October 30, 2015

BDCP/WaterFix Comments
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Sent via U.S. Mail and via email to: BDCPComments@icfi.com

To Whom It May Concern:

On behalf of the Natural Resources Defense Council, The Bay Institute, Defenders of Wildlife, Pacific Coast Federation of Fishermen's Associations, Institute for Fisheries Resources, and San Francisco Baykeeper, we are writing to comment on the California WaterFix / Bay Delta Conservation Plan ("BDCP") Revised Draft Environmental Impact Report / Supplemental Draft Environmental Impact Statement ("RDEIR/SDEIS"). As you know, many of our organizations have been engaged in the BDCP process since its very beginning, and several years ago requested that the state and federal agencies formally evaluate a Portfolio Alternative (including new conveyance and new South of Delta storage) in the environmental documents prepared under the National Environmental Policy Act ("NEPA") and California Environmental Quality Act ("CEQA"). Unfortunately, the agencies have refused to analyze and consider such an approach in the RDEIR/SDEIS.

As the attached comments demonstrate, the RDEIR/SDEIS is not consistent with the requirements of NEPA and CEQA. The document fails to provide a clear, understandable, and accurate assessment of the likely environmental impacts of the alternatives, misleads the public and decisionmakers as to the likely effects, and fails to disclose significant adverse impacts that are likely to occur and to analyze feasible alternatives and mitigation measures that would reduce or avoid those adverse effects. Most of the methodological and analytical flaws identified in our prior comments on the DEIS/DEIR ("Prior Comments") apply equally to the RDEIR/SDEIS. In order to comply with CEQA and NEPA, the RDEIR/SDEIS must be substantially revised and recirculated.

The modeling presented in the RDEIR/SDEIS indicates that the status quo is unsustainable and that, in combination with climate change, existing operations of the CVP and SWP will jeopardize the continued existence of several fish species, threaten the livelihoods of the thousands fishing jobs that depend on healthy salmon runs, and lead to continued declines of the health of the Bay-Delta estuary, including the growth of toxic harmful algal blooms like *Microcystis*, which threaten human health and safety as well as the environment. Yet instead of meaningfully addressing these threats and responding to the effects of climate change, the State's preferred alternative (Alternative 4A) and most of the other alternatives considered in the RDEIR/SDEIS largely ignore the effects of climate change and in many cases would **worsen** these problems, for instance increasing the likelihood of harmful algal blooms in the Delta and San Francisco Bay, reducing salmon survival through the Delta, and leading to the likely extinction of several native fish species.

Such an outcome is neither acceptable nor inevitable. Instead, we encourage the agencies to commit to the spirit and requirements of the 2009 Delta Reform Act, including reducing reliance on the Delta and investing in local and regional water supply projects in order to restore the health of the Delta ecosystem and improve water supply reliability, while sustaining the Delta's local communities and economy.

Thank you for consideration of our views.

Sincerely,

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One of NEPA's primary purposes is "to guarantee relevant information is available to the public." *N. Plains Res. Council, Inc. v. Surface Transp. Bd.*, 668 F.3d 1067, 1072 (9th Cir. 2011). NEPA requires that an EIS's "form, content and preparation foster both informed decision-making and informed public participation." *Churchill County v. Norton*, 276 F.3d 1060, 1071 (9th Cir. 2001); *see* 40 C.F.R. § 1502.10 (EIS must contain format "which will encourage good analysis and clear presentation of the alternatives including the proposed action"). CEQA provides a similar mandate, requiring that,

> [a]n adequate EIR must be prepared with a sufficient degree of analysis to provide decisionmakers with information which enables them to make a decision which intelligently takes account of environmental consequences. It must include detail sufficient to enable those who did not participate in its preparation to understand and to consider meaningfully the issues raised by the proposed project.

Kings Cnty. Farm Bureau v. City of Hanford, 221 Cal. App. 3d 692, 712 (1990) (internal quotation marks and citations omitted); *see also Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova*, 40 Cal.4th 412, 442 (2007). "The decisionmakers and general public should not be forced to sift through obscure minutiae or appendices in order to ferret out the fundamental baseline assumptions that are being used for purposes of the environmental analysis." *San Joaquin Raptor Rescue Center v. County of Merced*, 149 Cal.App.4th 645, 659 (2007). CEQA explicitly requires that an EIR be "organized and written in a manner that will be meaningful and useful to the decisionmakers and to the public." Pub. Res. Code § 21003(b).

As an initial matter, the presentation of the RDEIR is inherently confusing and difficult to navigate, in violation of CEQA and NEPA. Rather than including the project information in one cohesive document, the RDEIR/SDEIS consists of several new sections, dozens of figures that belong in new section 4, and a track-changed version of the earlier Draft EIR/EIS that is contained in a massive Appendix with dozens of sections and separate figures, some of which (chapter 11) does not actually correspond to the DEIS/DEIR. In addition, the RDEIR/SDEIS fails to synthesize potential effects across the various life stages of fish species, such as the upstream effects on salmon, the water quality effects on salmon, and the effects on salmon survival through the Delta. As a result, the document fails to assess or inform the reader of the likely net effects on fish and wildlife species.

As discussed throughout our comments, the RDEIR/SDEIS fails dramatically to provide a clear and accurate assessment of likely environmental impacts, and the document must be substantially revised and recirculated in order to provide a clear and accurate assessment of the environmental consequences of the alternatives that is understandable to the public and decisionmakers.

II. The RDEIR/SDEIS Fails to Analyze a Reasonable Range of Alternatives

CEQA and NEPA both require that a reasonable range of alternatives to the proposed project be considered in the environmental review process, including a no project alternative. 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. §§ 1502.14, 1508.25(b). As we noted in our prior comments, the DEIS/DEIR failed to include a reasonable range of alternatives, particularly because it (a) failed to include a range of alternatives that achieve the standards of the ESA, NCCPA, and other environmental laws, consistent with BDCP objectives, and (b) included no alternatives that include investments in water conservation, recycling, and other local supplies to improve water supply reliability and reduce reliance on the Delta. An alternative that includes both improved flows and investments in local water supplies is likely to result in substantial environmental benefits and improved water supply reliability, consistent with the overarching goals of BDCP/WaterFix, and the failure to include such an alternative violates NEPA and CEQA. *See 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).

These same flaws apply equally to the new alternatives in the RDEIR/SDEIS, and the RDEIR/SDEIS continues to fail to include a reasonable range of alternatives for the reasons set forth in our prior comments. The RDEIR/SDEIS fails to consider a reasonable range of alternatives for two additional reasons:

- First, none of the three new alternatives in the RDEIR/SDEIS (which are the only alternatives that are not intended to be approved as a Habitat Conservation Plan under the ESA and meet the requirements of the Natural Community Conservation Planning Act) improves flows in order to avoid or reduce significant adverse environmental impacts and reduces Delta water exports; and,
- Second, none of the 3,000 cfs alternatives in the RDEIR/SDEIS include a single tunnel, which could reduce costs, reduce environmental impacts, and improve water supply.

a. The RDEIR/SDEIS Violates NEPA and CEQA Because None of the New Alternatives Include Operations that Result in Improved Environmental Flows and Reduced Delta Exports

The RDEIR/SDEIS includes three new alternatives, none of which utilizes a HCP/NCCP approach, in response to substantial concerns from the fish and wildlife agencies and other stakeholders that preclude adoption of a 50-year long permit and/or substantial regulatory assurances. *See* RDEIR/SDEIS at 4.1-1. The RDEIR/SDEIS claims that these three new,

> sub-alternatives… are included to ensure a reasonable range of alternatives are considered that adopt the alternative implementation strategy to achieve federal and state endangered species act compliance using a shorter project implementation period

> through the "Section 7" process under the federal ESA, and the "Section 2081(b)" process under CESA.

RDEIR/SDEIS at ES-4. However, the three new alternatives in the RDEIR/SDEIS (4A, 2D, and 5A) all use operational rules that result in increased water exports, reduced reservoir storage, and reduced Delta outflow. *See* RDEIR/SDEIS at ES-21, Fig. 4.4.1-1, Fig. 4.4.1-15. The RDEIR/SDEIS fails to consider any alternatives that would reduce Delta exports and improve environmental flows (particularly Delta outflows and upstream reservoir storage), while using this different implementation strategy. Yet these new alternatives result in significant adverse environmental impacts that are disclosed in the RDEIR/SDEIS (as well as many impacts that the documents fail to disclose, as discussed *infra*). Alternatives that reduce Delta exports and change operational rules could reduce or avoid these impacts resulting from the new proposed alternatives. *See* RDEIR/SDEIS at ES-48, ES-50.

Although at least one other alternative in the RDEIR/SDEIS considers reduced exports and improved environmental flows (Alternative 8),[1] that alternative also includes numerous other conservation measures that fundamentally affect hydrodynamic modeling and the analysis of impacts. For instance, modeling in the BDCP process demonstrated that habitat restoration downstream of the new intakes was a necessary mitigation measure to avoid causing increases in reverse flows downstream of the new intakes, which likely would cause significant environmental impacts. *See* BDCP presentation to the Delta Science Program January 28, 2013, available online at: http://deltacouncil.ca.gov/sites/default/files/documents/files/DSP_01282014_Presentation_v2.pdf.[2][3] Alternative 8 used the NCCPA/HCP regulatory approach and included substantial habitat restoration and other conservation measures, and the analysis of impacts of Alternative 8 will not be the same without these other conservation measures. Therefore, the modeling of Alternative 8 would have to be revised before it can be utilized to analyze impacts of the facility and operations without the associated conservation measures (e.g., excluding the habitat restoration and other conservation measures in order to analyze hydrodynamic and water quality impacts). As a result, the RDEIR/SDEIS fails to consider a reasonable range of alternatives that use the CESA/ESA section 7 approach.

In addition, the RDEIR/SDEIS is being used to obtain numerous permits by regulatory agencies, including permits from the SWRCB. The SWRCB is required by law to deny the petition for change in point of

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[1] In addition, Appendix C provides additional modeling, "in order to provide Delta outflow similar to what was included in Alternative 8." RDEIR/SDEIS Appendix C at C-1. However, the RDEIR/SDEIS does not analyze this as an alternative (including analyzing the environmental benefits and impacts), and as discussed *infra* the document claims that these operational parameters would not be consistent with the purpose and need of the project.

[2] The RDEIR/SDEIS fails to analyze whether the new alternatives will cause reverse flows below the NDD, in light of the reduction in tidal marsh habitat restoration proposed in these alternatives. Increases in reverse flows below the NDD would constitute a significant adverse impact. The RDEIR/SDEIS must be revised to include this analysis, and it must identify and implement feasible mitigation measures if such significant impacts are found.

[3] This and all other websites referenced in these comments are hereby incorporated by reference and should be included in the administrative record. In addition, an electronic copy of many of these references is included with the hard copy of these comments that we have submitted. Should the agencies be unable to locate any of the references cited herein, we would be happy to provide electronic or paper copies of such documents.

diversion if the change would cause unreasonable effects on fish and wildlife. In addition, the SWRCB's review of the change petition must be informed by the 2010 Public Trust Flows Report, and any order approving the change in point of diversion must "include appropriate Delta flow criteria" that are subject to modification over time. Cal. Water Code § 85086(c)(2). Because the RDEIR/SDEIS fails to provide adequate analysis of alternatives, including alternatives that reduce exports and improve environmental flows sufficient for review and adoption of appropriate flow criteria by the SWRCB, it fails to analyze an adequate range of alternatives for the SWRCB's review.

Ultimately, the RDEIR/SDEIS appears intended to foreclose meaningful consideration of alternatives that reduce Delta exports and improve Delta flows, particularly Delta outflows in the winter and spring, despite the conclusions of the SWRCB's 2010 Public Trust Flows Report and the requirements of the Delta Reform Act. *See* Water Code § 85086(c)(1).[4] This is further evidenced by statements in the RDEIR/SDEIS stating that water exports could not be reduced below the ranges established in Alternative 4A without subsequent environmental review in a separate CEQA/NEPA document. *See* RDEIR/SDEIS at ES-38, 4.1-19 to 4.1-20, 4.1-31.[5] To the extent that this language in the RDEIR/SDEIS and the range of alternatives considered in the documents prevent regulatory agencies like CDFW or the SWRCB from adopting conditions that further reduce water exports and diversions by the SWP and CVP as compared to Alternative 4A, the RDEIR/SDEIS fails to consider a reasonable range of alternatives.

In order to consider a reasonable range of alternatives that utilize the CESA/ESA section 7 permit process instead of the HCP/NCCP approach considered in the DEIS/DEIR, the RDEIR/SDEIS must be revised to consider at least one alternative using this CESA/ESA section 7 permitting approach that substantially improves Delta outflows and reduces Delta exports.

b. The RDEIR/SDEIS Violates NEPA and CEQA Because None of the Alternatives Includes a 3,000 cfs Capacity Single Tunnel Alternative, which could reduce costs, reduce environmental impacts, and improve water supply.

The RDEIR/SDEIS also fails to consider a reasonable range of alternatives because each of the 3,000 cfs facilities considered in the RDEIR/SDEIS utilizes dual bore tunnels, *see* RDEIR/SDEIS at 4.1-29, despite DWR's admission that the capital cost for a single tunnel 3,000 cfs capacity project is approximately $2.2B less than a dual tunnel 3,000 cfs project and $5.9B less than a 9,000 cfs alternative (in 2012 dollars). *See* BDCP Blog, November 12, 2013, online at: http://baydeltaconservationplan.com/2015news/2010-2014news/2012-2014bdcpblog/13-11-12/Revised_Capital_Cost_for_3_000_cfs_Single_Bore_Tunnel.aspx. NRDC and other stakeholders

[4] As discussed *supra*, the Purpose and Need statement is likewise deficient under CEQA and NEPA because it is inconsistent with the Delta Reform Act's requirement to reduce reliance on the Delta, and because it is unlawfully narrow in an attempt to exclude consideration of alternatives that include water supply projects outside of the Delta, despite the significant adverse environmental impacts that result.
[5] As discussed *infra*, this language also attempts to provide regulatory assurances that are unlawful under CESA and other laws.

requested analysis of a single tunnel 3,000 cfs facility in comments submitted nearly 3 years ago (in early 2013), yet the agencies have refused to analyze such an alternative in the DEIS/DEIR or the RDEIR/SDEIS. Because such an alternative is feasible and could result in lower environmental impacts (by using the cost savings associated with a single tunnel facility to invest in local and regional water supplies to offset reductions in diversions from the Delta), the failure to consider such an alternative violates NEPA and CEQA.

III. The Revised Purpose and Need Statement and Revised Project Objectives in the RDEIR/SDEIS are Unlawful

As noted in our Prior Comments, the purpose and need statement in the DEIS/DEIR is unlawful because it unreasonably limits the range of alternatives, excludes compliance with the Delta Reform Act, and misstates the requirements of the NCCPA. Unfortunately, the changes to purpose and need statement and the revised project objectives in the RDEIR/SDEIS contain similar flaws and must be revised.

First, the RDEIR/SDEIS states that state policy for the Delta is summarized in the Delta Reform Act, but the document only references portions of the Delta Reform Act, and fails to reference state policy to reduce reliance on the Delta. RDEIR/SDEIS at ES-5, 1-7. The RDEIR/SDEIS text and the purpose and need statement must be revised to comply with state policy established by the Delta Reform Act, which states:

> The policy of the State of California is to reduce reliance on the Delta in meeting California's future water supply needs through a statewide strategy of investing in improved regional supplies, conservation, and water use efficiency. Each region that depends on water from the Delta watershed shall improve its regional self-reliance for water through investment in water use efficiency, water recycling, advanced water technologies, local and regional water supply projects, and improved regional coordination of local and regional water supply efforts.

Cal. Water Code § 85021. The project objectives in the RDEIR/SDEIS are improperly narrow, focused solely on securing water supply from the Delta, despite this state policy of reducing reliance on water supply from the Delta and despite the feasibility of investments in local and regional water supplies to offset reductions in water exports from the Delta. RDEIR/SDEIS at 1-8. Similarly, the purpose and need statement explicitly references the Delta Reform Act as the basis for the project purpose and need, but ignores this requirement of the Act. RDEIR/SDEIS at 1-9. In both cases, the project objective or purpose to “restore and protect” SWP and CVP water deliveries, and the failure to consider any investments in regional and local water supplies in the RDEIR/SDEIS, is antithetical to this requirement of the Delta Reform Act. In addition to revising the purpose and need and project objectives, the RDEIR/SDEIS must be revised to consider alternatives that include investments in local and regional water supplies to reduce reliance on water from the Delta, while also improving environmental flows to meet the goals and requirements of the Delta Reform Act and other state and federal laws, including CESA, ESA, Porter-Cologne Water Quality Act, and the Clean Water Act.

Second, the RDEIR/SDEIS states that the fundamental purpose of the project includes "improvements to the SWP system in the Delta necessary to restore and protect ecosystem health." RDEIR/SDEIS at 1-7. Similarly, chapter 4 asserts that, "the RDEIR/SDEIS considers additional sub-alternatives that meet the goal of restoring the ecological function of the Delta and improving water supply reliability.' RDEIR/SDEIS at 4.1-1. Alternative 4A and other new alternatives in the document fail to achieve this fundamental purpose, particularly because they refuse to consider any alternatives that reduce water exports from the Delta in order to improve environmental flows, and because these alternatives are likely to result in declining populations of native fisheries and deteriorating ecological health of the estuary (reduced turbidity, increased harmful algal blooms, higher salinity, etc.). The best available science demonstrates that improvements in Delta outflows and other environmental flows are necessary to achieving restoration of the Delta ecosystem and sustaining native fish and wildlife, including ESA and CESA listed species such as Longfin Smelt. *See, e.g.*, SWRCB 2010.

Third, the purpose and need statement and project objectives are impermissibly narrow because the RDEIR/SDEIS admits they exclude alternatives that increase Delta outflow while reducing water exports, despite the objective and project purpose of restoring the Delta ecosystem. In Appendix C, the RDEIR/SDEIS asserts that increases in Delta outflow that reduce water exports are not consistent with the purpose and need statement and project objectives: "This evaluation was conducted primarily to consider increases in outflow, without consideration of water supply benefits, and as such, an alternative that included this operational scenario would likely not meet the project objectives or purpose and need statement." RDEIR/SDEIS Appendix C at C-1. However, Appendix C also admits that, "[g]enerally, for water supply related effects (effects to agricultural resources, groundwater resources, etc.), the impacts are equal to or less than the impacts disclosed under Alternative 8." RDEIR/SDEIS Appendix C at C-38. It is inconsistent to exclude this alternative when the impacts are equal or less to those under Alternative 8, unless the agencies are not meaningfully considering Alternative 8.

As discussed in these comments, our Prior Comments, the SWRCB's 2010 Public Trust Flows report[6] ("SWRCB 2010"), and numerous other scientific studies and reports, the best available science demonstrates that increases in Delta outflow during key times of the year are necessary to achieve the Project's stated purpose and need / objectives, the Delta Reform Act, and requirements of other state and federal laws including CESA, ESA, Porter-Cologne Water Quality Control Act, Clean Water Act. As a result, the purpose and need statement and project objectives are inconsistent with other state and federal laws, and impermissibly exclude reasonable and feasible alternatives to meet the requirements of these laws.

[6] The Delta Reform Act specifically requires that this flow report be prepared for "the purpose of informing planning decisions for the Delta Plan and the Bay Delta Conservation Plan," Cal. Water Code § 85086(c)(1), and that the SWRCB's consideration of a petition to change the point of diversion include "appropriate flow criteria" that are informed by the 2010 Public Trust flows report, *id*. at § 85086(c)(2).

The purpose and need statement and project purposes in the RDEIR/SDEIS must be revised to require compliance with state policy to reduce reliance on the Delta as required by the Delta Reform Act, and the RDEIR/SDEIS revised to consider alternatives that include investments in local and regional water supplies and improvements in Delta outflow and other environmental flows.

IV. The Baseline Used in the RDEIR/SDEIS Misleads the Public and Decisionmakers by Understating the Likely Adverse Environmental Impacts of the New Alternatives

Both NEPA and CEQA require that the Project be analyzed against the existing environmental conditions (the "environmental baseline"), in order 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).

As we noted in our Prior Comments, the DEIS/DEIR used an illegal baseline that understates the likely adverse environmental impacts of the draft plan and alternatives, because it failed to include in the CEQA/NEPA baseline: (a) floodplain habitat restoration in the Yolo Bypass and tidal marsh habitat restoration in the Delta that was required under existing biological opinions; and, (b) the Fall X2 RPA action required under the Delta Smelt biological opinion. In the RDEIR/SDEIS, the agencies have revised the No Action Alternative for the three new alternatives, and the RDEIR/SDEIS appropriately includes the required habitat restoration under the existing biological opinions in that baseline for its analysis of the impacts of the three new alternatives. However, the RDEIR/SDEIS still fails to include the Fall X2 RPA Action in the baseline for any of the alternatives, and the RDEIR/SDEIS fails to include the required habitat restoration in the CEQA baseline. Equally important, the RDEIR/SDEIS now uses a different baseline for the three new alternatives from the baseline used for the other alternatives, because the RDEIR/SDEIS does not update the baseline and environmental analysis for the alternatives previously considered in the DEIS/DEIR. As a result of these flaws, the RDEIR/SDEIS fails to accurately inform the reader of the likely adverse environmental impacts of the alternatives, and the document must be revised to include a lawful baseline for all of the alternatives.

a. The RDEIR/SDEIS Violates NEPA and CEQA by Using Different Baselines for the New Alternatives and the Prior Alternatives

In the RDEIR/SDEIS, the baseline for comparison of the three new alternatives under NEPA (the No Action Alternative) includes the floodplain habitat restoration and tidal marsh habitat restoration required under the 2008 and 2009 biological opinions. RDEIR/SDEIS at ES-8, 4.1-15, 4.1-23, 4.1-25, 4.1-31, 4.1-42 to -43; 4.2-1. As the RDEIR/SDEIS makes clear, these actions "would be assumed to occur as part of the No Action Alternative because they are required by the existing BiOps." *Id*. at 4.1-31. Elsewhere, the RDEIR/SDEIS admits that, "Because Alternatives 4A, 2D, and 5A do not include these Yolo Bypass and habitat restoration actions they are now assumed for the No Action Alternative (ELT); **they**

are actions that would be required to occur with or without implementation of Alternatives 4A, 2D, or 5A." RDEIR/SDEIS at 4.2-1 (emphasis added). This approach of including required habitat restoration in the no action alternative / environmental baseline is correct under NEPA, and as discussed below, is also required under CEQA.

However, the RDEIR/SDEIS does not revise the No Action Alternative for the alternatives previously considered in the DEIS/DEIR to include this required habitat restoration, nor does it revise the analysis of environmental impacts. *See, e.g.,* RDEIR/SDEIS Appendix A at 11-96, 11-243, Appendix 3D. Despite acknowledging that these actions are likely and required to occur absent BDCP, the RDEIR/SDEIS fails to include them in the environmental baseline for the alternatives previously considered in the DEIS/DEIR. As a result, the RDEIR/SDEIS overstates the environmental benefits and understates the environmental impacts of these earlier alternatives, as discussed in our prior letter. It also means that the environmental impacts of the new alternatives cannot be compared to the environmental impacts of the prior alternatives, because the impacts of the different alternatives are compared against different baselines. The inability to compare the environmental impacts of the alternatives undermines and is inconsistent with CEQA and NEPA.

The RDEIR/SDEIS currently includes three separate baselines: the CEQA baseline, the NEPA baseline for the new alternatives that includes required habitat restoration, and the NEPA baseline for the prior alternatives that excludes required habitat restoration. This is incredibly confusing to the reader, biases the analyses, and makes it impossible to accurately compare the impacts of different alternatives, fundamentally undermining the purposes of NEPA and CEQA. In order to comply with CEQA and NEPA, the RDEIR/SDEIS must be revised to include a single baseline for analysis of all of the alternatives, which includes required habitat restoration and other required protections for fish and wildlife in the No Action Alternative and environmental baseline.

b. The RDEIR/SDEIS Violates CEQA by Excluding Required Floodplain and Tidal Marsh Habitat Restoration and the Fall X2 Action from the Baseline

As we noted in our prior comments, the DEIS/DEIR violates CEQA by excluding required habitat restoration and the Fall X2 action from the baseline for comparison of impacts. Even though the RDEIR/SDEIS revised the no action Alternative for the analysis of impacts of the new alternatives, the document did not revise the baseline for consideration of environmental impacts under CEQA. RDEIR/SDEIS at 4.1-42. As a result, the RDEIR significantly understates the environmental impacts of implementing the alternatives and misleads the public, contrary to the requirements of CEQA.

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 decisionmakers as to the actual environmental impacts, and that in this case the environmental impacts should be assessed against the no action alternative. *See Communities for a Better Environment v. South Coast Air Management District*, 48 Cal.4th 310, 322-326, 328 (2010); *Neighbors for Smart Rail v.*

Exposition Metro Line Const. Authority, 57 Cal.4th 439, 448-449, 451-453 (2013). For instance, as the Supreme Court wrote in *Neighbors for Smart Rail*,

> Interpreting the statute and regulations in accord with the central purpose of an EIR—"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" (§ 21061)—we find nothing precluding an agency from employing, under appropriate factual circumstances, a baseline of conditions expected to obtain at the time the proposed project would go into operation.... For a large-scale transportation project like that at issue here, to the extent changing background conditions during the project's lengthy approval and construction period are expected to affect the project's likely impacts, the agency has discretion to consider those changing background conditions in formulating its analytical baseline. Contrary to Justice Baxter's view (conc. & dis. opn. of Baxter, J., post, 160 Cal.Rptr.3d at p. 32, 304 P.3d at p. 525), such a date-of-implementation baseline does not share the principal problem presented by a baseline of conditions expected to prevail in the more distant future following years of project operation—it does not omit impacts expected to occur during the project's early period of operation.

Neighbors for Smart Rail, 57 Cal. 4th at 453.

The use of physical conditions existing at the time of the NOP is inappropriate and misleading for assessing environmental impacts under CEQA in this case for at least three reasons: first, because substantial improvements in physical conditions were required to be implemented under biological opinions adopted in 2008 and 2009 (Fall X2 RPA and habitat restoration); second, because the project will not be operational until at least 2029, and operational impacts will continue for many years thereafter; and third, because climate change will further impact water supply, fisheries, and other users as compared to the conditions that existed in 2009. The CEQA guidelines state that such conditions "will normally constitute the environmental baseline," but the Courts have held that deviations from the conditions at the time of the NOP can be appropriate or required, depending on the circumstances.

As the RDEIR/SDEIS explicitly explains, the habitat restoration measures "would be assumed to occur as part of the No Action Alternative because they are required by the existing BiOps." RDEIR/SDEIS at 4.1-31. These actions are reasonably expected to occur in the future because they are required by the biological opinions and are being implemented through separate permitting processes. *See* 78 Fed. Reg. 14117 (March 4, 2013) (Notice of intent and scoping meetings for Draft Environmental Impact Statement / Draft Environmental Impact Report for Yolo Bypass Salmonid Habitat Restoration and Fish Passage, California). Similarly, the Fall X2 RPA action is reasonably expected to occur in the foreseeable future. This element of the reasonable and prudent alternative in the 2008 FWS biological opinion is required to be implemented under the ESA and the CDFW consistency determination, the federal courts have fully upheld the biological opinion under the ESA, and the Fall X2 RPA action was partially implemented in 2011. None of the stated reasons in the DEIS/DEIR justify excluding the Fall X2 RPA action from the CEQA baseline.

In order to accurately assess environmental impacts under CEQA, the RDEIR must be revised to use a baseline that includes required habitat restoration and the Fall X2 RPA action. Doing so also helps avoid the confusion of having different baselines for NEPA and CEQA purposes, consistent with CEQA's primary function of accurately informing the public and decisionmakers of likely environmental impacts.

c. The RDEIR/SDEIS Violates CEQA and NEPA by Effectively Excluding the Effects of Climate Change and Sea Level Rise from the Determination of Significant Impacts

The RDEIR/SDEIS also admits that climate change is likely to result in significant changes to air and water temperatures and hydrology, which are likely to be adverse to numerous fish species. *See, e.g.*, RDEIR/SDEIS at 5-79, 5-105, 5-112, 5-114, 5-115. However, despite the fact that the environmental baseline under CEQA excludes the effects of climate change, the RDEIR/SDEIS excludes the effects of climate change and sea level rise in making determinations of what constitute significant environmental impacts under CEQA. As a result, the RDEIR/SDEIS fails to disclose the likely impacts of the effects of climate change in combination with the alternatives on fisheries, water quality, and other environmental parameters. By ignoring the effects of climate change and sea level rise in making these determinations (even in the cumulative impacts analysis), the RDEIR/SDEIS fails to disclose significant environmental impacts that are likely to occur. Similarly, by including climate change in the environmental baseline under NEPA, the RDEIR/SDEIS effectively ignores the effects of climate change in making determinations of significant impacts because those effects are already included in the baseline used for comparison. As a result, the reader is misled as to the likely impacts compared to conditions today.

For instance, in revised chapter 11 (Fisheries), the RDEIR/SDEIS asserts that, "DWR has focused in its CEQA analysis primarily on the contribution of the action alternatives, as opposed to the impacts of sea level rise and climate change, in assessing the significance of the impacts of these action alternatives." RDEIR/SDEIS Appendix A at 11-95.[7] Similarly, in the analysis of impacts on *Microcystis*, the RDEIR/SDEIS states that,

> Below, residence times under Alternative 4 is compared to residence times under the No Action Alternative to remove the effect of climate change and sea level rise, thereby revealing the effect due to CM1 (i.e., operations) and the effect of the CM2 and CM4 restoration areas, which were accounted for in the modeling performed for CM1.

