitigation measure for this significant impact, is not adequate to mitigate for the substantial loss of emigrating fish during non-pulse flow periods.[2] CDFW recommends the Project proponents revise the bypass flow requirement to maintain at least 13,000 cfs past all diversion facilities prior to the diversion of water to reduce impacts on out-migrating juvenile salmonids.

Furthermore, the Project does not include any protective bypass flow rates for Delta outflow, but as discussed in additional comments below, the Project is likely to affect Delta outflow significantly, with resulting impacts to aquatic biological resources. The DEIR/DEIS should propose Delta outflow requirements, in addition to bypass flow requirements, to adequately minimize the Project's impacts to downstream fisheries prior to diverting water from the Sacramento river.

The DEIR/DEIS identifies the elimination of fish passage at the Sites Reservoir dams as a less than significant impact because the extent to which fish species may move through this area is unknown and movement of these species is not considered an essential behavioral component of their life cycles. Yet, endemic species often reproduce in habitat dissimilar to rearing habitat (e.g. Sacramento splittail (*Pogonichthys macrolepidotus*)) and demonstrate the ability to move throughout an aquatic environment to access a variety of habitats. CDFW recommends a thorough review of existing scientific literature and studies related to the presence and life-history characteristics of endemic species in streams that would be blocked by the Sites Reservoir dams and/or nearby streams having similar attributes. Aquatic biological studies may also need to be performed to better understand which species are present and possibly impacted by the Project.

During operation of the Project, the DEIR/DEIS states that releases from Sites and Golden Gate dams would maintain flows of up to 10 cfs from October through May in Stone Corral and Funks creeks, respectively. The DEIR/DEIS anticipates these flows would be maintained close to natural levels, and therefore, the operational impacts to fish and aquatic habitats and fish passage in Funks and Stone Corral creeks below Sites and Golden Gate dams would be less than significant. This contradicts statements made in the DEIR/DEIS Chapter 6 section 6.2.6.1 and 6.2.6.2 that peak winter flows of approximately 2,000 cfs are common in Funks Creek and Stone Corral Creek may provide flows ranging from 600 to 2,000 cfs in December through April during wet water years. Therefore, maintaining flows of up to 10 cfs from October through May will not sufficiently mimic the variability of the hydrograph for Stone Corral and Funks creeks and will not provide the same amount of aquatic habitat or adequate protection for fish passage. In addition, these creeks are impacted by water diversions within their watersheds and the habitat being described as ephemeral may be due to anthropogenic degradation where natural flows would be more perennial in nature. To the extent the Project could exacerbate already degraded conditions in those creeks, the DEIR/DEIS should consider the potential impact to the hydrological regime of these streams. In order to maintain fish in good condition as

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[2] Juvenile monitoring data suggests that increases in emigration towards the Delta occur at every pulse in river flow, even where the 3-day average flows are less than 15,000 cfs, and regardless if a pulse has previously occurred in the calendar month. These lower peak flow events typically occur in the October and November months when winter-run are present in the system and identified at current rotary screw trap monitoring locations. Additionally, during pulse events with 3-day average flows near 25,000 cfs, any further flow increases produced by storm events have also resulted in increased rotary screw trap catch, contradicting the DEIR/EIS's claim of decreased migration rates at flows above 25,000 cfs.

required by Fish and Game Code section 5937, base flows outside of the "October through May" period below reservoirs may need to have a perennial regime to support fisheries downstream.

Through its coordination with CVP facilities, the DEIR/DEIS identifies potential impacts of the Project to Central Valley steelhead(*Oncorhynchus mykiss irideus*) in the American river, but the impacts are generalized as less than significant under all of the Action Alternatives. However, lower flows and higher probabilities of temperature exceedances would occur in the summer months under all of the Action Alternatives. Water temperature is a major stressor to juvenile steelhead over the summer months in the American river. The 2009 National Marine Fisheries Service *Biological Opinion and Conference Opinion on the Long-term Operations of the Central Valley Project and the State Water Project* identifies flow and temperature criteria applicable to the U.S. Bureau of Reclamation's operations of Folsom Dam. CDFW recommends the Project's proposed operations avoid lower flows and higher probabilities of temperature exceedances in the American river, particularly over the summer, or that the DEIR/EIS identifies this impact as significant and subsequently identifies mitigation measures.

Delta Outflow

The DEIR/DEIS analysis of winter-spring outflow effects on longfin smelt (*Spirinchus thaleichthys*) does not reflect the basic construct of Project operations. The Project description states that diversions are proposed to occur at any time in the year, so long as bypass flows at upstream diversion locations are met. Additionally, Chapter 3.3.1.3 and page 10 of the Executive Summary identify the Projects ability to capture up to 1.8 Million Acre Feet (MAF) of the identified 3 MAF of water produced by unregulated Sacramento River tributaries (i.e. unregulated surface flow during the December – June time period). This capture of flows, in the higher-flow winter and spring months, would significantly reduce Delta outflow. Longfin smelt abundance correlates to Delta outflows in January through June. Yet, the DEIR/DEIS modeled proportional changes to longfin smelt populations of less than 0.1% between all alternatives and all water year types. This implies the Project would have virtually no effect on winter-spring outflow across all water year types, a conclusion that is not consistent with the proposed operations and assumed diversions. CDFW recommends the DEIR/DEIS be revised to contain a more thorough analysis of the proposed outflow impacts to longfin smelt.

The fall abiotic habitat analysis for Delta smelt demonstrates additional inconsistencies between operational assumptions and abilities and the resulting analysis. The DEIR/DEIS concludes it would provide average improvements to X2 through the fall for all water year types. The implication is that Project operations are improving fall conditions enough to change the average position of X2 by half a kilometer or more for the entire September – December period. A change in fall habitat of this magnitude would require a considerable amount of water, likely more than could be released through Project facilities. The ability of the Project to acquire such a large quantity of water for the benefit of fall abiotic habitat is inconsistent with the conclusion that there would be virtually no change to winter-spring outflows based on the aforementioned longfin smelt analysis.

CDFW recommends the DEIR/DEIS explicitly analyze the direct relationship between Project diversions and Delta outflow. This analysis should be accompanied by a qualitative discussion identifying when water would generally be acquired (diverted) throughout the year.

Floodplain habitat

By diverting flows from the Sacramento River, the Project has the potential to reduce spill events at the Tisdale and Fremont Weirs, and consequent flooding of the Sutter and Yolo Bypasses. Reductions in spills could prevent fish from accessing high quality habitat, reduce the amount of time fish have access to the habitat, or reduce the extent of habitat. Therefore, a meaningful and thorough analysis of this potential impact is crucial. However, there are several limitations in the current analysis that prevented meaningful review.

The DEIR/EIS includes Yolo Bypass flow and Sutter Weir spill analyses that are based on the number of years where there is at least one spill event over the weirs into the bypasses of varying amounts (0, 2,000, 4,000, 6,000, 8,000, and 10,000 cfs) with a duration of 0-10 days, 11-20 days, 21-30 days, 31-45 days, and greater than 45 days. These analyses are limited to the months of October through April, when juvenile salmonids and spawning splittail are anticipated to be present in the bypasses. However, Chinook salmon, Sacramento splittail, and other native fish species have been observed using the bypasses during the months of May and June. It is important to note that a reduction in high flow events may delay the timing of fish entering and exiting the bypasses. Therefore, the analysis should include the months of May and June. In addition, by focusing on only whether a given year includes a spill or not, the analysis identically treats a year with one spill event versus ten. By not analyzing the total number of spill events, the analysis does not consider migration behavior of fish entering and exiting the bypasses, and the full suite of months which native fish may utilize these critical habitats. CDFW recommends the analyses be based on the total number of spill events, instead of the number of years with one event or more. Finally, the analysis should include additional inundation amounts of 20,000 and 30,000 cfs to account for the migration timing and behavior of fish entering and exiting the bypasses due to a rapid increase in the inundated area in the Yolo Bypass when flows increase up to 40,000 cfs. Evaluation of the Project's potential to reduce these high spill events would provide essential context to the analysis, given the high benefits to habitat and species from these events.

Entrainment, fish screens, and pre-screen losses

The effects of the proposed Project operations on entrainment and impingement of juvenile fish species at the Delevan Pipeline Intake/Discharge Facilities are identified as potentially significant (Impact Fish-1e). However, the DEIR/DEIS does not identify the specific species impacted. CDFW recommends providing further clarity as to which fish species and life stages are impacted so appropriate avoidance or mitigation measures can be developed. Specifically, the current proposed fish screen design criteria may not provide adequate protection for larval or juvenile fish less than 30-mm in length. For example, a study at Red Bluff Diversion Dam (Borthwick and Corwin 2001) concluded actual fish mortality due to the screens is probably less than 5%. The study did not report larval fish (<30mm) due to the mesh size of the nets used. However, larval fish were frequently observed during the study, particularly during the spring months. This indicates that the study's conclusions on screen efficacy did not consider larval fish, despite their being present in the area. Furthermore, sturgeon spawning is expected to take place on the Sacramento River during times when water diversions at all three intakes will be increased and Sacramento River flows will be reduced from Red Bluff to Delevan Pipeline under all Action Alternatives. Newly hatched green and white sturgeon larvae are subject to impingement on screened diversions, if the diversions are located near areas where adults are spawning.

The DEIR/DEIS identified effects of Project operations on entrainment and impingement at the TCCA Intake and the GCID Intake as potentially significant for Chinook salmon and steelhead but provided no evaluation of this impact for green sturgeon, white sturgeon, hardhead (*Mylopharodon conocephalus*), river lamprey (*Lampetra ayresii*), Pacific lamprey (*Lampetra tridentata*), and Sacramento splittail, all of which may be present in the vicinity of the diversions. In addition, the DEIR/DEIS identified no mitigation for the potentially significant impact to Chinook salmon and steelhead or other species at these facilities. CDFW recommends that the DEIR/DEIS disclose effects of green sturgeon, white sturgeon, hardhead, river lamprey, and Pacific lamprey entrainment and impingement at the TCCA and GCID intakes. CDFW also recommends appropriate avoidance and/or mitigation measures be proposed for each of the species impacted.

During dry and critical water years, the DEIR/DEIS shows that the Project operations would enable increased CVP/SWP exports from south Delta pumping plants and consequently increase Old and Middle River (OMR) reverse flows during the months of August, September, November, and January under all Action Alternatives. Although the DEIR/DEIS estimated increased entrainment losses for Delta smelt, the document does not address prescreen losses. For Delta smelt, prescreen losses that occur in waterways leading to the diversion facilities appear to be where most mortality occurs (Castillo et al. 2012). The impact analysis used for longfin smelt only relies on the winter-spring outflow model (Kimmerer et al. 2008) and does not analyze effects on entrainment and pre-screen loss relative to CVP/SWP exports for all longfin smelt life stages. Potential prescreen losses for Delta smelt and longfin smelt are reasonably foreseeable indirect impacts of the Project and should be included in the smelt impact analyses. Longfin smelt analysis should address entrainment losses and include variables such as OMR reverse flows and CVP/SWP exports. CDFW also recommends using the DSM2's Particle Tracking Model (DSM2-PTM) to analyze CVP/SWP entrainment effects on larval Delta and longfin smelt, using similar assumptions described in the Effects Analysis: State Water Project Effects on Longfin Smelt, prepared by CDFW in February 2009.

Mitigation

The DEIR/DEIS identifies potentially significant stranding, impingement, and entrainment impacts at the Delevan Facilities (Impact Fish-1e) broadly for juvenile fish species of management concern, and proposes mitigation measures Fish-1f (Sites Project Diversion Restrictions) and Fish-1e (Fish Salvage and Rescue Plan) to reduce the impacts to less than significant. However, mitigation measure Fish-1f appears to have been developed to minimize impacts on Chinook salmon and steelhead and does not address green sturgeon, white sturgeon, hardhead, river lamprey, and Pacific lamprey, all of which are fish species of management concern. In addition, many of the details of mitigation measures Fish-1f and Fish-1e are deferred to the future, without adequate performance criteria to ensure impacts are minimized. Lastly, as discussed previously in terms of habitat impacts, the pulse flow protection events that were simulated for the impact analyses are far too limited to mitigate the Project impacts on stranding, impingement and entrainment to less than significant levels.

Juvenile outmigration monitoring data on the Sacramento River shows increased movement of juvenile salmon not only during a pulse flow event, but frequently on the leeward side of the hydrograph as well. Based on the criteria used for "qualified" events, the Project would not impose the proposed restrictions during many dry water years when juvenile and larval fish are vulnerable. The DEIR/DEIS analysis shows that based on the past seven years of flow data at Bend Bridge this restriction would apply to less than 2% of all days during that time period. CDFW recommends the DEIR/DEIS include improved mitigation measures that address all of the juvenile fish species impacted and describe how the mitigation will avoid or reduce impacts to less than significant. If it is not possible to include details of the mitigation measures, the mitigation measures should establish performance standards to evaluate the success of the proposed mitigation, provide a range of options to achieve the performance standards, describe under what circumstances the measure will be implemented, and explain why the measure is feasible.

Additionally, Impact Fish-1f (Modification of Pulse Flows and Entrainment during Diversions at the Delevan Facilities) was never identified or analyzed in Chapter 12, but is listed as a significant impact in Table 12-8, despite being partially discussed in Chapter 6 in relation to a modeling assumption and Mitigation Measure Fish 1-f. Thus, there is no analysis in the DEIR/DEIS to support the less-than-significant statement in Table 12-8. CDFW recommends a review and/or modification of Chapter 12 to ensure the DEIR/DEIS thoroughly and accurately discloses, analyzes, and identifies feasible mitigation measures for all potential impacts of the Project.

Fluvial Geomorphology

The analysis to support the conclusion that there are no potentially significant impacts to fluvial geomorphology appears to be incomplete. A number of key areas were summarily eliminated from analysis without sufficient justification. Detected impacts in other areas appeared to be designated as less-than-significant without discussion, justification, or data.

CDFW recommends the DEIR/DEIS analyze the potential impacts to fluvial geomorphology and riparian habitat within the primary study area related to Funks and Stone Corral creeks as well as unnamed streams and associated riparian habitat impacted by the Project.

Section 8.1 states that "Impacts along the Feather, and American rivers were also evaluated and discussed qualitatively because the numerical model used for the Sacramento River did not address these rivers." Changes in operations of Shasta Lake, Trinity Lake, Lake Oroville, and Folsom Lake proposed by the Project could change stream flow in the rivers downstream of these reservoirs. This would include both the American and the Feather rivers. CDFW recommends impacts to both the Feather and American rivers be included in the numeric model and the DEIR/DEIS analyzes potential impacts. At a minimum, the reduced flows will have impacts related to changes in geomorphology at the confluence with each of these rivers.

The DEIR/DEIS identifies on pages 8-10 to 8-11 that "[a] grade control structure (with riprap on both banks) to decrease bank erosion susceptibility was created during construction of the new GCID Main Canal Intake, and suspended sediment deposits in the GCID canal Facilities and bedload deposits in the meander loop are removed periodically." Additional and exacerbated erosion and sedimentation issues at these locations are a potential consequence of the Project, and CDFW recommends the DEIR/DEIS discuss the cause of the deposition, the frequency of dredging, and the impacts of dredging. The DEIR/DEIS should also include a discussion of the potential impacts of proposed increased withdrawals from the Sacramento River on the carrying capacity of the river. Increased surface water intake could reduce the rivers carrying capacity and therefore increase deposition at each location where surface water intake is increased.

The DEIR/DEIS used a calibrated SRH-Meander model that relied on the Upper Sacramento River Daily Operations Model (USRDOM) daily flows from 1980 to 2010 to predict channel meandering from 2010 to 2030. (DEIR/DEIS, section 8.3.2.2.) Thus, the model was calculated using flows from 1980 – 2010. The severity of the 2012-2017 drought indicates it is likely that we will experience periods of more extreme drought followed by periods of extreme flood events. The DEIR/DEIS does not include any discussion of how the Project will function under those conditions and how impacts may change. In addition, the CALSIM II includes data only through 2003, omitting 15 years of operations that are highly relevant to understanding the potential impacts of the Project. CDFW recommends the DEIR/DEIS include a discussion of how 15 years of omitted data may have affected the modeled results as well as how the Project will function under extreme drought and flood conditions.

The DEIR/DEIS assumes that because water and sediment are both already being diverted at the Delevan Pipeline, the concentration of the sediment in the river would remain unchanged, and therefore, concludes the Project, under each alternative, will have a less than signification impact on sediment concentration. This assumes there is a one to one relationship that holds true regardless of the reduced flow. The CDFW recommends the DEIR/DEIS include the additional scientific data necessary to support this assumption.

Lake and Streambed Alteration

The DEIR/DEIS refers to a regulatory definition of a stream in California Code of Regulations, title 14, section 1.72. CDFW does not rely on this definition of stream for purposes of Fish and Game Code section 1602, and as a matter of law, section 1.72 does not define "stream" for the purpose of Fish and Game Code section 1602. In addition, the applicability of section 1602 of Fish and Game Code to altered or artificial waterways is not solely based on the value of those waterways to fish and wildlife resources but also natural history of such waterways, the hydrologic conditions, the resources they support, and other similar values.

California Endangered Species Act

Section 4.2.5 summarizes the process for obtaining a consistency determination under Fish and Game Code section 2080.1, but it does not include discussion of take authorization under section 2081, subdivision (b) of the Fish and Game Code. CDFW recommends that the DEIR/DEIS include discussion of the incidental take permit process in addition to the consistency determination process.

Section 4.4.2 identifies "consultation" with CDFW regarding California Endangered Species Act as an anticipated State permit or authorization. "Consultation" applies to federal Endangered Species Act. CDFW recommends revising the DEIR/DEIS to identify that the Project will acquire appropriate take authorization under Fish and Game Code sections 2080.1 and 2081, subdivision (b).

Similarly, Table 4-1 lists Section 2081 Management Agreement as a type of permit or approval for take of State-listed species. Please clarify the intended method for obtaining incidental take authorization for State-listed endangered, threatened, and candidate species or rare plants pursuant to current State law.

The DEIR/DEIS identifies various CESA-protected species with the potential to occur within the Project site and may be affected by the Project. Take of species that are listed as endangered or threatened under CESA, or designated as candidates for such listing, is prohibited without appropriate authorization. (Fish & G. Code § 2080, 2085.) Take is defined as "hunt, pursue, catch, capture or kill or attempt to hunt, pursue, catch, capture or kill." (Fish & G. Code § 86.) CESA take authorization, should be obtained if the proposed Project has the potential to result in take of a State-listed threatened, endangered, or candidate species, or rare plants.

Issuance of a CESA permit by CDFW is subject to CEQA; therefore the CEQA document must specify impacts, mitigation measures, and a mitigation monitoring and reporting program. If the proposed Project would impact CESA listed species, CDFW encourages the Authority to engage in early consultation, because significant modification to the proposed Project and mitigation measures may be required in order to obtain a CESA permit. A CESA permit may only be obtained if the impacts of the authorized take of the species are minimized and fully mitigated and adequate funding has been ensured to implement the mitigation measures. In addition, CDFW may only issue a CESA permit if the CDFW determines that issuance of the permit does not jeopardize the continued existence of the species. CDFW will make this determination based on the best scientific information available, and include consideration of the species' capability to survive and reproduce, including the species known population trends and known threats to the species.