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[7] All references to the revised version of Chapter 11 in Appendix A of the RDEIR/SDEIS are to the purported redline version that is available online at: http://baydeltaconservationplan.com/RDEIRS/Ap_A_Rev_DEIR-S/11_Fish.pdf.

RDEIR/SDEIS Appendix A at 8-302. And in Chapter 5 the RDEIR/SDEIS repeatedly concludes that the alternatives will not result in significant impacts, despite acknowledging that climate change will result in adverse effects. *See,* RDEIR/SDEIS at 5-79, 5-105, 5-112, 5-114, 5-115. For instance, on page 5-105 the RDEIR/SDEIS admits that the effects of climate change are excluded when making the cumulative impact determinations:

> However, the actual projects and programs that are considered as part of the cumulative analysis would not cumulatively cause significant negative changes to the entrainment of covered fish species, or on the spawning, rearing, and migration habitat conditions for these species beyond those changes presented above in the analysis of action alternatives **(when climate change is factored out)**.

RDEIR/SDEIS at 5-105 (emphasis added). Similarly, the RDEIR/SDEIS asserts that Alternative 2A will result in a 42% increase in the mortality of winter-run Chinook salmon eggs in Critically Dry years in the Late Long Term as compared to existing conditions, yet concludes this impact is less than significant under NEPA and CEQA. RDEIR/SDEIS Appendix A at 11-128 to 11-130. And the RDEIR/SDEIS seems to ignore the effects of climate change in making cumulative impact determinations by asserting that an alternative would not contribute to cumulative impacts, yet fails to disclose that the overall effect would still be significant and adverse. *See* RDEIR/SDEIS at 1-115. The RDEIR/SDEIS must be revised to consider the effects of climate change when making determinations of what constitutes significant impacts under CEQA.

With respect to NEPA, the RDEIR/SDEIS includes the effects of climate change in the No Action Alternative ("NAA"). Although the RDEIR/SDEIS admits in a few cases that the No Action Alternative will result in significant adverse impacts, at least in part as a result of climate change, it reaches a contrary conclusion for the action alternatives by effectively ignoring the effects of climate change (because they are already included in the baseline). This is improper, and as a result, the RDEIR/SDEIS fails to disclose significant adverse environmental impacts that are likely to result from the alternatives in combination with climate change. As a result, the RDEIR/SDEIS misleads the public to believe that fish and wildlife populations will not see significant impacts, yet native fisheries will likely see substantial population declines and increased threats as a result of the alternatives in combination with the effects of climate change.

For example, the DEIR/DEIS appendix reveals that temperatures under the NAA and various project alternatives will exceed those needed to support viable populations of Chinook salmon, steelhead, and/or sturgeon species on the Sacramento, American, Feather, and Stanislaus Rivers, where these species currently spawn and rear.[8] To illustrate, under the NAA, monthly average temperatures indicate

[8] Despite concerns raised in our Prior Comments with CALSIM II modeling of temperature impacts (*see* esp. pp. 56-64; 68-70) and concerns raised by others, the RDEIR/SDEIS continues to rely on the upstream temperature projections generated previously. *See* DEIR/DEIS Appendix 11D.

that daily average temperatures will exceed the critical 56^{o}F *daily average* threshold[9] for incubating Chinook salmon:

- Throughout the entire winter-run Chinook salmon spawning range (i.e., downstream of Keswick Dam[10]) in most water year types during September, all water years during October, and in many water years during August and November. Temperatures projected under the NAA (and those that are similar or exceed the NAA under project alternatives) for the Sacramento River below Keswick will also have severe negative consequences for fall-run Chinook salmon, spring-run Chinook salmon, and steelhead that attempt to migrate into, hold, spawn, or incubate in the Sacramento River during these months. *See, e.g.,* RDEIR/SDEIS Appendix 11D at 11D-255.
- In the Feather River (e.g., the low-flow channel) in every month from August-November. *Id*. at 11D-291. Such temperatures will have devastating consequences to spring-run and fall-run Chinook salmon and steelhead that attempt to spawn in this river.
- In the American River during August-November; this would eliminate successful spawning of fall-run Chinook salmon on the American River during most of the species' spawning season on that river. *Id*. at 11D-311.
- In the Stanislaus River for almost all of the fall-run Chinook salmon spawning season. *Id*. at 11D-323.

Furthermore, monthly average temperatures anticipated under the NAA on the Feather River (in July and August of Critically Dry Years), the American River (during most of August, September, and October), and the Stanislaus River (from August through November) equal or exceed those that are lethal for migrating and holding adult Chinook salmon and steelhead and/or those that would impede migration of adult salmonids to their spawning grounds.[11] This would result in elimination of a significant fraction of the fall-run Chinook salmon and steelhead spawning period on each of these rivers and, cumulatively, throughout the Central Valley.

Although the DEIR/DEIS and the RDEIR/SDEIS portray the temp erature modeling results as useful only for comparative purposes, the modeled temperatures are likely to represent real-world impacts because:

[9] US EPA (2003) recommends a temperature standard for Chinook Salmon incubation that is 55^{o}F as an average of daily *maximum* temperatures. The maximum daily temperature is always higher than the average of that day; thus, an average monthly temperature of 56^{o}F (as presented in the DEIS/DEIR temperature appendix, 11D) indicates that daily average temperatures will exceed this limit frequently and daily maximum temperatures will be much higher than US EPA recommends.

[10] Keswick Dam is the upstream limit of winter-run Chinook salmon spawning and during the summer through much of October, Sacramento River flows gain temperature downstream of this point. So these results reveal that the entire winter-run Chinook salmon spawning habitat will experience excessive temperatures that produce lethal and negative sub-lethal effects for a large portion of their incubation period.

[11] Even short duration exposures to temperatures 69.8°F -71.6°F are reported to be lethal for adult Chinook salmon and steelhead during migration -- slightly lower temperatures have potentially severe lethal and sub-lethal effects (USEPA 1999, 2003; Richter and Kolmes 1995).

- Temperature results are presented as monthly averages, meaning they underestimate the daily average and daily maximum temperatures that will lead to the lethal and negative sub-lethal effects;
- Current actual temperatures on major Central Valley Rivers are already near, at, or above critical thresholds, so projections of increased relative temperatures indicate that severe negative impacts are likely (regardless of the precision of those projections)
- Negative effects of high temperatures on any fish life-stage generally cannot be undone by "improved" temperatures at other times during development (and certainly not in other years; e.g., as a multi-year average) – for instance, egg mortality cannot be undone by better temperatures later in the year.

In cases where temperatures under the NAA are projected to exceed thresholds for lethal and negative sub-lethal effects on a monthly average basis, this indicates that operations under the NAA will require substantial mitigation (e.g., reservoir reoperation). Project alternatives that produce similar or worse temperature outcomes will also require significant modifications to avoid severe and potentially catastrophic results to covered species.

Ignoring the effects of climate change will not make these effects go away. Yet as discussed *infra* and in our Prior Comments, the alternatives will cause significant adverse impacts on native fish species, including adverse effects to species listed under the CESA, as a result of project operations and climate change. The CVP and SWP can and must modify operations to adapt to and minimize the effects of climate change. However, by including the effects of climate change in the NEPA baseline, and by excluding consideration of climate change in the determination of what constitutes significant adverse impacts under CEQA, the RDEIR/SDEIS misleads the public as to the likely effects of the alternatives, in violation of CEQA and NEPA.

V. The RDEIR/SDEIS Fails to Adequately Analyze Cumulative Impacts of the New Alternatives

Reclamation has prepared draft and/or final environmental documents (including quantitative modeling) for several projects, such as the Shasta Lakes Water Resources Investigation and Upper San Joaquin River Storage Investigation, which will likely cause cumulatively significant environmental impacts in combination with the WaterFix by reducing flows into and through the Delta, impacting water quality (including salinity) and adversely affecting the survival of salmon, Delta Smelt, Longfin Smelt, and other fisheries. Yet inexplicably, the RDEIR/SDEIS fails to include any modeling or quantitative analysis of the cumulative impacts of these projects in combination with the WaterFix.[12] This is in error. In addition, as discussed above, the RDEIR/SDEIS excludes the effects of climate change in assessing cumulative impacts under CEQA. As a result, the RDEIR/SDEIS fails to adequately disclose the likely cumulative impacts of the new alternatives on fisheries, water quality, and the environment.

[12] The environmental documents for these projects likewise fail to quantitatively analyze environmental impacts of the project with the WaterFix/BDCP alternatives, despite the modeling being available to Reclamation.

VI. The RDEIR/SDEIS Fails to Adequately Analyze the Potential Impacts of the New Alternatives Because the Temporal Scope of Analysis is Limited to the Early Long Term

a. Use of the Early Long Term Period for the Assessment of Environmental Impacts Is Highly Misleading Because the Facility will not yet be in Operation

The RDEIR/SDEIS proposes to assess the potential environmental impacts of the new alternatives (4A, 2D, and 5A) at the Early Long Term period, which is the year 2025. *See* RDEIR/SDEIS at ES-8 to ES-9, 4.2-1. It states that,

> The other alternatives evaluated in the RDEIR/SDEIS, Alternative 4A, 2D, and 5A, are evaluated at the Early Long-Term (ELT) timeframe because the project implementation period is anticipated to be shorter. For NEPA impact assessment purposes, Alternatives 4A, 2D, and 5A are compared to the No Action Alternative for the Early Long-Term timeframe. Where impacts differ at the Late Long-Term (LLT) period, discussions of these effects were included in the analysis. For CEQA impact assessment purposes, they are compared against Existing Conditions, as generally described in the Draft EIR/EIS.

RDEIR/SDEIS at ES-7 to ES-8. The document claims that the ELT period assumes a shorter time horizon of approximately 15 years following project approval. RDEIR/SDEIS at 4.2-1. The ELT period includes the effects of climate change on hydrology and operations, although those effects are less pronounced than the effects at the Late Long Term. *Id.*[13]

However, the RDEIR/SDEIS estimates that construction of the new diversion facilities is likely to take 10 years after all permitting is complete. *See, e.g.,* RDEIR/SDEIS at 5-17 to 5-18. And the revised air quality appendix to the document admits that the timeline for construction of the intake facilities continues until 2027 (for the Intake 3 Final Site Work) and 2029 (for the Intake 2 Final Site Work), with construction of the intermediate forebay and many other construction projects continuing through 2029. RDEIR/SDEIS Appendix A (Revisions to Appendix 22B of the DEIS/DEIR) at Table 22B-1. As a result, the RDEIR/SDEIS demonstrates that construction and operation of the new intake facilities proposed under the alternatives is likely to occur years after the ELT time period that the document uses for environmental analysis. In other words, the period for analysis in the RDEIR/SDEIS is a period when the new facilities would not actually be in operation. Because the RDEIR/SDEIS admits that the effects of climate change and increases in water demand are likely to increase over time, and these effects will increase adverse impacts on fisheries and water quality, this is not a harmless error.

[13] However, the RDEIR/SDEIS fails to utilize updated projections of the status of fish populations at the ELT time period. As discussed *infra*, many of these fish species are likely to decline further by 2025 under the status quo, yet the RDEIR/SDEIS does not account for the declines between today and 2025.

In addition, this schedule in Appendix 22B is overly optimistic. The construction schedule in revised Appendix 22B has not changed from the initial DEIS/DEIR issued in 2013 for many of the elements of the intakes, despite several years of additional delay. In addition, pursuant to the Delta Reform Act, construction of any of the alternatives cannot begin until the SWRCB has approved a petition for a change in point of diversion with appropriate flow criteria. Cal. Water Code § 85088. This adjudicatory process at the SWRCB is likely to take several years, according to the SWRCB. *See* SWRCB Fact Sheet, Bay Delta Conservation Plan/California WaterFix – Water Right Petition Process, available online at: http://www.swrcb.ca.gov/waterrights/water_issues/programs/bay_delta/california_waterfix/docs/ca_waterfix_factsheet.pdf (stating that "Complex proceedings such as these are often a multiyear process."). DWR also has admitted that additional environmental analysis will be required to obtain required permits from the Army Corps of Engineers. *See* Bay Delta Conservation Plan/California WaterFix Partially Recirculated Draft EIR/Supplemental EIS, Errata Sheet in Progress, updated 9/23/2015, at 2-3, available online at: http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library/BDCP_WaterFix_RDEIR-EIS_ERRATA_9-23-15.sflb.ashx (stating that the information in the current CEQA/NEPA documents "will not fully meet this level of detail and additional informational analysis and submittals will be necessary"). Because permits from the SWRCB and the Army Corps of Engineers are necessary before starting construction, and because those permits are unlikely to be obtained for several years, a 10 year construction period likely results in operations of a new facility beginning substantially later than the 2025 period used for analysis in the RDEIR/SDEIS.

Because the RDEIR/SDEIS uses a time period for analysis when the new facility would not yet be constructed, because native fisheries are declining under the status quo and are likely to be in worse shape at the ELT, and because the impacts are likely to be greater as a result of climate change and increased water demand, the RDEIR/SDEIS fails to adequately analyze environmental impacts of the alternatives. The document must be revised to use a realistic starting date period for the environmental analysis of the operations of the alternatives on fisheries and water quality.

b. The RDEIR/SDEIS Fails to Analyze the Duration of Adverse Environmental Impacts That are Likely to Occur between the Early Long Term and Late Long Term Periods[14]

As shown above, the use of the ELT time period for assessing environmental impacts is flawed because the proposed project will not be in operation at that time. More importantly, the use of the ELT time period for assessing environmental impacts is flawed because it fails to analyze the duration of the likely adverse environmental impacts of the alternatives. As the RDEIR/SDEIS admits, operations of the proposed project and alternatives are likely to continue for many years: "However, because the project would continue indefinitely, the analysis qualitatively examines impacts at the Late Long-Term

[14] In addition, the use of different temporal periods for assessment of environmental impacts in the RDEIR/SDEIS makes it very difficult to compare the environmental impacts of the new alternatives (analyzed at the ELT) with the prior alternatives (analyzed at the LLT). This is inconsistent with NEPA and CEQA.

timeframe for Alternatives 4A, 2D, and 5A, but does not make a CEQA or NEPA conclusion based off the No Action Alternative LLT baseline." RDEIR/SDEIS at 4.1-42.

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). As the Supreme Court noted in *Neighbors for Smart Rail*,

> Even when a project is intended and expected to improve conditions in the long term—20 or 30 years after an EIR is prepared—decision makers and members of the public are entitled under CEQA to know the short- and medium-term environmental costs of achieving that desirable improvement. These costs include not only the impacts involved in constructing the project but also those the project will create during its initial years of operation. Though we might rationally choose to endure short- or medium-term hardship for a long-term, permanent benefit, deciding to make that tradeoff requires some knowledge about the severity and duration of the near-term hardship. An EIR stating that in 20 or 30 years the project will improve the environment, but neglecting, without justification, to provide any evaluation of the project's impacts in the meantime, does not "giv[e] due consideration to both the short-term and long-term effects" of the project (Cal. Code Regs., tit. 14, § 15126.2, subd. (a)) and does not serve CEQA's informational purpose well.

57 Cal. 4th at 455. BDCP/WaterFix provides the opposite factual situation, where the SDEIS analyzes only the short term impacts occurring in 2025 (Early Long Term). As in *Neighbors for Smart Rail*, an EIR analyzing impacts of a project in the short term, but failing to evaluate the project's impacts in the medium-term or longer-term, does not give "due consideration to both the short-term and long-term effects" of the project. 14 Cal. Code Regs. § 15126.2(a).

Moreover, the effects of climate change are predicted to increase the adverse environmental impacts of the alternatives on fisheries and water quality over longer time periods (ELT vs. LLT), as the RDEIR/SDEIS admits. RDEIR/SDEIS at ES-5, ES-7, 1-11, Chapter 5, Appendix A (Revised Chapter 11 at 11-95). As a result, the failure to assess these impacts over the duration of the project significantly understates the likely environmental impacts of the alternatives over the longer-term period they would be permitted and in operation.

In addition, the failure to assess environmental impacts over the longer-term period is likely to prevent state and federal agencies from providing necessary permits (such as permits for incidental take under CESA or the ESA) that extend beyond the duration of the time period analyzed in the RDEIR/SDEIS.[15] CESA requires that CDFW to comply with CEQA before issuing an incidental take permit. 14 Cal. Code

[15] For instance, the incidental take permit issued by CDFW to DWR for take of Longfin Smelt by the State Water Project expires on December 31, 2018. *See* Incidental Take Permit No. 2081-2009-001-03.

Regs. § 783.5. CDFW would be in violation of CEQA if it issued an incidental take permit that had a longer duration than the analysis of environmental impacts from the project, since it would have failed to analyze the extent and duration of potential environmental impacts resulting from the action (issuance of the permit). The same is true with respect to NEPA and federal agencies, as required by a recent appellate court decision concluding that Reclamation must analyze the environmental impacts of implementing a biological opinion. *See San Luis & Delta Mendota Water Authority v. Jewell*, 747 F.3d 581, 645-655 (9th Cir. 2014).

The RDEIR/SDEIS must be revised to assess potential environmental impacts of project operations for the duration and extent of proposed operations under state and federal endangered species act permits, rather than limiting the analysis to a single snapshot in time before the facilities are even constructed.

VII. The RDEIR/SDEIS Unlawfully Defers Discussion of Key Issues to the FEIR/FEIS

In several cases, the RDEIR/SDEIS acknowledges significant issues that require analysis under CEQA and NEPA, but defers that analysis to the FEIS/FEIR. *See, e.g.*, RDEIR/SDEIS at 1-35 (deferring discussion of climate change to the Final EIS/EIR); *id*. at Table 3.4.1-1 (determination whether the D-1641 export: inflow ratio will apply to the North Delta intakes). However, providing this information for the first time in the FEIS/FEIR deprives the public of the opportunity to review and comment on these analyses. The RDEIR/SDEIS must be recirculated to provide an opportunity to review and comment on these issues, as well as on other significant changes made after public review of the RDEIR/SDEIS.

VIII. The RDEIR/SDEIS Misleads the Public Regarding Changes to the Analysis of Impacts to Fisheries (Chapter 11)

The revised Fish and Aquatic Resources chapter of the RDEIR/SDEIS (Chapter 11) is an assemblage of partial analyses and revisions or amendments to determinations made in the DEIS/DEIR, interspersed among redline edits from an unknown previous draft of this chapter. The impacts of the project alternatives and differences among them cannot be understood without reference to the DEIR/DEIS Chapter 11 and numerous other technical appendices. Many impacts are not described at all in this revision and it is uncommon that an analysis of all of the previous alternatives is provided for those impacts that are mentioned. This fundamentally undermines and is inconsistent with the basic purpose of informing the public and decisionmakers of environmental impacts under NEPA and CEQA.

The revised Chapter 11 is neither a complete rewrite of the DEIR/DEIS version of this chapter, nor is it a comprehensive markup (redline). For example, the redlined Table 11-2 in the RDEIR/SDEIS Chapter 11, is not found in the previous DEIR/DEIS; Table 11-2 in the DEIR/DEIS is titled SWP/CVP Export Service Area Delivery Reservoirs (DEIR/DEIS Chapter 11 at Part 1-11-17). Also, under the "Regulatory Setting" section of the RDEIR/SDEIS' Chapter 11 is a heading for "Federal Plans Policies and Regulations" with a subheading "Long-Term Central Valley 2008 and 2009 USFWS and NMFS Biological Opinions," but the only topics covered under these headers are the "Collaborative Science and Adaptive Management Program" and the "Longfin Smelt Settlement Agreement;" no description of the actual biological opinions for Delta Smelt (USFWS 2008) or anadromous fish (NMFS 2009) are provided and no other federal plans, policies, or regulations are mentioned. Furthermore, Chapter 4 of the RDEIR/SDEIS (describing new project alternatives) frequently refers to "Chapter 11" without indicating whether the reader should reference the old version of this chapter or the new version. The net effect is to obscure project proponents' current analyses and projected outcomes of both new and previously published California WaterFix alternatives.

Chapter 11 is, by no means, the only place where the RDEIR/SDEIS is missing information, internally inconsistent, or confusing. One other example is that section 8.3.1.4 does not exist (the document skips from 8.3.1.3 to 8.3.1.5). Chapter 8 refers to this section no less than five times (for example, to claim that "DWR and Reclamation have a good history of compliance with water quality objectives (see section 8.3.1.4 and 8.3.1.7 for more detail)") – these references should be removed.

The RDEIR/SDEIS is poorly constructed, organized, and internally inconsistent, such that even experts in the topics discussed are frequently disoriented. The RDEIR/SDEIS must be revised and recirculated to provide a comprehensible, internally consistent document, including Chapter 11, which is sufficient for the general public and decisionmakers to meaningfully comprehend the likely environmental impacts of the alternatives.

IX. The RDEIR/SDEIS Unlawfully Attempts to Provide Regulatory Assurances and Limitations on Future Reductions in Water Supply from the WaterFix

In the RDEIR/SDEIS, DWR and Reclamation appear to attempt to provide regulatory assurances to limit, delay or avoid reductions in water exports in the future, claiming that water exports could not be reduced below the ranges established in Alternative 4A without subsequent environmental review in a separate CEQA/NEPA document and revisions to CESA permits. RDEIR/SDEIS at ES-38, 4.1-19 to 4.1-20; *see id*. at 4.1-31 (same for Alternative 5A). However, having chosen not to meet the standards and requirements of the NCCPA, this is unlawful under CESA, and it fundamentally subverts the purposes of NEPA and CEQA. This is particularly true with respect to use of the RDEIR/SDEIS by other regulatory agencies, including the SWRCB.

First, the California Supreme Court has concluded that regulatory assurances are unlawful under CESA, unlike the assurances allowed under the NCCPA. *Environmental Protection Information Center v. Cal. Dept. of Forestry and Fire Protection*, 44 Cal. 4th 459 (2008). Because the new alternatives in the RDEIR/SDEIS, including Alternative 4A, do not meet the requirements of the NCCPA, it is unlawful to provide regulatory assurances under CESA.

In addition, as discussed *supra*, the RDEIR/SDEIS must meaningfully analyze reductions in water exports and improvements in environmental flows in order to consider a reasonable range of alternatives under NEPA and CEQA. To the extent that this RDEIR/SDEIS adequately analyzes reductions in water exports and increases in environmental flows, the agencies need not prepare a new CEQA/NEPA document before reducing exports in the future, for instance if species continue to decline (as the RDEIR/SDEIS indicates is likely). Project applicants cannot have it both ways: either the RDEIR/SDEIS considers a reasonable range of alternatives, including reduced export alternatives, and therefore provides sufficient analysis under NEPA and CEQA should the agencies determine that reductions in exports are needed in the future, or the RDEIR/SDEIS fails to analyze future reductions in exports, and the document fails to consider a reasonable range of alternatives.

Lastly, under the Delta Reform Act, approval of a change in point of diversion permit by the SWRCB must include "appropriate flow criteria" that are subject to change through adaptive management. Cal. Water Code § 85086(c)(2). This legislation requires that operations of the WaterFix/BDCP shall be subject to adaptive management and may result in reductions in water exports below the ranges identified in Alternative 4A, or other alternatives. Because Alternative 4A fails to reasonably protect fish and wildlife, the SWRCB must adopt additional conditions and flow criteria that improve environmental flows and reduce exports. Alternative 8 provides another basis for the SWRCB's review of the petition and appropriate flow criteria.

X. The RDEIR/SDEIS Fails to Adequately Describe or Analyze Alternative 4A

In order to understand the likely effects of an alternative, the alternative must be adequately described. However, in two key respects, Alternative 4A is inadequately described, and the analysis in the RDEIR/SDEIS is flawed. First, the modeling of the impacts of Alternative 4A fails to actually model the operational rules for this alternative, instead modeling the impacts of an alternative with higher Delta outflow. And second, the RDEIR/SDEIS fails to demonstrate that the outflow modeled under Alternative 4A is reasonably likely to occur. As a result, the RDEIR/SDEIS fails to adequately analyze the likely adverse environmental impacts of Alternative 4A.

a. The RDEIR/SDEIS Fails to Adequately Describe or Analyze the Impacts of Alternative 4A because it Fails to Identify or Model the Effects of the Proposed Winter/Spring Outflow Operating Criteria

According to the RDEIR/SDEIS, Alternative 4A will include new winter/spring outflow criteria that are different from previously analyzed alternatives. *See* RDEIR/SDEIS at 4.1-5, 4.1-9, 4.1-43. However, the RDEIR/SDEIS never identifies what this proposed outflow requirement will be over the winter months, except that it will be lower than the high outflow scenario under Alternative 4. The RDEIR/SDEIS also fails to demonstrate whether the proposed new outflow criteria will result in reductions in Delta outflow compared to the baseline. However, the best available science demonstrates that reductions in Delta outflow below the high outflow scenario, let alone below existing levels, are likely to cause significant adverse environmental effects. Moreover, the CALSIM modeling utilized in the RDEIR/SDEIS for Alternative 4A does not actually model the new, undisclosed outflow requirement, but instead simply models the high outflow scenario from Alternative 4 (Alternative 4_H4). *See, e.g.*, RDEIR/SDEIS Fig.

4.3.1.1. Because Alternative 4_H4 results in higher outflow than what is proposed under Alternative 4A, and because reduced outflow is likely to cause significant environmental impacts, the RDEIR/SDEIS fails to disclose and analyze the likely environmental impacts of Alternative 4A.[16]

The RDEIR/SDEIS fails to actually disclose or analyze the proposed outflow criteria for Alternative 4A, which fails to inform the public and decisionmakers of what is actually being proposed, let alone the likely environmental impacts. The RDEIR/SDEIS must be revised to describe, model, and analyze the operations that are being proposed under Alternative 4A.

b. The RDEIR/SDEIS Fails to Adequately Describe or Analyze the Impacts of Alternative 4A because Proposed Delta Outflows are not Reasonably Certain to Occur

In addition to failing to describe, model or analyze the winter/spring outflow operations that are being proposed in Alternative 4A, the RDEIR/SDEIS fails to model and analyze the likely effects of Alternative 4A because it fails to demonstrate that the outflow requirements of Alternative 4A will be achieved. The RDEIR/SDEIS states that the outflow requirements of Alternative 4A will be "provided through the acquisition of water from willing sellers. If sufficient water cannot be acquired for this purpose, the spring outflow criteria will be accomplished through operations of the SWP and CVP to the extent an obligation is imposed on either the SWP or CVP under federal or applicable state law." RDEIR/SDEIS at 4.1-5. However, the RDEIR/SDEIS fails to demonstrate that flows under Alternative 4A are reasonably likely to occur. First, the document fails to demonstrate that CVP/SWP contractors will be willing and able to acquire sufficient flow to meet these compliance obligations. Because these are mitigation and compliance obligations, public funds under Proposition 1 cannot be used. *See* Cal. Water Code § 79709. Second, to the extent that flows cannot be acquired, the RDEIR/SDEIS does not actually require that the CVP and SWP achieve these outflow requirements, instead limiting outflow "to the extent an obligation is imposed on either the SWP or CVP under federal or applicable state law. RDEIR/SDEIS at 4.1-5. The RDEIR/SDEIS fails to demonstrate that outflow requirements proposed in Alternative 4A would actually be achieved in the future using CVP/SWP operations. Third, the RDEIR/SDEIS proposes to achieve the outflow requirements "assuming outflow from export reductions first, then Oroville releases." RDEIR/SDEIS at 4.1-9. However, as other stakeholders noted in prior comments on a similar program in the DEIS/DEIR, this operational approach would likely result in a water supply deficit under the Coordinated Operating Agreement, which would likely result in significant changes in operations that are not analyzed in the RDEIR/SDEIS (including new environmental impacts), and different water supply impacts between CVP and SWP contractors than those identified in the RDEIR/SDEIS. The RDEIR/SDEIS

[16] Although Alternative B includes a sensitivity analysis, there are substantial differences in the CALSIM II modeling results of Alternative 4 and Alternative 4A, and Alternative 4A is likely to cause more adverse and significant impacts for fish compared with Alternative 4 in several key respects, including: upstream reservoir storage and water temperature impacts on the Sacramento and Feather Rivers; Delta outflow in January-March of Dry years; and Delta salinity in October to December of Below Normal, Dry, and Critical years. Appendix B mischaracterizes the two alternatives as "similar," but there are substantial differences that will result in additional impacts that are not adequately disclosed in the RDEIR/SDEIS.

must be revised to ensure that CVP/SWP operations will achieve required outflow under Alternative 4A irrespective of any water transfers.

XI. The RDEIR/SDEIS Fails to Adequately Analyze Likely Significant Adverse Environmental Impacts because it Fails to Analyze Likely Waivers of Water Quality Standards during Future Droughts, Which the RDEIR/SDEIS Indicates are Likely to Occur

As CVP/SWP operations during the recent drought have demonstrated, waivers of water quality standards and ESA protections during future droughts are reasonably foreseeable, and are likely to cause significant adverse environmental impacts on fish and wildlife. The RDEIR/SDEIS also indicates that the CVP and SWP are likely to seek substantial waivers of environmental protections in future droughts as well, operating in a manner that is not analyzed in the RDEIR/SDEIS. However, despite language in the RDEIR/SDEIS indicating that the CVP and SWP are likely to seek and obtain waivers of water quality standards and other environmental commitments in future droughts, the RDEIR/SDEIS fails to analyze the impact of such waivers in the future. As a result, the RDEIR/SDEIS fails to adequately analyze the likely environmental impacts of the alternatives during future drought conditions.

During the current drought, the SWRCB and fishery agencies have waived and relaxed Delta water quality standards (including salinity and X2) and ESA requirements under the existing biological opinions, and have failed to meet water temperature standards, in order to increase water diversions and water deliveries during the drought. *See, e.g.*, Water Rights Order 2014-0029 (September 24, 2014), available online at: http://www.waterboards.ca.gov/waterrights/board_decisions/adopted_orders/orders/2014/wro2014_0029.pdf; Water Rights order dated February 3, 2015, available online at: http://www.waterboards.ca.gov/waterrights/board_decisions/adopted_orders/orders/2014/wro2014_0029.pdf; April 6, 2015 Revised Order, available online at: http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/tucp/2015/tucp_order040615.pdf; July 3, 2015 order conditionally approving petition for temporary urgency change, available online at: http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/tucp/2015/tucp_order070315.pdf. For instance, in 2015 the waivers of water quality standards reduced Delta outflows and increased water deliveries by approximately 800,000 acre feet. *See* email from DWR to SWRCB dated October 26, 2015, available online at: http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/tucp/docs/dwr2015sept_droughtacct.pdf.

The failure to meet water quality standards and water rights conditions (including water temperature requirements) has contributed to devastating impacts to native fish and wildlife species, including:

- Greater than 95% mortality of endangered winter-run Chinook salmon eggs and juveniles above Red Bluff Diversion Dam in 2014, and the potential for similar or even higher mortality levels in 2015, due to lethal and chronically adverse water temperatures below Keswick Dam;
- Greater than 95% mortality of fall-run Chinook salmon eggs and juveniles that spawned in the mainstem Sacramento River above Red Bluff Diversion Dam in 2014;
- Record low abundance indices for Delta Smelt in the 2014 Fall Midwater Trawl, 2015 Spring Kodiak Trawl, and other surveys;
- Near record low abundance of Longfin Smelt in the 2014 Fall Midwater Trawl survey;
- Increases in the abundance of nonnative species like black bass in the Delta; and,
- Increases in harmful algal blooms like *Microcystis*.

See, e.g., Water Rights Order 2014-0029; Water Rights order dated February 3, 2015; April 6, 2015 Revised Order; July 3, 2015 order conditionally approving petition for temporary urgency change; Protest to TUCP filed by the NRDC dated February 13, 2015, available online at: http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/comments_tucp2015/docs/nrdc_obegi021315.pdf; March 24, 2015 Petition for Temporary Urgency Change, Attachment A, available online at: http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/tucp/2015/apr2015_req032415.pdf.

The RDEIR/SDEIS repeatedly indicates that during future droughts, the CVP and SWP are likely to be operated in a manner that does not comply with the flow, water quality, and other environmental standards identified in the RDEIR/SDEIS. For instance, the RDEIR/SDEIS admits that,

> These changes in storage would reduce the ability of the CVP and SWP to meet system water demands and environmental water needs. Adaption measures would need to be implemented on upstream operations to manage coldwater pool storage levels under future sea level rise and climate change conditions. As described in the methods section of Chapter 5, Water Supply, in the Draft EIR/EIS, **model results when storages are at or near dead pool may not be representative of actual future conditions because changes in assumed operations may be implemented to avoid these conditions.**

RDEIR/SDEIS at 4.2-4 (emphasis added). The same or similar language appears repeatedly in the document. *See, e.g.*, RDEIR/SDEIS at 4.2-10 to 11, 4.3.1-6, 4.3.4-25; RDEIR/SDEIS Appendix A at 5-3. Similarly, the RDEIR/SDEIS admits that

> Under extreme hydrologic and operational conditions where there is not enough water supply to meet all requirements, CALSIM II utilizes a series of operating rules to reach a solution to allow for the continuation of the simulation. It is recognized that these operating rules are a simplified version of the very complex decision processes that SWP and CVP operators would use in actual extreme conditions. Therefore, model results and potential changes under these extreme conditions should be evaluated on a

> comparative basis between alternatives and are an approximation of extreme operational conditions.
>
> As an example, CALSIM II model results show simulated occurrences of extremely low storage conditions at CVP and SWP reservoirs during critical drought periods when storage is at dead pool levels at or below the elevation of the lowest level outlet. When reservoir storage is at dead pool levels, there may be instances in which flow conditions fall short of minimum flow criteria, salinity conditions may exceed salinity standards, diversion conditions fall short of allocated diversion amounts, and operating agreements are not met.

RDEIR/SDEIS Appendix A at 5-2; RDEIR/SDEIS Appendix A at 8-237 (admitting that CALSIM modeling shows that during drought conditions, water quality standards in the Delta are exceeded due to dead pool conditions, but that this does not reflect likely CVP/SWP operations because CALSIM modeling does not reflect actual operations during such conditions). And the RDEIR/SDEIS asserts that extreme, prolonged droughts are not simulated or analyzed in the RDEIR/SDEIS, despite the likelihood of failing to meet water quality and other environmental commitments during such conditions, stating,

> Environmental conditions arise that cannot be foreseen or simulated in the model that can affect compliance with water quality objectives. These include unpredictable tidal and/or wind conditions, gate failures, operational needs to improve fish habitat/conditions, **and prolonged extreme drought conditions,** among others.

RDEIR/SDEIS Appendix A at 8-53 (emphasis added).

The adaptive measures taken in such conditions are likely to result in significant adverse environmental impacts, particularly on native fish and wildlife, which are not analyzed in the RDEIR/SDEIS. For instance, the RDEIR/SDEIS asserts that water quality impacts will be less significant than identified in the RDEIR/SDEIS because the projects will not be operated as modeled:

> Table 2 of Appendix 8H Attachment 1 indicates that most of these exceedances are a result of modeling artifacts, but some exceedances are due to dead pool conditions that occurred in 1977, 1981, and 1990 occurred under Alternative 4 and not under Existing Conditions. As discussed in Chapter 5, Water Supply, Section 5.3.1, Methods for Analysis, under extreme hydrologic and operational conditions where there is not enough water supply to meet all requirements, CALSIM II uses a series of operating rules to reach a solution that are is a simplified version of the very complex decision processes that SWP and CVP operators would use in actual extreme conditions. **Thus, it is unlikely that the Emmaton objective would actually be violated due to dead pool conditions.**

RDEIR/SDEIS Appendix A at 8-237 (emphasis added). Yet the RDEIR/SDEIS fails to explain how such adaptive measures would avoid violating the Emmaton objective as a result of dead pool conditions and without causing other significant environmental impacts. For instance, increased reservoir releases to meet water quality standards during such conditions could result in increased mortality of salmon eggs and juveniles as a result of lethal upstream temperatures. Indeed, the actions taken during the recent drought indicate that it is far more likely that water quality standards in the Delta will be waived in future droughts, and that this will cause significant adverse impacts that are not analyzed or disclosed in the RDEIR/SDEIS.

Moreover, the RDEIR/SDEIS acknowledges that reservoir storage will approach dead pool levels more frequently in the future as a result of climate change and CVP/SWP operations: for instance, under the No Action Alternative, "[t]he frequency of Trinity, Shasta, and Folsom Lakes dropping to dead pool storage would increase by about 10% under the No Action Alternative as compared to Existing Conditions." RDEIR/SDEIS Appendix A at 5-3. As a result, there is a 10% increase in the frequency during which operations are not likely to occur as modeled in the RDEIR/SDEIS. These are periods when environmental impacts that are more severe and significant than those disclosed in the RDEIR/SDEIS are likely to occur.

Finally, the RDEIR/SDEIS also misleads the public and decisionmakers as to the record of compliance with salinity and other water quality standards. The document asserts that there have been very few violations of salinity and water quality standards. *See* RDEIR/SDEIS Appendix A at 8-16 and Table 8-13a. Yet in both of the prolonged drought periods that have occurred since adoption of Decision 1641, the CVP and SWP have sought and/or obtained waivers of water quality standards in the Delta. The RDEIR/SDEIS fails to disclose that the CVP and SWP have violated the Delta X2 and salinity standards specified in the water quality control plan for much of 2014 and 2015, as well as petitioning the SWRCB to waive water quality standards (X2 and salinity) during drought conditions in 2009. These tables and text must be revised to disclose the recent record of non-compliance with the water quality control plan objectives.

XII. The RDEIR/SDEIS Fails to Adequately Analyze Environmental Impacts and Fails to Disclose Significant Adverse Impacts of the Previously Analyzed Alternatives

Despite significant scientific criticism of the methods used to assess environmental impacts in the DEIS/DEIR and the scope of analysis in our Prior Comments, independent scientific peer reviews, and comments from other agencies and stakeholders, the RDEIR/SDEIS largely fails to modify the assessment of impacts of the prior alternatives. For example, the revision to Chapter 11 in the RDEIR/RDEIS does not replace or modify modeling techniques that are likely to produce inaccurate or skewed results. These flawed modeling approaches include, but are not limited to, application of:

- The Delta Passage Model (*see* below and Prior Comments, footnote 70 at 187),
- CALSIM II (*see* Prior Comments, multiple locations e.g., in particular, at 56-64)
- Modifications of regression equations from Kimmerer et al. (2009; *see* below and Prior Comments at 136-140).

In addition, despite the numerous published papers, reports, and scientific reviews cited in our Prior Comments, the RDEIR/SDEIS has not modified project proponents' previous unsubstantiated assertions about the expected benefits of tidal marsh habitat restoration (CM4) or the uncertainty surrounding those expectations. The RDEIR/SDEIS does not appear to have incorporated or responded to analyses (e.g., Kimmerer X2 equation relating Fall X2 to Delta Smelt abundance, from comments submitted by The Nature Conservancy), or published papers (e.g., Rose et al 2013 a, b), agency reports, and peer reviews cited in our Prior Comments or those of other parties. And, the RDEIR/SDEIS makes no reference to new, highly relevant publications and reports that have become available since our Prior Comments were submitted (*see* references *infra*). As a result, the RDEIR/SDEIS ignores substantial scientific information relevant to the assessment of impacts. This failure to incorporate the best available science in to discussions of the previous alternatives, failure to identify impacts, new and persistent flaws in the analysis of impacts that are identified, and incorrect or misleading conclusions drawn from analyses, are covered in more detail below.

The RDEIR/SDEIS also fails to revise the environmental baseline in the analysis of these alternatives, which causes the document to incorrectly analyze impacts as discussed in our Prior Comments. As discussed *supra*, the failure to include Fall X2 and required habitat restoration in the baseline is even less justified today, the RDEIR/SDEIS includes these measures in the NEPA baseline for the new alternatives further demonstrates that the baseline should be changed for the prior alternatives, and the RDEIR/SDEIS now uses different baselines for the different alternatives.

Similarly, the RDEIR/SDEIS has not changed the temporal scope of the analysis of impacts, limiting the analysis of the previous alternatives to the Late Long Term and failing to show whether significant impacts will also result during the period between the Early Long Term and Late Long Term.

As in the previous version of the DEIR/DEIS, the new environmental documents present arbitrary thresholds for determining significant effects, and even these unjustified thresholds are applied arbitrarily. For example, both the DEIR/DEIS and RDEIR/DSDEIS state, **"**[a] 'difference' was defined as a >5% difference between the pair of model scenarios in at least one water year type in at least 1 month." DEIS/DEIR at 11-202; RDEIR/SDEIS Appendix A at 11-68. By contrast, in its "Methodology used for reaching a conclusion for the BDCP EIR/S for fish impacts related to water operations" the RDEIR/SDEIS, presents a different threshold for evaluation of flow impacts:

> In general, for habitat and migration-related impacts, if changes in flows were less than ~15% under the alternative relative to the baseline for a small proportion of months in which a fish is present (e.g., 1 or 2 of 7 months), there was no adverse effect. If changes in flows were greater than 15% in a substantial proportion of total months (e.g., 2 of 3 months), it would be considered substantial and warranted further biological evaluation.

RDEIR/SDEIS Appendix A at 11-78. Both of these thresholds are arbitrary. There is no basis in biology or hydrology to declare that smaller proportional changes are not significant. Such a conclusion can be based only on understanding the target species' (or ecosystem attribute's) response to change in conditions (e.g. is it linear or are there important non-linear, threshold effects?) and the baseline conditions involved (e.g., are conditions already close to a threshold value?). For example, the significance of a change in temperature can only be determined with reference to the starting temperature and known thresholds, and a 5% increase or decrease above or below 50^{o}F has very different biological impacts on salmon egg mortality than a 5% increase or decrease above or below 56^{o}F. Similarly, small changes in river flow can have dramatic effects on flow-related variables (e.g., temperature, sediment movement, habitat inundation) when the baseline flow is close to threshold levels. Readers cannot detect or evaluate the impact of a change in river flows simply by knowing the percentage change from a baseline (especially if that baseline is represented by modeling and not by current, real-world conditions). If two alternatives generate different model outcomes, the effect of the difference must be evaluated with reference to target species'/ecosystem attribute response and, in particular, the existence of threshold (non-linear) effects. That said, a change in flows of ~15% *relative to full natural flows* is likely to have a very large effect on ecosystem structure, function, and capacity to maintain species diversity. Richter et al. 2011. Application of the RDEIR/RDEIS' rule-of-thumb for evaluating the significance of flow alterations is likely to result in significant adverse effects that are not disclosed in the document.

The RDEIR/SDEIS' attempt to justify these arbitrary thresholds is incorrect. The documents explain that the models deployed to evaluate effects have high variances, so if the modeled difference between alternatives is "small" then that difference may not actually materialize. But, unless the model deployed is known to produce biased estimates, then the model's variance (error) should be distributed around its estimates and modeled differences in effects between different alternatives – in other words, "small" differences projected from modeling are as likely to be larger in the real world as they are to be smaller. By assuming that "small" negative effects will not actually occur, the RDEIR/SDEIS inappropriately ignores their potential importance and fails to capture multiple small effects that may add-up to a large effect. In contrast, the RDEIR/SDEIS frequently finds that such "small" effects are worth discussing when the sign of the effect presents project alternatives in a favorable light. This results in a biased analysis of impacts. Examples of these arbitrary standards and their arbitrary application are provided below.

Flawed Modeling of Impacts

In many cases, our Prior Comments regarding hydrological impacts of operations have not been addressed and remain a concern, as outputs of the hydrological modeling will become inputs to other models that are used to evaluate biological and other impacts. Even though some public comments are addressed at times in the text, the CALSIM II, DSM2, and temperature modeling was not changed, and contains the same flaws we previously identified. Where our previous comments were addressed with additional discussion, the presentation of the information may have improved, but the impacts analysis based on flawed results is still inadequate. Despite new information in the discussion and results, the modeling still fails to adequately represent likely operations either under the baseline or under the proposed project. For example, the following new or revised analyses and discussion still result in a flawed document:

1. In response to public comments, the RDEIR/SDEIS (at 8-50 and 8-51) explains why water quality errors and exceedances occur in the model results. Most of the water quality exceedances are due to the change in compliance location from Emmaton to Three Mile Slough (TMS) in the original alternatives (but not in Existing Conditions ("EC") or NAA). Page 4 of Appendix 8H Attachment 1 discloses that in Alternative 4 H3, moving the compliance point from TMS to Emmaton decreases exceedances from 28% to 15%, closer to the 13% in the NAA. Since CALSIM II has water quality compliance as its highest priority, any exceedances mean that it is not feasible for the model to comply. However, feasibility in the CALSIM II model is constrained by the model assumptions, and is not the same as feasibility in the real world. Also, non-compliance may be due to errors in the monthly to daily flow patterning in the ANN model (accounting for 1% error according to Appendix 8H Attachment 1). Real-world operations would comply most of the time as stated on p. 8-53, however as we note above, this outcome is far from certain. The new discussion, while helpful for understanding the sources of error, does not provide insight into expected water quality compliance under the alternatives, and is simply an explanation for why the modeling remains flawed.
2. Regarding real-world operations, Table 8-13a on pages 8-16 and 8-17 shows only one 35-day exceedance at Emmaton since 1995.[17] However there are 14 other exceedances on the San Joaquin River and Old River. Thus the revised discussion in the RDEIR/SDEIS confirms that neither the CALSIM II modeling (which shows many more exceedances will occur) nor the discussion (which claims no exceedances will occur) are an informative representation of likely real-world operations in relation to water quality, as we stated in Prior Comments (at 67). This is a continued failure to disclose impacts, and potentially invalidates any conclusions based on the water quality modeling.
3. Figures 4 through 6 of Appendix 8H Attachment 1 show a bias in the CALSIM II programming where the CALSIM II electrical conductivity standard at times exceeds the D1641 standard. Since the modeled standard should always be equal to or lower than the D1641 standard in order to properly model compliance, any time the D1641 standard is exceeded by the modeled criteria, it indicates environmental protection was not conservatively modeled and is not a priority for this project (however there are also times when the modeling underestimates project exports and overestimates Delta outflow—*see* Prior Comments at 59-60). The attachment (at 11) claims that the majority of the exceedances are not due to limitations of the modeling tools, but due to assumed operational criteria. Flawed assumptions lead to flawed models with flawed outputs, and as a result, the RDEIR/SDEIS provides no examples or analysis of operations needed to comply with water quality standards. This is a continued failure to disclose likely project operations and impacts.
4. The real-world track record of the projects (in table 8-13a) is a new analysis that perhaps informs this subject more than the modeling. Since 14 of the 15 exceedances since 1995 occurred in closer proximity to, or downstream of, the existing export pumps (i.e., San Joaquin

[17] As discussed *supra*, this table is inaccurate.

River), it is reasonable to assume (regardless of modeling) that operators will manage the proposed facilities with the same margin of error in relation to water quality standards as in the past and, therefore, that real-world operations at the proposed intakes on the Sacramento River will create new exceedances on the Sacramento River. The revised documents provide no analysis of changes in existing operations needed to improve compliance, and thus do not propose to mitigate this reasonably foreseeable, yet undisclosed, significant adverse effect of the NAA and alternatives. The RDEIR/SDEIS states that it is "unlikely that there would be increased frequency of exceedance of agricultural electrical conductivity objectives in the interior or southern Delta" (at 8-242) or that increased long-term and drought period average electrical conductivity would occur relative to EC. There is no support for this claim since credible operations scenarios and impacts are not disclosed.

5. Tables EC-1 through EC-9 in Appendix 8H were revised to show the same or additional days of electrical conductivity standard exceedances for NAA and the other alternatives, with no changes for Existing Conditions. Using the LLT water year type instead of the Existing Conditions water year type to determine electrical conductivity standards caused the 0-5% increases in modeled violations. Alternative 4 H3 and H4 are now out of compliance for the Emmaton electrical conductivity standard 42-43% of the days when the objective applies, and NAA is out of compliance 25% of the time, with Existing Conditions still out of compliance 11% of the time. All we can conclude is that the model performance related to actual proposed (D1641-compliant) operations has gotten worse, and the modeling is less relevant than ever to the real world, as well as to the impact conclusions, which did not change despite this significantly worse compliance.
6. The RDEIR/SDEIS addresses public comments regarding the conflation of Three Mile Slough and Emmaton (Prior Comments at 65) by removing the top row from the Alternative 4 table EC-4, however this row was not removed in the other tables (EC-1 through EC-9). This represents a continued failure to present information clearly, leading to possible confusion and misleading of the public and decisionmakers.[18]
7. Previously we commented on the inconsistency of the export to inflow ("E:I") ratio definition. The BDCP approach calculates inflow below the North Delta Diversion ("NDD") intakes and does not include diversions from the NDD as "exports." However, in operational variants H2 and H4 a different calculation of E:I (favored by NMFS) was employed, which includes NDD diversions as exports. The new alternatives abandon the NMFS-favored approach and all three alternatives 4A, 2D, and 5A (including variants H2 and H4) now use the BDCP approach. This change increases the confusion caused by inconsistent methods and unnecessarily complicates disclosure of impacts because scenarios H2 and H4 follow the NMFS approach in all alternatives—except in alternatives 4A, 2D, and 5A. We also noted previously that the sensitivity analysis memo (DEIS/DEIR at 5A-D148) characterized the two methods of calculating E:I as minimally different. The preferred project now adopts the BDCP approach of not including NDD diversions in the export total; on a monthly average this approach shifts exports from July-Aug

[18] The RDEIR/SDEIS inconsistently addresses whether changes to the Emmaton salinity standards were included in the modeling and analysis.

to May-Jun and reduces north Delta bypass flows and Delta outflows in June, both of which are indications that actual Delta flows (not monthly averages) would be worse for fish. It also tends to shift exports from south to north and to increase Folsom carryover storage. These changes reflect biases of the project proponents rather than the coequal goal of flow conditions that are more beneficial to fish – flow conditions for fish are diminished by the E:I ratio definition in alternatives 4A, 2D, and 5A. In addition to reducing entrainment, the E:I ratio enhances the natural variability of Delta outflow, and exempting the north Delta intakes from its export restriction would reduce that important variability and the benefit it provides to fish.

The RDEIR/SDEIS repeatedly obscures or minimizes impacts of project alternatives by comparing those impacts to assumed future operations (the NAA) that would significantly impact native species. One example of this practice is the erroneous comparison of water temperatures under project alternatives with extremely high temperatures predicted to occur under the NAA to reach a conclusion that operations under the project alternatives will be "not adverse," as discussed *supra*. Because the CVP and SWP will need to modify operations to adapt to the effects of climate change and avoid jeopardizing the continued existence of listed species, the NAA does not represent likely operating conditions of the CVP and SWP in the future. Significant adverse impacts to native species will occur under the NAA. Thus, a finding that modeled impacts of project alternatives are "similar to" the NAA does not mean that the impacts are less than significant or not adverse.

For all of these reasons, the RDEIR/SDEIS still fails to adequately assess environmental impacts of these alternatives. Examples of these failings and others are presented below in our critique of species-specific and ecosystem attribute-specific impacts that are described in the updated RDEIR/RDEIS' Chapter 11 (Fish and Aquatic Resources), which describes amendments and revisions to the analyses of previously described (BDCP) alternatives.

a. Flawed Modeling and Analysis of Impacts to Longfin Smelt

The RDEIR/SDEIS continues to analyze impacts to Longfin Smelt populations by misapplying regression equations derived from Kimmerer et al. (2009). Our Prior Comments described numerous inadequacies with this approach (*see* Prior Comments at 136-141), including that such an approach ignores more recent published findings of the Longfin Smelt population response to changes in Delta outflow. *See, e.g.*, Thomson et al. 2010; Mac Nally et al. 2010. Subsequent to our Prior Comments, Nobriga and Rosenfield (*in press*) developed a more refined analysis of the Longfin Smelt population response to changes in freshwater flow. Among other outcomes, this study documents the important effect of initial population size on population size in subsequent years ("stock-recruit relationships"). *See also* Thomson et al. 2010. However, stock-recruit relationships are not incorporated into the RDEIR/SDEIS's approach to evaluating Longfin Smelt populations. 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. As applied by the RDEIR/SDEIS, 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; this will lead to overestimation of Longfin Smelt abundance when wet years follow dry years and underestimates environmental impacts of the alternatives on Longfin Smelt.

Despite the wealth of studies cited in our Prior Comments demonstrating that tidal marsh habitat restoration is unlikely to provide substantial benefit to Longfin Smelt, the RDEIR/SDEIS continues to assert that such habitat will benefit Longfin Smelt populations. The revised Chapter 11 erroneously claims that the NEPA finding for Alternative 2D remains "adverse" specifically because of its "lack of extensive tidal habitat restoration." RDEIR/SDEIS Appendix A at 11-217. This and similar conclusions in the RDEIR/SDEIS are incorrect and lack substantive scientific support. By studying long-term patterns of population dynamics of different age classes of Longfin Smelt, Nobriga and Rosenfield (*in press*) disaggregated forces that are likely to contribute to the extreme decline in this once abundant forage fish. They found that freshwater flow out of the Delta drives production of early juvenile Longfin Smelt and that there was no time trend in this age class after accounting for Delta outflow (no other physical variable was an important predictor of Age 0 Longfin Smelt production). In particular, they found no evidence that changes to the estuarine food web had affected spawner-to-recruit productivity. Non-flow related declines in Longfin Smelt productivity were detected in Longfin Smelt survival between Age 0 and Age 2. During this part of their life cycle, Longfin Smelt aggregate almost exclusively in deep water habitats and most of the population is found in mesohaline or marine waters, *see* Rosenfield and Baxter 2007, far from proposed habitat restoration projects (CM4). Thus, Nobriga and Rosenfield (*in press*) provide yet more evidence that the presumed benefits of CM4 to Longfin Smelt (e.g., via the production of food to support larval and young juvenile fish) are unlikely. Thus, all NEPA/CEQA determinations regarding Longfin Smelt are suspect to the extent that they rely on the benefits that the RDEIR/SDEIS's assumes will accrue from implementation of CM4 (e.g., Alt 4).

Furthermore, the RDEIR/SDEIS proposes numerous "mitigations" that will not produce measureable improvement in conditions for Longfin Smelt. For example, AQUA-22a, AQUA-22b, and AQUA-22c consist of efforts to "evaluate", "model", and to "consult with USFWS and CDFW" to identify and implement feasible mitigations of effects to Longfin Smelt arising from alternatives and operations of the water conveyance facilities. But these actions are not mitigation measures; they are part of the process to identify such measures. They do not provide specific performance measures to show how impacts will be reduced to less than significant levels and they do not appear to be enforceable. *See* Tit. 14, Cal. Code Regs. § 15126.4. The RDEIR/SDEIS's "not adverse" determinations for Alternatives 1A, 1B, 1C, 3, 5, and 5A improperly rely on implementation of AQUA-22a, AQUA-22b, and AQUA-22c "mitigations."

b. Flawed Modeling and Analysis of Impacts to Winter-run Chinook Salmon

The RDEIR/SDEIS classifies as "not adverse" differences of modeled effects between alternatives that are less than <5%. As described *supra*, this is an arbitrary and biologically meaningless threshold.[19] The RDEIR/SDEIS concludes that effects of water operations on migration conditions for Chinook salmon (AQUA-48; *see* RDEIR/SDEIS Appendix A at 11-236) will be "not adverse" for the winter-run despite the findings that, in all water year types, through-Delta survival is expected to decline compared to the NAA under Alternative 4 (all operational variants and overall; Table 11-mult-54), Alternative 5 (Table 11-mult-57), and Alternative 7 (Table 11-mult-59). These findings rely on the Delta Passage Model (DPM); there is no indication that the RDEIR/SDEIS has considered our Prior Comments that DPM is inappropriate and likely to underestimate mortality for all but the largest juvenile salmonids (e.g., late-fall run Chinook salmon of hatchery origin or steelhead). The RDEIR/SDEIS argues that survival under the alternatives would be "similar to or slightly lower than NAA." *See, e.g.*, RDEIR/SDEIS Appendix A at 11-245. This inappropriately minimizes the effect of persistent survival declines projected for Alternatives 4, 5, and 7. Through-Delta survival of winter-run, and Central Valley Chinook salmon in general, is already extremely low. *See* Williams 2010; NMFS Recovery Plan 2014 at 127, and at Appendix B Attachment A; NMFS 2009 Biological Opinion; RDEIR/SDEIS Appendix A at 11-1330. Further declines in survival will have significant impacts to this imperiled species, regardless of whether the RDEIR/SDEIS presumes the decline caused by an alternative is "small."

Numerous potential impacts to winter-run Chinook salmon viability are identified upstream of the Delta; however, the RDEIR/SDEIS erroneously finds that these outcomes will be "not adverse" either because the modeled differences between an alternative and the NAA are deemed to be "small" or because the RDEIR/RDEIS minimizes or ignores the outcomes of its own analyses. For example, declines in storage volumes behind Shasta Dam (a proxy for subsequent temperatures and flow volumes during the winter-run Chinook salmon incubation and early rearing phases) are expected in at least some year types for all Alternative 4 operational variants and Alternative 7. Partially as a result, temperatures are projected to increase substantially in most year types at Bend Bridge over multiple months during the incubation period for winter-run Chinook salmon (for example, at Table 11-mult-33 for Alternative 4_H3; at Table 11-mult-38 for Alternative 4_H1 and _H4; at Table 11-mult-43 for Alternative 7). Using Reclamation's egg mortality model, the RDEIR/SDEIS finds that under Alternative 4-H3 winter-run Chinook salmon egg mortality will increase by 76% and 11% compared to NAA under Below Normal and Dry conditions respectively, but it then argues that these proportionate increases are "small" on an absolute scale. RDEIR/SDEIS Appendix A at 11-221. This reflects inconsistency in how the RDEIR/RDEIS (and the DEIR/DEIS) treat modeling results; in most cases, the environmental documents are at pains to argue that modeling outputs are for comparative purposes only and that relative changes between

[19] In some cases (mercury 4.2-31, flows 4.2-39, adult migration flows 4.3.7-179, sturgeon incubation flows 4.3.7-317, 4.4.7-171) it appears that the standard for identifying an adverse effect is actually 10%, although the reason for this shifting standard is not made clear.

alternatives, not absolute values, should be used to evaluate project impacts.[20] Faced with very large proportionate increases in winter-run egg mortality, the RDEIR/RDIES makes the opposite argument. Winter-run Chinook salmon egg-to-fry mortality rates are already chronically high compared to typical Chinook salmon populations[21] or desired conditions, thus large proportional changes in survival are likely to reflect large absolute changes, as well.