Terrestrial Biological Resources

Deferred Mitigation

CEQA Guidelines section 15126.4, subdivision (a)(1)(B) states that formulation of mitigation measures should not be deferred until some future time. The DEIR/DEIS lists a number of mitigation measures for biological resources that rely on future approvals or agreements as a means of bringing identified significant environmental effects to below a level of significance. For example, Mitigation Measures Wild-1a and 1b states that appropriately timed surveys shall be conducted for species as necessary in coordination with United States Fish and Wildlife Service (USFWS) and CDFW, and acreages of habitat loss shall be determined and compensated for in consultation with USFWS, CDFW, and the United States Army Corps of Engineers (USACE). As stated above because there is no guarantee these approvals or cooperation with all of the involved entities will ultimately occur or what measures they would contain, they should not be considered sufficient measures to reduce impacts to less than significant. The DEIR/DEIS must identify enforceable measures that will reduce the impacts to biological resources to a less-than-significant level.

CEQA requires that any activity resulting in loss of habitat, decreased reproductive success, or other negative effects on population levels of special-status species should be addressed in the DEIR/DEIS. There should be a clear impact assessment that outlines the temporary and permanent effects of the Project on all biological resources within and surrounding the Project site. If it is not possible to avoid impacts to special-status species, the DEIR/DEIS must identify feasible mitigation that reduces project impacts to a less-than-significant level.

Where it is infeasible to define mitigation measures with specificity, the DEIR/DEIS should establish performance standards to evaluate the success of the proposed mitigation, provide a range of options to achieve the performance standards, and commit the lead agency to successful completion of the mitigation. Mitigation measures should describe when the mitigation measure will be implemented, and explain why the measure is feasible. As discussed above, Mitigation Measures Wild-1a and 1b, and others, do not meet these requirements. Therefore, CDFW recommends the DEIR/DEIS include measures that are enforceable and do not defer the details of the mitigation to the future.

Fully Protected Species

The DEIR/DIES identifies multiple State fully protected species that have the potential to occur within the Project area. Take of fully protected species is unlawful and subject to enforcement under the Fish and Game Code. The only way for a project to obtain incidental take authorization for any fully protected species is through the development of a Natural Community Conservation Plan (NCCP) (Fish and G. Code, § 2800 et seq.). CDFW recommends the DEIR/DEIS include a discussion of potential for take of fully protected species, and identify measures to completely avoid take of these species.

Nesting Birds

All measures to protect nesting birds should be performance-based, meaning that they will be implemented in a way to ensure they reduce impacts and avoid take under potentially changing circumstances and depending on the individual species present. While some birds may tolerate disturbance within 250 feet of construction activities, other birds may have a different disturbance threshold and "take" could occur if the temporary disturbance buffers are not designed to reduce stress to an individual pair. CDFW recommends including performance-based protection measures for avoiding all nests protected under the Migratory Bird Treaty Act and Fish and Game Code sections 3503, and 3513. A 250-

foot exclusion buffer may be sufficient; however, a buffer may need to be increased based on the birds' tolerance level to the disturbance. Below is an example of a performance-based protection measure:

> Should construction activities cause the nesting bird or raptor to vocalize, make defensive flights at intruders, get up from a brooding position, or fly off the nest, then the exclusionary buffer will be increased such that activities are far enough from the nest to stop the agitated behavior. The exclusionary buffer should remain in place until the chicks have fledged or as otherwise determined by a qualified biologist.

Giant Garter Snake

The DEIR/DEIS states that the giant garter snake (*Thamnophos gigas*) has potential to occur within the Project site and may be affected by the Project. Giant garter snake is listed as a threated species under CESA and as such it is afforded full protection under the Act.

The Project would have a substantial adverse effect on giant garter snake because the construction of the Project would require direct alteration of known giant garter snake habitat specifically during the construction of the Delevan Pipeline. The giant garter snake is a highly aquatic, wetland obligate species endemic to California. Historic habitat was largely in tule marshes in the Central Valley, ranging from Kern County to Butte County (Hansen and Brode 1980). Giant garter snakes typically occur in slow-moving, warm aquatic environments like marshes, sloughs, and ponds. They have adapted to using irrigation canals and rice fields as natural wetlands have been reduced in the Central Valley (Halstead et al. 2010). Small mammal burrows in upland habitat are generally used for cover and retreat during the active season and for refuge from flood waters during the dormant season (Halstead et al. 2015).

Causes of decline are largely related to habitat loss and fragmentation of wetland habitat. Up to 98 percent of historic giant garter snake habitat in the Central Valley has been lost to development, including agricultural lands (Ellis 1987). Mechanical vegetation management along canal banks such as disking, mowing, and dredging of canals can result in direct mortalities and destruction of basking vegetation and burrows used for refugia. Rodent control along canal or levee banks including burrow grouting can also contribute to loss of habitat and direct mortality.

Based on the foregoing, CDFW considers that Project impacts on giant garter snake would be significant. Due to the likely significant adverse effects to giant garter snake, the Department recommends obtaining take coverage through an incidental take permit which will likely include habitat replacement at a CDFW approved mitigation bank with available giant garter snake credits, or through land acquisition in fee or with a conservation easement to protect managed marsh habitat.

Transmission Line Risks

The Project has the potential to impact birds by increasing their exposure to electrical transmission lines and mortality from electrocution or striking the lines. This is of concern given the Project's location in relation to key resident and migratory bird habitat. The Project is located fewer than five miles from the Sacramento National Wildlife Refuge Complex (SNWR Complex), which is comprised of five National Wildlife Refuges (NWR; Sacramento, Delevan, Colusa, Sutter, and Sacramento river), located between Interstate 5 and Highway 99 in Tehama, Glenn, Butte, Colusa, and Sutter Counties. The proposed transmission line alignment runs approximately one mile south of the Sacramento NWR, along the northern edge of Delevan NWR, and fewer than five miles south of the Sacramento river NWR. The SNWR Complex provides nearly 70,000 acres of wetland, grassland, and riparian habitats for a wide variety of resident and migratory birds, including waterfowl, shorebirds, raptors, waterbirds, and songbirds. The SNWR Complex supports nearly 300 species of birds, many of which are State and/or federally protected, including, but not limited to: bald eagle (*Haliaeetus leucocephalus*), Swainson's hawk (*Buteo swainsoni*), white-tailed kite (*Elanus leucurus*), greater sandhill crane (*Grus canadensis tabida*), western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), willow flycatcher (*Empidonax traillii*), and bank swallow (*Riparia riparia*). The SNWR Complex is located within the Pacific Flyway and provides wintering habitat and breeding grounds for thousands of waterfowl. Additionally, the SNWR complex provides recreational opportunities including bird and wildlife watching, auto tours, hiking, hunting, photography, biking, geocaching, fishing, and environmental education.

Utility structures such as transmission lines pose electrocution and collision risks to raptors and other birds (APLIC and USFWS 2005). Powerlines may kill hundreds of thousands of birds annually due to electrocution (Manville 2005). Electrocution has been documented as the cause of death of many raptor species in the United States, with eagles and hawks (of the Genus *Buteo*) typically at greatest risk (APLIC and USFWS 2005). Raptors such as golden eagles (*Aquila chrysaetos*), red-tailed hawks (*Buteo jamaicensis*), osprey (*Pandion haliaetus*), and great-horned owls (*Bubo virginianus*) are especially at risk for electrocution due to their large wingspans (APLIC and USFWS 2005). Eagles are the most commonly reported electrocuted birds, with golden eagles reported by Harness (1997) 2.3 times more frequently than bald eagles (*Haliaeetus leucocephalus*) in the western United States (Manville 2005). Red-tailed hawks and great-horned owls are the most commonly reported electrocuted hawk and owl species as reported by Harness (1997) and Harness and Wilson (2001) (Manville 2005). Additionally, birds other than raptors, such as corvids, small flocking birds, and wading birds, can also be electrocuted (APLIC and USFWS 2005). As many as 175 million birds may be killed annually due to collisions with powerlines (Manville 2005). Some studies have shown that waterbirds (e.g., waterfowl, gulls, shorebirds, etc.) are most susceptible to collisions near wetlands and raptors and passerines are most susceptible to collisions in upland habitats away from wetlands (Erickson, Johnson, and Young 2005).

CDFW is concerned the Project transmission line would pose an electrocution and collision risk to resident and migratory birds, including State and federally protected species, within the Project area. To reduce the risk of Project-induced electrocution and collision to birds, CDFW recommends the Project design and construct all transmission lines and associated facilities in accordance with the current Avian Power Line Interaction Committee (APLIC) guidelines: *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* and *Reducing Avian Collisions with Power Lines: The State of the Art in 2012* and revise the DEIR/DEIS as appropriate.

Botanical Resources

Throughout the Botanical Resources chapter of the DEIR/DIES the current California Rare Plant Ranks are referred to by "California Native Plant Society (CNPS) Rare Plant" lists, which is no longer the standard terminology. Additionally, some of these rankings are either incorrect, out of date, or missing threat ranks. CDFW recommends a review and/or modifications of this section to use current California Rare Plant Ranks terminology and correct rankings.

Page 13-15 of the Botanical Resources chapter indicates that land was not surveyed on properties for which authorized access was not obtained, private residences and yards, cemeteries, agricultural fields, and some bedrock stream channels and vertical slopes. This comprises a potentially large area within the Project area that may be impacted by Project activities, and may contain populations of rare plants. CDFW recommends completing an encompassing survey of all lands that could be impacted by the Project.

Botanical surveys were conducted in 1998 and 1999 within the reservoir footprint, and in 2000 through 2003 for potential conveyance routes, recreation areas, and road relocations. These surveys are out of date. CDFW recommends resurveying all areas associated within the Project area that would be impacted. Botanical surveys should be conducted over multiple years and multiple seasons/year to accurately document the species composition of a site. Some plants to do not emerge every year, and it would be easy to miss these plants if only one survey is conducted. CDFW's recommends conducting surveys consistent with *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (CDFW 2009).

The mitigation measure Bot-1a for "Impact Bot-1" states that compensatory mitigation measures for vegetation community impacts will be implemented in coordination with USFWS, CDFW, CNPS, and USACE. As stated above, this measure provides no certainty these approvals or cooperation with all of the involved entities will ultimately occur or what measures would be undertaken. Coordination should not be considered a sufficient measure to reduce impacts to less than significant. The DEIR/DEIS must identify enforceable measures that will reduce the impacts to biological resources to a less-than-significant level. Where it is infeasible to define mitigation measures with specificity, the DEIR/DEIS should establish performance standards to evaluate the success of the proposed mitigation, provide a range of options to achieve the performance standards, and commit the lead agency to successful completion of the mitigation. Mitigation measures should also describe when the mitigation measure will be implemented and explain why the measure is feasible. Therefore, the CDFW recommends the DEIR/DEIS include measures that are enforceable and do not defer the details of the mitigation to the future.

Recreation

Section 21.1 states "Recreation is one of several benefits typically provided by public and private water supply projects." "Popular recreation activities in California fall into two categories: (1) water-dependent activities, such as boating, waterskiing, swimming, and fishing; and (2) water-enhanced activities, such as wildlife viewing, camping, hiking, and hunting." However, the analysis in the DEIR/DEIS focuses solely on boat ramp accessibility, without analyzing potential impacts to these other recreational resources. CDFW recommends that the DEIR/DEIS discuss potential impacts to these water-enhanced activities in addition to the operations-related recreational activities that were evaluated.

Section 21.3.2.2 states the analysis only evaluated the operational portion of recreation-day value, meaning that the analysis did not consider the development of a recreational fishery, or a plan to create a sustainable fishery for recreation. The section states the guidelines used are intended to express the net benefit of a reservoir to a recreationist in terms of two equally weighted factors: (1) variety and quality of recreation, and (2) aesthetic qualities of the site. CDFW recommends providing an explanation as to why only some components of recreational activities were evaluated.

As cited in DEIR/DEIS, Table 12-5, several gamefish have been documented in the creeks within the inundation area including largemouth bass (*Micropterus salmoides*), redear sunfish (*Lepomis microlophus)*, bluegill (*Lepomis macrochirus*), green sunfish (*Lepomis cyanellus*), Chinook salmon and Sacramento pikeminnow (*Ptychocheilus grandis)*. The DEIR/DEIS also states that there are several stock ponds that likely hold gamefish and children have been observed fishing in the area. There is very little data on what recreational value the existing fisheries provide. The inundation area has the potential to provide quality recreational fisheries with the appropriate foresight. CDFW recommends a fisheries development plan outlining target species composition for Sites Reservoir including stocking strategy, habitat enhancement measures, and monitoring efforts to be included.

The DEIR/DEIS states that five recreation areas are possible but only three will be constructed. CDFW recommends including a detailed discussion of the methods to be used to prioritize the potential recreation areas to be constructed. CDFW recommends that any potential recreation areas within drawdown areas be prioritized for wildlife oriented recreation. In addition, CDFW recommends the DEIR\DEIS include a discussion of all recreational uses that will be provided by Sites Reservoir. Within this discussion, the document should include hunting as a compatible use in the recreation areas and lands surrounding the proposed reservoir.

Cumulative Impacts

The DEIR/DEIS concludes that, across all impact areas, there will be no cumulative impacts resulting from the Project. Based on population trends of native anadromous and pelagic fish that are steadily declining under existing regulatory conditions, CDFW considers that the additional extraction of water at the proposed bypass flow rates would exacerbate concerns and generate cumulatively considerable impacts. Table 35-1 provides a summary of present and foreseeable actions included in the cumulative impact analysis, but it appears to exclude a number of significant activities affecting fish and wildlife resources in the Project area. CDFW recommends that a list of relevant cumulative projects be provided with each resource section and the lead agency review for completeness.

Some of the programs, plans, and policies missing include: the lower American River Modified Flow Management Standard, the State Water Project Contract Extension, the Agricultural Drainage Selenium Management Program, the West Sacramento Levee Improvements Program, the Central Valley Flood Protection Plan, FloodSAFE California, the Lower Yolo Restoration Project, the Contra Costa Water District Intake and Pump Station (Alternative Intake Project), 2009 National Marine Fisheries Service Biological Opinion and Conference Opinion for the Coordinated Long-Term Operation of the CVP/SWP, the 2008 United States Fish and Wildlife Service Biological Opinion for Delta smelt for the Coordinated Long-Term Operation of the CVP/SWP, the Central Valley Flood Management Program, the San Joaquin River Restoration Program, the Recovery Plan for Sacramento-San Joaquin Delta Native Fishes, the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Implementation Plan, the Delta Plan, the California Water Action Plan, California EcoRestore, and the Davis-Woodland Water Supply Project.

ENVIRONMENTAL DATA

CEQA requires that information developed in environmental impact reports and negative declarations be incorporated into a database which may be used to make subsequent or supplemental environmental determinations (Pub. Resources Code, § 21003, subd. (e)). Accordingly, please report any special status species and natural communities detected during Project surveys to the California Natural Diversity Database (CNDDB). The CNNDB field survey form can be found at the following link: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/CNDDB_FieldSurveyForm.pdf. The completed form can be mailed electronically to CNDDB at the following email address: CNDDB@wildlife.ca.gov. The types of information reported to CNDDB can be found at the following link: http://www.dfg.ca.gov/biogeodata/cnddb/plants_and_animals.asp.

FILING FEES

The Project, as proposed, would have an impact on fish and/or wildlife, and assessment of filing fees is necessary. Fees are payable upon filing of the Notice of Determination by the Lead Agency and serve to help defray the cost of environmental review by CDFW. Payment of the fee is required in order for the underlying project approval to be operative, vested, and final. (Cal. Code Regs, tit. 14, § 753.5; Fish & G. Code, § 711.4; Pub. Resources Code, § 21089.)

CONCLUSION

Pursuant to Public Resources Code §21092 and §21092.2, CDFW requests written notification of proposed actions and pending decisions regarding the proposed Project. Written notifications should be directed to: California Department of Fish and Wildlife North Central Region, 1701 Nimbus Road, Rancho Cordova, CA 95670.

CDFW appreciates the opportunity to comment on the DEIR/DEIS to assist in identifying and mitigating Project impacts on biological resources. CDFW personnel are available for consultation regarding biological resources and strategies to minimize and/or mitigate impacts. Questions regarding this letter or further coordination should be directed to Jeff Drongesen, Environmental Program Manager at (916) 207-2823 or Jeff.Drongesen@wildlife.ca.gov.

Sincerely,

Kevin Thomas
Acting Regional Manager

ec: Jeff Drongesen, Environmental Program Manager
Chad Dibble, Environmental Program Manager
Garry Kelley, Environmental Program Manager
Jason Roberts, Acting Environmental Program Manager
Jennifer Nguyen, Senior Environmental Scientist (Supervisor)
Colin Purdy, Senior Environmental Scientist (Supervisor)
Shannon Little, Attorney III
Kyle Stoner, Senior Environmental Scientist (Specialist)
Department of Fish and Wildlife

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Appendix 9

January 12, 2018

VIA ELECTRONIC MAIL

Draft EIR/EIS Comments
Sites Project Authority
P.O. Box 517 Maxwell, CA 95955
EIR-EIS-Comments@SitesProject.org

To: Draft EIR/EIS Comments

COMMENTS ON DRAFT ENVIRONMENTAL IMPACT REPORT/ENVIRONMENTAL IMPACT STATEMENT FOR THE SITES RESERVOIR PROJECT, GLENN AND COLUSA COUNTIES.

Thank you for the opportunity to comment on the draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for construction and operation of the Sites Reservoir Project and associated facilities near the town of Maxwell, California. The mission of the State Water Resources Control Board (State Water Board) and the 9 Regional Water Quality Control Boards throughout the state (Regional Boards) is to preserve, enhance and restore the quality of California's water resources, and ensure their proper allocation and efficient use for the benefit of present and future generations. The State Water Board administers water rights in California and the State and Regional Boards have primary authority over the protection of the State's water quality. The Sites Project will require both water right and water quality approvals from the State Water Board and Central Valley Regional Board (collectively Water Boards). Accordingly, the Water Boards are responsible agencies for the project pursuant to the California Environmental Quality Act (CEQA). As responsible agencies under CEQA, the Water Boards must review and consider the environmental effects of the project identified in the EIR/EIS that are within their purview and reach their own conclusions on whether and how to approve the project. (Cal. Code Regs. tit. 14 section 15096, subd. (a).) Accordingly, the Water Boards submit these joint comments.

Permits and Certifications Needed for the Project from the Water Boards
The Sites Project will require various approvals from the Water Boards, including water right and water quality approvals. To facilitate these approvals, the CEQA document must analyze the impacts of the project on water quality and beneficial uses and identify feasible alternatives and appropriate mitigation measures. The Sites Project Authority (Authority) should fully evaluate the need for approvals for the project from the Water Boards and begin the application process early as the permits are often time consuming to acquire. Permits that may be required are discussed below. A well written and thorough CEQA document that includes specific mitigation measures and monitoring and evaluation provisions will be needed for these permitting processes.

Water Rights

The draft EIR/EIS states that Sites Reservoir will be filled entirely with Sacramento River water diverted at two to three locations, depending on the project alternative under consideration. The draft EIR/EIS further states that the Authority intends to file an application to appropriate water by permit with the State Water Board to seek authorization for these proposed diversions, and that any application filed would likely be consistent with the project described in State Water Right Filing A025517.