In addition, Reclamation's egg mortality model is notoriously inaccurate, especially when dry conditions persist over many years. Reclamation's egg mortality model and SALMOD model have significantly underestimated mortality of winter-run Chinook salmon during the current drought. In 2014 nearly the entire brood class of winter-run Chinook salmon eggs and fry were killed by high temperatures upstream of Red Bluff Diversion Dam, despite assurances from Reclamation that its operations would avoid such high mortality.[22] As a result, the environmental impacts of the alternatives during Dry and Critically Dry years are likely to be greater than those identified in the RDEIR/SDEIS using these models. Thus, the claim that large percentage changes in egg survival related to operations of different alternatives amount to small absolute changes is arbitrary. Furthermore, the SacEFT modeling tool predicts declines in four of six habitat metrics for winter-run Chinook salmon in the Upper Sacramento River under Alternative 4_H3 as compared to the No Action Alternative, including spawning habitat weighted usable area (by 28%) and incubation success (by 3%). The RDEIR/SDEIS presents similar results for other Alternative 4 operational variants and Alternative 7.

Despite these results, the RDEIR-SDEIS concludes that effects of Alternatives 4 and 7 will be "not adverse" upstream. Such a finding ignores that river temperatures upstream during winter-run incubation are already extremely high and flow conditions jeopardize winter-run rearing success, *see* Cunningham et al. 2015, Michel et al 2015, FWS 2014; both cause intolerable effects to winter-run productivity, *see* NMFS 2014 Recovery Plan, and significantly reduce the spawning range of winter-run Chinook salmon to very small area. The RDEIR/SDEIS' conclusions regarding upstream impacts are incorrect, and fail to disclose that these alternatives are likely to result in significant adverse impacts on winter-run Chinook salmon.

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[20] For example, the BDCP Effects Analysis Entrainment Appendix (Appendix 5.B, which is still the basis for determining entrainment effects in the RDEIR/SDEIS) states, "As with all such analyses, **caution should be applied when interpreting absolute differences (e.g., numbers of fish) and more emphasis should be put on relative differences between scenarios**." RDEIR/SDEIS Appendix 5.B at 5.B-iii (emphasis added).
[21] Mean egg-to-fry survival rates for winter-run Chinook salmon are 26.4% (USFWS 2014), well below the 38% average estimate for Chinook salmon populations provided by Quinn (2005). These rates are substantially lower than those predicted by SALMOD and Reclamation's egg mortality model.
[22] NMFS (2015) found that, "Even though State Water Resources Control Board Orders 90-5 and 91-1 require Reclamation to operate Keswick and Shasta dams to meet a daily average temperature of 56°F at Red Bluff Diversion Dam (RBDD) [or at a temperature compliance point (TCP) modified when the objective cannot be met at RBDD based on Reclamation's other operational commitments including those to water contractors, D-1641 regulations and criteria, and projected end of September storage volume], nearly every year, Reclamation has exceeded the TCP at some point throughout the temperature control season." *See* NMFS 2015 at 5.

Comparison of impact analyses for winter-run Chinook salmon from operations under Alternative 3 as compared to those expected from Alternative 4 and Alternative 7 do not reveal why the RDEIR/SDEIS finds that the former will have "adverse" impacts upstream but the latter two will have "not adverse" effects. SacEFT projected negative outcomes for each of these alternatives for winter-run Chinook salmon and accumulated degree days increased by >5% in Alternative 4_H1, Alternative 4_H3, and Alternative 7 (degree days are projected to increase 16% and 11% on average in certain months relative to the NAA for Alternative 4_H1 and Alternative 4_H3 respectively). As noted earlier, the NAA will have devastating effects on the endangered winter-run Chinook salmon, so the finding that these alternatives will further exacerbate conditions means that each would result in significant adverse impacts and should require mitigation to reduce or avoid these impacts.

The change in NEPA determination for impacts to winter-run Chinook salmon upstream under Alternative 2A (from "Adverse" to "Not Adverse") is arbitrary, unwarranted, and misleading. The RDEIR/SDEIS finds that, "the percentage of years with good (low) juvenile stranding risk under A2A_LLT is predicted to be 45% (14% on an absolute scale) lower than under NAA … the quantity and quality of juvenile rearing habitat in the Sacramento River would be lower under A2A_LLT relative to NAA." RDEIR/SDEIS Appendix A at 11-128. Regarding this impact, the RDEIR/SDEIS reports: "SALMOD and SacEFT [models] predicted contradicting results regarding habitat-related mortality. SacEFT found that juvenile stranding risk is expected to increase," *id.*, but the document discounts the SacEFT results in favor of SALMOD results. Similarly, even though Reclamation's model predicts relative increases in egg mortality for winter-run Chinook salmon under this alternative compared to the NAA (overall and particularly in Below Normal and Dry years), the RDEIR/SDEIS favors SALMOD's output that finds no degradation in upstream incubation and rearing conditions of Alternative 2A relative to those under the NAA (which, as noted above, are already unacceptable). The environmental documents explain that the preference for SALMOD results stems from that model's ability to combine all effects on early life history into one estimate of effect. But this rationale says nothing about the accuracy or relative value of the competing models. Discounting the projections of two models (Reclamation's Egg Mortality Model and SacEFT) because a third model synthesizes projections of multiple effects in to a single estimate confuses a model's convenience with the accuracy of its projections. Projections of increased egg mortality and juvenile stranding are important and must be evaluated more thoroughly in the context of the future viability of this endangered species. The data presented shows that significant impacts will occur that are not disclosed in the RDEIR/SDEIS.

The RDEIR/SDEIS acknowledges that through-Delta flows have "considerable importance for downstream migrating juvenile salmonids … and would be affected by the north Delta diversions." RDEIR/SDEIS Appendix A at 11-238. However, the RDEIR/RDEIS continues to understate the impacts of changes in flow volume to migrating winter-run Chinook salmon (and other fish) by representing these changes as the average within certain months *across years*. Thus, it finds that flows downstream of the North Delta Diversion (NDD) will be reduced relative to NAA by 11-23% (in months between November and May); 17% (in November), and up to 25% (*averaged over all water year types*) for Alternatives 4, 5, and 7, respectively. These findings represent very large changes in *average* flow downstream of the

NDD, but, fish will experience even greater reductions in flow in certain year types under each of these alternatives, and the use of averaging obscures the fact that flow reductions greater than the average will occur in a high proportion of years (*see* Appendix 11C, CALSIM II Model Results utilized in the Fish Analysis). The environmental documents further obscure the impacts of reduced through-Delta flows by describing bypass flow criteria that will be "managed in real time to minimize adverse effects of diversions at the north Delta intakes on downstream-migrating salmonids." RDEIR/SDEIS Appendix A at 11-238. Although the document asserts that impacts on winter-run Chinook salmon migration will be minimized with real-time fish sampling and adjustment of diversion rates when fish are in the immediate vicinity of the NDD, this is unrealistic because it overstates both our current understanding of fish migration behavior and the uniformity of that behavior. To the extent that some fish tend to migrate in response to flow conditions, that pattern reflects a pattern with substantial inter- and intra-annual variance and this means that short-term adjustments in diversion rates will have only limited benefit to migrating salmon and may result in significant adverse impacts on life history variation, a key component of the VSP criteria. The plan to manage bypass flows in real-time also overestimates the effectiveness of fish sampling; failure to detect fish does not mean that they are not present (especially when the fish are relatively rare). Finally, temporary reductions in diversions at the NDD will result in greater diversions on other days in the same or subsequent months (if the diversion and flow projections in the DEIR/DEIS and RDEIR/SDEIS are to be believed); to the extent that fish do not migrate past the NDD and out of the Delta within a very few days, they will still be subjected to substantial reductions in flows below the NDD that are likely to affect salmon orientation and survival through the Delta. Kimmerer 2008, 2011; Perry et al. 2010, 2012; Michel et al. 2015. Thus, the planned real-time operation under Alternative 4 is unlikely to mitigate the effect on migrating Chinook salmon of low flows below the NDD and through the Delta. This reduction in flow below the NDD will likely result in significant adverse effects on salmon survival that are not disclosed in the RDEIR/SDEIS.

c. Flawed Modeling and Analysis of Impacts to Spring-run Chinook Salmon

Despite our Prior Comments, the RDEIR/SDEIS continues to highlight *average* conditions across years and months while understating or ignoring impacts that occur in certain months and/or under particular water year types. The environmental documents tend to equate negative and perceived positive effects of project alternatives (and frequently emphasize marginal positive effects over the negative effects) without acknowledging that negative and positive effects may be asymmetrical. For example, the RDEIR/SDEIS description of operational impacts to spring-run on the Sacramento River under Alternative 2A makes no sense biologically:

> Flows during September would be up to 17% greater than or similar to those under NAA in wet, dry, and critical years, up to 15% lower in above normal and below normal years, but similar when all years are combined.

RDEIR/SDEIS Appendix A at 11-250. Fish do not experience the "all years combined" condition. Spring-run Chinook attempting to spawn or hold in the Sacramento River in Above Normal and Below Normal years will experience substantially lower flow under Alternative 2A than under the NAA, which is likely to affect the productivity, resilience, and overall viability of the spring-run Chinook salmon population in that river; fish spawning or incubating in those years are unaware of and unaffected by conditions in wet years (for example). There is no reason to assume that any positive impact of increased flows during certain year types will be symmetrical with the negative impacts of reduced flows that are projected to occur in September during Above Normal and Below Normal years. Similar irrelevant claims are made about average results over multiple year types (e.g., Alternative 4_H3) throughout the RDEIR/SDEIS and DEIR/DEIS.

The RDEIR/SDEIS makes the same mistake regarding changes in flow conditions within-years, regarding substantial changes in flow patterns as "adverse" only if they occur over a "substantial portion" of months. This arbitrary standard ignores the potential for poor environmental conditions in a particular month to be catastrophic (i.e., negating any benefit in other months of the same year) or to impact a particular segment of the population disproportionately (i.e., that fraction of the population that is in a given life history stage during the month(s) affected by the poor condition). For example, flows on the Sacramento River under Alternative 2A are reported to be lower during the spawning period (Sept-Nov) of certain years; thus, the finding that flows will be higher during December and January of those years (RDEIR/SDEIS Appendix A at 11-250) is irrelevant to the effects on spawning since spring-run Chinook salmon will have spawned before flow conditions "improve." Within the time frame of a specific life-stage (e.g., spawning, juvenile rearing, ocean entry), temporal asymmetry of project effects can limit the diversity of life-history strategies found in a population, *see* Zeug et al. 2014, and their subsequent success, *see* Satterthwaite et al. 2014. Behavioral and life-history diversity are critical to the viability of salmonids, *see* McElhaney et al. 2000, and are highly constrained among Central Valley salmon, *see*, *e.g.*, Carlson and Satherthwaite et al. 2011; Sturrock et al 2015. Reduced flows or increased temperatures during August or September are likely to limit spawning success of spring-run Chinook salmon in the early part of the spring-run spawning period, selecting against the early-spawning life history strategy and reducing life history diversity. Delayed spawning for spring-run can lead to increased introgression with fall-run Chinook salmon – this is a major threat to spring-run Chinook salmon populations of the Central Valley. *See* Moyle 2002; Williams 2006.

As with winter-run Chinook salmon, anticipated temperature changes upstream are likely to have major adverse effects on spring-run spawning populations, but these impacts are ignored or inappropriately minimized in the RDEIR/SDEIS. Alternative 2A, Table 11-Mult-63 (RDEIR/SDEIS Appendix A at 11-254) reveals an increase in degree days over NAA of up to 23% throughout the September-November period (spring-run Chinook salmon spawning and incubation occur during this time). The Reclamation model predicts that spring-run Chinook salmon egg mortality in the Sacramento River under A2A_LLT would be greater than under NAA in most year types (up to 28% greater in Below Normal years). SacEFT predicts a 26% relative decrease in the frequency of years with good egg incubation conditions and a 6% decrease in the relative percentage of years with lower redd dewatering risk under A2A_LLT relative to NAA. Alternative 4_H3 is projected to generate 29% higher mortality for spring-run Chinook in Below Normal years. These findings and similar ones for other alternatives suggest serious impacts to spring-run Chinook salmon attempting to spawn and incubate in the mainstem Sacramento River. Again, the additional degradation of conditions caused by the project alternatives is in addition to the devastating impacts (e.g., from extreme temperatures) projected under the NAA. The RDEIR/SDEIS erroneously claims that Alternative 2A does not cause a significant adverse impact, RDEIR/SDEIS Appendix A at 11-260, and must be revised to disclose this impact and identify and analyze feasible mitigation measures.

The RDEIR/SDEIS acknowledges that through-Delta flows and survival of spring-run Chinook salmon juveniles in the Delta would decline under Alternatives 3, 4, 5, and 7. The RDEIR/SDEIS states that "Juvenile salmonids migrating down the Sacramento River would generally experience lower flows below the north Delta intakes compared to baseline conditions," *see* RDEIR/SDEIS Appendix A at 11-288, and it projects a 5% relative decrease in survival between Alternative 3 and NAA in wetter years and a 3% decline overall, *see id*. at Table 11-mult-99. For Alternative 4_H3, the environmental documents focus on OMR flows and claim: "These improved net positive downstream flows would be substantial benefits of the proposed operations." RDEIR/SDEIS Appendix A at 11-295. However, Delta Passage Model results (which likely overestimate spring-run Chinook salmon survival, as noted in our Prior Comments) reveal a 6% decline in survival under Alternative 4 (H3 and H1 operations) during wetter months and 4% decline overall. Survival of migrating juvenile spring-run Chinook salmon is anticipated to decline by 2-4%, and 5-6% for Alternatives 5 and 7 respectively. The RDEIR/SDEIS determines that each of these impacts is "not adverse" but this determination is incorrect as through-Delta survival is already believed to be a major constraint on spring-run Chinook salmon populations. *See* NMFS Final Recovery Plan 2014; BDCP Appendix 3.G; Cunningham et al. 2015.Further persistent declines in through-Delta survival increase the likelihood that this species will become extinct and certainly limit its ability to recover.

Alternatives analyzed in the RDEIR/SDEIS also threaten to negatively affect the survival of adult spring-run Chinook salmon through the summer months and/or their subsequent spawning success. For example, in the Feather River, flows during July and August are projected to decline by 18%, 53%, 34%, and 38% (in at least some years) under Alternatives 3, 4, 5, and 7. The RDEIR/SDEIS' conclusion that, "these flow reductions are of too low of magnitude to affect adult spring-run Chinook salmon spawning in a biologically meaningful way," *see* RDEIR/SDEIS Appendix A at 11-303, is erroneous as spring-run Chinook salmon, in particular, must rely on holding habitat[23] to survive the period between adult migrations (in the spring) and spawning in the late-summer and fall; flow reductions as described on the Feather River during July and August should be expected to reduce the quantity and quality of such habitat to a significant extent.

The RDEIR/SDEIS fails to acknowledge the potential for additive negative effects to spring-run Chinook salmon populations from combinations of reduced incubation success, lower through-Delta survival

[23] Spring-run Chinook salmon migrate during the spring, but delay spawning until the late-summer and early fall. Between migration and spawning, they wait in freshwater for adequate spawning conditions to arise, a behavior called "holding". Because they do not eat during the holding period and are generally quite vulnerable to large terrestrial predators, spring-run Chinook salmon require adequate habitat conditions (including deep pools, cut banks and other hiding spots) to survive from migration to spawning.

rates, and challenges to adults holding upstream. For all alternatives analyzed, such additive effects are likely, particularly for the Feather River population.

d. Flawed Modeling and Analysis of Impacts to Fall-run and Late-Fall run Chinook Salmon

According to the RDEIR/SDEIS, fall-run Chinook salmon will experience "adverse" effects to adult migration (Impact AQUA-78) under Alternative 4. RDEIR/SDEIS Appendix A at 11-313. Flows on the Sacramento River under A4_H3 would generally be 5-18% lower during November; Feather River flows under Alternative 4_H1 would be up to 69% lower during August and September relative to NAA and under Alternative 4_H4, flows would be 43% lower during these months. These huge reductions in flow are similar to those projected under Alternative 5 (compared to NAA, Alternative 5 Sacramento River flows would be 17% lower during November and up to 14% lower during August and September; Feather River mean flows would be lower by up to 47%), yet the RDEIR/SDEIS incorrectly determines that Alternative 5 operations will be "not adverse" with regard to this impact. On the American River, the RDEIR/SDEIS admits that, "flow reductions would cause a biologically meaningful effect to fall-run Chinook salmon migrations" under Alternative 4 operations. *See* RDEIR/SDEIS Appendix A at 11-315. Reduced flows under Alternative 5 are likely to cause very significant adverse impacts on fall-run Chinook salmon on the American River, even if one were to ignore the effect of extreme temperatures from August-October under this Alternatives and the NAA, as described above.

The RDEIR/SDEIS improperly finds that impacts to juvenile fall-run migrating downstream will be "not adverse" under Alternative 7, even as it estimates that through-Delta mortality will increase by 6% in wetter years and 4% overall relative to NAA, and by 15% in wetter years and 8% overall relative to Existing Conditions. Factors affecting fall-run juvenile survival through the Delta have substantial influence on the productivity and abundance of fall-run Chinook salmon in the Central Valley. *See, e.g.*, BDCP Appendix 3.G (Proposed Interim Delta Salmonid Survival Studies); Cunningham et al. 2015. Increasing mortality for juvenile fall-run Chinook salmon migrating through the Delta jeopardizes the viability of this run, the commercial and sport fisheries that rely on Central Valley fall-run, and the marine mammal populations that prey on Chinook salmon (e.g. Orca whales). The magnitude and likelihood of these negative outcomes increases as the effect of increased juvenile mortality in the Delta is considered in the context of increasing negative effects upstream.

Analyses of Chinook salmon and steelhead survival rates through the Delta rely on application of the Delta Passage Model. In our Prior Comments, we described why DPM is inappropriate for estimating survival of fry-sized migrants (such as fall-run, and most spring-run Chinook salmon migrants) through the Delta because it is based on results from hatchery-origin late-fall run fish, which would be expected to have much higher through-Delta survival rates. Michel et al. 2015. Our previous concerns remain. In addition, it is unclear that the RDEIR/SDEIS have properly calibrated the DPM or incorporated results of the most up-to-date tagging experiments with late-fall run fish. For example, the through-Delta survival rates calculated for late-fall run fish and the proportional differences between wetter years and drier years under Existing Conditions (Table 11-mult-108) do not correspond to those reported by Michel et al. (2015), and significantly overestimate survival in drier years (low flows) and underestimate survival in wetter years (high flows). As a result of these and other shortcomings, the use of the DPM underestimates the likely adverse effects on salmon survival through the Delta under the Alternatives, and the RDEIR/SDEIS improperly concludes that these impacts are less than significant.

Mitigation measures for fall and late-fall run Chinook salmon (AQUA-78a, b, c) describe additional evaluation and modeling of impacts and consultation with NMFS and CDFW to identify and implement potentially feasible means to minimize effects on fall-/late fall–run Chinook salmon migration conditions. These actions do not describe actual mitigation measures that will be implemented, do not establish binding performance standards, and do not commit to implementation of such measures; therefore they cannot have effects that mitigate for the adverse impacts of any alternatives. *See* Tit. 14, Cal. Code Regs., § 15126.4. The RDEIR/SDEIS improperly concludes that these "mitigations" have, "…the potential to reduce the severity of impact (including reducing the effect of [Alternative 4] H3 and H4 to a level that would not be biologically meaningful), although not necessarily to a not adverse level." RDEIR/SDEIS Appendix A at 11-330. There is no indication that these measures will reduce the severity of impact in any way.

The RDEIR/SDEIS also misrepresents the effect of construction impacts on migrating adult fall-run Chinook salmon. Table 11-4 identifies adult fall-run as "semi-abundant" during the October construction window. RDEIR/SDEIS Appendix A at 11-118. However, fall-run Chinook salmon should be at their peak abundance for North and East Delta during September and October; October should be the peak of fall-run adult abundance in the South Delta for fish migrating into the San Joaquin River and its tributaries. The environmental documents minimize the potential impact of construction activities stating: "migrating adult salmon are expected to readily avoid or swim away from areas of elevated noise." RDEIR/SDEIS Appendix A at 11-120. This conclusion assumes without evidence that Chinook salmon avoidance behavior does not lead to migration delay, stress, and exposure to additional mortality. We note that any negative effect of construction effects will occur over at least the 10-15 year construction window projected in the RDEIR/SDEIS. Even negative effects to a small number of migrating adult salmon may become significant when the effect is persistent over such a long-period of time (especially when populations are low). The RDEIR/SDEIS fails to analyze these potential negative impacts of fall-run Chinook salmon as they attempt to avoid construction activity during their migration season.

e. Flawed Modeling and Analysis of Impacts to Steelhead

The RDEIR/SDEIS correctly concludes that impacts due to low flows under the NAA are "significant" for CEQA purposes. However, the RDEIR/SDEIS fails to acknowledge the adverse impact to steelhead of reduced flows under several alternatives. For example, in the American River, flows under Alternative 5 during months when adult and juvenile steelhead are migrating are generally characterized as "similar to flows under NAA" except: during October in Wet years (10% lower under Alternative 5), Above Normal years (15% lower), and Critical years (12% lower); during November in Above Normal and Below Normal years (9% lower); and during January in Dry water years (8% lower). RDEIR/SDEIS Appendix A at 11-368. Furthermore, during September (a month during which adult steelhead migrate) flows would be 8% and 16% lower in Wet, Above Normal and Critical water years. In other words, under Alternative 5, flows will not "generally be similar to the NAA as claimed by the RDEIR/SDEIS; during every water year type, steelhead juveniles and adults would experience at least one month (and often more than one month) when flows were lower than NAA, and the RDEIR/SDEIS already regards flows during this period as a "significant" impact of the NAA (CEQA determination). As noted elsewhere, flows in the Feather River under Alternative 5 are expected to be 47% lower during September, a reduction that would negatively affect steelhead migration during that month. These reductions in flow will cause a significant impact that the RDEIR/SDEIS fails to disclose.

The NEPA determination that Alternative 5 would be "not adverse" for adult and juvenile migrating steelhead is not credible given the impacts to temperatures and flows during the migration and spawning season under the NAA. Furthermore, the RDEIR/SDEIS concludes that "...through-Delta juvenile survival under Alternative 5 would be similar to or slightly lower than NAA, averaged across all years." RDEIR/SDEIS Appendix A at 11-371. Given the already low survival rate of steelhead migrating through the Delta, *see, e.g.,* NMFS 2009 Biological Opinion; NMFS 2014 Final Recovery Plan; BDCP Appendix 3.G, the further decline in survival rates downstream combined with devastating effects of Alternative 5 upstream result in significant adverse impacts under this alternative that are not disclosed in the RDEIR/SDEIS.

RDEIR/SDEIS Table 11-4 fails to identify potential construction impacts to adult steelhead because it incorrectly lists them as "not present" in the east or southern Delta during the construction window. In fact, steelhead will be relatively "abundant" in these regions at the same time as they are abundant in the North Delta. Also, the RDEIR/SDEIS states, "Similar to Chinook salmon, the risk of injury or mortality of adult steelhead from pile driving noise is low because of their large size, high mobility, and rapid migration rates through the Delta and lower rivers." RDEIR/SDEIS Appendix A at 11-122. This reasoning completely ignores the potential for steelhead avoidance behavior to disrupt migration causing delay, stress, and exposure to additional mortality. Negative construction impacts on steelhead will accumulate over the multiple years projected for facilities construction.

The RDEIR/SDEIS incorrectly asserts that steelhead are like Chinook salmon and Delta Smelt with respect to their potential to accumulate toxic compounds and that the "potential for bioaccumulation is low given their diet (i.e., relatively low trophic position)." RDEIR/SDEIS Appendix A at 11-171. This is incorrect. Unlike juvenile Chinook salmon or adult Delta Smelt, steelhead prey on other fish; at migration they are much larger than Chinook salmon or Delta Smelt, and they spend much more of their life cycle in freshwater than do Chinook salmon. Furthermore, unlike Chinook salmon or Delta Smelt, steelhead are iteroparous and may migrate upstream and downstream through (and feed in) the Project Area more than once during their lives. These differences suggest the RDEIR/SDEIS should adopt a higher level of concern regarding potential bioaccumulation of toxins by steelhead than by either Chinook salmon or Delta Smelt.

f. Flawed Modeling and Analysis of Impacts to Green Sturgeon[24]

The RDEIR/SDEIS finds that operations under the No Action Alternative will have a significant negative effect on Green Sturgeon populations (Impact AQUA—NAA6, *see* RDEIR/SDEIS Appendix A at 11-108). Thus, much like the effect of temperatures on salmonid life stages that occur upstream of the Delta described *supra*, the NAA and all alternatives that produce similar or worse impacts will require substantial mitigation. The RDEIR/SDEIS analyzes the effects of water operations on migration conditions for Green Sturgeon (AQUA-132), and finds large negative effects for certain alternatives, even compared to the unacceptable conditions of the NAA. Rather than acknowledge these modeled effects are "adverse" for Green Sturgeon, the RDEIR/SDEIS disparages the method it employs to analyze this effect. For example, on the lower Sacramento River, the RDEIR/SDEIS finds that applying the known correlation between flow and White Sturgeon productivity suggests that Green Sturgeon year class strength would be up to 50% lower under Alternative 4_H3 than under NAA operations. RDEIR/SDEIS Appendix A at 11-380. Indeed, the RDEIR/SDEIS states that:

> Due to the removal of water at the North Delta intakes, there are substantial differences in through-Delta flows between Alternative 4 and NAA_ELT. The percentage of months exceeding the USFWS (1995) Delta outflow thresholds in April and May of wet and above normal years under Alternative 4 was appreciably lower than that under NAA_ELT.

RDEIR/SDEIS Appendix A at 11-381.

Although, "the analysis indicates that green sturgeon year class strength could be lower under Alternative 4," the environmental documents incorrectly deem its own method of analysis, using the known correlation between Delta flows and White Sturgeon year-class strength, as "unreliable."[25] RDEIR/SDEIS Appendix A at 11-381. In fact, in their conceptual model of Green Sturgeon life history, Israel and Klimley (2008) write:

> Increased water flows presumably enhance spawning efficiency for green sturgeon. The flow of water on the Sacramento, Feather, and Yuba rivers is controlled by dams, and the flows can be predicted with high reliability. Thus, water managers can directly influence the successful production of larvae and juveniles. Outflow to the San Francisco Bay-Delta between April and July is significantly correlated with white sturgeon year class strength (Kohlhorst et al. 1991), and a similar relationship is presumed to exist with green sturgeon. Daily discharge at known green sturgeon spawning locations were

[24] These comments regarding the analysis of impacts to Green and White Sturgeon apply equally to the analysis of the new alternatives in the RDEIR/SDEIS. *See,e.g.,* RDEIR/SDEIS at 4.3.7-281 (stating that entrainment impacts would be the same as under Alternative 4); *id*. at 4.3.7-290 to -291 (analysis of flow and temperature effects, using the same method of analysis as in the DEIR/DEIS); *id*. at 4.3.7-294 to -298 (ignoring effects of changes in Delta outflow on rearing habitat and abundance, similar to the analysis used in the DEIS/DEIR); *id*. at 4.3.7-301 (similar analysis of delta outflow and abundance as in the DEIS/DEIR).

[25] Similar rationalizations are offered for negative effects projected under Alternatives 2A and 7.

> similar to the estimated minimum necessary for strong age classes of white sturgeon on the Sacramento River (19,988 cfs, Neuman et al. 2007).

Israel and Klimley 2008 at 18. Thus, given the lack of data necessary to investigate Green Sturgeon productivity as a function of flows, it is not only reasonable to presume that the relationship exists and is similar to that found for White Sturgeon, the recommendation is found in California DFW's conceptual model. Based on the analysis in the RDEIR/SDEIS and lacking credible scientific evidence to the contrary, the RDEIR/SDEIS should have concluded that Alternatives 4 and 5 are likely to result in significant adverse impacts for Green Sturgeon during its juvenile migrations, and analyzed feasible mitigation measures.

On the Feather River, the RDEIR/SDEIS finds that year-round flows below Thermalito Afterbay (high-flow channel) and at the confluence with the Sacramento River under Alternative 4_H1 would be up to 86% lower during July through September. Moreover, it states that, "flows at Thermalito under [Alternative 4] H3 would generally be lower than flows under NAA during July through September," which is the larval and juvenile migration period. *See* RDEIR/SDEIS Appendix A at 11-380. The environmental documents incorrectly claim that these reductions would not have a substantial effect on Green Sturgeon, in part because they are benthic fish.[26] RDEIR/SDEIS Appendix A at 11-380. The fact that Green Sturgeon are bottom oriented does not make them immune to these incredibly large reductions in river flow rates. These fish still need adequate freshwater flows to complete their life-cycle successfully. The RDEIR/SDEIS incorrectly ignores evidence of flow reductions that are likely to be significant when it finds that the project alternatives will have "not adverse" effects under NEPA. These conclusions are incorrect, and the RDEIR/SDEIS fails to disclose significant adverse impacts that are likely to occur and to consider feasible mitigation measures.