Two initial findings are required before a permit can be issued: (1) unappropriated water is available to supply the applicant, and (2) the applicant's appropriation is in the public interest. If the proposed appropriation does not meet these criteria, conditions may be imposed to ensure they are satisfied or the application may be denied. A permit may only allow diversion and use of that amount of water that the applicant has demonstrated is necessary for the proposed purpose for as long a time as the project is deemed reasonable and is diligently pursued. For State Water Right Filings, the board must also make other findings related to consistency with the original intention of the state filed application and determine that the diversion is not in conflict with water quality objectives. A water right hearing is also required for State Water Right Filings and to resolve unresolved protests against water right applications. In all likelihood, the Sites Project water right permitting process will require an evidentiary State Water Board hearing. The water right hearing process can be very time consuming depending on the number of parties and issues and the other hearing proceedings currently before the board. A thorough environmental analysis with appropriate mitigation and monitoring will be essential to that process.

Water Availability

The draft EIR/EIS estimates that the amount of Sacramento River water available for appropriation by the proposed project each year would range from zero in critical and dry years to 1 million acre-feet (MAF) in wetter years, with the average annual diversion amount ranging from 480 to over 540 thousand acre-feet (TAF). The draft EIR/EIS states that these estimates are based on historic hydrologic data, senior water right demands, existing regulatory flow requirements, and certain assumptions regarding proposed project operations and associated diversion limitations necessary to maintain and protect anadromous fish and water quality in the San Francisco Bay and Sacramento-San Joaquin Delta (Bay-Delta).

State Water Board staff will consider the hydrologic analyses, diversion limitations, and water availability findings included in the final EIR/EIS when processing any water right application filed for the proposed project. However, the State Water Board is required to make its own, independent findings on the availability of unappropriated water to supply the proposed project as a prerequisite to any water right permitting decision. In determining the amount of water available for appropriation, the State Water Board must take into consideration the public interest and the amounts of water required for recreation, preservation and enhancement of fish and wildlife resources, and water quality. Additional hydrologic analysis may be required during the water right permitting process to inform and support these findings per the below comments related to necessary bypass flows for the project. The additional analysis may ultimately lead to water availability findings and associated diversion restrictions that differ from those presented in the draft EIR/EIS.

Clean Water Act (CWA) Section 401, Water Quality Certification

Discharge of dredged or fill material to waters of the United States requires a Clean Water Act (CWA) Section 401 Water Quality Certification (Water Quality Certification). Typical activities include any modifications to these waters, such as stream crossings, stream bank modifications, filling wetlands, etc. Water Quality Certifications are issued in combination with CWA Section 404 Permits issued by the United States Army Corps of Engineers. Both the Section 404 Permit and Water Quality Certification must be obtained prior to site disturbance, because this project involves a water right activity, the application for a Water Quality Certification should be submitted to the State Water Board who will coordinate with the Regional Board on its processing.

Isolated Wetlands and Other Waters Not Covered by the Federal Clean Water Act
Some wetlands and other waters are considered “geographically isolated” from navigable waters and are not within the jurisdiction of the CWA (e.g., isolated wetlands, vernal pools, or stream banks above the ordinary high water mark). Discharge of dredged or fill material to these waters may require either individual or general waste discharge requirements from the Regional Board. If the U.S. Army Corps of Engineers determines that isolated wetlands or other waters exist at the project site, and the project impacts, or has the potential to impact, these non-jurisdictional waters, a Report of Waste Discharge and filing fee must be submitted to the Regional Board. The Regional Board will consider the information provided and either issue or waive Waste Discharge Requirements.

Any person discharging dredge or fill materials to waters of the State must file a report of waste discharge pursuant to Sections 13376 and 13260 of the California Water Code. Both the requirements to submit a report of waste discharge and apply for a Water Quality Certification may be met using the same application form, found at:

http://www.waterboards.ca.gov/centralvalley/water_issues/water_quality_certification/wqc_application.pdf

General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (CGP)
Construction activity, including demolition, resulting in a land disturbance of one acre or more must obtain coverage under the CGP. The Sites Reservoir Project must be conditioned to implement storm water pollution controls during construction and post-construction as required by the CGP. To apply for coverage under the CGP the property owner must submit Permit Registration Documents electronically prior to construction. Detailed information on the CGP can be found on the State Water Board website:

http://www.waterboards.ca.gov/water_issues/programs/stormwater/gen_const.shtml

Wastewater Application/Report of Waste Discharge
The current project design includes a number of potential recreational areas which may require onsite sewage treatment and disposal systems. Additionally, the project proposes the construction of one or more power generation facilities associated with the construction of dams. CWC Section 13260 requires that, anyone who initiates a discharge of waste that could affect the quality of waters of the state must submit a report of waste discharge to the Regional Board. The discharges of wastes from sewage systems and power generation facilities including but not limited to floor drains, sumps, and turbine lubrication infrastructure to surface water(s) or land may require a permit (Waste Discharge Requirements, or WDRs) from the Regional Board. A complete application for WDRs (referred to as a Report of Waste Discharge, or ROWD) must be submitted at least 140 days prior to discharging waste. The applicant should contact Regional Board staff to discuss this process.

Bypass Flows and Diversion Rates

The draft EIR/EIS indicates that diversions from the Sacramento River for the Sites Project could occur during any month of the year but would occur most frequently between December and March of wet and above normal years. The maximum proposed diversion rate is 5,900 cubic-feet per second (cfs) with an annual average diversion amount of about half a MAF. These diversions would result in a corresponding decrease in Sacramento River inflow and Delta outflow in winter and spring (Appendix 12C). The draft EIR/EIS identifies proposed Sacramento River bypass flows at Red Bluff, Hamilton City, and Wilkins Slough based on existing minimum flow requirements. The draft EIR/EIS also identified proposed bypass flows at Freeport on the Sacramento River based on month that range between 11,000 and 15,000 cfs that the EIR/EIS indicates "were designed to protect and maintain existing downstream water uses and water quality in the Delta" (page 3-106).

As part of the Phase II update to the Water Quality Control Plan for the San Francisco/Sacramento-San Joaquin Delta (Bay-Delta Plan), the State Water Board is currently considering new and modified Sacramento River inflow, Delta outflow, and cold water habitat objectives, as well as other requirements to ensure the reasonable protection of fish and wildlife beneficial uses. In support of this effort, the State Water Board released a final science report identifying the science upon which Phase II changes to the Bay-Delta Plan will be based, as well as the conceptual basis for those changes this fall. The final science report is available at:

https://www.waterboards.ca.gov/water_issues/programs/peer_review/docs/scientific_basis_phase_ii/201710_bdphaseII_sciencereport.pdf.

While the State Water Board has not completed the update to the Bay-Delta Plan, and its findings may ultimately differ from the conclusions in the science report, the timing and volume of bypass flows are an important issue in the Bay-Delta Plan and other regulatory processes. Thus, it would be prudent for the draft EIR/EIS to include a broader range of bypass flows so that it can be used for future permits and other regulatory approvals.

The science report documents the current ecological crisis in the Bay-Delta watershed and the associated population declines of multiple native aquatic species to historic low levels. The science report concludes that present Sacramento River inflow, Delta outflow, and cold water habitat management requirements are inadequate for the protection of these species. In particular, on average, annual outflow from the Delta into the Bay has been reduced by more than half and sometimes by much greater quantities at critical times for native species, according to the report. Additionally, because existing Bay-Delta Plan flow requirements are far below current flow levels most of the time, the report indicates that additional regulatory requirements are needed to prevent flows from being substantially reduced in the future. The report states that the January to June time period is one of the most impaired seasons with current median Delta inflow and outflow being less than half of unimpaired flows. Loss of functional flows in this winter and spring time period reduces potential recruitment opportunities and the viability of native aquatic species communities, including listed species. The report concludes that higher winter and spring Sacramento River inflow and Delta outflow requirements are necessary to increase the recruitment of these species. Higher Sacramento inflows also increase the magnitude, duration and frequency of flooding in the Yolo and Sutter Bypasses, important habitat for juvenile salmonids and Sacramento splittail.

The proposed Sites Reservoir Project Freeport bypass flows are lower than existing median flow levels during the sensitive winter and spring period and substantially less than existing flows from January through March (see science report page 2-22). The proposed bypass flows are also less than the flows that the Phase II science report indicates are needed for the restoration of native fish and wildlife (see science report page 3-48). Accordingly, we recommend that the draft EIR/EIS include a detailed justification for the proposed Freeport and upstream bypass flows (including the magnitude and timing). In addition, in order to inform the State Water Board's future decisions related to this project, the draft EIR/EIS should analyze a range of bypass flows and lower diversion rates that are consistent with the Phase II science report regarding needed measures for the protection of fish and wildlife. Further, specific pulse flows that improve migration conditions for native species, natural geomorphic processes and other important ecological functions should also be evaluated and proposed.

Delta Smelt and Other Important Native Fish and Invertebrate Species in the Bay-Delta Estuary

The 2015 Interagency Ecological Program Delta Smelt Management Analysis and Synthesis Team (MAST) report found that there was a positive relationship between Delta outflow in February-June and the index (20 - millimeter) of larval Delta smelt after 2003. The outflow abundance relationship became statistically stronger when the index was standardized by the number of sub-adult smelt in the previous year's fall midwater trawl index suggesting that the number of available spawners (stock recruitment index) and the magnitude of spring outflow are both important for determining larval abundance. Yet the draft EIR/EIS states that there is no known correlation between Delta outflow and Delta smelt abundance (Appendix 12B-13). The Sites Project will reduce baseline Delta outflows between January and March (Appendix 12C), which could negatively impact Delta smelt. This potential impact should be evaluated and any appropriate mitigation should be identified.

In addition, the draft EIR/EIS did not evaluate the impact of the project on Starry flounder, California bay shrimp, and important zooplankton food species for native juvenile fish species, including *Neomysis mercedis*, *Eurytemora affinis* and *Pseudodiatpomous forbesi*. Decreases in these zooplankton species are likely to result in decreases in recruitment of native larval fish. The abundance of all three zooplankton species and Starry flounder increase with increasing Delta outflow in winter and spring. The EIR/EIS should evaluate the impacts of the project on Starry flounder and the three zooplankton species and the effect of the reduction in secondary zooplankton production on recruitment of native fish and propose any appropriate mitigation measures.

Entrainment Losses of Native Fish

The Sites Project will increase the amount of water available for export at the Central Valley Project and State Water Project (Project) pumping facilities. The Project facilities divert water from the southern Delta causing reverse flows on Old and Middle Rivers (OMR). The magnitude of reverse OMR flows is affected by the magnitude of Project pumping. OMR reverse flows result in the entrainment of multiple native species into the southern Delta. The U.S. Fish and Wildlife Service (USFWS) has determined that entrainment at the Project facilities remains a significant ongoing threat to the Delta smelt population. The draft EIR/EIS used the Kimmerer regression model (see Appendix 12G-1) to estimate Delta smelt entrainment losses; however, the regression model does not include prescreen losses in southern Delta channels. The draft EIR/EIS also did not evaluate Project-induced entrainment losses for white and green sturgeon and Sacramento splittail. All three species are salvaged at Project facilities. The EIR/EIS should evaluate these potential impacts and propose any appropriate mitigation measures.

Fish Screens
The Sites Project will divert most of its water during the winter and spring when smaller weaker swimming juvenile emigrating salmonids will be in the Sacramento River rather than during the late spring and summer when agricultural diversions currently occur at the existing points of diversion. The effectiveness of the fish screens that are part of the project at avoiding entrainment of these sensitive life stages of native species should be evaluated, including the direct loss of larval fish that might pass through the louvers and be entrained into Sites Reservoir or the indirect loss of fish that are impinged on the screens, disoriented, and later consumed by predators. The EIR/EIS should also evaluate the potential for the diversion facility to become a predator hotspot and propose any appropriate mitigation.

Funks Creek and Stone Corral Creek Diversions and Associated Instream Flow Releases
The draft EIR/EIS initially states that Sites Reservoir will be filled entirely with water from points of diversion on the Sacramento River, but goes on to describe how water would also be diverted to Sites Reservoir from Funks and Stone Corral Creeks via the proposed Golden Gate Dam (Stone Corral Creek) and Sites Dam (Funks Creek) (Page 6-51). Text on Pages 6-51 and 9-20 seems to suggest that water diverted at these locations would be held in Sites Reservoir for the sole purpose of flood control, and not for storage and beneficial use at a later date pursuant to an appropriative water right. Ultimately, the intent of these diversions is not clear. The EIR/EIS should clarify the intent of the proposed diversions at Funks and Stone Corral Creeks and the proposed instream flow releases for these creeks below Sites Reservoir including the rate, timing, duration, and amount of proposed minimum instream flow releases as well as the underlying basis and/or supporting rationale for each.

- On Page 6-51, the draft EIR/EIS states that a minimum instream flow release of up to 10 cfs would be maintained in both streams <u>year-round</u>. No rationale or scientific basis for this instream flow prescription is provided, although text on Page 3-52 indicates that it is based on a recommendation from the California Department of Fish and Wildlife and is intended to replace existing seepage flow from Funks Dam.

- On Page 15-21, the draft EIR/EIS states that it would operate Sites and Golden Gate Dams to release stream maintenance flows of up to 10 cfs <u>from October through May</u> to mimic the ephemeral nature of Funks and Stone Corral Creeks. Again, no rational or scientific basis for this 10 cfs instream flow prescription is provided, and the proposed October-May release period is different than the year-round release period described above.

- On Page 9-20, the draft EIR/EIS states that Sites and Golden Gate Dams would be operated to match pre-project flows (other than flood flows) through the reservoir inlet/outlet works. This is different than the minimum instream flow and maintenance flow prescriptions described above (10 cfs) in that historic flow data presented on Page 6-32 indicates that (non-flood) flows in Stone Corral Creek and Funks Creek typically exceed 10 cfs during the winter and early spring.

Diversions on Funks and Stone Corral Creeks
The draft EIR/EIS does not address the effects of the proposed Funks Creek (Golden Gate Dam) and Stone Corral Creek (Sites Dam) diversions on geomorphic conditions and processes downstream of Sites Reservoir (e.g., gravel recruitment and channel maintenance). The associated environmental impact analysis for aquatic resources also does not fully evaluate the

potential effects of these diversions on special status species known to exist in both waterbodies. The analysis is limited to fish passage (Page 12-86), and concludes that the diversions on Funks Creek and Stone Corral Creek would have a less-than-significant impact on fish movement without providing information on fish migration under existing conditions or the fish passage conditions that would exist under the post-construction instream flow regime that would be controlled almost entirely by flow releases from Sites and Golden Gate Dams. The report also does not provide information on spawning and rearing opportunities before and after construction of the facility. Chapter 8 (Geomorphology) and Chapter 12 (Aquatic Resources) of the EIR/EIS should include a thorough description of existing conditions in these stream reaches, and the conditions that would exist under the proposed post-construction instream flow regime and propose any appropriate mitigation for potential impacts.

Methylmercury Production and Bioaccumulation

New impoundments often develop elevated levels of methylmercury in water and fish tissue after construction as naturally occurring terrestrial vegetation decays in the reservoir. In addition, methylmercury will be in water released from the reservoirs. Mercury sources to reservoirs include source water, atmospheric deposition, mercury mines in the watershed, and geologic formations. Elevated methylmercury in fish tissue poses a health risk for people and wildlife consuming the fish. Fish in the lower Sacramento River and Delta are already impaired by methylmercury and additional methylmercury loads from the Sites Reservoir Project may increase methylmercury levels in these fish. Black Butte Reservoir, Stony Gorge Reservoir, East Park Reservoir, Indian Valley Reservoir and Colusa Basin Drain are near the proposed Sites Reservoir and have fish advisories recommending limited human consumption of fish and are also on the 303(d) list for mercury. These water bodies, like Sites Reservoir, receive coast range runoff and/or Sacramento River water. The EIR/EIS should evaluate the potential for the construction and operation of the Sites Reservoir Project to methylate mercury and its subsequent bioaccumulation in reservoir fish. In addition, the EIS/EIR should evaluate potential increases in fish methylmercury levels in the Sacramento River and Delta due to methylmercury in reservoir water releases. Since these may be significant impacts, the EIS/EIR should propose mitigation measures and methylmercury monitoring in water and fish to monitor the Project's effects both within and downstream of the reservoir.

Cyanobacterial Blooms

Cyanobacterial blooms can release toxins that are hazardous for human and wildlife health. Other shallow nearby coast range impoundments including Clear Lake and Black Butte Reservoir regularly experience cyanobacteria blooms. Cyanobacteria cells have also been observed in nearby Stony Gorge Reservoir and East Park Reservoir although concentrations were not at toxic levels. The frequency and magnitude of cyanobacterial blooms are expected to increase in California with global warming. Diverted storm-water flows from the Sacramento River will carry elevated concentrations of nitrogen, phosphorous and other nutrients into Sites Reservoir. When these waters warm in summer they may produce algal blooms, including cyanobacteria and associated toxins. The EIR/EIS should evaluate the potential for blue green algal blooms and hazardous levels of toxins to occur in Sites Reservoir and propose any appropriate mitigation. Due to the increased risk of cyanobacterial blooms and potential impacts, mitigation, monitoring and public response procedures for ensuring protection of public health and minimization of environmental impacts must be considered in the EIR/EIS. Regional Board staff is available to share the most recent reservoir monitoring data and discuss successful monitoring and remediation strategies.

Temperature Effects

The EIR/EIS states that: *"The design of the reservoir facility would include the ability to release water from proposed outlet structures at nine depths. This operation would pull water from various levels of the reservoir (it is assumed that the reservoir would become stratified like all larger reservoirs throughout the Central Valley), with warming in the upper layer of the reservoir occurring in the summer months. Given the Project's operational objective of matching the temperature of released water at the Delevan Pipeline Intake/Discharge Facilities to temperatures in the Sacramento River, or otherwise using the release to protect downstream water temperature for aquatic species, operations of the Delevan Pipeline Intake/Discharge Facilities would involve withdrawing water at suitable depths to manage temperatures"* (page 3-102). Given that the reservoir would be constructed on the Valley floor where temperatures are warmer and the reservoir would not be filled with snowmelt runoff like other Central Valley reservoirs and the effects of climate change, it is not clear that such operations would be possible. The basis for assuming that such operations are possible should be explained. Appropriate monitoring and mitigation should also be proposed to ensure that temperature impacts do not result from the project, including appropriate temperature modeling to guide reservoir operations. A thorough description of how the project would operate in conjunction with Shasta Reservoir and other reservoirs to provide the indicated temperature benefits and avoid impacts should also be provided.

Benefit of Temperature Control

The draft EIR/EIS states: *"The CALSIM II model results are used as inputs to the water temperature models, including the Upper Sacramento River Water Quality Model (USRWQM), Reclamation's Temperature Model, the Folsom Reservoir CE-QUAL-W2 Temperature Model, and the Sites Reservoir Discharge Temperature Model…it was determined that incremental changes of 0.5° F in mean monthly water temperatures would be within model uncertainty…changes of 0.5° F or less are considered to be not substantially different, or "similar" in this comparative analysis."* However, throughout the draft EIR/EIS and the modeling Appendices there are indicated temperature benefits that average 0.38 degrees that are within the stated confidence limits of the models. It is not clear that these benefits should be indicated given the uncertainty of the modeling. This issue should be clarified.

Thank you again for the opportunity to provide comments on the draft EIR/EIS. Water Boards staff are available to work with the Authority on the above comments and on referenced permitting processes. Scott Frazier is available to coordinate on matters before the State Water Board and can be contacted at (916) 341-5289 or Scott.Frazier@waterboards.ca.gov. George Low is available to coordinate on matters before the Regional Board and is available at (530) 224-4205 or George.Low@waterboards.ca.gov.

Sincerely,

ORIGINAL SIGNED BY

Diane Riddle, Asst. Deputy Director
Division of Water Rights
State Water Resources Control Bd.

ORIGINAL SIGNED BY

Adam Laputz, Asst. Executive Officer
Rancho Cordova Office
Central Valley Regional Water Quality Control Bd.

Appendix 10

Save California Salmon

California Sportfishing Protection Alliance
CSPA
Since 1983

Pacific Coast Federation of Fishermen's Associations
PCFFA
Stewards of the Fisheries

Environmental Water Caucus

california water impact network

Planning and Conservation League

Institute for Fisheries Resources

CRAB BOAT OWNERS ASSOCIATION, Inc.
2907 Jones Street
San Francisco, California 94133-1115
415-885-1180

Since 1971
the Northcoast Environmental Center
www.yournec.org

S.A.F.E.
Alternatives for our Forest Environment

Southern California Watershed Alliance

California Native Plant Society
Sacramento Valley Chapter

EJCW
Water Justice for All

PARC
protect american river canyons

Butte Environmental Council
Protecting Butte County's Land, Air & Water Since 1975

Fly Fishers
Davis, California

Friends of the River
Since 1973

Sacramento River Council

California Wilderness Coalition

GoldenGate Salmon Association

Fly Fishers International
Northern California Council

The Bay Institute

Winnemem Wintu Tribe
Middle River People

Coast Action Group

March 17 2019

Mr. Jim Watson
Sites Project Authority
P.O. Box 517
Maxwell, CA

Re: Request For A Recirculated Draft Sites Reservoir EIS/EIR

Dear Mr. Watson:

It is our understanding that the Sites Project Authority (SPA) is planning on release of a final EIS/EIR in March 2020. We are requesting a revision and recirculation of the Draft Sites Reservoir EIS/EIR (DEIS/EIR) prior to release of a final EIS/EIR because the initial DEIS/EIR was inadequate under the law to fully describe the project, reasonable alternatives, impacts and appropriate mitigation measures. The inadequacy of the DEIS/EIR was clearly pointed out in comment letters by numerous organizations and individuals, including many of our organizations and the California Department of Fish and Wildlife (CDFW).[1]

The DEIS/EIR was inadequate to meet the legal requirements of CEQA and NEPA as described in detail below, but more importantly, the project as described to date does not resolve the fundamental issue of what will be the minimum bypass flows for the Sacramento River. This is a key issue that underlies the basic water yield and economic feasibility of this project.

The California Department of Fish and Wildlife has recommended a much higher minimum bypass flow in the Sacramento River than is being proposed by the SPA (13,000 cfs compared to 3,250 cfs at Red Bluff, 4,000 cfs at Hamilton City and 5,000 cfs at Wilkins Slough).[2] The impacts to the Sacramento River fishery have not been adequately described in the DEIS/EIR, nor is there an alternative analyzed in the DEIS/EIR that would provide the flow recommendations by CDFW.

[1] See Friends of the River's website on Sites Reservoir for comment letters on the Sites DEIS/EIR at https://www.friendsoftheriver.org/our-work/rivers-under-threat/sacramento-threat-sites/

[2] See CDFG letter of 1/12/18, page 9 "*CDFW recommends the Project proponents revise the bypass flow requirement to maintain at least 13,000 cfs past all diversion facilities prior to the diversion of water to reduce impacts on out-migrating juvenile salmonids.*" Accessed at https://www.friendsoftheriver.org/wp-content/uploads/2018/09/1-12-2018-CDFW-Sites-Project-Letter.pdf

It is impossible for anybody to know if this project is cost effective and promised environmental public benefits can be delivered until the Sacramento River minimum bypass flow issue is resolved. The SPA's recommendation for Sacramento River minimum bypass flows appears to justify a finding of financial feasibility, but how feasible will the project be if CDFW's minimum bypass flows are legally required? We believe this issue must be fully and adequately analyzed in the DEIS/EIR, prior to any water rights hearing or other permitting process that will rely on the information in the DEIS/EIR.

Due to the extensive and significant issues listed above, a recirculated draft document addressing these deficiencies is necessary for the Sites Project to comply with NEPA and CEQA. The existing DEIS/EIR is inadequate and cannot be relied upon for preparation of a Final EIS/EIR. Therefore, we urge you to prepare a recirculated draft EIS/EIR for the proposed Sites Reservoir to fully disclose impacts, alternatives and mitigation measures. You would do a disservice to your own cause to do otherwise.

Sincerely,

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Jean Hays, ED Leadership Team
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And Freedom Earth Democracy
Skyhorse3593@sbcglobal.net

Attachment: Kamman Hydrology Analysis of Sites DEIS/EIR on Trinity River

cc: California Water Commission Members
Representative Jared Huffman
Karuk Tribe
Hoopa Valley Tribe
Yurok Tribe
Humboldt County Board of Supervisors
Trinity County Board of Supervisors
Eileen Sobeck, Executive Officer SWRCB
Charlton Bonham, Director CDFW

Specific List of Issues That Must Be Addressed in a Recirculated Draft EIS/EIR For The Sites Project

1. **Foreseeable Impacts to Trinity River Water Temperature Objectives Associated with Sites Project Operations Need to be Evaluated with an Accurate Temperature Model.** The revised Trinity River Division water operations associated with the Sites Project (shifting diversions to winter/spring from summer/fall in dry years) violates the 2000 Trinity Record of Decision and will lead to increased water temperatures in Lewiston Reservoir and downstream in the Trinity River. The Draft EIS/EIR does not disclose the impact, even though the proposed operation would clearly increase river temperatures, meaning that the temperature model is not accurate. Any increase in the temperature of water released to the Trinity River would degrade water quality conditions and increase the potential for violations of North Coast Basin Plan water quality (temperature) objectives protective of adult spring and fall Chinook, as well at the water temperature objectives established under the Trinity River Record of Decision to protect outmigrating juvenile salmonids. The water temperature model developed by USGS for the Trinity River should be used to evaluate the impacts to Trinity River water temperatures and attainment of water temperature objectives See detailed comments in attached memo from Kamman Hydrologics.

2. **Foreseeable Impacts to Trinity River Associated with Trinity Lake Carryover Storage.** The Sites Project water operation and temperature analyses assume a minimum Trinity Reservoir carryover storage volume of 600TAF, thereby impacting Trinity River water temperatures. Water temperature modeling for the Trinity River, including studies by the Bureau of Reclamation, indicate that initial October 1 carryover storage volumes of 600- and 750-TAF are not sufficient to satisfy Trinity River temperature objectives for a single dry/critically dry water year-type, let alone multi-year droughts. It is reasonable to foresee that current implementation of the ROD Flows without sufficient carryover storage will not achieve Trinity River temperature objectives during critically dry year-types and possibly not meet objectives of the ROD for the Long-Term Plan to Protect Adult Salmon in the Lower Klamath River. Additionally, Trinity Reservoir storage has no chance of being replenished during multi-year droughts. See detailed comments in attached memo from Kamman Hydrologics.

3. **Inaccurate Existing (Baseline) TRD Water Operations.** The water operations analysis for Sites Project EIR/S did not include an analysis considering use of Humboldt County's 50 TAF water contract included as a provision of the Trinity River Division Act of 1955. The ROD for the Long-Term Plan to Protect Adult Salmon in the Lower Klamath River (Lower Klamath ROD) identifies Humboldt County's 50 TAF water contract as a volume of water available to release into the Trinity River to reduce the probability of a fish kill in the Lower Klamath River. The omission of the Humboldt County 50 TAF contract and the Lower Klamath ROD in the DEIR/S analyses could have significant effects on projected CVP water deliveries and the water quality conditions and potential impacts to both the Trinity and Sacramento Rivers. Therefore, the DEIR/S should be considered incomplete in the analysis of the effects of the Site Project operations on the Trinity River. See detailed comments in attached memo from Kamman Hydrologics.

4. **Incomplete Cumulative Impact Assessment Pertaining to TRD Operations.** Several issues were not evaluated as part of the cumulative impact assessment that will likely have adverse impacts on the Trinity River including (1) the impact of the 600 TAF minimum carryover storage in meeting Trinity River water temperature objectives during multi-year droughts, (2) accounting for Humboldt County's 50 TAF water contract, and (3) the influence of climate change on meteorology and hydrology of northern California rivers. See detailed comments in attached memo from Kamman Hydrologics.
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5. **Mitigation for Trinity/Lower Klamath Impacts.** Effective mitigation measures must be recommended to ensure that fishery/fish habitat management objectives for the Trinity River and lower Klamath River will be met. The Bureau of Reclamation has used the auxiliary outlet on Trinity Dam to release colder water during drier years, but this action results in the loss of power generation and this impact on CVP power generation needs to be evaluated as it relates to revised Trinity operations as proposed for Sites.

6. **Narrow Scope of Alternatives.** The DEIS/EIR should include a wider range of alternatives rather than only alternatives that maximize attaining project benefits of increasing water supply. Alternatives that achieve varying levels of project objectives while minimizing project impacts should be developed and evaluated.

7. **No Action Alternative and Existing Conditions.** Assuming the existing conditions and No Action alternatives are the same is inappropriate, compromises the ability to compare impacts across alternatives, and may minimize the magnitude of some of the impacts. The faulty assumption that State and Federal water contractors would be projected to use their full contracted water volumes (2030 projected conditions) does not reflect the current water management (existing condition) and likely provides inaccurate impact results. Because of this, the no action alternative minimizes potential impacts and greatly reduces the mitigation responsibilities required under CEQA.

8. **Sites Project Water Rights and Potential Unforeseen/Undisclosed Impacts**. The DEIS/EIR does not sufficiently address the acquisition of water rights for the Sites Project nor does it address water over-allocation issue in the Central Valley. Also, potential impacts of acquiring these water rights and the associated water to be stored in Sites Reservoir on other streams/watersheds must be evaluated.

9. **Cumulative Impacts.** The conclusion presented in the DEIS/EIR that there are no cumulative impacts associated with the Sites Project is flawed. An evaluation of cumulative impacts is necessary to comply with the law. With the declining status of the fishery resources in the Sacramento-San Joaquin Basin and the Delta, reduction of flows in the Sacramento River by the proposed Sites Project operations would contribute to the decline of these populations in a cumulative manner. Changes in proposed diversions from the Trinity Basin would also have cumulative impacts on the fishery resources of the Klamath-Trinity Basin. Additionally, many

actions are not identified in the cumulative impacts section and need to be included in the cumulative impacts analysis including: the ROD for the Trinity River Mainstem Fishery Restoration (without modifications to diversions to the Sacramento River as proposed in the DEIS/EIR), the ROD for the Long-Term Plan to Protect Adult Salmon in the Lower Klamath River (as proposed), the lower American River Modified Flow Management Standard, California Water Fix, the Temperance Flat Dam proposal, the proposed enlargement of Shasta Dam, the State Water Project Contract Extension, the Agricultural Drainage Selenium Management Program, the West Sacramento Levee Improvements Program, the Central Valley Flood Protection Plan, FloodSAFE,, the Lower Yolo Restoration Project, the Contra Costa Water District Intake and Pump Station (Alternative Intake Project), 2009 National Marine Fisheries Service Biological Opinion and Conference Opinion for the Coordinated Long-Term Operation of the CVP/SWP, , the new Biological Assessment and NOAA Fisheries consultation regarding the State and Federal Water Projects, the 2008 United States Fish and Wildlife Service Biological Opinion for Delta smelt for the Coordinated Long-Term Operation of the CVP/SWP, the Draft Environmental Impact Statement for Revisions to the Coordinated Long-Term Operation of the Central Valley Project and State Water Project, the Central Valley Flood Management Program, the San Joaquin River Restoration Program, the Recovery Plan for Sacramento-San Joaquin Delta Native Fishes, the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Implementation Plan, Bay Delta Phase 2 plan updates, the California Water Action Plan, California EcoRestore, and the Davis-Woodland Water Supply Project.

10. **Sites Reservoir Operating Procedures/Priorities Absent.** The operating /accountable entity of the Sites Project is not identified, and no operating rules/procedures are provided. The DEIS/EIR identifies four potential uses of stored water (supplemental deliveries to TC Canal, GC Canal and RD108 settlement contractors; increasing deliveries to wildlife refuges; increasing water reliability for CVP and SWP contractors; and releases for delta water quality) but no rule set with priorities and volumes to be used to meet these uses are provided. These procedures must include integration of the Sites Project with CVP, SWP, and other water management projects.

11. **Tribal Consultation and Mitigation Absent.** There is no Tribal consultation outside the footprint area and there are cultural resources within the foot print area with no mitigation measures discussed for their protection. AB-52 tribal consultation is now required and federal Tribal consultation has always applied.

12. **Compliance with California Endangered Species Act (CESA).** As identified in the DEIS/EIR, CESA protected species may be affected (take) by the Sites Project and any take must be authorized by CDFW by a CESA permit which is also subject to CEQA. Impacts, mitigation actions with an associated monitoring and reporting program much be included in the CEQA document supporting the CESA permit. In addition, Klamath River spring Chinook are now a candidate species under CESA and must be considered.

13. **Hydropower Licensing.** Since it is likely that hydropower facilities would be constructed as part of the project, a detailed descriptions and operation protocols of the proposed facilities and analyses of potential impacts should be presented in the DEIS/EIR. A description of the steps, including timelines, that will be taken to obtain FERC approval for the project should also be provided.

14. **Environmental Baseline/Modeling**. The source of much of the information used in the modeling and impact assessment appears to be outdated (it is difficult to discern the source of some of the data) and likely does not reflect the current understanding of the system using the best available data. Without the use of updated, contemporary models the information presented in the document on potential impacts are highly questionable.

15. **Bypass Flows and Diversion Rates.** The DEIS/EIR indicates diversions to the Sites Project would reduce flows in the Sacramento River and Delta outflows, especially in the winter in spring. Potentially significant flow reductions in the Sacramento River, especially during dry and critically dry water years, will likely have significant biological impacts on fish species in the river at those times. The proposed bypass flows of 3,250 cfs at Red Bluff, 4,000 cfs at Hamilton City and 5,000 cfs at Wilkins Slough are less than those needed to restore native fish and wildlife identified in the State Water Resources Control Board report "*Scientific Basis Report in Support of New and Modified Requirements for Inflows from the Sacramento River and its Tributaries and Eastside Tributaries to the Delta, Delta outflows, Cold Water Habitat, and Interior Delta Flows*" (https://www.waterboards.ca.gov/water_issues/programs/peer_review/docs/scientific_basis_phase_ii/201710_bdphaseII_sciencereport.pdf). Justification for these flow magnitudes should be presented and impacts of these flows that are insufficient for restoration of native fish species should be thoroughly evaluated. The timing of the Sites Project diversions during winter and spring will eliminate or greatly diminish the effectiveness of higher releases of water from Shasta Dam to meet environmental needs if it remained in the river. Additionally, potential mitigation measures to address these decreased flow impacts such changing diversion timing and magnitude, a variety of pulse flows to improve outmigration conditions for fishes, and other physical/biological/ecological processes should be proposed and evaluated. An alternative using Sacramento minimum bypass flows of no less than 13,000 cfs recommended by CDFW should be fully analyzed.

16. **Reduced Delta Outflows and impacts on Delta Smelt and Other Important Bay-Delta Species.** The draft EIS/EIR erroneously states there is no relationship between winter/spring Delta outflows and Delta smelt abundance. Information presented in the Interagency Ecological Delta Smelt Management Analysis and Synthesis Team report (2015) shows a positive relationship between larval Delta smelt abundance and winter-spring Delta Outflows. The impacts on larval Delta smelt abundance resulting from reduced winter-spring Delta outflows due to Sites Project operations needs to be evaluated and necessary mitigation actions identified. Additionally, the impacts of reduced Delta outflows on the zooplankton community should be evaluated because of their critical importance as food for larval fishes.

17. **Delta and Longfin Smelt Impacts due to Old and Middle River Reverse Flows.** The DEIS/EIR acknowledges the potential increase of Old and Middle River reverse flows during some summer, fall, and winter months due to increased pumping at the CVP and SWP facilities but does not adequately assess the impact on Delta smelt and Longfin smelt. In addition to the estimated losses due to entrainment in the CVP/SWP facilities, losses in Old and Middle River (and other affected waterways) occurring before the diversion facilities, the areas where the majority of mortality occurs, must be evaluated.

18. **Water Quality and Beneficial Use Impacts.** Diverting higher-quality water from the Sacramento River will likely lead to water quality degradation at downstream sites and these potential impacts are not evaluated. The Sacramento River and Delta already suffer from water quality impairments (temperature, heavy metals, nutrients, pesticides) and decreasing flows will only exacerbate these problems. This not only impacts the aquatic resources but also potentially agricultural and domestic uses of these waters.

19. **Sacramento River Flow and Temperature Modeling.** The use of an outdated version of the CALSIM II model not calibrated to current data is inappropriate. This model is based on a monthly timestep which is not appropriate for modeling impacts on habitat availability and water temperature. Water temperature analyses should be based on daily time steps because of the potential sub-lethal and lethal effects of temperatures on aquatic organisms due to daily or weekly changes. The water quality analyses that use the weekly time-step information from CALSIM II would not capture this shorter timeframe impacts. The shorter timestep for habitat modeling such as weekly would be more appropriate.

20. **Sacramento River Temperature Effects.** The assumption that a multi-level outlet structure to manage releases water temperatures to match those of the Sacramento River needs to be evaluated and appropriate information presented. The Sites Reservoir will be a relatively shallow and large surface area impoundment that may not provide the stratification and resulting cold water pool necessary to effectively manage water temperature releases to preserve cold water fishes. Modeling of reservoir water volume and thermal dynamics, using information from similar reservoirs, should be conducted, and potential impacts on attaining the objective of releasing the same water temperature as the Sacramento River disclosed. Incorporation of operations procedures using the multi-level outlet should be presented and an evaluation of how these procedures, using anticipated volumes of cold-water storage and release patterns, is needed to evaluate the effectiveness of this component of the proposed action. Additionally, an explanation and modeling data of how Sites Project operations will be incorporated CVP and SWP operations in meeting temperature objectives should be presented.

21. **Impacts to Floodplain Habitat.** Sites Project operations will reduce flows in the Sacramento River and may impact the timing and duration that fish have to high quality habitat in the Yolo

and Sutter bypasses. An annual time-series analyses of flow impacts on access to, duration of connectivity and extent of habitat availability of these floodplain habitats is needed.

22. **Evaluation of Fishery Impacts Lacking.** Fishery resources in the Sacramento-San Joaquin and Klamath-Trinity Basins contribute to significant tribal, commercial, and recreational fisheries within these river systems and along the coasts of California and Oregon. An evaluation of the cultural, social and economic impacts on these fisheries must be included in the document to fully disclose potential impacts. The is no supporting documentation on how the fishery impact information presented in the DEIS/EIR were derived and many statements pertaining to fishery impacts are unsupported. There is no information concerning the potential impacts on spring and fall Chinook salmon, Coho salmon, and steelhead populations in the Klamath-Trinity. The DEIR/EIS should evaluate how alternatives would impact different runs and species as well as the fisheries that depend on these resources, including impacts on port facilities, marinas, bait shops, motels, and restaurants that benefit from these fisheries.

23. **Water Quality – Toxic Metals.** Potential significant water quality issues pertaining to toxic metals are not evaluated in the DEIS/EIR. Although data are limited, the source water for the Sites Reservoir (Sacramento River, Funks and Stone Corral creeks) indicate high levels of many metals that exceed water quality standards. In addition to the high concentrations of metals present in streams inundated by the project, additional leaching from soils under the reservoir, known for high concentrations of mercury, will occur when these soils are inundated. The impacts of toxic metals on water quality in the reservoir and impacts to the Sacramento River water quality from Sites Project release needs to be analyzed. Additionally, the potential impacts to the reservoir fishery due to chronic toxicity/mortality and public health/fish consumption concerns needs to be evaluated.