The RDEIR/SDEIS also fails to acknowledge potentially significant impacts of facility construction on Green Sturgeon adults and juveniles. Table 11-mult-2 (RDEIR/SDEIS Appendix A at 11-125) suggests that because the total acreage of impact from pile driving noise is low, the impact to Green Sturgeon is low. This assumes there is a random distribution of Green Sturgeon adults and juveniles. But, the environmental documents acknowledge that the Sacramento River is a main migratory corridor for adults and juveniles -- so their distribution there is non-random. Also, the fact that adults and juveniles are capable swimmers does not mean that their migrations will not be interrupted by behavioral response to pile driving. The RDEIR/SDEIS must be revised to address these impacts.

g. Flawed Modeling and Analysis of Impacts to White Sturgeon

As with Green Sturgeon, the RDEIR/SDEIS ignores or minimizes flow-related impacts to White Sturgeon populations from operations under project alternatives. Major change in proportional duration (up to 50%) of critical flows during February -May at Verona are expected under Alternative 1A, *see*

[26] Similar reasoning in the RDEIR/SDEIS is applied in erroneously concluding that Alternatives 2A and 7 would not have "adverse" impacts.

RDEIR/SDEIS Appendix A at 11-387 and Table 11-mult-111, and the frequency with which Delta outflows exceed critical thresholds during April and May in Wet and Above Normal years declines substantially, *see* RDEIR/SDEIS Appendix A at 11-388 and Table 11-mult-112. Similarly, the documents admit that, "...migration flows at Verona were up to 55% lower under A1A_LLT relative to NAA during July through September and November." RDEIR/SDEIS Appendix A at 11-388. Despite the tremendous reduction in frequency of Delta flow rates that are necessary to support White Sturgeon year-class strength, the RDEIR/SDEIS finds that the effect on this species will be "not adverse", declaring:

> "The scientific uncertainty regarding which mechanisms are responsible for the positive correlation between year class strength and river/Delta flow will be addressed through targeted research and monitoring to be conducted in the years leading up to the initiation of north Delta facilities operations. Given the outcome of these investigations, Delta outflow would be appropriately set for Alternative 1A operations such that the effect on white sturgeon Delta flow conditions would not be adverse"

RDEIR/SDEIS Appendix A at 11-389. This conclusion is unwarranted. Similarly large flow reductions that would affect White Sturgeon migration and rearing are anticipated under other alternatives described in the RDEIR/SDEIS, including Alternatives 2A, 3, and 4. In each case, the environmental documents rely on similarly strained logic to reach a "not adverse" NEPA determination, without adequate performance standards or commitments to ensure that mitigation measures that increase Delta outflow to sufficient levels will be adopted.[27] In addition, lack of knowledge regarding the mechanisms that produce the relationship between flow and White Sturgeon abundance is not an excuse to ignore the effect of those mechanisms, as evidenced by the correlation itself.

h. Additional Flaws in the Analysis of Impacts to White Sturgeon and Green Sturgeon

The RDEIR/SDEIS finds that the NAA alternative will produce significant negative effects as compared to Existing Conditions via the effect of water operations on rearing habitat for sturgeon. RDEIR/SDEIS Appendix A at 11-107. This finding appears to be based on the flawed assumption that, "[o]perations to meet Fall X2 criteria would... also likely reduce flows (and rearing habitat) at other times of the year." RDEIR/SDEIS Appendix A at 11-107. This reasoning assumes that there is no way to maintain necessary flows at other times of year if water is used during Above Normal and Wet years to provide adequate conditions in the Delta during the fall. However, other options exist, including reducing water deliveries and diversions. Fall X2 actions only occur following Wet and Above Normal Years and represent a small amount of water with relatively higher reservoir storage levels in those years. Even assuming that provision of fall X2 habitat conditions will affect the flows required to maintain suitable habitat conditions for Green Sturgeon or White Sturgeon, the RDEIR/SDEIS must consider feasible mitigation measures that provide adequate flows for these species.

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[27] The RDEIR/SDEIS assurance that Delta outflow will be adjusted to avoid any adverse impact to White Sturgeon is a direct contradiction of statements elsewhere in the RDEIR/SDEIS that certain flow-related effects are "unavoidable" because changing flow rates would change the project description.

i. Flawed Modeling and Analysis of Impacts to Covered and Non-Covered Pelagic Fish Species

The RDEIR/SDEIS fails to identify or analyze the additive effect of projected abundance declines in many of the San Francisco Bay Estuary's most important forage fish. Taken together, the projected declines resulting from both the NAA and project alternatives in the Estuary's population of Longfin Smelt, Delta Smelt, Striped Bass, Threadfin Shad, American Shad, Chinook salmon, steelhead, and other fish, plus important zooplankton, such as Bay Shrimp, represents a substantial loss in prey for piscivorous birds, mammals, and fish. *See* RDEIR/SDEIS Appendix A at 11-161, 11-165. Writing about declines in the San Francisco Bay Estuary's population of Longfin Smelt alone, Nobriga and Rosenfield (*in press*) observed:

> Forage fishes serve as energy conduits between zooplankton and higher trophic-level predators (Pikitch et al. 2014). This central role in aquatic food webs means that forage fish production is critical to sustainable fisheries management (Alder et al. 2008), desired ecosystem functions (Hall et al. 2012), and in some cases the maintenance of biodiversity (Trathan et al. 2015). For instance, seabirds around the world display reduced and more variable productivity when forage fish biomass drops below one-third of the maximum observed in long-term studies (Cury et al. 2011).

Thus, declines in numerous forage fishes (a term that refers to small-bodied fishes in general) are likely to have an additive effect on the food web of the entire San Francisco Bay Estuary complex. These outcomes are not mentioned or investigated by the environmental documents for the California WaterFix. The RDEIR/SDEIS must be revised to consider the cumulative effect of reduced populations of forage fish on higher trophic levels.

j. Flawed Modeling and Analysis of Impacts to Water Quality

The RDEIR/SDEIS fails to analyze, or incorrectly analyzes effects of project alternatives on various aspects of water quality in and downstream of the Plan Area. The RDEIR/SDEIS now describes changes in residence times under the alternatives (Table 8-60 at 8-83); residence times increase in the Delta, often to an extraordinary degree. But, this does not address our previous comment regarding the failure to account for full residence time of particles diverted from and returned to Delta waterways by agricultural diversions—a failure that could mean the effects are even worse than shown in Table 8-60. As we discuss elsewhere, increased retention times promote harmful algal blooms (e.g., such as *Microcystis*; Berg and Sutula 2015) and the spread and persistence of invasive submerged macrophytes (Boyer and Sutula 2015).

The RDEIR/SDEIS analysis of sediment transport beyond the Plan Area is misguided, incorrect, and misleading. This analysis compares freshwater flow inputs to the Delta relative to tidal flow rates at the Golden Gate (*see* Table 11-mult-14, mult-15, mult-16, mult-17, mult--18, and mult-19, RDEIR/SDEIS Appendix A at 11-181 and -187) in order to make the point that inflow rates are a small fraction of total water exchange at the Golden Gate. This comparison is totally irrelevant to sediment transport dynamics. Freshwater flow rates are what determine how much sediment is delivered to the Delta. Reduction in upstream flow rates expected to arise periodically from BDCP/California WaterFix operations combined with the diversion of sediments carried by the Sacramento River at the NDD will reduce sediment delivery to the Delta and subsequent transport downstream. This represents a significant impact to various fish and wildlife species as well as to the accretion rate in restoring marshes and beaches in the Bay Area. Additional analyses of sediment transport effects of project alternatives are *infra*, in our critique of the new California WaterFix alternatives and in our critique of the RDEIR/SDEIS' inadequate analysis of impacts to San Francisco Bay.

The RDEIR/SDEIS correctly finds (RDEIR/SDEIS Appendix A at 11-194) that effects of operations on contaminants on covered species (AQUA-219) is likely to result in significant adverse effects, stating, "...could result in adverse effects on all fish species considered, with greatest concern for sturgeon, since as larger fish that spend several years in the Delta, and therefore will tend to bioaccumulate more mercury in tissues." However, the document fails to consider these contaminant effects in assessing impacts to fish and wildlife more generally.

k. The RDEIR/SDEIS Fails to Adequately Analyze Impacts of the Alternatives on Selenium[28]

The San Francisco Bay hosts a recreational fishery for White Sturgeon (*Acipenser transmontanus*), and the local Green Sturgeon (*Acipenser medirostris*) population is listed as threatened under the federal Endangered Species Act. Hence, any increase in selenium concentrations in these sensitive species is cause for concern. The RDEIR/SDEIS incorrectly asserts that Alternatives 1 through 4 will not cause a significant impact with respect to selenium concentrations in the water column or biota and, thus, would not cause the CWA Section 303(d)-listed selenium impairment to worsen. *See, e.g.*, RDEIR/SDEIS Appendix A at 11-201 and 8-283. This conclusion is erroneously based on the RDEIR/SDEIS' arbitrary threshold of significance, criteria that places biota at considerable risk from selenium bioaccumulation. The impacts of selenium accumulation are most notable with regard to White Sturgeon and Green Sturgeon. For example, despite the fact that annual average selenium concentrations in sturgeon would increase by 18.3% relative to Existing Conditions in the San Joaquin River at Antioch, the environmental documents determine that this effect would be "not adverse" and "not significant" for Alternative 4. RDEIR/SDEIS Appendix A at 8-283. Elsewhere, the RDEIR/SDEIS concludes that, "selenium concentrations in sturgeon fish tissue would be slightly to moderately increased to above the toxicity value for Alternatives 1 through 9 at the San Joaquin River at Antioch." RDEIR/SDEIS Appendix A at 11-198. This impact was considered "not adverse" and "not significant" because the RDEIR/SDEIS claims that toxicity thresholds would be elevated 'only slightly' above the toxicity threshold. RDEIR/SDEIS Appendix A at 11-201.

[28] These concerns apply equally to the new alternatives analyzed in the RDEIR/SDEIS. *See, e.g.*, RDEIR/SDEIS at 4.3.4-51 to -53.

The best available science indicates that existing selenium concentrations in biota are likely resulting in significant impacts to sturgeon. Linville 2006; Riu et al. 2014. Diet is the primary route of exposure that controls chronic toxicity to fish, the group considered to be the most sensitive to chronic selenium exposure. Coyle et al. 1993; Hamilton et al. 1990; Hermanutz et al. 1996. The RDEIR/SDEIS inappropriately assesses risk based on the modeled water quality target of 0.202 µg/L, rather than dietary exposure risk, such as elevated tissue concentrations among the bivalves on which sturgeon feed. Linville et al. 2002; Linville 2006; Adams et al. 2007; Presser and Luoma 2013; Riu el al. 2014. The RDEIR/SDEIS states that selenium concentrations in White Sturgeon muscle throughout the entire San Francisco Bay, including fish from the North Bay, have mostly been below 10 mg/kg (dry weight) in the most recent fish surveys conducted by the RMP. This does not acknowledge that approximately 20% of White Sturgeon samples have exceeded the fish-tissue target. SFEI 2015. Selenium in Green Sturgeon has not been routinely monitored in the field, however, available science indicates White Sturgeon should not serve as a proxy for Green Sturgeon with respect to selenium toxicity, given greater sensitivity of Green Sturgeon. Riu et al. 2014. Several studies in the Bay-Delta indicate significant selenium risk to Green Sturgeon under existing conditions:

> This analysis indicates that white and green sturgeon are among the most sensitive of fish to adverse effects of selenium, with the listed green sturgeon being the more sensitive of these two species. These levels of sensitivity evidently put sturgeon at substantial risk at current levels of exposure in the San Francisco Bay area. Selenium concentrations in food items of sturgeon in the San Francisco Bay area are almost always high enough that they may cause at least 10 percent mortality in hatchling green sturgeon (≥3.58 µg/g), and they are frequently high enough that they may cause at least 10 percent mortality among hatchling white sturgeon (≥10.8 µg/g) as well.

Beckon 2012. NMFS (2010) also recognizes that Green Sturgeon are more sensitive to selenium than White Sturgeon. And Riu et al. (2014) showed that, "…a dietary Se concentration at 19.7 ± 0.6 mg Se/kg, which is in range with the reported Se concentrations of the benthic macro-vertebrate community of the San Francisco Bay, had adverse effects on both sturgeon species," and that the Green Sturgeon should be "monitored and managed independently from White Sturgeon." Riu et al 2014 at 73; *see also* Kaufman et al. 2008.

Recent research indicates that White Sturgeon and federally-listed Green Sturgeon are likely experiencing significant impacts associated with selenium at concentrations found in their existing diet. Under all Alternatives this level of risk is expected to increase. RDEIR/SDEIS Appendix A at 11-198. Therefore, any increased risk to the sturgeon species or other higher trophic species within the Delta or the larger San Francisco Bay Estuary must be considered significant and appropriately analyzed; the RDEIR/SDEIS fails to do this and must be revised accordingly.

XIII. The RDEIR/SDEIS Fails to Adequately Analyze Environmental Impacts of the New Alternatives, Fails to Disclose Significant Adverse Impacts of the New Alternatives, and Incorrectly Describes Some Impacts as Significant and Unavoidable

Unfortunately, the RDEIR/SDEIS continues to use many of the same flawed methods to assess environmental impacts of the new alternatives, and as a result it fails to adequately assess the environmental impacts of the new alternatives and fails to disclose significant adverse impacts that are likely to occur. The methodological and analytical flaws identified in our Prior Comments apply equally to the analysis in the RDEIR/SDEIS. For example, because none of the CALSIM II modeling of the NAA has been redone, the comparison of new project alternatives to NAA outcomes obscures the severity of impacts that can be expected under these new alternatives, as discussed above. If conditions expected under the NAA are worse than current conditions and will result in significant impacts to public resources, then outcomes of project alternatives that are similar to or worse than NAA will produce similar or worse impacts to those public resources. In those cases, rather than finding that the project alternatives effects will be "not adverse", the RDEIR/SDEIS should reveal that both the NAA and the project alternative cause significant impacts that require implementation of mitigation measures.

In addition, the RDEIR/SDEIS improperly concludes that the No Action Alternative results in significant and unavoidable impacts to winter-run Chinook salmon and Green Sturgeon Spawning and Rearing (AQUA-NAA-4), *see* RDEIR/SDEIS at ES-48, and fall-run Chinook salmon, *see* RDEIR/SDEIS Appendix A at 11-330 and -335, ignoring changes to reservoir operations, water deliveries, and other feasible mitigation measures that could reduce or avoid these environmental impacts.

Furthermore, the section of the RDEIR/SDEIS dedicated to analyzing new alternatives (Chapter 4) is simply not well researched and does not represent a comprehensive review of best available science. Released on July 9, 2015, Chapter 4's Reference Section (4.5.27) for Fish and Aquatic Resources cites no publications from 2015, only one paper published in 2014, and only 10 papers or publications from the past decade. No publications or references of any kind are listed for the Terrestrial Biological Resources or Public Health sections or for over a dozen other sections of Chapter 4.

a. The RDEIR/SDEIS Fails to Adequately Analyze Impacts to Water Quality

As discussed below, the RDEIR/SDEIS fails to adequately analyze potential impacts to turbidity, harmful algal blooms, and salinity. These flawed analyses and conclusions also affect the analyses and conclusions in Chapter 4. The RDEIR/SDEIS must be revised to correct these substantial flaws.

i. The RDEIR/SDEIS Fails to Adequately Analyze Impacts of the Alternatives on Turbidity

The RDEIR/SDEIS incorrectly asserts that the alternatives will not cause a significant impact on sediment loading and turbidity, and as a result it fails to analyze the effects of the substantial reductions in sediment and turbidity on fish and wildlife and other water quality parameters such as harmful algal blooms. The best available science indicates that the alternatives are likely to substantially reduce sediment and turbidity in the Delta via numerous pathways: sediment will be diverted into the new North Delta intakes; river flow rates (which determine the ability of water to transport and mobilize sediments) both upstream and downstream of the NDD will be reduced; and depositional habitats such as wetlands and floodplain habitats will be restored. Reductions in sediment and turbidity are likely to cause adverse environmental impacts including:

- Increases in harmful algal blooms (including, in particular, *Microcystis* and production of the toxin microcystin), *see* Berg and Sutula 2015;
- Increases in the extent of invasive submerged aquatic vegetation, *see* Boyer and Sutula 2015;
- Reductions in habitat for Delta Smelt, indirectly, as a result of the aforementioned effects on harmful cyanobacteria blooms and submerged aquatic vegetation, and directly, *see* Nobriga and Herbold 2009; and
- Increased predation risk for multiple species, indirectly, as a result of increases in submerged aquatic vegetation and directly, by increasing predator efficacy (e.g., predation on Chinook salmon, *see* Gregory 1993; Gregory and Levings 1998).

In our Prior Comments, we described the potential damage to rearing habitat for, and increased predation on, larval sturgeon resulting from increased light penetration below the NDD (both decreased turbidity and lowered river stage in that area are likely to increase light penetration into the benthic habitats of sturgeon; Prior Comments at 203-205). The RDEIR/SDEIS must be revised to adequately analyze and disclose these significant impacts.

The RDEIR/SDEIS admits that operation of the new North Delta Intakes is likely to reduce sediment supply to the estuary by 8-9%, and that habitat restoration will also reduce the available sediment supply. For instance, it states that under Alternative 4A,

> [o]peration of the north Delta intakes (water conveyance facilities) is estimated to result in around 8 to 9% less sediment entering the Plan Area from the Sacramento River, the main source of sediment for the Delta and downstream subregions. In addition, sediment could be accreted (captured) in restored areas (Environmental Commitment 4 Tidal Natural Communities Restoration). These actions could limit sediment supply to areas currently important to delta smelt, such as Suisun Bay, which would result in less seasonal deposition of sediment that could be resuspended by wind-wave action to make/keep the overlying water column turbid.

RDEIR/SDEIS at 4.3.7-29. However, the RDEIR/SDEIS asserts that the alternatives would not cause a significant impact on sediment and turbidity because there would be a less than 10% change in sediment loading and because sediment collected at the intake facilities could be reintroduced at restoration sites. RDEIR/SDEIS at 2-2. As we have emphasized before and in these comments, *see supra*, there is no biological basis for the 10% threshold of significance. In addition, other regulatory agencies and scientific peer reviews have concluded that such a reduction would cause significant impacts. For instance, in 2014 the Bay Conservation and Development Commission concluded that,

> The BDCP EIR discusses a potential reduction in suspended sediment transport to the Suisun Marsh and San Francisco Bay of approximately eight to ten percent. The EIR/S does not characterize this change as a significant impact. The ISB report to the Delta Stewardship Council raises this as a significant issue. United States Geological Survey researchers have observed a steep reduction suspended sediment concentrations in the Bay and characterize San Pablo Bay as erosional. **With projected sea level rise, further reduction in Bay sediment inputs should be considered significant, given Bay wetland restoration targets, current subsided diked baylands, and the overall Bay-Delta sediment budget.** Sediment settling in the new northern forebay, the relocation of flows from channels into underground pipes, new pumping regimes and proposed restoration conservation measures together and separately will alter sediment transport, delivery, and the rate of deposition downstream. Reduced suspended sediment in the Bay will exacerbate nutrient loading problems caused from the sewage treatment plants discharging into the Bay.
>
> Construction of restoration projects, which are highly desirable in the Delta upstream of the Bay, likely will create sediment sinks, thus further reducing sediment flows to the Marsh and San Francisco Bay. The cumulative impacts analysis should consider all of these changes to the Bay sediment regime, using science-based thresholds of significance.

July 29, 2014 Comments of the Bay Conservation and Development Commission on BDCP (emphasis added).

The Bay-Delta ecosystem already suffers from a deficit of sediment and turbidity as a result of prior human activities (gold mining, dams, etc.; Schoellhamer 2011). Increasing water clarity is recognized as a significant impact on Delta Smelt and other native fisheries in the Delta, as well as affecting the growth of harmful algal blooms (Berg and Sutula 2015). Because of the existing sediment deficit, the removal of nearly 10% of the existing sediment through the new intakes is likely to result in significant adverse effects on fisheries, water quality, and habitat restoration. Analysis prepared for DWR by ICF International estimated that the North Delta Diversion was responsible for the vast majority of the reduction in sediment, with habitat restoration contributing a lesser role; ICF International's midpoint estimate of the total reduction in sediment as a result of both habitat restoration and the North Delta Diversion is over 10%. There is no biological basis for the 10% threshold of significance used in the RDEIR/SDEIS, and given the current sediment deficit in the estuary, a nearly 10% reduction in sediment is likely to cause a significant impact.

The RDEIR/SDEIS also fails to analyze the feasibility of depositing entrained sediment in habitat restoration sites and how that will affect turbidity. Analysis prepared for DWR by ICF international estimated that only 7-9% of the entrained sediment could actually be reused, with the vast majority of the sediment lost. The RDEIR/SDEIS provides no analysis of the potential sediment that could actually be reintroduced at restoration sites, but the analysis prepared by ICF International estimated that only a tiny fraction is likely to be available for reuse. Furthermore, as the DEIR/DEIS acknowledges, restoring tidal wetland habitats are expected to be areas of sediment accretion; thus, any assumption that sediments deposited in habitat restoration sites will contribute significantly to turbidity in waters surrounding restoration sites is flawed.

In addition, the RDEIR/SDEIS fails to use existing turbidity models to analyze the impacts of the project alternatives on turbidity, incorrectly asserting that changes in turbidity in the Delta could not be quantified. RDEIR/SDEIS Appendix A at 8-82; *see id.* at 8-293 to 8-294. Although the RDEIR/SDEIS calculates the reductions in sediment supply, it fails to use existing models (such as the turbidity model developed by Delta Modeling Associates, which has previously been used by the Department of Water Resources and the Army Corps of Engineers) to quantitatively analyze how the reduction in sediment supply would affect turbidity. *See* Delta Modeling Associates webpage, available online at: http://www.deltamodeling.com/projects.html#sediment.[29] The RDEIR/SDEIS fails to explain why existing models and methods were not used to analyze this impact, and the conclusions in the RDEIR/SDEIS are not justified.

Moreover, the RDEIR/SDEIS ignores the impact of reduced turbidity as a result of the alternatives on fish and wildlife and other water quality parameters, such as harmful algal blooms. For instance, the RDEIR/SDEIS asserts with respect to *Microcystis* that, "[a]s described under WQ-29 (Effects on TSS and Turbidity from CM1), changes in total suspended solids ("TSS") and turbidity levels within the Delta under the project alternatives could not be quantified, but are expected to be similar under the project alternatives to Existing Conditions and the No Action Alternative." RDEIR/SDEIS Appendix A at 8-82. Yet the reduction in sediment related to the new NDD is likely to lead to a continued reduction in turbidity. And as the RDEIR/SDEIS admits, a reduction in turbidity (particularly in combination with increased water temperatures and increased residence times) is likely to increase the severity and frequency of harmful algal blooms, including *Microcystis*. RDEIR/SDEIS Appendix A at 8-45 to 8-46; *see* Berg and Sutula 2015. Because turbidity is likely to be reduced in the future as a result of the north Delta intakes, the RDEIR/SDEIS fails to adequately analyze the likely impacts of increasing the frequency of *Microcystis* blooms and other harmful algal blooms and fails to disclose that Alternative 4A is likely to cause significant impacts from increased *Microcystis* blooms.

[29] Resource Management Associates (RMA) has also developed quantitative turbidity models that have been utilized to calculate estimates of turbidity resulting from CVP/SWP operations. *See* http://www.rmanet.com/projects/modeling/turbidity-and-delta-smelt-forecast-modeling/.

ii. The RDEIR/SDEIS Fails to Adequately Analyze Impacts of the Alternatives on Harmful Algal Blooms, Including *Microcystis*

Harmful algal blooms (HAB) including the cyanobacteria *Microcystis aeruginosa* (*Microcystis*), generate toxins that can be poisonous to humans, fish, and wildlife. These blooms have become more frequent in the Delta, especially during years with exceptionally low freshwater flows through the Delta. Damaging levels of toxins produced by cyanobacteria have been detected in fish and invertebrate species in the Delta, and appear to bioaccumulate in some of the fish species studied. *Microcystis* blooms have thus been implicated as a potential driver in the rapid decline of pelagic species in the San Francisco Bay Estuary. Lehman et al. 2010. Lehman et al. (2010) reported that, "even at low abundance, *Microcystis* may impact estuarine fishery production through toxic and food web impacts at multiple trophic levels."

A review of factors affecting the growth of cyanobacteria in the Sacramento-San Joaquin Delta finds that among the principle factors promoting cyanobacteria (and particularly, *Microcystis*) blooms in the Delta are high water temperature, increased water clarity, and stratified water column coupled with long residence times. Berg and Sutula 2015. Salinity limits cyanobacteria blooms towards the west, but "salinity gradients do not explain the spatial distribution of cyanoHABs in the Delta" and "salinity is not a barrier to toxin transport, as cyanotoxins have been detected in SF Bay." Berg and Sutula 2015, executive summary at *iv; see also* Miller et al. 2010. Furthermore, the report finds no evidence that initiation of *Microcystis* blooms in the Delta is constrained by concentration or ratios of nutrients in the Delta. The report finds that, "turbidity, low temperatures, and higher flows during most of the year are likely restricting cyanobacteria blooms to the July-August time period." Berg and Sutula 2015. Thus, factors associated with the California WaterFix (i.e., reduced turbidity, increased residence times, and reduced flow into the Delta) in combination with effects of climate change (increased temperatures) threaten to increase the frequency and magnitude of harmful cyanobacteria blooms in the future. This outcome could have very serious effects on water quality and human health, as well as the persistence and productivity of the Delta and San Francisco Estuary's fish and wildlife populations. The analysis of the effects of the alternatives on harmful algal blooms in the RDEIR/SDEIS is flawed in several key respects, and as a result the RDEIR/SDEIS understates the likely environmental impacts of the alternatives and fails to disclose significant environmental impacts that are likely to occur under some alternatives.

First, the analysis in the RDEIR/SDEIS incorrectly assumes no reductions in turbidity in analyzing impacts of the alternatives on *Microcystis*. *See*, *e.g.,* RDEIR/SDEIS Appendix A at 8-82. As the RDEIR/SDEIS admits, turbidity limits the formation of harmful algal blooms like *Microcystis*, and increased water clarity is likely to increase harmful algal blooms. *Id*. Appendix A at 8-45 to 8-46, 8-82. However, as discussed above the RDEIR/SDEIS admits that the operation of the North Delta intakes will reduce sediment supply by 8-9%, and turbidity in the estuary has been diminishing for several decades (Schoellhamer 2011). Increased water clarity is likely to increase the frequency and magnitude of *Microcystis* blooms (Berg and Sutula 2015). The RDEIR/SDEIS asserts that Alternatives 4A, 2D, and 5A will not cause significant impacts from increased *Microcystis* blooms because these alternatives include reduced habitat restoration, *see* RDEIR/SDEIS at ES-29, but the analysis incorrectly assumes that there will not be increased water clarity. Because Alternatives 4A and 2D will increase water clarity (with larger impacts to turbidity and the sediment budget under Alternative 2D because it includes a larger North Delta diversion), in combination with increased water temperatures and increased residence times, these alternatives are likely to result in significant environmental impacts under WQ-29 that are not disclosed in the RDEIR/SDEIS. By failing to analyze the continued increase in water clarity (as a result of both the alternative and existing conditions), the RDEIR/SDEIS fails to adequately analyze impacts of the alternatives on *Microcystis* blooms.

Second, the analysis of changes to residence times under the alternatives understates the likely environmental impacts from *Microcystis* because it excludes the effects of climate change from the analysis. In the revisions to Chapter 8, the RDEIR/SDEIS admits that the determination of significant effects ignores the effects of climate change:

> Below, residence times under Alternative 4 is compared to residence times under the No Action Alternative **to remove the effect of climate change and sea level rise**, thereby revealing the effect due to CM1 (i.e., operations) and the effect of the CM2 and CM4 restoration areas, which were accounted for in the modeling performed for CM1.

RDEIR/SDEIS Appendix A at 8-302 (emphasis added); *see id*. at 8-303 (concluding no water temperature-driven increases in *Microcystis* blooms would occur in the Delta under Alternative 4, relative to the No Action Alternative because climate change is assumed under the NAA). Similarly, in Chapter 4 of the RDEIR/SDEIS, the document concludes that changes in *Microcystis* under the No Action Alternative are a significant impact,[30] yet it erroneously concludes that impacts under Alternative 4A and 2D would not result in a significant impact because the impacts are similar to those occurring under the No Action Alternative. RDEIR/SDEIS at 4.3.4-67 to -68. This is in part because the analysis excludes the effects of climate change in making this determination:

> Besides the effects of operations and maintenance described above, substantial increases in water residence times due to factors unrelated to the project alternative, including habitat restoration (8,000 acres of tidal habitat and enhancements to the Yolo Bypass), sea level rise and climate change, are expected to occur in the Delta, relative to Existing Conditions. Although there is uncertainty regarding the degree to which operations and maintenance of the project alternative would affect water residence times in the Delta, it is likely that such effects would be small in comparison to the combined effects of restoration activities, sea level rise and climate change. Slight increases in ambient water temperatures (1.3–2.5°F), due to climate change in the ELT, are expected to occur in the Delta under Alternative 4A, relative to Existing Conditions.

[30] Table ES-9 in the Executive Summary of the RDEIR/SDEIS fails to disclose whether the No Action Alternative will result in significant impacts to water quality under NEPA and CEQA, and must be revised to include these conclusions.

> However, due to the combination of the effects of restoration activities unrelated to the project alternative, climate change, and sea level rise on increased residence times, as well as the effects of climate change on increased ambient water temperatures, it is possible that increases in the frequency, magnitude, and geographic extent of *Microcystis* blooms in the Delta would occur, relative to Existing Conditions. The magnitude by which water temperatures and residence times would increase due to these factors would be less under Alternative 4A than under Alternative 4.
>
> …
>
> In summary, operations and maintenance of Alternative 4A is not expected to increase water residence times or ambient water temperatures throughout the Delta, and thus result in adverse effects on *Microcystis*, relative to No Action Alternative (ELT and LLT).