24. **Methylmercury.** Many impoundments near the proposed Sites Project (Black Butte, Colusa Drain, Indian Valley Stony Gorge) have fish advisories due to elevated mercury levels. There is a potential for methylmercury creation and subsequent bioaccumulation in fish resulting from the implementation of the Sites and this should be modeled, evaluated and any potential mitigation measures proposed.

25. **Noxious Algal Blooms**. Blue-green algal are common in shallow reservoirs in California near the proposed Sites Project as well as downstream in the Delta. The potential for noxious algal blooms should be evaluated under the proposed operation plan and potential mitigation measures to minimize algal blooms and minimize public health issues should be proposed.

26. **Water Quality – Salinity**. Sites Reservoir will inundate areas where known saline springs exist. The impact of these salt springs on the water quality of the reservoir and the releases into the Sacramento needs to be evaluated.

27. **Geomorphology.** The problematic geomorphic analyses (errors/inconsistencies in data presented on geomorphic impacts, inappropriate citations, apparent analyses of alternatives that are different than the proposed alternatives) requires reanalysis of the potential geomorphic impacts. Increases in sediment entrainment of 55% in the Tehama-Colusa Canal and 46% in the Glenn-Colusa Canal suggest that there are significant undisclosed geomorphic impacts which could affect riverine and riparian habitats adjacent to these canal intakes.

28. **Entrainment Losses of Native Fish**. The amount of water available to be pumped through the Federal and State pumping facilities will be increased with the Sites Project. The potential impacts to larval and juvenile fishes (salmonids, Delta smelt, white and green sturgeon, Pacific Lamprey, and other native species) should be evaluated. This evaluation should not just estimate losses of entrainment as was done in the draft EIS/EIR but also estimated losses in southern delta channel prior to fish reaching the screening facilities. The mitigation actions to address the potentially significant impacts of impingement, entrainment and stranding are not sufficiently defined to ensure that impacts are minimized. These mitigation actions need to be developed with appropriate performance criterial so the effectiveness of these actions can be assessed.

29. **Fish Screens**. Effectiveness of fish screens and fish mortality associated with entrainment into the Sites Project or impinged on screens should be evaluated. With the majority of the diversions occurring during the winter and spring, impacts to larval and small juvenile fishes migrating past the Sites Project can be significant.

30. **Impacts on Funks and Stone Corral creeks**. Impacts to the instream habitats and dependent fish populations in Funks and Stone Corral creeks are not evaluated. No justification for the instream flows of “up to 10 cfs” in these creeks is provided. The method for establishing this flow level should be provided. An evaluation of how these flow levels will impact physical processes necessary to maintain stream habitats and impacts to aquatic habitats and fish populations should be included.

31. **Reservoir Fishery Impacts from Pumping Plant Operation:** Since a recreational fishery is an anticipated benefit of the Project, the potential impacts of the pumping/power generation between the reservoirs should be evaluated in the context of the sustainability of a recreational fishery. Stating that a fishery impact analysis was not conducted because no reservoir exists is not sufficient. Mitigation measures to minimize pumping/power generation impacts to recreational fisheries such as screening or timing of operations should be proposed.

32. **Recreation.** The presentation of potential recreation benefits of the Sites Project presented in the DEIS/EIR is insufficient. Only boat ramp accessibility is evaluated, presumably to inform fishing/boating use, but no information on other recreational activities (swimming, bird watching, camping, hunting, etc.) are provided. Additionally, the potential for the development of a reservoir fishery should include a fish management plan. While the development of a

warm-water reservoir fishery may be a recreational benefit, the potential impact of increased non-native predators on native fish populations needs to be evaluated.

33. **Wildlife Mitigation Actions**. Future agreements with other public or private entities for mitigation actions to address significant wildlife and terrestrial habitat impacts are not acceptable because there is no guarantee these actions will be implemented. Mitigation actions should be feasible and the agency needs to commit to ensuring these actions are fully implemented to reduce project impacts to less than significant prior to project approval.

34. **Need for a Natural Community Conservation Plan (NCCP).** A plan for the development and implementation of a NCCP must be included because the Sites Project affect several species that may occur in the Sites Project area.

35. **Nesting Birds.** Sites Project activities must be implemented in a manner that eliminates disturbance to the nests/nesting birds protected under the Migratory Bird Treaty and Fish and Game Code. Depending on the species, the disturbance distance of activities may be variable and, if established buffer distances are found to be ineffective at minimizing disturbance through monitoring of nests, the buffer must be increased to eliminate the disturbance.

36. **Giant Garter Snake.** The Giant Garter Snake, a CESA protected species, may occur in the areas within the Sites Project and the Project would negatively alter giant garter snake habitats resulting in significant impacts to this species. Implementable and enforceable actions must be included to address these significant impacts and appropriate CESA permits obtained.

37. **Botanical Surveys.** Information contained in the DEIS/EIR is insufficient to determine the impacts on botanical resources within the Sites Project area. Botanical surveys must be redone, data included in the DEIS/EIR are from the late 1990's and early 2000's, and must include all areas affected by the project. Accepted scientific protocols should be used to conduct these surveys.

38. **Botanical Resources Mitigation.** Using information from updated botanical surveys, implementable actions, with the commitment to fully implement them until they effectively mitigate for project impacts, need to be include in the document. These actions must include sufficient detail to allow for determination of their feasibility and likelihood for success.

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January 21, 2019

Mr. Noah Oppenheim, Pacific Coast Federation of Fishermen's Association (PCFFA)
Mr. Thomas Stokely, Save California Salmon

Subject: Review of Draft Environmental Impact Report/Statement
Sites Reservoir Project

Dear Mr. Oppenheim and Mr. Stokely:

I have reviewed the Draft Environmental Impact Report/Draft Environmental Impact Statement (DEIR/S) for the Sites Reservoir (Sites) Project located in Glenn and Colusa Counties, California. The focus of my review was to evaluate if the Sites Project and associated Trinity River Division (TRD) of the Central Valley Project (CVP) operations would potentially impact the hydrology and water quality of the Trinity River. I am familiar with how TRD operations affect water temperatures as I have completed numerous water temperature modeling studies related to alternative operations of Trinity and Lewiston reservoirs with a focus on effects on downstream temperatures in the Trinity River. These studies were completed from 1997 through 2004. A copy of my resume is attached.

The DEIR/S indicates that the project poses less than significant impacts on the water quality to the Trinity River downstream of Trinity and Lewiston reservoirs. However, based on my review and analysis of the DEIR/S and other available information, I have identified a number of notable deficiencies in the water quality assessment that fail to identify and correctly analyze revised water operation impacts on Trinity River water quality (temperature) and, in turn, biological resources. Therefore, it is my opinion that the information presented in the DEIR/S is inadequate in evaluating potential adverse impacts to the water quality of the Trinity River. Nor does it propose mitigation measures for reasonably foreseeable adverse impacts to water quality and aquatic resources of the Trinity River. A discussion of the identified deficiencies is provided below.

1. Foreseeable Impacts to Trinity River Associated with Sites Project Operations
Based on my knowledge and experience in analyzing water temperature conditions of the TRD of the CVP, it is my opinion that the revised TRD water operations associated with the Sites Project will lead to increased water temperatures in Lewiston Reservoir and releases to the Trinity River. Any increase in the temperature of water released to the Trinity River would degrade water quality conditions and increase the potential for violations of North Coast Basin Plan[1] water quality (temperature) objectives as well at the water temperature objectives

[1] "Water Quality Control Plan for the North Coast Region" Footnote 5, Table 3-1, page 3-8.00: Accessed at http://www.waterboards.ca.gov/northcoast/water_issues/programs/basin_plan/083105-bp/04_water_quality_objectives.pdf

established under the Trinity River Record of Decision (USDOI 2000) to protect outmigrating juvenile salmonids[2].

I reached this conclusion through analysis of water resources system modeling results provided in Appendix 6B of the DEIR/S. Tables 1 through 3 are taken from Appendix 6B and present Trinity Reservoir storage, Trinity River flow and Clear Creek Tunnel diversion modeling results for both the Sites Project No Action Alternative and Alternative D under a variety of water year types. Table 1 presents a comparison of end of month (EOM) storage in Trinity Reservoir. The DEIR/S suggests incorrectly that the small differences between the No Action Alternative and Alternative D are not significant per the following statement (page 6-36).

> *The CALSIM II model monthly simulation of real-time daily (or even hourly) operation of the CVP and SWP results in several limitations in use of the CALSIM II model results. The model results must be used in a comparative manner to reduce the effects of use of monthly assumptions and other assumptions that are indicative of real-time operations, but do not specifically match real-time observations. Given the CALSIM II model uses a monthly time step, incremental flow and storage changes of 5 percent or less are generally considered within the standard range of uncertainty associated with model processing, and as such flow changes of 5 percent or less were considered to be similar to Existing Conditions/No Project/No Action flow levels in the comparative analyses using CALSIM II conducted in this EIR/EIS.*

Table 2 presents the monthly average releases to the Trinity River from Lewiston Reservoir. Apart from the 8.9% decline during December of Wet years, 8.6% to 31.2% decline in flows during February and March of Above Average water year-types, and the 24.2% drop during February of the Below Average water year-type, there are no reductions in flow under Alternative D that are considered significant in the DEIR/S.

Table 3 presents the changes in flow through the Clear Creek Tunnel, which represent diversions from Lewiston Reservoir (via the Carr power plant) to the Sacramento River and potentially Sites Reservoir. A general pattern seen in the these data is a shift in operations under the Project Alternative that increase the rate of diversions through the winter months (December-March) and reduce diversion rates through the summer/fall months (July-November) during dry and critically dry year types. I assume this change in operations is intended to provide more water to the Sacramento River during the winter to enhance

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Daily Average Not to Exceed	Period	River Reach
60°F	July 1- Sept 15	Lewiston to Douglas City Bridge
56°F	Sept 15-Oct 1	Lewiston to Douglas City Bridge
56°F	Oct 1- Dec 31	Lewiston to North Fork Confluence

[2] Trinity River Outmigrant Juvenile Salmonid objectives at Weitchpec (Trinity River Flow Evaluation (USFWS and HVT 1999) accessed athttp://www.trrp.net/library/document/?id=226

Normal, Wet and Extremely Wet	April 1-May 22	<13.0 C (<55.4 F)
	May 23-June 4	<15.0 C (<59.0 F)
	June 5-July 9	<17.0 C (<62.6 F)
Dry and Critically Dry	April 1-May 22	<15.0 C (<59.0 F)
	May 23-June 4	<17.0 C (<62.6 F)
	June 5-July 9	<20.0 C (<68.0 F)

the opportunity for diversion to Sites Reservoir. However, this change in operations would have a significant negative effect on the water temperatures in Lewiston Reservoir as well as the temperature of releases to the Trinity River.

Table 4 was developed in order to compare the total average flow through Lewiston Reservoir under the Sites Project No Action Alternative and Alternative D operations. The total flow through Lewiston Reservoir was computed by summing the average monthly flow values of releases to the Trinity River (Table 1) and flow through Clear Creek Tunnel (Table 3).

Due to its geometry and operations of the TRD, water temperatures in Lewiston Reservoir are highly variable. During the summer when there are relatively low and constant releases to the Trinity River and Carr power plant diversions are at capacity, the rate of flow through Lewiston Reservoir is sufficient to displace its entire volume in about 2.5 days and water temperatures remain relatively cool (Brown et al., 1992)[3]. On the other hand, when the Carr power plant is not operating, flow through Lewiston Reservoir stagnates and thermal stratification develops within days, typically leading to the warming of summer surface waters to between 60 and 70 F (15.6 and 21.1 C) (Ibid).

Modeling that I have completed suggests that total flow rates through Lewiston Reservoir (i.e. the sum of Carr power plant diversions and river releases) should be between approximately 800 cubic feet per second (cfs) during the late summer/early fall months of normal year-types and up to 1900 cfs during the summer/fall months of critically dry year-types in order to comply with downstream temperature objectives (Kamman, 1999a)[4]. The maximum late summer/early fall daily releases for releases to the Trinity River under the Trinity ROD range from 300 to 450 cfs. Thus, Carr power plan diversions (i.e., flow through Clear Creek Tunnel) would need to be maintained between 1450 and 1600 cfs to meet summer/early fall temperature needs during normal and critically dry years, respectively.

Based on this this information, it can be inferred that any decrease on total flow through Lewiston Reservoir during the summer/fall period would lead to increased temperatures in water released to the Trinity River as well as that diverted via the Carr power plant and Clear Creek Tunnel. Comparison of total flow rates through Lewiston Reservoir for Alternative D (Table 4) indicates significant reductions during most summer/fall months of the representative dry and critically dry year-types. Most notable are the reductions in flow and likely reservoir heating during the month of October, where flow through Lewiston Reservoir is reduced by 165% and 56% during dry and critically dry year-types, respectively, a time when meeting downstream temperature objectives is already compromised (Kamman, 1999b)[5].

Evaluation of average monthly temperature results for releases to the Trinity River presented in Appendix 7E (River Temperature Modeling) of the DEIR/S do not corroborate the anticipated increase in Lewiston Reservoir temperatures. Table 5 presents the DEIR/S temperature modeling results and

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[3] Brown, R., Yates, G., and Field, J. (1992) "Temperature Modeling of Lewiston Lake with the BETTER two-dimensional reservoir flow mixing and heat exchange model." *Rep*., Department of Transportation and Planning, Trinity County, Weaverville, CA.
[4] Kamman, G.R., 1999a, Temperature Analysis of Proposed Trinity River Fish and Wildlife Restoration Flow Alternatives using the BETTER Model: Prepared for: Trinity County Planning Department, June, 80p.
[5] Kamman, G.R., 1999b, Addendum to Temperature Analysis of Proposed Trinity River Fish and Wildlife Restoration Flow Alternatives using the BETTER Model: Cumulative Effects. Prepared for: Trinity County Planning Department, September, 7p.

suggests (contrary to the discussion above) that water temperatures in Lewiston Reservoir (i.e., temperature of releases to Trinity River) would decrease as total flow through the reservoir decreases. In fact, the temperature decreases are most pronounced during some dry and critically dry months of greatest reduction in flow rates through Lewiston Reservoir, when water temperatures would be increasing. This leads me to call into question the validity of the temperature model analysis of TRD operations presented in the DEIR/S.

More important is that the proposed change in TRD operations by the Sites Project directly conflicts with and reverses intended operations stipulated in the Secretary of Interior's 2000 Record of Decision (ROD) for the Trinity River Mainstem Fishery Restoration project. As you are aware, the modeling and temperature analysis work I completed for Trinity County back in the late 1990's contributed significantly to development of the instream flow and Carr power plant and Clear Creek Tunnel diversion schedules for the Trinity Preferred Alternative in order to better meet downstream temperature objectives. This work was accomplished through lengthy and focused analyses and meetings with project stakeholders and resulted in final preferred alternative operations with increased late summer CVP diversions to the Sacramento River. Acknowledging that even the river releases and temperatures from Lewiston Reservoir associated with the Preferred Alternative may not satisfy downstream temperature objectives, the Trinity Project ROD stipulates the following (page 20): "*Under the Preferred Alternative, the TRD would be operated to release additional water to the Trinity River, and the timing of exports to the Central Valley would be shifted to later in the summer to help meet Trinity River instream temperature requirements*". By proposing to reduce late summer CVP diversions to the Sacramento River, the Sites Project creates a foreseeable potential impact on Trinity River water quality by reversing the very operations associated with the Trinity River ROD that are intended to satisfy downstream water temperatures objectives and protect instream beneficial uses, particularly for salmon and steelhead.

This potential shift in TRD operations is concerning due to the fact that there are frequent exceedances of water temperature objectives under the current TRD ROD operations and flows. Recent studies completed by the U.S. Fish and Wildlife Service[6] provide data on how the TRD operations and ROD flows comply with downstream Basin Plan and Restoration Project temperature objectives. Appendix A from David and Goodman (2017), presented below, summarizes the exceedances to the Basin Plan (DGC and NFH locations) and Trinity River Restoration Project (TRWEI location) temperature objectives for the period 2001 through 2016.

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[6] David, A.T. and Goodman, D.H., 2017, Performance of water temperature management on the Klamath and Trinity Rivers, 2016. U.S. Fish and Wildlife Service, Arcata Fisheries Technical Report TR 2017-29, November, 72p; and
Polos, J. 2016. Adult salmon water temperature targets. Trinity River Restoration Program Performance Measure. Trinity River Restoration Program.

Appendix A. Number of days exceeding numeric water temperature objectives for the three specified locations on the Trinity River, 2001-2016. DGC = Trinity at Douglas City; NFH = Trinity above the North Fork Trinity; TRWE1 = Trinity above the Klamath.

Year	Objective locations: DGC	NFH	TRWE1	Forecast water year type	Actual water year type
2001	--	--	33[a]	Dry	Dry
2002	0	--	54	Normal	Normal
2003	11	--	34	Wet	Wet
2004	0	--	43	Wet	Wet
2005	--	1	21[b]	Normal	Wet
2006	6	0	18	Ex. Wet	Ex. Wet
2007	3	0	19	Dry	Dry
2008	1	4	0	Normal	Dry
2009	31	2	21	Dry	Dry
2010	6	7	10	Normal	Wet
2011	0	0	7	Wet	Wet
2012	0	1	25	Normal	Normal
2013	0	0	26	Dry	Dry
2014	18	15	53	Crit. Dry	Crit. Dry
2015	--	18	65	Dry	Dry
2016	14	3	52	Wet	Wet

[a] Data unavailable prior to 5/3 for TRWE1 in 2001. We assumed mean daily temperatures did not reach or exceed 15.0 C before this date.
[b] Data unavailable prior to 4/4 for TRWE1 in 2005. We assumed mean daily temperatures did not reach or exceed 13.0 C before this date.

These exceedances occur during all water year types, but with highest frequency during dry and critically dry year types. Of note in this Appendix are the high number of exceedances during the wet water year 2016. As reported by David and Goodman, the exceedances during 2016 are, in part, due to depletion of the cool water pool (carry-over storage) during the preceding 3-year drought period (2013-2015).

2. Foreseeable Impacts to Trinity River Associated with Trinity Lake Carryover Storage

Ordinarily in late summer, water temperatures in Trinity Reservoir are well stratified, displaying a layer of warm water above a deeper pool of much colder water. During this time, releases from Trinity Reservoir to Lewiston Reservoir occur through a submerged powerhouse outlet. If the reservoir is drawn down to a relatively low level, the upper warm layer may intersect the powerhouse outlet, releasing warm water to Lewiston Reservoir. In turn, these warm temperatures are propagated through Lewiston Reservoir to the Trinity River. As presented below, a number of studies have been completed to quantify the minimum October 1st carryover storage volume that is needed to protect against the introduction of warm summer water releases during various water year types and droughts.

In 1998, Trinity County retained KHE to evaluate how an intense multi-year drought would affect carryover storage in Trinity Reservoir (Kamman, 1998)[7]. The study approach included an

[7] Kamman, G.R., 1998, Carryover Storage Analysis – Simulated (1928-1934) period. Prepared for: Trinity County Planning Department, May 22, 3p

interannual accounting of Trinity Reservoir storage during a series of representative water year-types similar to those experienced during the 1928-1934 drought.[8] Water releases from Trinity Lake were based on the water year type for Trinity Division operations[9] under the ROD Flows. A series of interannual Trinity Reservoir water budgets were developed with initial carryover storage volumes ranging from 750- to 2000-TAF.

Study results (Kamman, 1998) indicate that under CVP operations to meet ROD Flows, there is a net annual increase in Trinity Reservoir storage during normal (1928) year-types, but decrease during dry (-17.5 TAF) and critically dry (-341 TAF) year-types. Thus, when starting with 750 TAF of storage, Trinity Reservoir storage would have dropped below 200 TAF after the third year of the drought, primarily driven by storage reductions experienced during critically dry years. Study results also indicate that a starting storage volume of 1250 TAF is required to maintain a minimum carryover storage of 600 TAF through the drought. However, modeling results (Kamman, 1999a and 1999b) indicate that even 600 TAF of carryover storage does not fully achieve compliance with temperature objectives during dry and critically dry year types. This study suggests that a minimum carryover storage volume of between 1250- and 1500-TAF during the first year of drought is likely required in order to provide the necessary water release temperatures to the Trinity River to meet downstream temperature objectives during subsequent years.

In addition to the work cited above, I am aware of other studies focused on identifying the minimum Trinity Reservoir carryover storage to provide the necessary cold water releases to satisfy river temperature objectives. In their 1992 testimony to the State Water Board, Finnerty and Hecht (1992)[10] concluded that Trinity Reservoir carryover storage of 900 TAF or slightly more may be needed to meet downstream temperature objectives during 90% of all years. Their conclusion was based on analysis of hydrology, reservoir operations and temperatures for 1991, a single critically dry year-type. The second study, completed by Deas in 1998[11] on behalf of Trinity County, included water temperature simulations of Trinity Reservoir using the Water Temperature Simulation Model (WTSM). Deas evaluated temperature compliance under 1990 dry year-type conditions assuming initial reservoir storage volumes of 750-, 1250- and 1500-TAF. Model simulation results indicated elevated water temperatures at the powerhouse intake elevation for the 750 TAF carryover storage scenario and minimal to no temperature concerns at initial carryover storage volumes of 1250- and 1500-TAF, respectively. Deas' findings of elevated temperatures associated with 750 TAF of carryover storage are corroborated in the 2012 report by Reclamation[12], which found that a September 30 carryover storage requirement of less than 750 TAF is "problematic" in meeting state and federal Trinity River temperature objectives

[8] The interannual water budget accounting started in 1928, a normal water year type.
[9] It is likely that CVP operations would change during drought periods. However, we did not have the knowledge or expertise to define such changes. Thus, the analysis used operations consistent with the earlier PROSIM simulations.
[10] Hecht, B. and Finnerty, A.A., 1992, Testimony to the State Water Resources Control Board regarding Carryover Storage in Trinity and Lewiston Reservoirs to Protect Public-interest Resources. State Water Resources Control Board Water Right Phase of the Bay-Delta Estuary Proceedings, June 26, 7p.
[11] Deas, M.L., 1998, Trinity Reservoir Carryover Analysis. Prepared for: Trinity County Planning Department, Natural Resources Division, August, 26p.
[12] U.S. Department of Interior, Bureau of Reclamation, 2012, Trinity Reservoir Carryover Storage Cold Water Pool Sensitivity Analysis – Technical Service Center (TSC) Technical Memorandum No. 86-68220-12-06. August 20, 7p.

protective of the fishery.

The Sites Project water operation and temperature analyses assume a minimum Trinity Reservoir carryover storage volume of 600TAF. The study findings presented above indicate that initial October 1 carryover storage volumes of 600- and 750-TAF are not sufficient to satisfy Trinity River temperature objectives for a single dry/critically dry water year-type, let alone multi-year droughts. Thus, it is reasonable to foresee that current implementation of the ROD Flows without sufficient carryover storage will not achieve Trinity River temperature objectives during critically dry year-types. Modeling results indicate that critically dry water year-types deplete reservoir carryover storage volumes at much higher rates than occurs during dry years. Whether dealing with dry or critically dry year-types, reservoir storage has no chance of being replenished during multi-year droughts under the current and proposed Sites Project CVP operations.

As determined by Finnerty and Hecht, a minimum baseline carryover storage volume of 900 TAF is required to meet Basin Plan temperature objectives on the Trinity River during a single dry year. Studies by Deas and Kamman suggest this baseline carryover storage volume is likely higher for critically dry year-types. Significantly higher carryover storage volumes over the baseline value are required to preserve the necessary reservoir cool water pool during multi-year drought periods, in order to achieve temperature objectives. Modeling studies suggest first year drought carryover storage volumes of around 1750 TAF are sufficient to maintain adequate carryover storage to meet temperature objectives during multi-year droughts. Thus, a single minimum carryover storage volume cannot be developed without revising CVP operations that focus on preserving Trinity Reservoir carryover storage, most likely by reducing water that is diverted out of the Trinity River basin.

The Sites Project DEIR/S presents the results of their modeling analyses as monthly average values of flow, storage and water temperature for multiple years within designated water-year type classifications. This presentation masks the impacts from a single extreme dry year as well as repeated impacts associated with a continuous multi-year drought. These are the periods of greatest concern and potential damage to aquatic resources, but they are not identified or described in the DEIR/S. Prior to 2016, the USGS[13] developed a water temperature model that accurately simulates daily mean water temperature along the course of the Trinity River, from Lewiston Dam to the Klamath River confluence. This model would be a more appropriate tool to evaluate how changes in TRD water operations associated with the Sites Project would satisfy water temperature objectives in the Trinity River.

3. Inaccurate Existing (Baseline) TRD Water Operations

The water operations analysis for Sites Project EIR/S did not include an analysis considering use of Humboldt County's 50 thousand acre feet (TAF) water contract included as a provision of the Trinity River Division Act. The following is an excerpt from the Statutory Authority Appendix contained in the DEIS for the Long-Term Plan to Protect Adult Salmon in the Lower Klamath River (Lower Klamath LTP)[14] describing Humboldt County's 50 TAF water contract.

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[13] Jones, E.C., Perry, R.W., Risley, J.C., Som, N.A. and Hetrick, N.J., 2016, Construction, calibration and validcation of the RBM10 water temperature model for the Trinity River, Northern California. U.S. Department of Interior, U.S. Geological Survey, Open-File Report 2016-1056, prepared in cooperation with the U.S. Fish and Wildlife Service and the Bureau of Reclamation, 56p.

[14] U.S. Department of Interior, Bureau of Reclamation, 2016, Long-Term Plan to Protect Adult Salmon in the Lower Klamath River, Humboldt County, California Draft Environmental Impact Statement, October.

Construction of the Trinity River Division (TRD) of the Central Valley Project (CVP) was authorized by the Act of August 12, 1955 (Public Law 84-386) (TRD Act). In section 2 of the 1955 TRD Act, Congress directed that the operation of the TRD should be integrated and coordinated with the operation of the CVP, subject to two conditions set forth as distinct Provisos in section 2 of that Act. The first of these two Provisos states that the Secretary of the Interior is authorized and directed to "adopt appropriate measures to insure the preservation and propagation of fish and wildlife" including certain minimum flows in the Trinity River deemed at the time as necessary to maintain the fishery. The second Proviso directs that not less than 50,000 acre-feet of water shall be released and made available to Humboldt County and other downstream users[15].

The recently released Solicitor's Opinion, M-37030, concludes that each of the two Provisos in section 2 of the TRD Act are "separate and independent limitations on the TRD's integration with, and thus diversion of water to, the CVP" and that the two Provisos may "require separate releases of water as requested by Humboldt County and potentially other downstream users pursuant to Proviso 2 and a 1959 Contract between the U.S. Department of the Interior, Bureau of Reclamation (Reclamation) and Humboldt County."[16] M- Opinion 37030 at 2. Formal 18 opinions of the Solicitor are binding on the Department of the Interior and its bureaus.

Chapter 6 and Appendix 6A of the Sites Project DEIR/S state that the project water operations modeling analyses adhered to 2000 Trinity River ROD releases to the Trinity River downstream of Lewiston Reservoir to meet instream flow requirements. The DEIR/S states, "The total volume of water released to the Trinity River ranges from approximately 368,600 AF in critically dry years to 815,000 AF in extremely wet years, depending on the annual water-year type (hydrology) determined as of April 1st (DOI, 2000). Table 6-2 shows the annual volumes, peak flows, and peak flow duration by water type." Table 6-2 from the DEIR/S is presented below. However, there is no mention of Humboldt County's 50 TAF annual water contract being integrated into the DEIR/S water resources system modeling and analysis. It is not possible to compare total annual modeled Trinity River releases from the DEIR/S (Table 2, attached) to the annual Trinity River ROD flow volumes (Table 6.2 below) as they represent different water year type classification schemes[17]. The USFWS report by David and Goodman (2017) indicates how the Humboldt County 50 TAF water contract has been especially important for flow augmentation during dry years to meet flow and temperature targets in the lower Klamath River to reduce the probability of an adult fish kill. The omission of the Humboldt County 50 TAF contract in the DEIR/S analyses could have significant effects on the water quality conditions and potential impacts

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[15] Reclamation's water permits from the State of California includes the following condition:
"Permittee shall release sufficient water from Trinity and/or Lewiston Reservoirs into the Trinity River so that not less than an annual quantity of 50,000 acre-feet will be available for the beneficial use of Humboldt County and other downstream users." Condition 9

[16] The 1959 water delivery contract between Reclamation and Humboldt County includes the following:
"The United States agrees to release sufficient water from Trinity and/or Lewiston Reservoirs into the Trinity River so that not less than an annual quantity of 50,000 acre-feet will be available for the beneficial use of Humboldt County and other downstream users."
Contract, Article 8.

[17] The water year types included in the Trinity ROD are probability-based and classified by ranges of annual upper Trinity River Basin water year runoff. This classification is different from the water year types presented in all other tables in Appendix 6B of the DEIR/S, which are based on the historical record of WY1922 through WY2003 and defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 2000).

to both the Trinity and Sacramento Rivers. Therefore, the DEIR/S should be considered incomplete in the analysis of the effects of the Site Project operations on the Trinity River.

Table 6-2
Trinity River Record of Decision
Annual Flow Volumes and Peak Flows

Water Year Type	Volume (AF)	Peak Flow (cfs)	Peak Flow Duration (days)
Extremely Wet	815,000	11,000	5
Wet	701,000	8,500	5
Normal	647,000	6,000	5
Dry	453,000	4,500	5
Critically Dry	369,000	1,500	36

Notes:
cfs = cubic feet per second
Source: DOI, 2000.

4. Incomplete Cumulative Impact Assessment
In addition to the omission of the Humboldt County 50 TAF water delivery contract on the Trinity River, the Sites Project DEIR/S fails to consider and incorporate the Lower Klamath LTP operations into the water resources system modeling analyses. Under CEQA, a cumulative impact assessment must consider development projects within the cumulative study area, which includes past projects, projects under construction and approved, and pending projects that are anticipated to be either under construction or operational by the time of the completion of the proposed project. The Sites DEIR/S states the following (pg. 6A-2, Appendix 6A).

> *The Existing Conditions/No Project/No Action Condition simulation was developed assuming Year 2030 level of development and regulatory conditions. The Existing Conditions/No Project/No Action Condition assumptions include existing facilities and ongoing programs that existed as of March 2017 (publication of the Notice of Preparation) that could affect or could be affected by implementation of the alternatives. The Existing Conditions/No Project/No Action Condition assumptions and the models do not include any restoration actions or additional conveyance over the current conditions.*

Although the ROD for the Lower Klamath LTP[18] wasn't signed until April 2017, it was certainly a well-known and defined pending project and should have been incorporated into the baseline condition of the water resource system modeling analysis. Tables 6 through 8 provide average monthly storage and flow values for the TRD under the Lower Klamath LTP. Comparison of the Lower Klamath LTP Alternative 1 conditions presented in Table 6 through 8 to the Sites Project No Action Alternative conditions presented in Tables 1 through 3 indicate significant differences in project operations and hydrologic conditions when including the Lower Klamath LTP in the water resource impact assessment. For example, under the Lower Klamath LTP, diversions to

[18] U.S. Department of the Interior, Bureau of Reclamation, 2017, Record of Decision for the Long Term Plan to Protect Adult Salmon in the Lower Klamath River, April, Accessed at https://www.usbr.gov/mp/nepa/includes/documentShow.php?Doc_ID=28314

the Sacramento River are reduced by an average of 13 TAF per year, while Sites DEIR has diversions increasing, on average, by 4 TAF per year. The main reason for this difference is the August and September Trinity River release rates: as a result of flow augmentations, the Lower Klamath LTP increases average releases to Trinity River by 20% and 42% (presumably using the Humboldt County 50TAF water) above No Action flows, respectively (see Table 7). Alternative D of the Sites Project maintains a constant 450 cfs baseline ROD flow during these months for all water year types. The Lower Klamath LTP introduces significant project operations, not included in the Sites Project DEIR/S analyses, which could have significant effects on the anticipated water supply available to the project as well as impacts to temperature on the Sacramento River. Because of this omission in the impact analysis, the Sites Project DEIR/S should be considered incomplete.

Another cumulative impact that is not evaluated in the Sites Project DEIR/S is the influence of climate change on the meteorology and hydrology of northern California rivers. The water temperature modeling of Alternatives completed as part of DEIR/S analyses uses historic meteorologic and hydrologic data and do not consider the predicted warmer future temperatures in the Trinity and Klamath River basins under climate change (USBR, 2011)[19]. Warmer air temperatures under climate change will result in warmer reservoir and river water temperatures. Anticipated changes to the timing and magnitude of spring snowmelt hydrograph and associated tributary accretion (flow and water temperature) are likely to increase river water temperatures, which will reduce the attainment of water temperature objectives on the Trinity River, especially those established for outmigrant juvenile salmonids. Thus, the DEIR/S fails to evaluate the cumulative impact of climate change conditions.

Please feel free to contact me with any questions regarding the material and conclusions contained in this letter.

Sincerely,

Greg Kamman, PG, CHG
Principal Hydrologist

REGISTERED GEOLOGIST
GREGORY R. KAMMAN
NO. 360
CERTIFIED HYDROGEOLOGIST
12/31/20
STATE OF CALIFORNIA

[19] U.S. Department of the Interior, Policy and Administration, Bureau of Reclamation, 2011, SECURE Water Act Section 9503(c) – Reclamation Climate Change and Water. April, 226p.

TABLE 1: Trinity Lake end of month storage. Source: Table SW-01-9a, Appendix 6B of Sites Project DEIR/S.

Table SW-02-9a
Trinity Lake, End of Month Elevation
Long-term Average and Average by Water Year Type

Analysis Period	End of Month Elevation (FEET)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-term												
Full Simulation Period[1]												
No Action Alternative	2,278	2,280	2,285	2,292	2,302	2,313	2,325	2,324	2,321	2,310	2,297	2,286
Alternative D	2,281	2,283	2,288	2,294	2,304	2,314	2,325	2,325	2,322	2,310	2,298	2,287
Difference	2	3	3	2	2	1	1	1	1	1	1	1
Percent Difference[3]	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	2,322	2,323	2,325	2,324	2,337	2,347	2,357	2,359	2,358	2,350	2,342	2,332
Alternative D	2,322	2,323	2,324	2,325	2,338	2,348	2,358	2,360	2,358	2,350	2,341	2,331
Difference	-1	0	0	1	1	1	0	0	0	0	-1	-1
Percent Difference	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Above Normal (15%)												
No Action Alternative	2,305	2,305	2,307	2,298	2,313	2,329	2,341	2,342	2,340	2,331	2,321	2,309
Alternative D	2,307	2,307	2,309	2,305	2,319	2,334	2,345	2,346	2,344	2,335	2,323	2,311
Difference	2	2	2	7	6	5	4	4	4	4	2	2
Percent Difference	0.1%	0.1%	0.1%	0.3%	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%	0.1%	0.1%
Below Normal (17%)												
No Action Alternative	2,275	2,278	2,285	2,281	2,289	2,298	2,313	2,313	2,310	2,298	2,287	2,277
Alternative D	2,275	2,278	2,286	2,281	2,289	2,298	2,314	2,313	2,310	2,298	2,286	2,277
Difference	0	1	0	0	0	0	0	0	0	0	0	0
Percent Difference	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dry (22%)												
No Action Alternative	2,260	2,261	2,270	2,283	2,291	2,304	2,316	2,312	2,307	2,293	2,277	2,266
Alternative D	2,261	2,263	2,273	2,284	2,292	2,304	2,316	2,312	2,306	2,291	2,277	2,266
Difference	2	2	2	1	1	0	0	-1	-1	-1	0	0
Percent Difference	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%
Critical (15%)												
No Action Alternative	2,189	2,190	2,198	2,240	2,246	2,255	2,263	2,260	2,258	2,239	2,218	2,203
Alternative D	2,203	2,206	2,211	2,242	2,248	2,257	2,265	2,262	2,260	2,242	2,224	2,208
Difference	14	16	13	2	2	2	2	2	2	2	6	5
Percent Difference	0.6%	0.7%	0.6%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.3%	0.2%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average

TABLE 2: Monthly flow on Trinity River below Lewiston Reservoir. Source: Table SW-04-9a, Appendix 6B of Sites Project DEIR/S.

Table SW-04-9a
Trinity River below Lewiston Reservoir, Monthly Flow
Long-term Average and Average by Water Year Type

	Monthly Flow (CFS)											
Analysis Period	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-term												
Full Simulation Period[1]												
No Action Alternative	368	360	522	655	645	575	554	3,779	2,091	923	450	450
Alternative D	373	360	498	638	621	570	561	3,779	2,091	923	450	450
Difference	5	-1	-24	-17	-24	-5	6	0	0	0	0	0
Percent Difference[3]	1.2%	-0.2%	-4.6%	-2.6%	-3.7%	-0.9%	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	373	300	852	1,412	1,026	1,096	627	4,636	3,318	1,289	450	450
Alternative D	373	300	775	1,351	1,052	1,143	647	4,636	3,318	1,289	450	450
Difference	0	0	-76	-61	26	47	20	0	0	0	0	0
Percent Difference	0.0%	0.0%	-8.9%	-4.3%	2.5%	4.3%	3.2%	0.0%	0.0%	0.0%	0.0%	0.0%
Above Normal (15%)												
No Action Alternative	373	713	621	316	831	436	469	4,462	2,488	1,048	450	450
Alternative D	373	709	621	332	760	300	469	4,462	2,488	1,048	450	450
Difference	0	-5	0	16	-72	-136	0	0	0	0	0	0
Percent Difference	0.0%	-0.7%	0.0%	5.1%	-8.6%	-31.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Below Normal (17%)												
No Action Alternative	373	300	300	300	517	319	507	3,774	1,672	869	450	450
Alternative D	373	300	300	300	392	319	507	3,774	1,672	869	450	450
Difference	0	0	0	0	-125	0	0	0	0	0	0	0
Percent Difference	0.0%	0.0%	0.0%	0.0%	-24.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dry (22%)												
No Action Alternative	373	300	300	300	300	300	529	3,216	1,251	667	450	450
Alternative D	373	300	300	300	300	300	529	3,216	1,251	667	450	450
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Percent Difference	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Critical (15%)												
No Action Alternative	342	300	300	300	300	300	575	2,092	783	450	450	450
Alternative D	373	300	300	300	300	300	575	2,092	783	450	450	450
Difference	31	0	0	0	0	0	0	0	0	0	0	0
Percent Difference	9.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average

TABLE 3: Monthly flow through Clear Creek Tunnel. Source: Table SW-05-9a, Appendix 6B of Sites Project DEIR/S.