RDEIR/SDEIS at 4.3.4-67 to -68. Even though the RDEIR/SDEIS admits that cyanobacteria blooms (including *Microcystis*) may increase in the Delta, impairing beneficial uses, the document concludes the impacts are due to climate change, sea level rise, habitat restoration, and other factors, and no mitigation is required. *Id*. at 4.3.4-69. This conclusion is erroneous. In fact, the RDEIR/SDEIS demonstrates that the alternatives, in conjunction with the effects of climate change, are likely to result in significant adverse environmental impacts, and the RDEIR/SDEIS fails to disclose these impacts are likely to occur.

Third, the RDEIR/SDEIS fails to actually model and analyze changes in residence time under the new Alternatives (Alternative 4A and 2D), despite the fact that such modeling is feasible and utilized in the RDEIR/SDEIS. *See* RDEIR/SDEIS at 4.3.4-66 and Table 8-60 at 8-83. The RDEIR/SDEIS fails to explain why it chose not to use the existing model to calculate residence time without habitat restoration, and it provides no analysis to support its conclusion that changes to residence time under Alternative 4A would be less than with habitat restoration. This conclusion, and the failure to employ the existing residence time model, is particularly unjustified since the document also asserts that, "there is substantial uncertainty regarding the extent that operations and maintenance of Alternative 4A would result in a net increase in water residence times at various locations throughout the Delta relative to Existing Conditions." RDEIR/SDEIS at 4.3.4-67. The RDEIR/SDEIS provides no analysis to support its conclusion that changes in residence time may be driven more by habitat restoration than by operations of the north Delta intake and existing south Delta pumps, and text in the RDEIR/SDEIS suggests that changes in residence time as a result of the new intake facility and changes in operations are likely to be substantial. *See* RDEIR/SDEIS Appendix A at 8-305 ("Increases in Delta residence times are expected throughout the Delta during the summer and fall bloom period, due in small part to climate change and sea level rise, but due more proportionately to CM1 and the hydrodynamic impacts of restoration included in CM2 and CM4."). Because it fails to use the existing model to determine what changes in residence time would occur without habitat restoration under Alternative 4A, the conclusions in the RDEIR/SDEIS are unjustified and it is likely that a significant impact would occur.

Fourth, the analysis in the RDEIR/SDEIS is flawed because the text understates the magnitude of increases in residence time that are projected to occur under the alternatives. For instance, the document asserts that increases in residence time are a "small increase" during June to September, the period when blooms are most likely to occur. RDEIR/SDEIS Appendix A at 8-102. The RDEIR/SDEIS asserts that the one exception is in the East Delta, when residence times increase on average by 20 days. *Id*. Yet Table 8-60a shows very substantial increases in summer and fall residence time occurring in many regions of the Delta under the No Action Alternative as compared to the Existing Conditions baseline, including a greater than 10% increase in summer residence time in the North Delta, Cache Slough, East Delta, South Delta, and Suisun Marsh, as well as more than doubling residence time in the fall in the East Delta and South Delta. According to the table, Alternative 4[31] would result in very substantial increases in residence time, including:

- More than doubling summer residence time in Cache Slough as compared to the existing conditions baseline;
- Nearly tripling residence time in the fall in the East Delta as compared to the existing conditions baseline;
- Nearly quadrupling fall residence time in the South Delta as compared to the NAA, and an even higher increase compared to existing conditions;
- Doubling fall residence time in Suisun Marsh as compared to existing conditions.

RDEIR/SDEIS Appendix A at 8-83. The RDEIR/SDEIS improperly downplays these impacts in the text.[32]

Fifth, the analysis in the RDEIR/SDEIS is flawed because it focuses on the average residence time of water particles, ignoring the effects of increased residence time for particles that exceed the mean residence time and providing no biological rationale for a threshold of significance in terms of increased residence time that is likely to cause significant impacts. The RDEIR/SDEIS asserts that using the model to calculate when 50% of the particles exit the Plan Area is "a useful parameter," but admit that this analysis "do not represent the length of time that water in the various subregions spends in the Delta in total." RDEIR/SDEIS Appendix A at 8-82. There is no explanation why the average (50%) was used instead of a higher threshold such as 75%, and by focusing on the average results, the RDEIR/SDEIS ignores whether in some regions, a smaller percentage of the water (as much as 49%) could have increases in residence time that are significantly higher than that shown in the RDEIR/SDEIS. Because it is the absolute residence time, rather than mean residence time, that affects the formation of harmful algal blooms, the RDEIR/SDEIS fails to analyze potentially significant impacts.

Sixth, the RDEIR/SDEIS is flawed because it focuses solely on *Microcystis* and does not address other harmful algal blooms, as noted by other reviewers. The document should be revised to address other

[31] The RDEIR/SDEIS fails to analyze the effects of the so-called high outflow scenario under Alternative 4, only analyzing scenario H3.

[32] In addition, by failing to analyze the impact of potential waivers of water quality standards and environmental commitments during future droughts, which are likely to reduce summer outflow and increase microcystis blooms, the RDEIR/SDEIS understates the likely adverse environmental impacts and fails to disclose significant impacts. The same is true if operations result in greater diversions from the North Delta intakes than modeled, particularly in the summer and fall months.

harmful algal blooms and to investigate the effects, alone and in combination, of the various toxins produced by different cyanobacteria on fish, wildlife, and human health in the Delta and beyond in the Bay and nearshore ocean (*see infra*; Miller et al. 2010; Berg and Sutula 2015 and studies cited therein; UC Santa Cruz 2015).

b. The RDEIR/SDEIS Fails to Adequately Analyze Environmental Impacts of the New Alternatives on Delta Food Webs

The RDEIR/SDEIS fails to adequately analyze the effects of CVP/SWP operations on Delta food webs, including phytoplankton and zooplankton that support Delta Smelt populations. Existing scientific information documents how changes in exports, residence time, and flows can affect these populations. *See, e.g.*, Jassby et al. 1995; Kimmerer 2002; Winder et al. 2011; Cloern and Jassby 2012. We raised this issue in our 2012 Prior Comments, yet the RDEIR/SDEIS wholly fails to analyze these impacts (despite including some modeling of residence time for the assessment of impacts on *Microcystis* blooms, demonstrating that residence time modeling is available). In addition, changes in exports are likely to affect the amount of phytoplankton that is exported by the CVP and SWP, yet the RDEIR/SDEIS fails to use existing methods to assess these impacts. *See* Jassby et al 2002; Cloern and Jassby 2012.

Similarly, recent studies submitted with our Prior Comments document how changes in Delta outflow can affect recruitment and abundance of *Corbula* clam populations and thus affect Delta food webs. *See, e.g.*, Brown et al. 2012; Thompson et al. 2012; Teh 2012; Baxter and Slater 2012. However, the RDEIR/SDEIS fails to analyze effects of changes in Delta outflows on foodwebs or *Corbula* clam populations. The RDEIR/SDEIS also ignores peer reviewed research that hydrologic modifications, including diversions by the CVP and SWP, have facilitated invasions of the estuary, *see* Winder et al 2011, and it fails to analyze the extent to which the alternatives will facilitate the abundance of invasive species in the future. Furthermore, although the environmental documents analyze the effect of project alternatives on numerous populations of the San Francisco Bay Estuary's forage fish assemblage (including Longfin Smelt, Delta Smelt, Sacramento Splittail, American Shad, Threadfin Shad, Striped Bass, and Chinook salmon juveniles), the RDEIR/SDEIS fails to analyze the impact of declines in overall fish populations on migratory waterfowl (e.g., diving ducks), shorebirds, pelagic seabirds, marine mammals (e.g., Orca whales, seals, sea lions, sea otters), or piscivorous fish species. The environmental documents predict declines in many of these fish species under several alternatives (including the NAA) and declines in forage fish populations are known to have effects on fish eating predator populations. *See, e.g.*, Pikitch et al. 2014, Cury et al. 2011. The RDEIR/SDEIS must be revised to analyze these effects of CVP/SWP operations on delta food webs including effects resulting from changes in residence time, *Corbula* and *Corbicula* populations, and Delta outflow.

In addition, as noted in our Prior Comments, the analysis of the foodweb impacts of restored habitats is also significantly flawed and fails to adequately analyze the likely impacts.

c. The RDEIR/SDEIS Fails to Adequately Analyze Impacts to Flood Risks

The qualitative characterization of impacts to flooding (SW-2) in the RDEIR/SDEIS is misleading, and fails to disclose both potentially significant impacts (including cumulative impacts) and potential mitigation measures. The changes in flow are summarized in percent of channel capacity, and the significance threshold is set at 1% because "changes due to simulation techniques and logic in the CALSIM II model are generally about 1%." RDEIR/SDEIS Appendix A at 6-4. However, the percentage of channel capacity is not the relevant metric for flood risk; the relevant metric is the stage height increase relative to the flood stage combined with the vulnerability of structures in the floodway at various stages. The RDEIR/SDEIS does not provide that information. Instead, it states that, "[a]lternative 4 would not result in adverse impacts" because "there would not be a consistent increase in high flow conditions" compared to the NAA. RDEIR/SDEIS Appendix A at 6-16 to 6-19. Yet the purpose of the qualitative analysis is to detect any increase above the 1% error in the model, and even inconsistent increases could have impacts and must be investigated further in a quantitative way. For instance, the document claims that the 2-3% increase of channel capacity at Bend Bridge under Alternative 4 compared to Existing Conditions would occur "due to sea level rise, climate change, and increased north of Delta demands." RDEIR/SDEIS Appendix A at 6-16. Yet despite a greater than 1% increase, it does not conclude this is a significant impact and does not propose mitigation measures. Without investigating the daily flow pattern, it is unknown how much the highest instantaneous and daily flood stages would increase. The flood impacts of this project and potential mitigation remain undisclosed.

The NEPA effects discussion simply states that the flood risk will be similar to if no action is taken—ignoring the fact that under the status quo, significant impacts may occur and mitigation measures may need to be undertaken. The CEQA conclusion, that the highest flows will be similar to Existing Conditions "when the changes due to sea level rise and climate change are eliminated from the analysis," *see* RDEIR/SDEIS Appendix A at 6-20, ignores the possibility of great changes due to those factors that are within the ability of the project to mitigate. *See also* RDEIR/SDEIS Appendix A at 6-3 (comparing flood capacity to river flows under the NAA under CEQA "to avoid consideration of changes in river flows caused by sea level rise and climate change.").

In addition, the RDEIR/SDEIS admits that the NAA will result in significant impacts from increased flood risks under CEQA, although this impact is not disclosed in the Executive Summary and the document fails to consider any feasible mitigation measures to reduce or avoid the impact. For instance, the RDEIR/SDEIS states,

> No Action Alternative (ELT) could result in an increase in potential risk for flood management compared to Existing Conditions because of the changes due to sea level rise and climate change. It is expected that flood management criteria would be modified in the future to reduce risks due to sea level rise and climate change. This potential impact is considered significant.

RDEIR/SDEIS at 4.2-15 to -16. However, the document erroneously concludes that Alternative 4A will not cause significant impacts because it excludes the effects of climate change from the assessment. *See id*. at 4.3.2-5 ("Alternative 4A would not result in an increase in potential risk for flood management compared to Existing Conditions when the changes due to sea level rise and climate change are eliminated from the analysis.").

Thus, the reader is ill-informed of the true nature of the expected flood risks with or without the project—they are simply reassured that the risks will be similar to those without the project, so the project need do nothing about it. This flawed methodology and presentation in the RDEIR/SDEIS misleads the public and encourages flawed decision making based on inadequate and incorrect information. The analysis of flood risk must be revised and recirculated.

d. The RDEIR/SDEIS Fails to Adequately Analyze Environmental Impacts of the New Alternatives on Delta Smelt

The RDEIR/DEIS fails to identify significant and adverse effects of new project alternatives to Delta Smelt. Delta Smelt are listed under the state and federal Endangered Species Act and are among the most endangered species in the United States. The Delta Smelt abundance index for 2014 was the lowest on record -- approximately two orders of magnitude lower than when this species was originally listed under the ESA and half of its previous low. Most Delta Smelt live only one year and spawn after dying. Moyle et al. 2002; Bennett 2005; Nobriga and Herbold 2009. As a result, the RDEIR/SDEIS use of arbitrary thresholds of significance and of averaging results across months and within year types obscures the likelihood that highly negative effects will occur in particular years and are particularly inappropriate for this species.

Historic and ongoing Delta Smelt population declines are believed to have been caused by multiple factors, including those that undoubtedly will be altered by project alternatives such as: water exports and/or entrainment at the South Delta export facilities; salinity; turbidity; and other water quality parameters (e.g., related to elevated levels of selenium, *Microcystis* blooms, etc.). Nobriga et al. 2008; Nobriga and Herbold 2009; Kimmerer 2008, 2011; Mac Nally 2010; Thomson 2010; Maunder and Deriso 2011; Rose et al. 2013a,b.; *see* our Prior Comments at 100 and 215-233. Furthermore, the latest research from the Interagency Ecological Program's Management Analysis and Synthesis Team (MAST 2015) has found that, "…Delta outflow and a more westward LSZ in fall, winter, and spring may have important beneficial effects on early life stages of Delta Smelt, but other factors (possibly including summer flows which were not included in this analysis) may be more important for their survival to adults." MAST 2015 at 161. Temperatures also impact Delta Smelt productivity and, food supplies and their effect (in combination with temperature effects) on larval and juvenile growth rates is also a suspected driver of Delta Smelt population declines. Maunder and Deriso 2011; Rose et al. 2013a. While not a direct outcome of project alternatives, temperatures effects are anticipated under the NAA and project alternatives as a result of climate change. Temperature effects on Delta Smelt are largely mediated through the bioenergetic response to temperatures, and production of Delta Smelt food supplies is linked to freshwater flows through and out of the Delta. *See, e.g.*, Jassby et al. 1995;

Kimmerer 2002; *see also* Nobriga and Herbold 2009 (regarding the effects of *Microcystis* on Delta Smelt food supplies). Thus, project operational impacts on food supply are also vital to assessing the temperature related impacts of alternatives on Delta Smelt.

An emerging consensus regarding the Delta Smelt's decline towards extinction is that multiple forces are likely to be at work and to interact in complex ways. Thomson et al 2010; Rose et al. 2013a, b; MAST 2015. Thus, studying changes in environmental factors one at a time is unlikely to reveal the overall effects of environmental change on the Delta Smelt population. In our Prior Comments, we encouraged project proponents to apply existing life cycle models (e.g., Rose et al. 2013a, b) that synthesize the effects of changes to multiple environmental conditions in order to understand the potential response of Delta Smelt population dynamics to project alternatives. The RDEIR/SDEIS fails to mention, evaluate, or apply this modeling framework and does not incorporate findings of Rose et al (2013a,b) into its analysis of new (or old) project alternatives. Furthermore, the analysis of new alternatives (and re-analysis of old alternatives in Chapter 11) completely ignores the MAST (2015) reports findings related to X2 position and an index of Delta Smelt Recruitment. Thus, the RDEIR/SDEIS does not employ the best available science and fails to synthesize its analyses of individual effects into a credible estimate of project effects on this endangered species.

Even taking its incomplete and inadequate analysis at face value, the RDEIR/SDEIS improperly minimizes impacts to Delta Smelt that are expected to arise under the NAA. The RDEIR/SDEIS reports that entrainment of Delta Smelt is expected to increase under the NAA.[33] The RDEIR/SDEIS rationale for its "not significant" determination regarding increased entrainment is that conditions of the 2008 USFWS Biological Opinion will regulate operations to minimize entrainment; this reasoning is flawed and circular because the NAA incorporates effects of implementing the Biological Opinion. Furthermore, the RDEIR/SDEIS statement regarding Delta Smelt salvage under the NAA is confusing and incorrect; the document states, "Despite modeled increases in entrainment in the No Action (ELT) compared to the Existing Condition, the differences are not expected to reach the level of adverse effects on Delta Smelt populations (less than 5% of the population)." RDEIR/SDEIS at 4.2-51. This may mean that the RDEIR/SDEIS considers salvage under the NAA to be "not significant" because it is "less than 5% of the population"; however, such a claim would be inaccurate because the average annual estimated proportion of the adult Delta Smelt population lost to entrainment at the SWP/CVP South Delta facilities under the NAA is greater than 5% on average and in all year types (*see*, for example, DEIR/DEIS Figure 11-4-2). On the other hand, the RDEIR/SDEIS rationalization for its "not significant" determination may mean that the relative "difference" between NAA and Existing Conditions is less than 5%. As discussed above, the 5% relative difference threshold is arbitrary, without biological foundation, and (given model error rates) may represent relative differences greater than 5%.[34] A modeled increase in Delta Smelt

[33] Concerns with the method of estimating and analyzing entrainment impacts on Delta Smelt remain; the modeling of this impact has not changed from that used in the DEIR/DEIS.

[34] Indeed, the proposed biological objective for Delta Smelt entrainment under BDCP (DTSM1.2) was less than 5% of the Delta Smelt population, and the existing biological opinion (page 387) estimates that adult entrainment would be less than approximately 5% of the population under the incidental take statement.

entrainment means that the model's best estimate is that entrainment will increase. This is a significant impact that the RDEIR/SDEIS fails to disclose.

The RDEIR/SDEIS conclusion that Alternative 4A will have a beneficial effect on Delta Smelt is unwarranted. The RDEIR/SDEIS attempts to cast poor outcomes in a beneficial light by "isolate[ing] the effect of the alternative from those of sea level rise, climate change, and future water demands." RDEIR/SDEIS at 4.3.7-24. As described above, the effect of the NAA is negative. The comparison of new alternatives to the NAA frequently shows no difference (thus, the same negative effect as the NAA) or worse outcomes. Modeled entrainment of Delta Smelt for new alternatives is alarmingly high on an absolute scale. For example, the RDEIR/RDEIS shows that greater than 5% of the adult Delta Smelt population will be entrained, on average, in every year and all year types (Figure 11-4A-2) under Alternative 4A and entrainment of larval and juvenile Delta Smelt will be greater than 10% on average and in most years types (Figure 11-4A-2). Total population entrainment is estimated to be greater than under Existing Conditions on average in Below Normal years (by 1%) and Dry years (by 6%) and is not projected to change relative to NAA in Dry or Critical years (Table 11-4A-1); these are important findings because most entrainment mortality for this species occurs in Below Normal, Dry, and Critical years. Furthermore, entrainment of juvenile Delta Smelt is projected to increase under Alternative 4A in Below Normal, Dry, and Critical years (Table 11-4A-1). Total population entrainment mortality under Alternative 5A is expected to increase in most years (Table 11-5A-1) and juvenile entrainment mortality is expected to increase (between 2-6%) in every year type. As noted in our Prior Comments and elsewhere in this letter, the average entrainment across years is irrelevant; Delta Smelt will respond to entrainment mortality in particular years.

The RDEIR/DEIS inappropriately dismisses potentially negative effects of project alternatives on availability of Delta Smelt spawning and incubation habitat. In its analysis of this impact (AQUA-4), the RDEIR/SDEIS states, "There is the potential for salinity to be greater than is optimal for delta smelt egg/larvae in Suisun Marsh, during February-June in drier years." RDEIR/SDEIS at 4.3.7-25. However, the environmental document dismisses this potential impact by declaring that there is no evidence that spawning habitat limits Delta Smelt populations. This statement incorrectly implies that, because spawning habitat does not limit Delta Smelt abundance or distribution currently, loss of spawning habitat cannot be a problem in the future. The loss of potential spawning habitat identified in the RDEIR/SDEIS would reduce the spatial extent of Delta Smelt spawning, which is important beyond just the loss in total acreage of available habitat. Nobriga and Herbold (2009) state that, "... it is likely that increased water clarity and possibly water diversions have constricted the distribution of suitable spawning habitat." Nobriga and Herbold 2009 at 14. Increased salinity in existing spawning habitat, as anticipated by the RDEIR/SDEIS, would be expected to further constrain the distribution of Delta Smelt spawning. Even if Delta Smelt are not currently limited by total acreage of spawning habitat, continued restriction of their geographic extent is a grave risk to the population. *See, e.g.*, Mac Elhaney et al. 2000; Rosenfield 2002. Finally, the RDEIR/SDEIS contradicts the DEIR/DEIS' findings for Alternative 4 and part of its justification for tidal wetlands restoration (CM4); the DEIR/DEIS states:

> "Alternative 4 would reduce the flows downstream of the north Delta intakes, with the reduction being greatest for H1 and H3 (which do not include enhanced spring outflow) and lowest for H2 and H4 (which include enhanced spring outflow). However, flow reductions below the north Delta intakes are not expected to substantially reduce available spawning habitat under any of the operating scenarios for Alternative 4 because implementation of CM4 Tidal Natural Communities Restoration is expected to more than offset any loss of spawning habitat caused by reduced flows below the north Delta intakes."

DEIR/DEIS at 11-1295. Project proponents cannot have it both ways; either flow reductions under Alternative 4 cause an impact to Delta Smelt spawning habitat that requires mitigation, or Conservation Measure 4 does not provide a benefit to Delta Smelt via increasing spawning habitat.

The RDEIR/SDEIS improperly minimizes the likely negative effect of reductions in suspended sediment caused by operations under the new alternatives. As we discuss elsewhere in these comments and in our Prior Comments, operation of the NDD is expected to reduce suspended sediment and turbidity throughout the Plan Area – by ~9% for Alternative 4A. *See* RDEIR/SDEIS at 4.3.7-29. Reductions in turbidity are already believed to have a negative effect on Delta Smelt productivity, abundance, and geographic extent. *See* Nobriga et al. 2009; Thomson et al. 2010; Maunder and Deriso 2011. Reductions in turbidity also facilitate increased predation on fishes and an increased likelihood of toxic cyanobacteria blooms (such as *Microcystis*), both of which are likely to increase direct mortality of Delta Smelt (and cyanobacteria blooms may further limit Delta Smelt prey availability). *See, e.g.*, Nobriga and Herbold 2009; MAST 2015. Thus, further reductions in suspended sediment under new project alternatives are likely to have a negative effect on Delta Smelt that is not disclosed in the RDEIR/SDEIS.

The RDEIR/SDEIS reiterates the erroneous claim of the DEIR/DEIS that restored tidal marsh habitats, included as part of Environmental Commitment 4, will benefit Delta Smelt (and other pelagic fish species) by increasing food supplies. *See, e.g.*, RDEIR/SDEIS at 4.3.7-31 and 4.4.7-7. As documented at length in our Prior Comments, there is no scientific support for this assertion regarding previously planned habitat restoration efforts and even less support now that the planned restoration acreages have been reduced by several orders of magnitude (from 65,000 acres in CM4 to the 59 acres of inundated habitat that the California WaterFix Environmental Commitment 4 proposes to restore).

e. The RDEIR/SDEIS Fails to Adequately Analyze Environmental Impacts of the New Alternatives on Longfin Smelt

Longfin Smelt is a pelagic fish species native to the San Francisco Bay Estuary. It is listed as threatened under the California Endangered Species Act. The U.S. Fish and Wildlife Service has determined that this population warrants listing under the federal ESA, although the actual listing is temporarily precluded by funding and bureaucratic constraints. USFWS 2012a. On a proportional basis, the Longfin Smelt's population decline in the San Francisco Bay-Delta Estuary is as great as, or greater than, that observed for Delta Smelt. The 2014 abundance index from the fall midwater trawl survey (FMWT) for Longfin Smelt was the second lowest on record, representing a 99.9% decline from the highest index values in the 1980-2014 period. Results from two other fish assemblage surveys produced similar results; 2014 index values represented declines of 99.5% and 99.3% from high levels detected since 1980 for the Bay Study's midwater trawl and otter trawl (BMWT and BOT), respectively. Most Longfin Smelt live no more than two years and spawn after dying. Moyle et al. 2002. Because of its extremely low abundance and short life span, negative effects that occur in a year when the population is already extremely low (as it now is in almost every year) could result in loss of an entire cohort of Longfin Smelt or the entire population. The RDEIR/SDEIS fails to adequately assess impacts to Longfin Smelt because of its reliance on arbitrary thresholds of significance, by averaging results across months and within year types, and by failing to estimate changes in Delta outflow for periods of relevance to Longfin Smelt productivity, all of which obscure the likelihood that highly negative effects will occur in particular years. As a result, the RDEIR/SDEIS fails to assess whether impacts will result in the loss of the entire population or a year class.

It is well documented that Longfin Smelt abundance in this estuary respond positively to increasing winter-spring flows into, through, and out of the Delta.[35] *See, e.g.*, Stevens and Miller 1983; Jassby et al. 1995; Kimmerer 2002; Rosenfield and Baxter 2007; Kimmerer et al. 2009; Thomson et al. 2010; Mac Nally et al. 2010; Nobriga and Rosenfield *in press*. Indeed, this flow: abundance effect has persisted over multiple decades and is seen in data from multiple independent surveys. Rosenfield and Baxter 2007; Nobriga and Rosenfield *in press*. It is one of the strongest ecological relationships found in the San Francisco Bay Estuary and its watershed. No other ecological factor studied has been found to have nearly as strong and persistent a relationship with Longfin Smelt abundance and productivity as winter-spring freshwater flows.[36]

Project alternatives that are expected to reduce winter-spring flows through the Delta and into the estuary must be expected to lead to declines in the Longfin Smelt population. To the extent that operation of a new diversion facility in the North Delta reduces the chances of increasing Delta outflow in certain years or on average in the future, that alternative is likely to lead to continued declines in abundance, or at best persistence at current population levels that are 2-3 orders of magnitude below historical populations. These low population levels also represent a significant degradation to the San Francisco Bay Estuary's food web, as Longfin Smelt were once among the most abundant forage fish in

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[35] Although some studies have related the flow effect on Longfin Smelt productivity to Sacramento River inflow to the Delta, *see* Stevens and Miller 1983, given the species' ecology, it is most likely that flows out of the Delta into Suisun Bay are the driving force behind the mechanisms underlying the abundance-flow relationship, *see* Rosenfield 2010. In either case, diversion of flow at the North Delta Diversion facility proposed by the California WaterFix would be expected to negatively affect the species' population.

[36] In a bizarre twist of logic, the RDEIR/SDEIS analysis of new alternatives turns the incredible weight of evidence relating freshwater flows and Longfin Smelt productivity into an "uncertainty" (e.g., at 4.1-9 and 4.3.7-36) that it plans to "adaptively manage" in the future. The RDEIR/SDEIS steadfast refusal to acknowledge the relationship of winter-spring Delta outflows on Longfin Smelt abundance and productivity generates little confidence that future efforts to inform management with science will result in increased flows needed to protect this population.

this region. Moyle 2002; Kimmerer 2002a; US Fish and Wildlife Service 2012b; Nobriga and Rosenfield *in press*.

i. The RDEIR/SDEIS Ignores Significant Scientific Information Regarding Impacts to Longfin Smelt And Understates the Environmental Impacts of the New Alternatives

The RDEIR/RDEIS' description of the effect of freshwater flow on Longfin Smelt spawning, incubation, and larval rearing (Impact AQUA-22; e.g., at 4.3.7-36) is clearly erroneous and fails to use the best available science. It relies on the DEIR/DEIS discussion of these effects and, as discussed in our Prior Comments (e.g., at 129-148) and *supra*, the DEIR/DEIS did not represent the best available science with regard to Longfin Smelt spawning, incubation, and larval rearing. Important findings from Nobriga and Rosenfield (*in press*) that are not incorporated or are misinterpreted by the RDEIR/SDEIS include that Longfin Smelt population dynamics are a function of:

1. Initial abundance (i.e., there are stock recruit effects; *see also* Thomson et al. 2010);
2. Fresh water flow rates during the spawning, incubation, and larval rearing period (as opposed to later in life);
3. Survival of Age 0 fish until spawning; and
4. Density dependence in both the recruits-per-spawner and spawners-per-recruit relationships

See Nobriga and Rosenfield (*in press*).

The RDEIR/SDEIS approach to modeling Longfin Smelt population dynamics completely ignores points #1, #3, and #4. There is no historicity in application of X2-abundance regressions modified from Kimmerer et al. (2009). As we have noted before, (a) application of these regressions would only predict Longfin Smelt population extinction for one particular value of X2 and, (b) even were such a value modeled, the population would be magically "resurrected" in the next year when X2 values predicted a positive population. Both of those outcomes are biologically flawed and unrealistic.

The RDEIR/SDEIS grudgingly accepts that the X2-abundance correlation for Longfin Smelt is the best available relationship "at this time" (at 4.3.7-36) for predicting outcomes of project alternatives. However, as noted in Prior Comments and above, the RDEIR/SDEIS fundamentally misinterprets Kimmerer et al (2009) as saying that the position of the salinity field (partially a function of Delta outflow) drives Longfin Smelt population dynamics by altering available Longfin Smelt habitat, rather than some other mechanism tied to Delta outflow; ironically, the very paper that the RDEIR/SDEIS relies on (Kimmerer et al. 2009) find little support for application of X2 as an index of Longfin Smelt habitat availability (though it is an index of Longfin Smelt abundance in scenarios where outflow, not sea level rise, is the force responsible for changing X2). The inappropriate use of X2, rather than outflow, to estimate Longfin Smelt abundance in the future leads to a confounding of project effects on Delta outflow during the winter and spring with the effects of sea level rise. Furthermore, Kimmerer et al.'s 2009 regression equations are not the best available estimates of X2 (or flow) effects on Longfin Smelt abundance, as Thomson et al. 2010 found evidence of an additional step-change in this relationship for which Kimmerer 2009 does not account. Most recently Nobriga and Rosenfield (*in press)* developed a more comprehensive approach to modeling Longfin Smelt population dynamics that incorporated each of the four main points above.