Table SW-05-9a
Clear Creek Tunnel, Monthly Flow
Long-term Average and Average by Water Year Type

Analysis Period	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	Monthly Flow (CFS)											
Long-term												
Full Simulation Period[1]												
No Action Alternative	1,033	344	257	420	95	269	389	168	551	1,812	1,926	1,666
Alternative D	900	261	269	460	155	341	373	163	576	1,862	1,957	1,675
Difference	-133	-83	12	40	61	71	-16	-5	25	50	30	9
Percent Difference[3]	-12.9%	-24.2%	4.7%	9.4%	64.2%	26.4%	-4.2%	-3.2%	4.6%	2.8%	1.6%	0.5%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	1,593	481	536	430	81	344	483	278	421	1,742	1,678	2,135
Alternative D	1,571	448	585	437	118	355	493	268	439	1,765	1,882	2,142
Difference	-22	-32	49	7	36	12	10	-10	18	23	204	6
Percent Difference	-1.4%	-6.7%	9.1%	1.6%		3.4%	2.0%	-3.5%	4.3%	1.3%	12.1%	0.3%
Above Normal (15%)												
No Action Alternative	964	437	304	269	58	302	588	0	167	1,417	1,875	1,958
Alternative D	1,088	340	237	269	71	468	564	21	166	1,500	2,313	1,875
Difference	124	-98	-67	0	12	166	-24	21	-1	83	438	-83
Percent Difference	12.9%	-22.4%	-22.1%	0.0%		54.9%	-4.1%		-0.5%	5.9%	23.3%	-4.3%
Below Normal (17%)												
No Action Alternative	429	186	65	295	80	384	265	61	660	1,538	1,796	1,361
Alternative D	433	68	96	334	212	406	171	61	660	1,698	1,714	1,342
Difference	4	-118	32	39	132	22	-94	0	0	161	-82	-18
Percent Difference	1.0%	-63.5%	48.6%	13.4%		5.8%	-35.3%	0.0%	0.0%	10.5%	-4.6%	-1.4%
Dry (22%)												
No Action Alternative	884	333	100	408	166	141	222	221	905	2,100	2,322	1,468
Alternative D	676	205	81	551	265	295	252	200	978	2,147	2,119	1,420
Difference	-209	-128	-20	143	99	154	29	-22	73	47	-203	-48
Percent Difference	-23.6%	-38.4%	-19.7%	35.2%	59.9%	109.4%	13.1%	-9.8%	8.1%	2.2%	-8.7%	-3.3%
Critical (15%)												
No Action Alternative	818	156	62	715	70	135	385	147	561	2,245	2,075	1,012
Alternative D	142	84	99	710	90	174	342	143	585	2,200	1,802	1,235
Difference	-676	-72	37	-5	21	39	-43	-4	25	-45	-272	222
Percent Difference	-82.6%	-46.2%		-0.8%		28.5%	-11.2%	-2.5%	4.4%	-2.0%	-13.1%	22.0%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average

TABLE 4: Estimated Monthly flow through Lewiston Reservoir.

Flow through Lewiston Lake (cfs)												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Full Simulation Period1												
No Action Alternative	1401	704	779	1075	740	844	943	3947	2642	2735	2376	2116
Alternative D	1273	621	767	1098	776	911	934	3942	2667	2785	2407	2125
Difference	(128)	(83)	(12)	23	36	67	(9)	(5)	25	50	31	9
Percent Difference	-9.1%	-11.8%	-1.5%	2.1%	4.9%	7.9%	-1.0%	-0.1%	0.9%	1.8%	1.3%	0.4%
Wet (32%)												
No Action Alternative	1966	781	1388	1842	1107	1440	1110	4914	3739	3031	2128	2585
Alternative D	1944	748	1360	1788	1170	1498	1140	4904	3757	3054	2332	2592
Difference	(22)	(33)	(28)	(54)	63	58	30	(10)	18	23	204	7
Percent Difference	-1.1%	-4.2%	-2.0%	-2.9%	5.7%	4.0%	2.7%	-0.2%	0.5%	0.8%	9.6%	0.3%
Above Normal (15%)												
No Action Alternative	1337	1150	925	585	889	738	1057	4462	2655	2465	2325	2408
Alternative D	1461	1049	858	601	831	768	1033	4483	2654	2548	2763	2325
Difference	124	(101)	(67)	16	(58)	30	(24)	21	(1)	83	438	(83)
Percent Difference	9.3%	-8.8%	-7.2%	2.7%	-6.5%	4.1%	-2.3%	0.5%	0.0%	3.4%	18.8%	-3.4%
Below Normal (17%)												
No Action Alternative	802	486	365	595	597	703	772	3835	2332	2407	2246	1811
Alternative D	806	368	396	634	604	725	678	3835	2332	2567	2164	1792
Difference	4	(118)	31	39	7	22	(94)	0	0	160	(82)	(19)
Percent Difference	0.5%	-24.3%	8.5%	6.6%	1.2%	3.1%	-12.2%	0.0%	0.0%	6.6%	-3.7%	-1.0%
Dry (22%)												
No Action Alternative	1257	633	400	708	466	441	751	3437	2156	2767	2772	1918
Alternative D	1049	505	381	851	565	595	781	3416	2229	2814	2569	1870
Difference	(208)	(128)	(19)	143	99	154	30	(21)	73	47	(203)	(48)
Percent Difference	-16.5%	-20.2%	-4.8%	20.2%	21.2%	34.9%	4.0%	-0.6%	3.4%	1.7%	-7.3%	-2.5%
Critical (15%)												
No Action Alternative	1160	456	362	1015	370	435	960	2239	1344	2695	2525	1462
Alternative D	515	384	399	1010	390	474	917	2235	1368	2650	2252	1685
Difference	(645)	(72)	37	(5)	20	39	(43)	(4)	24	(45)	(273)	223
Percent Difference	-55.6%	-15.8%	10.2%	-0.5%	5.4%	9.0%	-4.5%	-0.2%	1.8%	-1.7%	-10.8%	15.3%

TABLE 5: Monthly temperatures of Trinity River below Lewiston Dam. Source: Table SQ-33-9a, Appendix 7E of Sites Project DEIR/S.

Table SQ-33-9a
Trinity River below Lewiston Dam, Monthly Temperature
Long-term Average and Average by Water Year Type

	Monthly Temperature (DEG-F)											
Analysis Period	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-term												
Full Simulation Period[1]												
No Action Alternative	49.4	44.7	40.0	39.4	42.7	47.0	50.2	46.6	50.9	51.3	51.7	50.7
Alternative D	49.3	44.6	39.9	39.5	42.7	46.9	50.3	46.6	50.8	51.1	51.3	50.7
Difference	-0.1	-0.1	-0.1	0.2	0.0	-0.2	0.1	0.0	-0.1	-0.2	-0.4	0.1
Percent Difference[3]	-0.2%	-0.2%	-0.2%	0.4%	0.0%	-0.4%	0.2%	-0.1%	-0.2%	-0.4%	-0.7%	0.1%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	47.0	44.6	41.5	40.6	43.0	45.9	49.1	45.8	48.3	50.8	51.6	48.6
Alternative D	47.0	44.6	41.3	40.5	43.0	45.8	49.1	45.8	48.3	50.7	50.9	48.8
Difference	0.1	0.0	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	-0.2	-0.7	0.2
Percent Difference	0.1%	0.1%	-0.3%	-0.2%	-0.1%	-0.3%	-0.1%	0.0%	0.0%	-0.3%	-1.4%	0.4%
Above Normal (15%)												
No Action Alternative	48.2	43.3	40.2	38.6	42.6	47.3	49.9	45.9	50.6	51.6	50.9	48.8
Alternative D	47.7	43.2	39.8	38.8	42.6	47.2	50.0	45.9	50.5	51.2	49.6	49.4
Difference	-0.5	-0.1	-0.4	0.1	0.0	-0.1	0.1	-0.1	-0.1	-0.4	-1.3	0.6
Percent Difference	-1.1%	-0.2%	-1.1%	0.3%	0.0%	-0.2%	0.2%	-0.2%	-0.2%	-0.8%	-2.5%	1.3%
Below Normal (17%)												
No Action Alternative	50.2	44.7	39.0	38.7	41.9	46.8	51.1	46.4	51.3	52.0	52.0	51.3
Alternative D	50.2	44.7	39.1	38.8	41.9	46.7	51.6	46.5	51.3	51.6	52.2	51.5
Difference	0.0	0.0	0.2	0.1	0.0	-0.2	0.5	0.0	0.0	-0.3	0.1	0.2
Percent Difference	-0.1%	0.1%	0.4%	0.3%	0.0%	-0.4%	1.0%	0.1%	0.0%	-0.6%	0.3%	0.4%
Dry (22%)												
No Action Alternative	49.5	45.0	39.6	38.4	42.4	47.9	51.4	46.7	51.9	50.7	50.1	50.3
Alternative D	49.7	44.7	39.4	39.0	42.4	47.6	51.1	46.6	51.7	50.5	50.5	50.4
Difference	0.2	-0.2	-0.2	0.6	0.0	-0.4	-0.2	-0.1	-0.2	-0.3	0.4	0.1
Percent Difference	0.4%	-0.5%	-0.4%	1.5%	0.1%	-0.8%	-0.4%	-0.2%	-0.5%	-0.5%	0.8%	0.2%
Critical (15%)												
No Action Alternative	54.5	45.7	38.2	39.4	43.1	48.0	50.2	49.3	55.5	52.5	54.4	56.6
Alternative D	53.8	45.5	38.4	39.7	43.2	47.8	50.4	49.2	55.3	52.6	53.9	55.6
Difference	-0.7	-0.2	0.1	0.2	0.1	-0.2	0.2	-0.1	-0.2	0.1	-0.5	-1.0
Percent Difference	-1.3%	-0.5%	0.3%	0.6%	0.2%	-0.3%	0.4%	-0.2%	-0.3%	0.2%	-0.9%	-1.8%

1 Based on the 82-year simulation period
2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)
3 Relative difference of the monthly average

TABLE 6: Monthly Trinity Lake Storage. Source: Table 4-1, Lower Klamath LTP DEIS.

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No Action (TAF)												
Extremely Wet	1,197	1,258	1,399	1,618	1,839	1,998	2,208	2,300	2,236	2,105	1,993	1,850
Wet	1,373	1,393	1,507	1,621	1,806	1,952	2,114	2,090	2,018	1,896	1,752	1,606
Normal	1,322	1,324	1,346	1,415	1,529	1,669	1,843	1,773	1,689	1,534	1,386	1,276
Dry	1,096	1,089	1,113	1,127	1,189	1,292	1,403	1,361	1,302	1,159	1,005	901
Critically Dry	1,051	1,016	1,014	988	1,012	1,068	1,087	1,048	985	836	676	598
Average All Years	1,233	1,242	1,306	1,385	1,511	1,637	1,779	1,755	1,686	1,548	1,403	1,283
Alternative 1 (TAF)												
Extremely Wet	1,170	1,236	1,377	1,597	1,821	1,981	2,191	2,285	2,221	2,090	1,979	1,839
Wet	1,362	1,382	1,497	1,613	1,798	1,946	2,107	2,083	2,011	1,890	1,743	1,595
Normal	1,319	1,321	1,343	1,415	1,528	1,669	1,842	1,772	1,689	1,536	1,387	1,266
Dry	1,092	1,085	1,109	1,123	1,184	1,288	1,399	1,357	1,298	1,148	992	881
Critically Dry	1,044	1,007	1,005	979	1,004	1,058	1,078	1,039	976	848	677	576
Average All Years	1,224	1,233	1,298	1,377	1,504	1,631	1,772	1,749	1,680	1,544	1,396	1,269
No Action compared to Alternative 1 (TAF)												
Extremely Wet	-27	-22	-22	-21	-17	-17	-17	-15	-15	-15	-15	-11
Wet	-11	-11	-10	-9	-8	-7	-7	-7	-6	-6	-8	-11
Normal	-3	-2	-3	0	0	0	0	0	0	3	1	-10
Dry	-4	-4	-4	-4	-4	-4	-4	-4	-4	-11	-13	-20
Critically Dry	-7	-9	-9	-9	-8	-9	-9	-9	-9	11	1	-22
Average All Years	-9	-9	-9	-8	-7	-6	-6	-6	-6	-5	-8	-14
No Action compared to Alternative 1 (%)												
Extremely Wet	-2%	-2%	-2%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%
Wet	-1%	-1%	-1%	-1%	0%	0%	0%	0%	0%	0%	0%	-1%
Normal	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-1%
Dry	0%	0%	0%	0%	0%	0%	0%	0%	0%	-1%	-1%	-2%
Critically Dry	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	1%	0%	-4%
Average All Years	-1%	-1%	-1%	-1%	0%	0%	0%	0%	0%	0%	-1%	-1%

Key:
TAF = thousand acre-feet

TABLE 7: Monthly flow on Trinity River below Lewiston Reservoir. Source: Table 4-3, Lower Klamath LTP DEIS.

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No Action (cfs)												
Extremely Wet	373	796	930	1,264	1,525	2,458	1,042	4,570	4,626	1,241	450	450
Wet	373	300	1,023	1,175	915	510	481	4,687	2,862	1,102	450	450
Normal	373	300	300	300	385	302	477	4,189	2,120	1,102	450	450
Dry	337	286	300	300	300	300	543	2,848	847	481	450	450
Critically Dry	368	267	300	300	300	300	600	1,498	783	450	450	400
Average All Years	363	359	605	696	668	654	584	3,753	2,210	890	450	445
Alternative 1 (cfs)												
Extremely Wet	373	719	930	1,248	1,455	2,458	1,042	4,570	4,626	1,241	460	477
Wet	373	300	1,024	1,151	910	505	481	4,687	2,862	1,102	503	533
Normal	373	300	300	300	358	302	477	4,189	2,120	1,102	508	632
Dry	337	286	300	300	300	300	543	2,848	847	481	574	725
Critically Dry	332	267	300	300	300	300	600	1,498	783	450	699	861
Average All Years	359	349	605	687	652	652	584	3,753	2,210	890	538	630
No Action compared to Alternative 1 (cfs)												
Extremely Wet	0	-77	0	-16	-69	0	0	0	0	0	10	27
Wet	0	0	1	-24	-5	-5	0	0	0	0	53	83
Normal	0	0	0	0	-27	0	0	0	0	0	58	182
Dry	0	0	0	0	0	0	0	0	0	0	124	275
Critically Dry	-37	0	0	0	0	0	0	0	0	0	249	461
Average All Years	-4	-10	0	-9	-16	-2	0	0	0	0	88	185
No Action compared to Alternative 1 (%)												
Extremely Wet	0%	-10%	0%	-1%	-5%	0%	0%	0%	0%	0%	2%	6%
Wet	0%	0%	0%	-2%	-1%	-1%	0%	0%	0%	0%	12%	18%
Normal	0%	0%	0%	0%	-7%	0%	0%	0%	0%	0%	13%	40%
Dry	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	28%	61%
Critically Dry	-10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	55%	115%
Average All Years	-1%	-3%	0%	-1%	-2%	0%	0%	0%	0%	0%	20%	42%

Key:
% = percent
cfs = cubic feet per second

TABLE 8: Monthly flow on Trinity River Diversion to Sacramento River at Lewiston Reservoir. Source: Table 4-3, Lower Klamath LTP DEIS.

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No Action (cfs)												
Extremely Wet	827	233	235	410	7	329	278	498	407	1,836	1,526	2,079
Wet	945	541	376	482	97	322	591	0	290	1,190	1,952	2,065
Normal	792	355	193	418	243	396	228	0	472	1,553	1,991	1,471
Dry	712	418	166	385	134	153	229	247	1,011	1,973	2,098	1,358
Critically Dry	598	609	132	748	168	157	426	378	736	2,028	2,178	949
Average All Years	802	439	241	464	131	276	367	172	575	1,640	1,965	1,648
Alternative 1 (cfs)												
Extremely Wet	766	234	233	410	7	329	278	465	407	1,836	1,513	1,984
Wet	904	551	355	482	100	303	586	0	290	1,181	1,937	2,025
Normal	767	344	196	378	270	396	228	0	469	1,510	1,957	1,471
Dry	636	415	162	387	134	152	229	247	1,008	2,092	2,009	1,196
Critically Dry	521	642	132	753	143	177	426	373	736	1,701	2,092	880
Average All Years	748	443	234	457	134	272	366	167	573	1,623	1,920	1,573
No Action compared to Alternative 1 (cfs)												
Extremely Wet	-61	1	-2	0	0	0	0	-33	0	0	-13	-95
Wet	-42	10	-21	0	3	-20	-5	0	0	-9	-14	-41
Normal	-25	-10	4	-40	27	0	0	0	-3	-43	-34	0
Dry	-75	-3	-4	2	0	-1	0	0	-3	119	-89	-163
Critically Dry	-77	32	0	5	-25	20	0	-4	0	-327	-86	-69
Average All Years	-53	4	-7	-7	3	-4	-2	-5	-2	-16	-45	-74
No Action compared to Alternative 1 (%)												
Extremely Wet	-7%	0%	-1%	0%	0%	0%	0%	-7%	0%	0%	-1%	-5%
Wet	-4%	2%	-6%	0%	3%	-6%	-1%	0%	0%	-1%	-1%	-2%
Normal	-3%	-3%	2%	-10%	11%	0%	0%	0%	-1%	-3%	-2%	0%
Dry	-11%	-1%	-3%	1%	0%	0%	0%	0%	0%	6%	-4%	-12%
Critically Dry	-13%	5%	0%	1%	-15%	13%	0%	-1%	0%	-16%	-4%	-7%
Average All Years	-7%	1%	-3%	-1%	3%	-1%	0%	-3%	0%	-1%	-2%	-5%

Key:
% = percent
cfs = cubic feet per second

Greg Kamman, PG, CHG
Principal Hydrologist

EDUCATION	1989	M.S. Geology - Sedimentology and Hydrogeology Miami University, Oxford, OH
	1985	A.B. Geology Miami University, Oxford, OH
REGISTRATION	No. 360 No. 5737	Certified Hydrogeologist (CHG.), CA Professional Geologist (PG), CA
PROFESSIONAL HISTORY	1997 - Present	Principal Hydrologist/Vice President Kamman Hydrology & Engineering, Inc. San Rafael, CA
	1994 - 1997	Senior Hydrologist/Vice President Balance Hydrologics, Inc., Berkeley, CA
	1991 - 1994	Project Geologist/Hydrogeologist Geomatrix Consultants, Inc., San Francisco, CA
	1989 - 1991	Senior Staff Geologist/Hydrogeologist Environ International Corporation, Princeton, NJ
	1986 - 1989	Instructor and Research/Teaching Assistant Miami University, Oxford, OH

SKILLS AND EXPERIENCE

As a Principal Hydrologist with over 25 of technical and consulting experience in the fields of geology, hydrology, and hydrogeology, Mr. Kamman routinely manages projects in the areas of surface- and ground-water hydrology, stream and wetland habitat restoration, water supply, water quality assessments, water resources management, and geomorphology. Areas of expertise include: stream and wetland habitat restoration; characterizing and modeling basin-scale hydrologic and geologic processes; assessing hydraulic and geomorphic responses to land-use changes in watersheds and causes of stream channel instability; evaluating surface- and ground-water resources and their interaction; and designing and implementing field investigations characterizing surface and subsurface conditions; and stream and wetland habitat restoration feasibility assessments and design. In addition, Mr. Kamman commonly works on projects that revolve around sensitive fishery, wetland, wildlife and/or riparian habitat enhancement. Thus, Mr. Kamman is accustomed to working within a multi-disciplined team and maintains close collaborative relationships with biologists, engineers, planners, architects, lawyers, and resource and regulatory agency staff. Mr. Kamman is a prime or contributing author to over 80 technical publications and reports in the discipline of hydrology – the majority pertaining to ecological restoration. Mr. Kamman routinely teaches courses on stream and wetland restoration through U.C. Berkeley Extension and San Francisco State University's Romberg Tiburon Center.

PROFESSIONAL SOCIETIES & AFFILIATIONS	American Geological Institute Society for Ecological Restoration International California Native Plant Society

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Kamman, G.R., 2004, Evaluation of potential hydrologic effects, THP No. 1-04-059 SON and Proposed Mitigated Negative Declaration TCP No. 04-531, Sleepy Hollow (Martin) THP/Conversion, Annapolis, CA. Professional declaration prepared for Friends of the Gualala River, July 17, 9p.

Kamman, G.R., 2004, Robert Mondavi Properties Vineyard (Erosion Control Plan Application #99323). Professional declaration prepared for the Law Offices of Thomas N. Lippe, July 1, 5p.

Kamman, G.R., 2004, Pocket Canyon THP No. 1-020216 SON. Professional declaration prepared for Pocket Canyon Protection Group, March 8, 2p.

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Kamman, G.R., 1999, Review of Final Supplemental Environmental Assessment, Cirby-Linda-Dry Creek Flood Control Project. Professional declaration prepared for: Monty Hornbeck, Sunrise Office Park Owners Association; Bill Kopper/John Gabrielli, Attorneys at Law; and Sharon Cavello/Cathie Tritel, Placer Group Sierra Club, May 24, 10p.

Kamman, G.R., 1997, Review comments, Deer Creek Hills Draft EIR. Professional declaration prepared for: The Nature Conservancy, August 4, 6p.

Kamman, G.R., 1995, Variable Water Resources Available in the Area of Salinas, California. Declaration prepared for Price, Postal, and Parma, Santa Barbara, California, May, 6p.

3.0 PUBLICATIONS AND PRESENTATIONS

Kamman, G.R. and Kamman, R.Z., 2015, Landscape Scale Urban Creek Restoration in Marin County, CA - Urban Creek Restoration: Interfacing with the Community. 33rd Annual Salmonid Restoration Conference, March 11-14, Santa Rosa, CA.

Kamman, G.R., R.Z., 2015, Enhancing Channel and Floodplain Connectivity: Improving Salmonid Winter Habitat on Lagunitas Creek, Marin County, CA - Beyond the Thin Blue Line: Floodplain Processes, Habitat, and Importance to Salmonids. 33rd Annual Salmonid Restoration Conference, March 11-14, Santa Rosa, CA.

Kamman, G.R., 2012, The role of physical sciences in restoring ecosystems. November 7, Marin Science Seminar, San Rafael, CA.

King, N. and Kamman, G.R., 2012, Preferred Alternative for the Chicken Ranch Beach/Third Valley Creek Restoration Project. State of the Bay Conference 2012, Building Local Collaboration & Stewardship of the Tomales Bay Watershed. October 26, Presented by: Tomales Bay Watershed Council, Inverness Yacht Club, Inverness, CA.

King, N. and Kamman, G.R., 2010, Chicken Ranch Beach Restoration Planning by TBWC. State of the Bay Conference 2010, A Conference about Tomales Bay ant its Watershed. October 23, Presented by: Tomales Bay Watershed Council, Inverness Yacht Club, Inverness, CA.

Higgins, S. and Kamman, G.R., 2009, Historical changes in Creek, Capay Valley, CA. Poster presented at American Geophysical Union Fall Meeting 2009, Presentation No. EP21B-0602, December.

Kamman, G.R. and Higgins, S., 2009, Use of water-salinity budget models to estimate groundwater fluxes and assess future ecological conditions in hydrologically altered coastal lagoons. Coastal and Estuarine Research Federation 20th Biennial Conference, 1-5 November, Portland, OR

Bowen, M., Kamman, G.R., Kaye, R. and Keegan, T., 2007, Gualala River Estuary assessment and enhancement plan. Estuarine Research Federation, California Estuarine Research Society (CAERS) 2007 Annual Meeting, 18-20 March, Bodega Marine Lab (UC Davis), Bodega Bay, CA

Bowen, M. and Kamman, G.R., M., 2007, Salt River Estuary enhancement: enhancing the Eel River Estuary by restoring habitat and hydraulic connectivity to the Salt River. Salmonid Restoration Federation's 25th Salmonid Restoration Conference, 7-10 March, Santa Rosa, CA.

Magier, S., Baily, H., Kamman, G., and Pfeifer, D, 2005, Evaluation of ecological and hydrological conditions in the Santa Clara River Estuary with respect to discharge of treated effluent. In: Abstracts with Programs, The Society of Environmental Toxicology and Chemistry North America 26th Annual Meeting, 13-17 November, Baltimore Convention Center, Baltimore, Maryland.

Baily, H., Magier, S., Kamman, G., and Pfeifer, D, 2005, Evaluation of impacts and benefits associated with discharge of treated effluent to the Santa Clara River Estuary. In: Abstracts with Programs, The Society of Environmental Toxicology and Chemistry North America 26th Annual Meeting, 13-17 November, Baltimore Convention Center, Baltimore, Maryland.

Kamman, G.R., Kamman, R.Z., and Parsons, L., 2005, Hydrologic and Hydraulic Feasibility Assessments for Ecological Restoration: The Giacomini Wetland Restoration Project, Point Reyes National Seashore, CA. *In:* Abstracts with Programs, The Geological Society of America, 101st Annual

Cordilleran Section Meeting, Vol.37, No. 4, p. 104, Fairmont Hotel, April 29-May1, 2005, San Jose, CA.

Kamman, G.R., 2001. Modeling and its Role in the Klamath Basin – Lewiston Reservoir Modeling. Klamath Basin Fish & Water Management Symposium, Humboldt State University, Arcata, CA, May 22-25.

Kamman, G.R., 1998, Surface and ground water hydrology of the Salmon Creek watershed, Sonoma County, CA. Salmon Creek Watershed Day, May 30, Occidental, CA.

Kamman, G.R., 1998. The Use of Temperature Models in the Evaluation and Refinement of Proposed Trinity River Restoration Act Flow Alternatives. ASCE Wetlands Engineering and River Restoration Conference Proceedings, Denver, Colorado (March 22-23, 1998).

Hecht, B., and Kamman, G.R., 1997, Historical Changes in Seasonal Flows of the Klamath River Affecting Anadromous Fish Habitat. In: Abstracts with Programs Klamath Basin Restoration and Management Conference, March 1997, Yreka, California.

Hanson, K.L, Coppersmith, K.J., Angell, M.**,** Crampton, T.A., Wood, T.F., Kamman, G., Badwan, F., Peregoy, W., and McVicar,T., 1995, Evaluation of the capability of inferred faults in the vicinity of Building 371, Rocky Flats Environmental Technology Site, Colorado, in Proceedings of the 5th DOE Phenomena Hazards Mitigation Conference, p. 185-194, 1995.

Kamman, G.R. and Mertz, K.A., 1989, Clay Diagenesis of the Monterey Formation: Point Arena and Salinas Basins, California. *In:* Abstracts with Programs, The Geological Society of America, 85th Annual Cordilleran Section Meeting, Spokane Convention Center, May 1989, Spokane, Washington, pp.99-100.

4.0 ENGINEERING DESIGNS AND SPECIFICATIONS

Kamman G.R., Kamman R.Z., Hayes, C., Lapine, S.L. and Fiori Geoscience, 2017, Lagunitas Creek Salmonid Winter Habitat Enhancement Plans, Marin County, CA., Project Sites 1-9: – Issued for Bid. Prepared for: Marin Municipal Water District, April 17, 25 sheets.

Kamman G.R., Kamman R.Z., Hayes, C., 2017, Mana Plain Wetland Restoration Plan, Mana, Kauai, Hawaii. Prepared for: State of Hawaii, Board of Land and Natural Resources, April 15, 18 sheets.

Kamman G.R., Kamman R.Z., and Hayes, C., 2017, Home Ranch Pond #2 and #9 Design, Point Reyes National Seashore. Prepared for: Jacobs Engineering, February 3, 5 sheets.

Kamman G.R. and Kamman R.Z., 2015, Plans for Construction of Conlon Avenue Parking Lot – 90% Design. Prepared for: Golden Gate National Recreation Area, Muir Woods National Monument, December 3, 10 sheets.

Kamman G.R. and Kamman R.Z., 2015, Plans for Construction of Conlon Avenue Parking Lot – 90% Design. Prepared for: Golden Gate National Recreation Area, Muir Woods National Monument, December 3, 10 sheets.

Kamman G.R. and Kamman R.Z., 2014, Plans for construction of Lower Miller Creek Channel Maintenance Project – 30% Design. Prepared for: Las Gallinas Valley Sanitary District, November, 11 sheets.

Kamman G.R., Lapine, S.L., and Hayes, C., 2014, Rheem Creek Wetland Restoration Design. Prepared for: Olberding Environmental, Inc., October 22, 1 sheet.

Kamman G.R., Kamman R.Z. and Lapine, S.L., 2014, East Arm Mountain Lake Wetland Restoration Plan, The Presidio of San Francisco, CA. Prepared for: The Presidio Trust, June 30, 11 sheets.

Kamman, G.R., 2014, John West Fork Fish Passage Repair Project. Prepared for: Point Reyes National Seashore, June, 6p.

Kamman G.R., Kamman R.Z., Lapine, S.L. and Oberkamper Associates Civil Engineers, Inc., 2014, YMCA Reach of Tennessee Hollow Creek Wetland Restoration Construction Documents, The Presidio of San Francisco, CA. Prepared for: The Presidio Trust, April, 15 sheets.

Kamman G.R., Kamman R.Z., and Oberkamper Associates Civil Engineers, Inc., 2014, Technical Specifications for YMCA Reach of Tennessee Hollow Creek Wetland Restoration, The Presidio of San Francisco, CA. Prepared for: The Presidio Trust, April, 133p.

Kamman G.R., and Kamman R.Z., 2014, Technical Specifications for East Arm Mountain Lake Wetland Restoration, The Presidio of San Francisco, CA. Prepared for: The Presidio Trust, March, 127p.

Kamman G.R., Kamman R.Z., Lapine, S.L., Oberkamper Associates Civil Engineers, Inc., and Roth LaMotte Landscape Architecture, 2014, MacArthur Meadow Wetland Restoration Plan, The Presidio of San Francisco, CA – 30% Design. Prepared for: The Presidio Trust, March 10, 12 sheets.

Kamman G.R., 2013, Suisun Creek Preserved Mitigation Wetland, Solano County, CA. Prepared for: Las Gallinas Valley Sanitary District, November, 11 sheets.

Kamman G.R., Kamman R.Z. and Lapine, S.L., 2013, Cayatano Creek Preserve Mitigation Wetland, Livermore Area, Alameda and Contra Costa Counties, CA – 50% Design. Prepared for: Grizzly Bay LLC., July 16, 2 sheets.

Miller Pacific Engineering Group and Kamman, G.R., 2013, Landslide stabilization retaining wall and rip-rap cascade, Green Gulch Zen Center, Muir Beach, CA. Prepared for: Green Gulch Zen Center, July, 8 sheets.

Kamman G.R., Kamman R.Z. and Lapine, S.L., 2013, Kellogg Creek and Deer Valley East Restoration Project, Contra Costa County, CA. Prepared for: Contra Costa Water District, June, 15 sheets.

Kamman G.R. and Kamman R.Z., 2013, Technical Specifications for Kellogg Creek and Deer Valley East Restoration Project, Contra Costa County, CA. Prepared for: Contra Costa Water District, June, 91p.

Kamman, G.R., 2012, John West Fork Repair Project, Point Reyes National Seashore, CA. Prepared for: National Park Service, December, 5 sheets.

Kamman G.R. and Lapine, S.L., 2012, Home Ranch Pond #9 Design, Point Reyes National Seashore, CA. Prepared for: Point Reyes National Seashore., October 24, 3 sheets.

Kamman G.R. and Lapine, S.L., 2012, G Ranch Wetland Swale near Abbott’s Lagoon, Point Reyes National Seashore, CA. Prepared for: Point Reyes National Seashore., October 3, 3 sheets.

Kamman G.R. and Lapine, S.L., 2012, Eagle Ridge Preserve Property Wetland Design, Livermore Area, Contra Costa and Alameda Counties, CA. Prepared for: Olberding Environmental, Inc., August 31, 2 sheets.

Kamman G.R., 2012, Bear Valley Trail Upper Culvert Replacement and Bank Repair, Point Reyes National Seashore, CA. Prepared for: Point Reyes National Seashore, April, 8 sheets.

Kamman R.Z., Kamman G.R., and Lapine, S., 2012, Salt River Ecosystem Restoration Project, Riverside Ranch Tidal Marsh Restoration Plans, Phase 1 Construction. Prepared for Humboldt County RCD, April, 24 sheets.

Kamman R.Z., Kamman G.R., and Lapine, S., 2012, Technical Specifications for the Salt River Ecosystem Restoration Project, Phase 1 Construction, Riverside Ranch and Salt River Restoration Plans. Prepared for Humboldt County RCD, February, 163p.

Kamman, G.R., Kamman, R.Z., Higgins, S. and Lapine, S., 2010, Las Gallinas Valley Sanitary District (LGVSD) - Miller Creek Sanitary Sewer Easement Restoration (100% construction drawings), San Rafael, California. Prepared for LGVSD, September 1, 8 sheets.

Kamman, G.R., Kamman, R.Z., Higgins, S. and Lapine, S., 2010, Technical Specifications for Las Gallinas Valley Sanitary District (LGVSD) - Miller Creek Sanitary Sewer Easement Restoration, San Rafael, California. Prepared for LGVSD, September 1, 70p.

Kamman, G.R., Kamman, R.Z. and Lapine, S., 2010. Point Reyes National Seashore, Restore Critical Dune Habitat to Protect Threatened and Endangered Species, 100% construction drawings. Prepared for: Point Reyes National Seashore Association and National Park Service, June 1, 13 sheets.

Kamman, G.R. and Lapine, S., 2010. Former Reservoir Fill Site, Restoration at Muir Beach, Golden Gate National Recreation Area (100% Construction drawings). Prepared for Golden Gate National Parks Conservancy, May 12, 2 sheets.

Kamman, G.R. and Lapine, S., 2010. Alluvial Fan Fill Site, Restoration at Muir Beach, Golden Gate National Recreation Area (100% Construction drawings). Prepared for Golden Gate National Parks Conservancy, May 12, 2 sheets.

Kamman, G.R., Kamman, R.Z. and Lapine, S., 2010. Technical Specifications, Point Reyes National Seashore, Restore Critical Dune Habitat to Protect Threatened and Endangered Species, 100% plan set. Prepared for: Point Reyes National Seashore Association and National Park Service, June 1, 132p.

Kamman G.K. and Lapine, S., 2010, Dragonfly Creek Restoration Design, in: State of California, Department of Transportation, Project plans for construction on adjacent to State Highway in the City and County of San Francisco 0.3 mile south of Route 1/101 separation, March 25, 30 sheets.

Kamman G.R. and Lapine, S.L., 2009, Project Plans for Construction on Eastern Tributary of Tennessee Hollow Creek, The Presidio of San Francisco, CA. Prepared for: The Presidio Trust, on behalf of State of California, Department of Transportation., September 23,10 sheets.

Kamman, R.Z., Kamman G.K., and Beahan, C., 2008, 100% Design Drawings, Plans for construction of Vineyard Creek Channel Enhancement Project, from end of Arbor Circle to McClay Road, Project No. 2008-006. Prepared for Marin County Department of Public Works, Flood Control and Water Conservation District Zone 1 and City of Novato, CA, June, 28 sheets.

Kamman G.K., Kamman, R.Z., and Beahan, C., 2008, Contract documents including: notice to contractors, proposals, special provisions and contract documents for Vineyard Creek Channel Enhancement Project, from end of Arbor Circle to McClay Road, Novato California. Prepared for Marin County Department of Public Works, Flood Control and Water Conservation District Zone 1, June, 144p.

Kamman G.K. and Kamman, R.Z., 2008, Giacomini Wetland Restoration Project, Phase 2 (2008) Construction Drawings. Prepared for Golden Gate National Recreation Area and Point Reyes National Seashore, May, 33 sheets.

Kamman G.K., Kamman, R.Z., and Beahan, C., 2007, Giacomini Wetland Restoration Project, Phase I (2007) Construction Drawings. Prepared for Golden Gate National Recreation Area and Point Reyes National Seashore, August, 23 sheets.

Kamman G.K., Kamman, R.Z., and Beahan, C., 2007, Technical Specifications for Giacomini Wetland Restoration Project, Phase I (2007) Construction. Prepared for Golden Gate National Recreation Area and Point Reyes National Seashore, with contributions from Winzler & Kelly, August, 185p.

Kamman G.K. and Kamman, R.Z., 2008, Technical Specifications for Giacomini Wetland Restoration Project, Phase 2 (2008) Construction. Prepared for Golden Gate National Recreation Area and Point Reyes National Seashore, May, 243p.

Kamman, G.R., Kamman R.Z., and Beahan, C., 2007, 100% Specifications, Lower Redwood Creek floodplain and salmonid habitat restoration at the Banducci site, Golden Gate National Recreation

Area, Marin County, CA. Prepared for Golden Gate Parks Conservancy and National Park Service, June 8, 46p.

Kamman, R.Z., Kamman G.K., and Beahan, C., 2007, 100% Design Drawings, Lower Redwood Creek Restoration, The Banducci Site, Golden Gate National Recreation Area, Marin County, CA. Prepared for Golden Gate Parks Conservancy and National Park Service, February 28, 7 sheets.

Kamman G.K. and Kamman, R.Z., 2006, Feasibility Study and Construction Drawings for Freshwater Marsh and High Water Wildlife Refugia on the West Pasture of the Giacomini Dairy. Prepared for Golden Gate National Recreation Area and Point Reyes National Seashore, September.

Kamman, G.R., 2002, Haypress Pond Restoration Grading Plan, Tennessee Valley, Sausalito, CA. Prepared for Golden Gate National Recreation Area, National Park Service, January 10, 15p.

5.0 ACADEMIC APPOINTMENTS

San Francisco State University, 2012 through 2014, Wetland hydrology. SFSU College of Extended Learning, Romberg Tiburon Center, CA, 2-day course, 1.6 CEU.

San Francisco State University, 2011, Introduction to wetland hydrology. Basic Wetland Delineation Training, SFSU College of Extended Learning, Romberg Tiburon Center, CA, March 28-April 1.

University of California, Berkeley Extension, 2001 through 2008, Hydrologic and geomorphic processes in stream restoration. Civil and Environmental Engineering, Certificate Program in California Water Management and Ecosystem Restoration, Berkeley, CA, 2-day course, 1.0 CEU.

San Francisco State University, 2007, Introduction to tidal wetland hydrology. SFSU College of Extended Learning, Romberg Tiburon Center, CA, May 11-12, 1.6 CEU.

City of San Jose, 2005, Hydrologic and geomorphic processes in stream restoration. City of San Jose's Environmental Services Department, Watershed Protection Division, San Jose, CA, January 26.

Miami University Geology Field Station, Dubois, WY, 1989, Instructor, Summer Session, May-July.

Miami University, Oxford, Ohio, 1985-89, Instructor and Research/Teaching Assistant (MS candidate).