Nobriga and Rosenfield (*in press*) probed mechanistic relationships between flow and the persistent, high-order, statistically significant relationship between winter-spring Delta outflow and Longfin Smelt productivity. Their results demonstrate that there has been no change in the relationship between freshwater flow and abundance of young Longfin Smelt (Age 0 fish) relative to spawning stock (Age 2 fish) over the past several decades – the well-documented step-declines in Longfin Smelt abundance with respect to flow, *see, e.g.,* Kimmerer et al. 2002; Thomson et al. 2010, are not related to any change in the relationship between spawner-recruit productivity and flow. Nobriga and Rosenfield (*in press*) found evidence of declining Longfin Smelt survival between Age-0 and spawning-aged fish (Point #3 above), but noted that during this period, most Longfin Smelt are found in deep water in the downstream embayments of the San Francisco Estuary or the nearshore Pacific Ocean. *See* Rosenfield and Baxter 2007; Rosenfield 2010. In other words, forces that contribute to the decline in Longfin Smelt (beyond those related to Delta outflow effects on the spawner-recruit relationship) likely occur outside of the Plan Area. In addition, this study found that Longfin Smelt abundance data from three different sampling gears (FMWT, BMWT; and BOT) were quite consistent, contrary to the RDEIR/SDEIS' unsupported claim of "bias" in some of the sampling programs.

The Estuary's population of Longfin Smelt is likely to decline under the new alternatives proposed by the California WaterFix because winter-spring Delta outflow declines in most years relative to baseline conditions. At best, the new alternatives produce outflows similar to baseline, but baseline conditions are producing ongoing declines for this imperiled population. Table 11-4A-8 does not represent likely outcomes of operations under Alternative 4A because it employs equations that are: (a) out of date and thus not representative of the best available science; and, (b) based on a fundamental misunderstanding of the X2-abundance relationships, which then become confounded by the RDEIR/SDEIS's estimates of sea level rise.

Under Alternatives 2D and 5A, Delta outflow is expected to decline relative to the NAA (or in a few cases, remain unchanged) in every month from February-May, in every year type. As a result, the RDEIR/SDEIS determines that both alternatives will have adverse results (at 4.4.7-10 and 4.5.7-11). As discussed above, there is no evidence that mitigation measures AQUA22a-c would have any effect on Longfin Smelt populations as they describe efforts to identify and develop potential mitigations, not the mitigations themselves. The RDEIR/SDEIS acknowledges that application of mitigation measures AQUA22a-c will not change the "adverse" effect determination.

The RDEIR/SDEIS obscures changes to Delta outflows under Alternative 4A because it fails to specify operations during this period. Furthermore, the RDEIR/SDEIS fails to aggregate estimated Delta outflows under the proposal for time periods that are likely to be relevant to Longfin Smelt productivity. Different authors have studied freshwater flow rates in different combinations of months (e.g., March-

May; January-March) to study the effect of flow on Longfin Smelt productivity. Nobriga and Rosenfield (*in press*) studied flows in December-May because these months fully overlap the spawning and larval rearing phases of Longfin Smelt's life cycle in the SFE (*see* CDFW 2010) and because the correlation of flows among months within years makes it difficult to segregate the effect of flow statistically (Personal Communication, M. Nobriga, USFWS). Using the modeling of Alternative 4 flows presented in Appendix B, we observe that freshwater Delta outflow aggregated from December to May will decline relative to the NAA during all but the Dry year type for Alt4_H3 and for all but the Dry and Below Normal year types for Alt4_H4. Thus, if operations under Alternative 4A are bracketed by estimated flows under operational variants H3 and H4, it is reasonable to believe that Delta outflows during the December-May period will decline in the majority of years and, as a result, Longfin Smelt populations will decline under Alternative 4A. The RDEIR/SDEIS fail to acknowledge this adverse result.

As described in our Prior Comments, it is possible that the flows that drive Longfin Smelt population dynamics in this estuary occur in particular months during the December-May period; although this effect is difficult to discern statistically, it is valuable to study changes in flows caused by project alternatives in particular months to understand the potential risk to Longfin Smelt populations (i.e., the change in total flow from December-May may underestimate the effect of flow alterations that occur in particular months during that period). The RDEIR/SDEIS presentation of flow changes in individual months demonstrates that flows decline in most of the months critical to Longfin Smelt spawner-recruit productivity under both operational variants in many years. For example, flows under variant H3 decline in most year types between February and May as compared to Existing Conditions (by as much as 20.6%), and Delta outflows decline versus the NAA alternative in every year type of March-May. The H4 operational variant is intended to produce improved outflow conditions, but flows actually decline in every month from February-June during a large proportion of years (at least 2 of the five year types modeled) as compared to Existing Conditions – flows are reduced in the driest years throughout the February-May period. As compared to the NAA, flows under Alternative 4_H4 decline or remain unchanged in most months from January through May during Critical, Dry, Above Normal, and Wet years. As noted above, the flow modeling in the RDEIR/SDEIS assumes implementation of applicable regulations (e.g., D-1641 flow and salinity standards; RPA's of the Biological Opinion), but many of these standards have been waived or weakened repeatedly in drought conditions. If safeguards for clean water, endangered species, and/or fish and wildlife are not fully enforced in the future, then the Delta outflows projected in the RDEIR/SDEIS will not materialize and impacts to Longfin Smelt in the San Francisco Estuary will be even worse than analyzed in the RDEIR/SDEIS. Thus, analyses of estimated Delta outflows across periods when they are likely to be relevant to Longfin Smelt populations (December-May and smaller intervals of months between December and May) reveal that the Longfin Smelt population should be expected to decline relative to NAA in most year types. This negative effect of Delta outflow reductions is a significant adverse impact not disclosed by the RDEIR/SDEIS, and the document must be revised to consider feasible mitigation measures including increased Delta outflow.

Despite our Prior Comments, the RDEIR/SDEIS still fails to estimate Longfin Smelt entrainment using known and statistically significant relationships between entrainment and Old and Middle River flows

(OMR; *see* Grimaldo et al. 2009). Grimaldo et al. (2009) demonstrated that Longfin Smelt entrainment begins to occur as OMR flows become negative and that they increase exponentially as the magnitude of these "reverse flows" increases. OMR decreases (becomes more negative) under Alternative 4 in most year types during April and May (when entrainment of Longfin Smelt larvae and juveniles would be expected to occur, *see* Grimaldo et al. 2009; Rosenfield 2010, versus Existing Conditions and substantial declines are predicted as compared to NAA in many years. More negative OMR flows would be expected to increase Longfin Smelt entrainment rates during Critical and Dry years (when most Longfin Smelt entrainment occur); problems may also arise under Below Normal years under Alternative 4A, given the increasingly negative OMR flows expected during those years. Under Alternative 2D, OMR flows are negative (frequently more negative than NAA and/or Existing Conditions) in April-June of Above Normal, Dry and Critical years; similarly, OMR flows are negative under Alternative 5A during Dry and Critical years from April-June. Thus, we would expect entrainment of Longfin Smelt to be unacceptably high under those alternatives.

The RDEIR/SDEIS models Longfin Smelt entrainment using particle tracking and the so-called "salvage density method." Under Alternative 5A, Longfin Smelt entrainment is expected to increase in some year types, compared to both Existing Conditions and the NAA – of particular concern is the projected increase versus the NAA in Below Normal and Critical years as these are year types when entrainment of these fish occurs and in which the USFWS (2012a) currently assumes they will be protected by implementation of the Delta Smelt Biological Opinion RPA. Both methods indicate large reductions in entrainment mortality under Alternatives 4A and 2D. While we would welcome such reductions in entrainment mortality, the benefits asserted in the RDEIR/SDEIS are vastly overstated for wetter years as Longfin Smelt salvage is negligible (almost always zero when net Delta outflow during February-June is >25,000cfs) during such years. *See* Grimaldo et al. 2009; Rosenfield 2010. The RDEIR/SDEIS improperly implies that large reductions in Longfin Smelt entrainment can occur in year types when large numbers of Longfin Smelt are not entrained in those year types. Furthermore, the particle tracking and salvage density estimates of entrainment do not account for shifts in the position of the low salinity zone due to sea level rise. Although it is not appropriate to use X2 as an index of Longfin Smelt abundance in scenarios involving sea level rise (because the relationship of Longfin Smelt abundance with X2 has only been studied under relatively static sea levels and because X2 does not necessarily represent the functional mechanisms by which Longfin Smelt respond to Delta outflow), the position of the salinity field appears to be directly related to the location of Longfin Smelt spawning and early rearing, and thus to entrainment risk for Longfin Smelt. *See, e.g.*, Dege and Brown 2004; Grimaldo et al. 2009; Rosenfield 2010. In summary, by failing to model Longfin Smelt entrainment correctly, the RDEIR/SDEIS fails to identify and disclose significant adverse impacts on this threatened population or identify and consider feasible mitigation measures.

ii. The RDEIR/SDEIS Fails to Disclose that the No Action Alternative and other New Alternatives Result in Significant Impacts to Longfin Smelt, and it Ignores Feasible Mitigation Measures Including Changes to Delta Outflow Requirements

In addition to failing to adequately analyze the effects of the alternatives on Longfin Smelt as discussed above, the RDEIR/SDEIS also fails to disclose that the No Action Alternative and all of the new alternatives are likely to cause significant adverse impacts on Longfin Smelt, which can be reduced or mitigated by increasing spring outflow. The RDEIR/SDEIS must be revised to do so.

Because CVP/SWP operations are significantly reducing the abundance and viability of Longfin Smelt as a result of substantially reducing winter/spring Delta outflow, both the Existing Conditions and No Action Alternative cause significant impacts to this species. CEQA Guidelines § 15065; RDEIR/SDEIS Appendix A at 11-94. The RDEIR/SDEIS suggests that climate change will cause significant impacts to Longfin Smelt under the No Action Alternative, but ignores the significant effect of CVP/SWP operations in reducing winter/spring delta outflow and fails to identify any mitigation measures. *See* RDEIR/SDEIS Appendix A at 11-107. Indeed, the RDEIR/SDEIS admits that Longfin Smelt abundance is expected to decrease by 33% on average under the No Action Alternative compared to Existing Conditions.[37] *Id*. Increased Delta outflow is a feasible mitigation measure to address this impact, and the RDEIR/SDEIS must be revised to acknowledge the substantial role of CVP/SWP operations in reducing Delta outflow and propose increases in Delta outflow as a mitigation measure to reduce or mitigate this impact.

Despite the fact that the NAA causes significant impacts to Longfin Smelt, the RDEIR/SDEIS concludes that Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8 and 9 will not cause significant impacts to Longfin Smelt under impact AQUA-22. RDEIR/SDEIS Appendix A at 11-216.[38] This conclusion is incorrect for all of the alternatives that reduce Delta outflow, as well as for the alternatives that do not substantially increase Delta outflow to a level sufficient to avoid jeopardizing the continued existence of the species. The RDEIR/SDEIS incorrectly assumes that habitat restoration will reduce the impacts of Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 3, 4, and 5 to a less than significant level. RDEIR/SDEIS Appendix A at 11-217. However, as discussed previously, there is no scientific evidence that habitat restoration is likely to provide substantial benefits for Longfin Smelt, and the conclusion that this habitat restoration will mitigate these impacts to a less than significant level is arbitrary and capricious.

In addition, the RDEIR/SDEIS claims that Alternative 4A is not adverse because spring outflow will be managed to avoid differences from the No Action Alternative. RDEIR/SDEIS Appendix A at 11-217 ("As described in more detail in section 4.3.7, Alternative 4A is not adverse because Delta outflows would be provided to avoid differences from NAA during spring, included in Mitigation Measure AQUA-22d."). As demonstrated above, Delta outflow under Alternative 4A is significantly reduced compared to the NAA for key months and water year types. Moreover, Delta outflow under the No Action Alternative will result in significant adverse impacts to Longfin Smelt. Simply maintaining Delta outflow at the level of the Existing Conditions baseline is insufficient to avoid a mandatory finding of significance because Delta outflow under Existing Conditions is jeopardizing the continued existence of Longfin Smelt. And as

[37] *But see* discussion *supra* regarding use of X2 instead of outflow to calculate longfin smelt abundance.
[38] The text also contradicts the executive summary, claiming that impact AQUA-22 will not be significant under Alternative 4. *Compare* RDEIR/SDEIS at ES-50 (significant impact before mitigation) *with* RDEIR/SDEIS Appendix A at 11-216.

noted above, abundance of Longfin Smelt is anticipated to decline by 33% under the NAA compared to Existing Conditions. *See* RDEIR/SDEIS Appendix A at 11-107. Meeting the NAA conditions will result in continued declines in abundance of Longfin Smelt and will jeopardize the continued existence of the species.

Similarly, the RDEIR/SDEIS claims that Alternatives 6A, 6B, 6C, 7, 8, and 9 would not be adverse because they "had similar or greater predicted all-year mean fall midwater trawl indices than NAA." RDEIR/SDEIS Appendix A at 11-217. Yet the RDEIR/SDEIS fails to analyze whether the increase in abundance predicted by the modified Kimmerer 2009 equation would be sufficient to restore the abundance of the species, as opposed to simply maintaining the continued declines in abundance under the NAA, let alone under the Existing Conditions baseline.

The RDEIR/SDEIS must be revised to disclose that Existing Conditions, the No Action Alternative, and any alternative that simply maintain Delta outflow and Longfin Smelt abundance at levels similar to the No Action Alternative (including Alternatives 4 and 4A) result in significant environmental impacts, and the RDEIR/SDEIS must be revised to identify and analyze feasible mitigation measures, particularly increases in Delta outflow, to reduce or avoid these impacts.[39]

f. The RDEIR/SDEIS Fails to Adequately Analyze Environmental Impacts of the New Alternatives on Salmon and Steelhead

i. The RDEIR/SDEIS Uses Flawed Methods to Assess Environmental Impacts to Salmon and Steelhead

The RDEIR/SDEIS uses flawed methods and misinterprets results from the methods it applies to investigate impacts to Chinook salmon and steelhead from new project alternatives. In addition, the RDEIR/SDEIS improperly minimizes or ignores certain impacts of the new alternatives on anadromous salmonids, and fails to disclose significant impacts that are likely to occur and feasible mitigation measures and alternatives to reduce or avoid those impacts. We have addressed many of these flaws elsewhere in this letter and in our Prior Comments, which apply equally to these new alternatives.

In addition, the RDEIR/SDEIS fails to adequately analyze the likely socioeconomic impacts to recreational and commercial salmon fishing from the alternatives, particularly operations. Fall-run Chinook salmon form the backbone of the salmon fishery in California and along the West Coast, and reductions in the abundance of fall-run Chinook are likely to cause socioeconomic impacts to sport and commercial fishermen and related businesses. In addition, reductions in the abundance of winter-run Chinook salmon or other ESA listed species are also likely to cause socioeconomic impacts to the salmon fishery, because fishing is constrained to protect ESA listed stocks. The RDEIR/SDEIS wholly fails to analyze the socioeconomic impacts to the sport and commercial salmon fishery (Chapter 16) and erroneously

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[39] Maintaining Delta outflows and Longfin Smelt abundance at these levels is inconsistent with the obligations of Reclamation and DWR under CESA and the ESA.

assumes that there would be no significant impacts to salmon populations in its brief assessment of recreational impacts. *See* RDEIR/SDEIS Appendix A at 15-32.

Our Prior Comments on project effects on through-Delta survival of winter-run (e.g., at 176-178); spring-run (e.g., at 184-186); fall-run (e.g., at 214-215); and late-fall run Chinook salmon (e.g., at 213-214) and, in general (e.g., at 186-189) are still relevant and remain unaddressed in the RDEIR/SDEIS. The RDEIR/SDEIS continues to model salmonid survival through the Delta using the Delta Passage Model (DPM) despite the fact that this model is built around data from fish that are expected to behave very differently than most of the Chinook salmon migrating into the Delta. DPM is based on data from studies of hatchery origin late-fall run Chinook salmon that are much larger and older than the wild salmon fry and parr. Smaller Chinook salmon are weaker swimmers and are likely to have migration/rearing strategies than differ from older larger fish (e.g., rearing rather than migrating), and these smaller and younger migrants represent the bulk of Chinook salmon entering the Delta. *See, e.g.*, Williams 2006; Sturrock et al. 2015. Also, wild Chinook salmon are expected to behave very differently from hatchery-produced salmon. *See, e.g.*, Quinn 2005; Williams 2006; Williams 2010. Furthermore, the DPM is constructed based on fish behavioral responses to flow, turbidity, width-to-depth ratios, and hydrodynamic patterns that have been observed in recent years. It is incorrect to assume that those results can be extrapolated to the significantly reduced flows, reduced turbidity, increased width-to-depth ratios, and hydrodynamic patterns below the NDD that will result from operations under the new alternatives. Thus, the applicability of the DPM to migrations of fry and parr-sized Chinook salmon or to any fish under the completely different environmental conditions that will accompany operation of the NDD is highly questionable and represents a major flaw in the analysis that must be corrected.

Through-Delta survival is a major impediment to conservation and recovery of all Central Valley salmonid populations. NMFS 2014 Recovery Plan; BDCP Appendix 3.G. Salmon survival in the Delta is influenced by factors including reduced freshwater flows into and through the Delta and the altered hydrodynamics and ecological conditions caused by south Delta exports. NMFS 2009 biological opinion; Williams 2010; Michel et al. 2014; Buchannan et al. 2013; Buchannan et al. 2015; Cunningham 2015; *see* Prior Comments. These drivers of Chinook salmon migration success are controlled or influenced by project operations and will be substantially modified by operations under the proposed new alternatives. Flows into the Delta from the Sacramento River basin (below the North Delta Diversion) will decrease substantially in every month of the Chinook salmon and steelhead migration seasons during every year under operational variant H3 and almost every year under H4 operations. RDEIR/SDEIS Appendix B and Table B.7-28. Similarly, in the San Joaquin Basin, flows into the Delta will decline in the vast majority of years, in every month or nearly every month, during the juvenile Chinook salmon migration period (January-June) as compared to Existing Conditions. Relative to the NAA, Delta outflows will be reduced under Alternative 4A in most year types; both operational variants result in lower outflows in Wet, Above Normal, and Critical years – outflow under the NAA in Below Normal years falls between H3 and H4 estimates. RDEIR/SDEIS at Table B.7-31. Thus, based on the well-documented correlation between flow rates and through-Delta survival, Chinook salmon juveniles emigrating from the Sacramento River basin will suffer reduced survival as a result of Alternative 4A operations in most years.

Through-Delta survival will likely be worse than would be expected solely from the reduced flows into and out of the Delta projected for the new alternatives. Direct mechanisms causing elevated juvenile salmon mortality include:

- Entrainment at the south Delta export facilities;
- Factors exacerbated by reduced turbidity and reduced flow rates, such as predation, *see* Gregory 1993; Gregory and Levings 1998; Grossman 2013; USBR 2015;[40]
- The spread of invasive macrophytes that improve predator efficacy (Boyer and Sutula 2015) and harmful algal blooms like *Microcystis* (Berg and Sutula 2015).

Aside from direct entrainment at the south Delta export facilities, the RDERI/SDEIS fails to consider the additional mortality from these sources related to the extraordinarily low levels of Delta inflow and outflow expected under the new project alternatives. For example, as described elsewhere in this letter and in our Prior Comments, diversion of suspended sediment and increased Delta residence times are expected to increase water clarity, the frequency of harmful algal blooms, and the areal extent of invasion by certain macrophytes.

The RDEIR/SDEIS remains overly optimistic about the ability of operations under the new alternatives to reduce salmonid entrainment at the South Delta export facilities. Indeed, like its predecessor, the new environmental document maintains both that proportional Chinook salmon entrainment is low currently and that California WaterFix alternatives will make a big difference in Chinook salmon entrainment. For example, with regard to winter-run Chinook salmon, the RDEIR/RDEIS states that:

> The proportion of juvenile winter-run Chinook salmon subject to entrainment is low under Existing Conditions and NAA_ELT (annual index of abundance average 1.4%) and Alternative 4A would further reduce entrainment of juvenile winter-run Chinook salmon at the south Delta facilities. For example, Scenario H3_ELT would reduce the proportion of juvenile winter-run Chinook entrained in the south Delta export facilities (average of 0.6%). As such, average entrainment under Scenario H3_ELT would be reduced by 54% (~3,800 fish: Table 11-4A-10) across all water years compared to NAA_ELT. Entrainment would be substantially reduced in wet and above normal water year types (65–72% less than NAA_ELT) and would be moderately reduced in below normal, dry, and critical water year types (14–44% less than NAA_ELT).

[40] In materials submitted in support of its petition (with California DWR) to reduce Delta outflow standards during 2015, the US Bureau of Reclamation wrote that reduced Delta inflows could: "…reduce survival of juvenile salmonids migrating through the Lower Sacramento River and North Delta by increasing rates of predation mediated by hydrodynamic mechanisms (i.e. transit times, turbidity)."

RDEIR/SDEIS at 4.3.7-47. Even lower rates of entrainment and similar benefits are claimed for reductions in entrainment of fall-run and late-fall run Chinook salmon. *Id*. at 4.3.7-126 to -127. Yet the document must be internally consistent: either a project alternative is expected to reduce a serious problem or it is projected to make a negligible reduction to an inconsequential problem. If the RDEIR/SDEIS persists in its claim that Chinook salmon entrainment is "low" (or, for fall-run, "very low") currently, then it must abandon its claims that there are substantial environmental benefits from reducing Chinook salmon entrainment. Failure to do so misleads the public as to the impacts of the alternatives.

The RDEIR/SDEIS fails to consider or incorporate methods and findings from studies of this problem that we cited in our Prior Comments. *See, e.g.,* Kimmerer and Nobriga 2008; Kimmerer 2008 (which found direct entrainment-related mortality of winter-run Chinook salmon was approximately 10% of the juvenile winter-run population, on average, at the highest export flows recorded). In addition, as noted above, the RDEIR/SDEIS fails to incorporate results from more recent studies such as Cunningham et al. 2015, which found that among the top environmental drivers affecting fall-run Chinook salmon were the export-to-inflow ratio for the Delta and the Delta gross channel depletion. This study also found that export levels, and sediment concentration at Fremont, were major environmental drivers for spring-run Chinook salmon populations on the Sacramento River, results that were not mentioned or integrated into the RDEIR/SDEIS.

In contrast to its analysis of south Delta entrainment under the new project alternatives, the RDEIR/SDEIS continues to ignore potential entrainment/impingement-related mortality at the new NDD. These diversions will be fitted with fish screens, but there is no analysis of how well these screens can be expected to function and the RDEIR/SDEIS assumes they will function perfectly, forever. This is an unreasonable expectation because (a) screens of this type have never been deployed on a diversion of the size anticipated in the new alternatives, and (b) screens may fail and/or suffer reduced efficacy, at least temporarily. The RDEIR/DEIS analysis of anadromous fish survival past the NDD should be redone with some assumption of periodic failure or less than perfect performance of the unique fish screens.

Furthermore, the RDEIR/SDEIS erroneously concludes that Alternative 4A will not likely cause a significant adverse impact from predation of Chinook salmon as a result of the NDD. Based on the *median* assumption of predation rates input into the RDEIR/SDEIS's bioenergetics model, the environmental documents estimate that 0.6% of the fall-run Chinook salmon population would be lost due to predation at the NDD; this is more than double the loss of fall-run that the RDEIR/SDEIS attributes to entrainment at the south Delta export facilities in the NAA (at 4.3.7-126). The RDEIR/SDEIS declares that reduction in south Delta entrainment by 0.1% would be a "substantial reduction," RDEIR/SDEIS at 4.3.7-127, and yet this reduction is only achieved by creating a new source of mortality for fall-run Chinook problem at the NDD that is substantially greater. Moreover, the RDEIR/SDEIS employs another method of estimating mortality loss at the NDD and suggests that predation loss may be up to 13% of both the fall-run and late-fall run populations. *Id*. at 4.3.7-175. Clearly, this represents a much greater potential loss at the NDD than the estimated reduction in mortality at the south Delta facilities expected from implementing Alternative 4A. The RDEIR/SDEIS states: "…at this time, due to the absence of comparable facilities anywhere in the lower Sacramento River/Delta, the degree of predation-related mortality expected from near-field effects at the NDD remains highly uncertain." RDEIR/SDEIS at 4.3.7-182. This is an understatement; as discussed *supra*, there are no facilities comparable to the planned NDD anywhere in the world.

The proposed mitigation measures in the RDEIR/SDEIS (targeted predator removal) and further study are unlikely to significantly benefit salmon, as noted in recent reviews regarding the effectiveness of predator removal programs. Grossman et al. 2013. If predation effects remain high (e.g., as high as estimated loss via entrainment mortality at the South Delta export facilities), then additional new mitigations for predation loss must be developed that are reasonably certain to be highly effective. Even with the proposed mitigation measures, this is a significant adverse environmental impact that is not disclosed in the RDEIR/SDEIS.

The RDEIR/SDEIS fails to account for the importance of the spatial distribution and life history diversity attributes of viability that are critical to the persistence and recovery of all of the Central Valley's fish species, including salmonids. McElhaney et al. 2000; Lindley et al. 2007. For example, the RDEIR/SDEIS fails to analyze impacts on the survival and recovery of spring-run Chinook salmon migrating to and from the San Joaquin River and its tributaries, despite the facts that: (a) spring-running Chinook salmon are already found in the San Joaquin River's tributaries, including the Stanislaus River (Franks 2012; personal communication, R. Johnson, NOAA Southwest Research Center); (b) the NMFS Final Restoration Plan (2014) calls for restoration of multiple populations of spring-run Chinook salmon in the San Joaquin Basin; and (c) major restoration efforts for spring-run Chinook salmon are underway in the San Joaquin River basin (i.e., the San Joaquin River Restoration Program; SJRRP).

Despite the RDEIR/SDEIS' failure to analyze these impacts; it is clear that Alternative 4A operations (and those of other new and old alternatives) will adversely impact ongoing natural and human-assisted re-colonization of the San Joaquin Basin by spring-run Chinook salmon and existing or desired future populations of spring-run Chinook salmon in the San Joaquin River Basin, and the Stanislaus River in particular. For example, flows on the Stanislaus River are projected to decline under Alternative 4A (both operational variants) during the adult and juvenile spring-run migration period (January –May and March-June; respectively); the RDEIR/SDEIS erroneously references Appendix 11C to conclude that flows would be lower than those under Existing Conditions during January through May in most water year types (up to 29% lower in February of Critical years). *See* RDEIR/SDEIS at 4.3.7-164,-167. Appendix B.7-24 confirms that flows at the Stanislaus River confluence with the San Joaquin River will be reduced (substantially so, in most cases) in every month of almost every year under Alternative 4A as compared to Existing Conditions. These large flow reductions would be expected to have negative effects on migrating spring-run Chinook salmon. For example, analysis of publicly available data regarding dissolved oxygen and temperature in the Stanislaus River near its confluence with the San Joaquin River (CDEC: "RPN" gauge) indicates that current conditions would impair both adult and juvenile spring-run migrations in the Stanislaus River. For example, temperatures are detrimental (>20.5^{o}C as a 7-day average of daily maximum) or even lethal to migrating adult salmon by the beginning of June in most years, and dissolved oxygen levels have been sub-optimal (4 or more days below 8 mg/l) in at least 1 week (and up to 5 weeks) of the spring-run adult migration period for 13 of the years from 2000-2015. Declining flows on the Stanislaus River will tend to exacerbate migration problems for migrating spring-run Chinook salmon; indeed, the temperature modeling for the Stanislaus River, indicates that temperatures are expected to increase under Alternative 4A relative to Existing Conditions. RDEIR/SDEIS Appendix B at Table B.7-77. Also, reduced flows from the Stanislaus River are expected to contribute to reduced flows on the San Joaquin River mainstem; reduced flows at Vernalis would be expected to contribute to poor migration conditions for all Chinook salmon and steelhead spawning in and emigrating from the San Joaquin River Basin. *See, e.g.*, Buchannan et al. 2015.

Fall-run Chinook salmon productivity in the San Joaquin River Basin would also be negatively affected by operations under Alternative 4A. Current flow conditions in the San Joaquin River and its tributaries lead to the persistently low productivity and abundance of fall-run Chinook salmon that have resulted in failure to attain goals and objectives of the Central Valley Project Improvement Act and Bay-Delta Water Quality Control Plan. Increased water temperatures and reduced flows will cause significant adverse impacts that are not identified in the RDEIR/SDEIS, and feasible mitigation measures such as temperature control devices, reservoir reoperation, and passage around existing dams must be analyzed and considered.

In addition to the flow and reservoir operational issues addressed above (e.g., reduced flow and increased temperatures during the juvenile migration and intolerable spawning and incubation temperatures), the RDEIR/SDEIS reports that through-Delta survival of fall-run Chinook salmon migrating through the Delta from the San Joaquin River will decline under Alternative 4A, relative to the NAA (by 4%, in absolute terms, or 19-20% in relative terms).[41] This is a significant adverse impact that requires mitigation. This outcome would presumably apply to fall-run Chinook salmon from all the San Joaquin's tributaries and to spring-run Chinook salmon populations that re-colonize this watershed, including populations of both runs that are being restored as part of the SJRRP. In addition, as we noted in our Prior Comments, current estimated through-Delta survival rates are currently so low that they result in elimination of self-sustaining Chinook salmon population within a few generations. *See also* Buchanan et al. 2013, 2015; Sturrock et al. 2015. Given the precarious state of all San Joaquin River salmonids, the failure to attain CVPIA and Water Quality Control Plan objectives for San Joaquin salmonids, and the large investment of multiple parties in restoring spring-run and fall-run Chinook salmon under the SJRRP, increased mortality rates of San Joaquin River Chinook salmon in the Delta must be regarded as significant and adverse, and the RDEIR/SDEIS must identify, consider and analyze mitigation measures to reduce or avoid these impacts.

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[41] In rationalizing this surprising outcome, the RDEIR/SDEIS states, "There is considerable uncertainty in effects on San Joaquin River Chinook salmon survival at such low levels of exports because the studies upon which the DPM flow- and export-survival relationships are based did not include these low levels of exports." RDEIR/SDEIS at 4.3.7-180. This is exactly the point we have made repeatedly regarding project proponents' reliance on the Delta Passage Model to estimate survival below the planned (and completely novel) North Delta Diversion.

In addition to the need to improve productivity (i.e. survival and reproductive success rates), abundance, and spatial diversity of Central Valley salmonids, there is an emerging consensus among researchers that life-history diversity of Central Valley salmonids is heavily constrained and limits the ability of the population to respond to shifting environmental conditions (human-caused and otherwise). For example, Lindley et al. (2007) state: "We are unlikely to be able to identify all possible sources of risk … so we should also think of managing risk by maximizing diversity within [salmonid] ESUs." Numerous recent studies demonstrate the effect of managed flow regimes on salmonid life-history distributions that contribute to overall population success, *see, e.g.*, Beechie et al. 2006, especially among Central Valley populations. Miller et al. 2010. As described elsewhere and in our Prior Comments, the RDEIR/SDEIS fails to analyze the effects of its operational alternatives on life-history diversity among Central Valley salmon populations. For example, disproportionate negative impacts to one end of the temporal distribution of a life state (e.g., early spawners, late migrants, oversummering "yearling" migrants) would clearly have a negative effect on the portfolio of life-histories in that population and are likely to affect population success in the short or long-term. *See* Satterthwaite et al 2014; Zeug et al. 2014; Buchanan et al. 2015. The RDEIR/SDEIS must be revised to analyze impacts to life history diversity of salmonids and how that will affect these species' viability.

ii. The RDEIR/SDEIS Incorrectly Identifies Significant And Unavoidable Impacts to Winter Run Chinook Salmon and Green Sturgeon Spawning and Rearing (AQUA-NAA4) Because it Ignores Feasible Changes to Reservoir Operations, Water Deliveries, and Other Mitigation Measures that Would Reduce or Avoid these Impacts

The executive summary to the RDEIR/SDEIS correctly identifies significant impacts to spawning and rearing habitat for winter-run Chinook salmon and Green sturgeon under the No Action Alternative (AQUA-NAA4), but it erroneously claims that these impacts are unavoidable. RDEIR/SDEIS at ES-48. In contrast, the text of Chapter 4 claims there is no significant impact under AQUA-NAA4, and Appendix A (revised Chapter 11) provides no analysis or conclusions. RDEIR/SDEIS at 4.2-53; *id*. Appendix A at 11-106 to -107. The RDEIR/SDEIS must be revised to be internally consistent, and to disclose the significant adverse impacts under existing conditions and the No Action Alternative under AQUA-NAA4. Moreover, the RDEIR/SDEIS ignores changes in reservoir operations and other feasible mitigation measures that can reduce or avoid these impacts, and it must be revised to identify and analyze such mitigation measures.

The revisions to Chapter 11 provide almost no analysis of temperature impacts on these species under the No Action Alternative. *See* RDEIR/SDEIS Appendix A at 11-106 to -107. Moreover, Chapter 4 states that the CEQA conclusion is a less than significant impact, but provides little analysis and does not provide a conclusion under NEPA.

During the current drought, as discussed above Reclamation's operation of Shasta Dam in 2014 resulted in greater than 95% mortality of endangered winter-run Chinook salmon eggs and juveniles as a result of lethal water temperatures and the failure to meet existing temperature standards. In 2015 Reclamation targeted higher water temperatures in the Sacramento River, despite the significant impacts that would result on spawning and rearing; as of mid-October, passage of winter-run Chinook salmon juveniles has been lower than 2014, *see* U.S. Fish and Wildlife Service, Red Bluff Diversion Dam juvenile salmon passage data, biweekly report for October 8, 2015 to October 21, 2015, available online at: http://www.fws.gov/redbluff/RBDD%20JSM%20Biweekly/2015/BiWeekly20151008-20151021.pdf, despite similar spawning dates and increased escapement in 2015, raising significant concerns that Reclamation will again cause unsustainably high mortality that jeopardizes the species. Under current conditions, during extended droughts Reclamation cannot maintain adequate temperature control because of unsustainable water deliveries and upstream diversions, jeopardizing the species. Indeed, even in non-drought years, egg to fry survival of winter-run Chinook salmon is extremely low, significantly impacting winter-run Chinook salmon and causing even more severe impacts to fall-run Chinook salmon. *See* USFWS 2014. Climate change will likely increase water temperatures, water demands, and the frequency of extended droughts, increasing impacts under the No Action Alternative as compared to existing conditions. As a result, the RDEIR/SDEIS must disclose that the No Action Alternative will cause significant impacts under AQUA-NAA4.

However, these impacts are not unavoidable. Changes to reservoir operations and reductions in reservoir releases and water diversions (including reductions in water deliveries to Sacramento River Settlement Contractors during Critically Dry years), can reduce or avoid these significant impacts to water temperatures and spawning and rearing habitat for winter-run Chinook salmon and Green Sturgeon. The RDEIR/SDEIS must be revised to identify and analyze the effects of such mitigation measures.

iii. The RDEIR/SDEIS Fails to Disclose that Alternative 4A is Likely to Cause Significant Impacts to Winter Run Chinook Salmon and Green Sturgeon Spawning and Rearing, and Must Consider Changes to Reservoir Operations and Water Deliveries and other Feasible Mitigation Measures

In addition, the RDEIR/SDEIS fails to disclose that Alternative 4A is likely to cause significant adverse impacts to winter-run Chinook salmon. Although the document claims that these impacts are less than significant, it also admits that these effects are similar to those under the NAA, which are significant and adverse. *See* RDEIR/SDEIS Appendix A at 11-217 ("In general, the effects of Alternative 4 on spawning and egg incubation habitat for winter-run Chinook salmon relative to the NAA are not adverse."). Although the RDEIR/SDEIS focuses its analysis on the comparison with the NAA, it largely ignores the significant adverse impacts that result under the NAA. Because the NAA results in significant adverse impacts, Alternative 4A also results in similar adverse impacts, and the RDEIR/SDEIS must be revised to disclose this significant impact and identify and consider feasible mitigation measures that improve temperature control (including reductions in water diversions and deliveries).

iv. The RDEIR/SDEIS Fails to Disclose that Alternative 4A is Likely to Cause Significant Adverse Impacts to Fall Run Chinook Salmon and Must Consider

Changes to Reservoir Operations, Water Deliveries and other Feasible Mitigation Measures

The RDEIR/SDEIS identifies adverse impacts to fall-run Chinook salmon arising from operations under Alternative 4A, but fails to describe how its suggested mitigation measure will eliminate the adverse effect and how it will affect other flow-related environmental conditions (e.g., in the mainstem Sacramento River or the Delta). Alternative 4A is likely to result in significant adverse impacts to fall run Chinook salmon, and the RDEIR/SDEIS must be revised to identify these impacts and potential mitigation measures.

For example, the RDEIR/SDIES states that, "the effect of Alternative 4A could be adverse because flows in the Feather and American Rivers (depending on scenario – H3_ELT or H4_ELT) would be reduced substantially and persistently and could cause biologically meaningful effects to fall-run Chinook salmon adult migration." RDEIR/SDEIS at 4.3.7-181. However, it claims that implementation of Mitigation Measure AQUA-78d, would make the actual effect "not adverse." The proposed mitigation measure ("Slightly adjust the timing and magnitude of Shasta, Folsom, and/or Oroville Reservoir releases, within all existing regulations and requirements, to ameliorate changes in instream flows that would cause an adverse effect to fall-run Chinook salmon") states that: "Whenever possible during real-time operations, project proponents will slightly adjust Shasta, Folsom and/or Oroville Reservoir operations to ensure that instream flows are sufficient to minimize or avoid migration-related effects to fall-run Chinook salmon." RDEIR/SDEIS at 4.3.7-193. However, the RDEIR/SDIES fails to describe what it means by "whenever possible" and how significant the "slight" changes in flow will need to be in order to reduce the impact of low flows to a non-significant state. The flow effects that lead to the "adverse" determination include reductions on Feather River flow during August and September of 32% and 22% relative to the NAA; the RDEIR/SDEIS describes the reductions as "substantial." RDEIR/SDEIS at 4.3.7-173. It is not clear how modifying reservoir releases on the Feather or American River would alter flow schedules and impacts downstream of the Feather River and how well such deviations from the RDEIR/SDEIS modeled flows would protect fall-Run Chinook salmon on Sacramento River tributaries. The RDEIR/SDEIS must be revised to reveal how frequently revisions to the modeled flow schedule (as envisioned in Mitigation Measure AQUA-78d) would occur, what effects those revisions would have elsewhere, and what benefit they would provide to the fall-run Chinook salmon populations in question. There is no basis in the RDEIR/SDEIS to conclude this mitigation measure will reduce impacts to a less than significant level.

In general, flow reductions and temperature increases expected under Alternative 4A would cause widespread, catastrophic impacts to the Central Valley's fall-run Chinook salmon populations similar to those identified above with regard to previously proposed project alternatives. Indeed, the RDEIR/SDEIS finds significant effects with regard to its CEQA baseline. It states:

> Under Alternative 4A, there would be moderate to substantial flow reductions and substantial increases in temperatures and temperature exceedances above thresholds

> in the Sacramento, Feather, and American Rivers, which would interfere with fall-/late fall--run Chinook salmon spawning and egg incubation. Biological models, including the Reclamation egg mortality model and SacEFT, predict substantially degraded spawning and egg incubation habitat conditions in the Sacramento, Feather, and American Rivers. These modeling results are generally consistent for H3_ELT and H4_ELT.

RDEIR/SDEIS at 4.3.7-155; *see id.* at 4.3.7-147. As elsewhere, the RDEIR/SDEIS attempts to avoid an "adverse" NEPA determination and to hide this extreme impact to fall-run Chinook salmon throughout the Central Valley by attributing the impact to climate change. RDEIR/SDEIS at 4.3.7-167. But just as with other species, the RDEIR/SDEIS cannot make significant impacts to fall-/late fall-run Chinook salmon populations disappear by ignoring the effects of climate change. Instead, the RDEIR/SDEIS must identify and analyze real mitigations to reduce or eliminate these substantial negative effects.

g. The RDEIR/SDEIS Fails to Adequately Analyze Impacts to Terrestrial Species

As discussed below, the RDEIR/SDEIS fails to adequately analyze impacts to terrestrial species.

i. The RDEIR/SDEIS Fails to Adequately Analyze Impacts to Central Valley Wildlife Refuges

The RDEIR/SDEIS fails to adequately analyze the impacts that the new alternatives will have on national, state, and private wildlife refuges that receive water pursuant to the Central Valley Project Improvement Act ("CVPIA"). These refuges are clearly part of the Project Area, as they are within CVP and SWP export service areas, *see* RDEIR/SDEIS at App. A_03, 3-4 (defining project area), and the proposed alternatives could directly and indirectly impact the refuges' water supply. Yet the RDEIR/SDEIS fails to accurately portray the refuges' water supply in its baseline conditions, and fails to analyze how the new alternatives will impact the refuges' water supply and the terrestrial species that depend upon the refuges.

As an initial matter, any attempt to understand the new alternatives' impacts on wildlife refuges is undermined by the inaccurate assumptions regarding refuge water supply included in the No Action Alternative. First, as discussed in our Prior Comments, the baseline operational assumptions do not seem to include Level 4 water deliveries to the wildlife refuges, despite the requirements of the CVPIA. *See* P.L. 102-575, § 3406(d). It is unreasonable to anticipate that Reclamation will continue to operate the CVP in violation of the CVPIA by failing to deliver Level 4 water to the refuges, and omitting Level 4 deliveries from the No Action Alternative undermines the RDEIR/SDEIS's analysis of water supply impacts to the wildlife refuges and other water users.

Second, the RDEIR/SDEIS makes unsupported assumptions regarding shifts in refuge water demand. In particular, the RDEIR/SDEIS states that CVP and SWP operations under the No Action Alternative would differ from existing conditions because "there is a shift in refuge demands from south to north (24 TAF per year reduction in south of Delta and 32 TAF per year increase in north of Delta)." RDEIR/SDEIS at

4.2-3. The basis for this assumption is unclear, and it is inconsistent with our understanding of the future water-supply needs of south of Delta refuges.

Third, the RDEIR/SDEIS's analysis of water supply impacts under the No Action Alternative appears to include operational assumptions that are inconsistent with existing water rights priorities. The RDEIR/SDEIS states that, "[u]nder No Action Alternative (ELT), model results show a 18 TAF (1%) decrease in CVP Settlement Contract deliveries and a 8 TAF (2%) decrease in CVP Level 2 Refuge Water Supplies during dry and critical years compared to the Existing Conditions. . . . Results show no changes in deliveries to CVP Exchange Contractors." RDEIR/SDEIS at 4.2-10. Because the wildlife refuges are entitled to at least the same water supply priority as the Settlement Contractors and Exchange Contractors, it does not make sense that Level 2 refuge water supply would decrease by 2% while the Settlement Contractors' supply would decrease by only 1% and the Exchange Contractors' supply would not decrease at all. Please explain the operational assumptions underlying this seemingly impermissible outcome.[42]

Further, the RDEIR/SDEIS fails to provide sufficient details regarding how the new alternatives will impact refuge water supplies. The Water Supply Summary Tables in Appendix B of the RDEIR/SDEIS indicate that Level 2 water deliveries could be negatively affected by implementation of Alternative 4A. For example, Table B.1-3 shows that, under Alternative 4 H3 (ELT), Level 2 refuge water supplies would decline compared to the No Action Alternative in Dry and Critical years. RDEIR/SDEIS at B-43. However, there is no discussion or analysis of this water supply impact. In contrast, the RDEIR/SDEIS includes a detailed discussion of the new alternatives' water supply impacts to CVP south of Delta agricultural deliveries, CVP Settlement and Exchange Contract deliveries, CVP north of Delta municipal and industrial deliveries, CVP south of Delta municipal and industrial deliveries, and several different SWP deliveries. *See, e.g.*, RDEIR/SDEIS at 4.3.1-5 to 4.3.1-9.

The omission of any detailed discussion of the alternatives' impacts on refuge water supplies must be remedied in a revised and recirculated draft NEPA/CEQA document. The quantity of water that is delivered to each wildlife refuge and the timing of those deliveries can have substantial impacts to the health of species that rely on the refuges, including the threatened giant garter snake, other listed species, and millions of birds that migrate along the Pacific Flyway each year. Because the new alternatives may affect refuge water supplies, both directly and indirectly, the EIS/EIR must provide details regarding which refuges' water supplies will be impacted, when, and how, and must analyze the ways in which terrestrial species may be impacted by the water supply changes. Without this information, it is impossible to understand how the proposed project will impact sensitive wildlife populations. Further, the revised and recirculated draft EIR/EIS must explain how water supply impacts to specific refuges will be fully mitigated.

[42] The same problem, in which the refuges seem to receive a lower water supply priority than the Settlement and Exchange Contractors, appears in the water supply analysis for the new alternatives. *See* RDEIR/SDEIS at B-43.

ii. The RDEIR/SDEIS Fails to Adequately Analyze the New Alternatives' Impacts on Water Transfers and the Water Transfers' Impacts on Terrestrial Species

The RDEIR/SDEIS acknowledges that, compared to existing conditions, demand for cross-Delta water transfers will increase under the No Action Alternative. Specifically, the document concludes that "[d]emand for cross-Delta water transfers will increase, with the frequency of such transfers increasing from about 52 percent of years to 68 percent of years compared to existing conditions." RDEIR/SDEIS at 4.2-9. The RDEIR/SDEIS also describes how the new project alternatives will make it easier to conduct cross-Delta transfers in the future. For example, the RDEIR/SDEIS explains that:

> Alternative 4A provides a separate cross-Delta facility with additional capacity to move transfer water from areas upstream of the Delta to export service areas and provides a longer transfer window than allowed under current regulatory constraints. In addition, the facility provides conveyance that would not be restricted by Delta reverse flow concerns or south Delta water level concerns. As a result of avoiding those restrictions, transfer water could be moved at any time of the year that capacity exists in the combined cross-Delta channels, the new cross-Delta facility, and the export pumps, depending on operational and regulatory constraints, including criteria guiding the operation of water conveyance facilities under Alternative 4A.

RDEIR/SDEIS at 4.3.1-9. Yet the RDEIR/SDEIS inexplicably concludes that Alternative 4A will *decrease* cross-Delta water transfer demand compared to the No Action Alternative because Alternative 4A will increase project water supply allocations as compared to the No Action Alternative. RDEIR/SDEIS at 4.3.1-9.[43]

The RDEIR/SDEIS's conclusion regarding the impact of Alternative 4A on cross-Delta water transfers lacks support. The determination that demand for cross-Delta transfers will decrease under Alternative 4A compared to the No Action Alternative appears to assume, without analysis, that any increases in south of Delta project water supply allocations from implementation of Alternative 4A will satisfy demand. If the increased allocations do not completely satisfy south of Delta demand, the fact that the new conveyance facility could extend the transfer window and remove existing barriers to cross-Delta water transfers would likely cause a substantial increase in demand for cross-Delta water transfers.

[43] We also note that the RDEIR/SDEIS's conclusions regarding Alternative 4A's impacts on water transfers seem to suffer from serious errors. For example, for "NEPA Effects," the document states that, "Alternative 4A would **decrease** water transfer demand compared to existing conditions. Alternative 4A would **decrease** conveyance capacity, enabling additional cross-Delta water transfers that could lead to increases in Delta exports when compared to No Action Alternative." RDEIR/SDEIS at 4.3.1-9 (emphasis added). In contrast, for its "CEQA Conclusion," the document states that "Alternative 4A would **increase** water transfer demand compared to existing conditions. Alternative 4A would **increase** conveyance capacity, enabling additional cross-Delta water transfers that could lead to increases in Delta exports when compared to existing conditions." *Id.* (emphasis added). These errors make it impossible to understand the RDEIR/SDEIS's analysis and conclusions.

With groundwater regulation on the horizon and hardened demand from the planting of permanent crops, it seems extremely unlikely that Alternative 4A's increases in south of Delta project water supply allocations will completely satisfy demand and temper the growing interest in cross-Delta water transfers.[44]

Because the RDEIR/SDEIS's conclusion that Alternative 4A will decrease the demand for cross-Delta water transfers compared to the No Action Alternatives seems highly speculative, the revised and recirculated draft NEPA/CEQA document should consider the environmental impacts of increases in the frequency and quantity of water that is transferred across the Delta. In addition to impacts to groundwater supplies and aquatic species, the transfers can have profound impacts to terrestrial species. Crop idling transfers that involve the fallowing of rice and other crops can devastate fragile giant garter snake populations, and can substantially reduce the availability of winter-flooded rice that provides important food for waterfowl and shorebirds.

The RDEIR/SDEIS's failure to accurately characterize the new alternatives' impacts on water transfers makes it impossible to understand how the new alternatives may affect sensitive terrestrial ecosystems, and further analysis is necessary.

iii. The Environmental Commitments and Other Measures Are Insufficient to Mitigate Potentially Significant Impacts to Terrestrial Species

Throughout the RDEIR/SDEIS's analysis of the new alternatives' impacts on biological resources, the document concludes that impacts to particular ecosystems from the new alternatives would be significant if not for the environmental commitments and other mitigation measures. For example, with respect to managed wetlands, the RDEIR/SDEIS states that "[t]he construction loss of this special-status natural community would represent a significant impact if it were not offset by other the environmental commitments described in Section 4.1.2.3, *Environmental Commitments*, of this RDEIR/SDEIS." RDEIR/SDEIS at 4.3.8-47. The RDEIR/SDEIS reaches similar conclusions for impacts to the valley/foothill riparian natural community (RDEIR/SDEIS at 4.3.8-18), the nontidal perennial aquatic community (RDEIR/SDEIS at 4.3.8-24), the vernal pool complex natural community (RDEIR/SDEIS at 4.3.8-41), and several other sensitive natural communities.

However, the RDEIR/SDEIS also acknowledges that the "environmental commitments have not been defined to the level of site-specific footprints," and accordingly that it is not possible to specifically

[44] To the extent the RDEIR/SDEIS's discussion of future demand for water transfers is based on the analysis in Appendix 5D to the BDCP DEIR/DEIS, we note that the prior analysis is based on unsupported assumptions. In particular, the analysis "assume[s] that the SWP and CVP contractors would attempt to replace approximately half of the supply deficits below the 50 percent and 40 percent allocation thresholds respectively with cross-Delta transfers, up to the assumed maximum available supply." BDCP DEIR/DEIS at 5D-5. If temporal and other limitations to cross-Delta transfers are removed by the new facilities, it is likely that south of Delta contractors would seek additional water through cross-Delta transfers, even when their allocations are at or above the 50 and 40 percent thresholds. They may also seek to augment more than 50 percent of their supply deficits with water from cross-Delta transfers.

delineate and quantify how the commitments "could alter the acreages and functions and values of wetlands and waters of the United States in the study area." RDEIR/SDEIS at 4.3.8-341. The RDEIR/SDEIS also explains that, "[n]ot all wetlands perform all functions nor do they perform all functions equally well," and that "[t]he location and size of a wetland may determine what functions it will perform." RDEIR/SDEIS at 4.3.8-335. Further, it states that "the geographic location may determine its habitat functions, and the location of a wetland within a watershed may determine its hydrologic/hydraulic or water quality functions." RDEIR/SDEIS at 3.8-335 to 336. Clearly, the value of managed, restored, and protected wetlands and other habitats to particular species can vary dramatically based on things like location, water depth, height and percentage of vegetation, and many other factors.

Because of the uncertainty in the value of the replacement habitat that the environmental commitments provide, the RDEIR/SDEIS cannot reasonably conclude that the environmental commitments and other measures will fully mitigate the projects' admittedly significant impacts. Presumably for this reason, the RDEIR/SDEIS indicates that, in addition to the environmental commitments and Avoidance and Minimization Measures, the Adaptive Management and Monitoring Program "would serve a mitigation function under CEQA." RDEIR/SDEIS at 4.1-14. Similarly, the RDEIR/SDEIS states that:

> The success in implementing these Environmental Commitments would be assured through effectiveness monitoring, which includes success criteria, and adaptive management as outlined in the Adaptive Management and Monitoring sections of the Draft BDCP for tidal marsh restoration (Draft BDCP Section 3.4.4.4), channel margin enhancement (Draft BDCP Section 3.4.6.4), valley/foothill riparian restoration (Draft BDCP Section 3.4.7.4), vernal pool and alkali seasonal wetland complex restoration (Draft BDCP Section 3.4.9.4), and nontidal marsh restoration (Draft 13 BDCP Section 3.4.10.3).

RDEIR/SDEIS at 4.3.8-338.

However, from the description of Alternative 4A, it is not clear whether these adaptive management and monitoring sections of the Draft BDCP remain part of project description for the new preferred alternative. *See* RDEIR/SDEIS at 4.1-18 to 21 (describing Collaborative Science and Adaptive Management Program component of Alternative 4A but not specifically mentioning any monitoring or adaptive management of restored or protected terrestrial habitats). And no other details regarding plans for monitoring and adaptive management of restored wetlands and other terrestrial habitats are apparent. Please clarify whether the above-referenced portions of the Draft BDCP that focus on monitoring and adaptive management for restored terrestrial habitats remain part of Alternative 4A and the other new alternatives, or whether there are other details regarding plans for monitoring and adaptive management.

Because the benefits of the habitat restoration included in the environmental commitments remain unquantified and unclear, effective monitoring and adaptive management is crucial to ensuring that the new alternatives' impacts to terrestrial species will be fully mitigated. Details regarding how the monitoring and adaptive management programs will function must be included in the recirculated draft EIR/EIS. Without this information, the proposed environmental commitments and other mitigation measures remain insufficient to fully mitigate the admittedly significant impacts that the new alternatives will cause to terrestrial species and the sensitive habitats upon which they depend.

iv. The RDEIR/SDEIS Fails to Ensure Adequate Mitigation for Impacts to Waterfowl and Shorebirds

Cultivated lands provide important food and habitat for large numbers of shorebirds and waterfowl that migrate along the Pacific Flyway. For example, "[s]hallow flooded agricultural fields and wetlands support large numbers of wintering and migrating shorebirds (Shuford et al. 1998), particularly least and western sandpipers, dunlin, greater yellowlegs and long-billed dowitcher." RDEIR/SDEIS at 4.3.8-345. Rice field and other cultivated lands are also essential for waterfowl that migrate into the Central Valley each fall and winter.

The RDEIR/SDEIS explains that the new alternatives will cause substantial impacts to cultivated lands. For example, under Alternative 4A, "[d]evelopment of the water conveyance facilities would result in the permanent removal of . . . 3,768 acres of suitable cultivated lands (including grain and hay crops, pasture, field 36 crops, rice, and idle lands)," and would temporarily impact 1,339 acres of suitable cultivated lands. RDEIR/SDEIS at 4.3.8-342. Additionally, "implementation of Environmental Commitments would result in the permanent loss or conversion of 2,212 acres of cultivated lands." RDEIR/SDEIS at 4.3.8-343.

Though this loss of cultivated lands will cause significant impacts to waterfowl and shorebirds, the RDEIR/SDEIS concludes that the impacts will not be significant because of the restoration and protection activities that will occur under the new alternatives. *See, e.g.*, RDEIR/SDEIS at 4.3.8-343. However, cultivated lands and restored habitats may have little value to shorebirds and waterfowl if those lands are not managed to ensure the availability of food and habitat. Post-harvest practices are particularly important for determining whether cultivated lands will provide any value for shorebirds and waterfowl.

The RDEIR/SDEIS recognizes the importance of management for waterfowl and shorebirds, and includes a long list of practices that should be implemented on managed wetlands and cultivated lands to benefit these species. RDEIR/SDEIS at 4.3.8-346 to 347. However, the document merely states that these management practices "would be considered for implementation under Environmental Commitment 11 in areas where they would not conflict with other species management." RDEIR/SDEIS at 4.3.8-346. This statement is extremely vague, and it is unclear whether any of the identified practices would be implemented, by whom, and on what time frame.

Because the management of the protected and restored lands is critical to their ability to effectively mitigate the project's impacts to shorebirds and waterfowl, and it is unclear how the protected and restored lands will actually be managed, significant and unmitigated impacts to these species will likely remain.

v. The RDEIR/SDEIS Improperly Fails to Consider Cumulative Impacts to Terrestrial Species and Natural Communities around the Clifton Court Forebay from the San Luis Transmission Project

The RDEIR/SDEIS's analysis of cumulative impacts is substantially flawed because it fails to consider the fact that the new alternatives and the San Luis Transmission Project will both impact sensitive natural communities and species in the vicinity of the Clifton Court Forebay. The San Luis Transmission Project includes 95 miles of new transmission lines within easements ranging from 125 to 250 feet wide along the foothills of the Diablo Range in the western San Joaquin Valley. The project also includes two new 500-kV substations, communication facilities, new permanent access roads, and temporary access roads to facilitate construction activities. A Draft Environmental Impact Statement and Environmental Impact Report for the project was issued in July 2015.[45] From the Draft EIS/EIR, it is clear that the project will include construction of facilities in the vicinity of the Clifton Court Forebay. *See* Figure 2-1 at page 2-2 of the Draft EIS/EIR for the San Luis Transmission Project. The RDEIR/SDEIS also makes clear that some of the most substantial impacts to sensitive natural communities from the new alternatives will occur in the areas surrounding the Clifton Court Forebay. In particular, the RDEIR/SDEIS notes that implementation of Alternative 4A would harm the following habitats in the vicinity of the Clifton Court Forebay: tidal perennial aquatic community (RDEIR/SDEIS at 4.3.8-3), tidal freshwater perennial emergent wetland community (RDEIR/SDEIS at 4.3.8-29), nontidal freshwater perennial emergent wetland natural community (RDEIR/SDEIS at 4.3.8-30), alkali seasonal wetland complex natural community (RDEIR/SDEIS at 4.3.8-34), vernal pool complex natural community (RDEIR/SDEIS at 4.3.8-40), managed wetland community (RDEIR/SDEIS at 4.3.8-45), and grassland natural community (RDEIR/SDEIS at 4.3.8-54).

Despite the fact that both the new alternatives and the San Luis Transmission Project will harm sensitive natural communities and the species that depend on those communities in the areas surrounding the Clifton Court Forebay, the RDEIR/SDEIS does not seem to consider the San Luis Transmission Project in its cumulative impacts analysis. This omission undermines the RDEIR/SDEIS's conclusions about the project's impacts and must be remedied.

[45] The Draft EIS/EIR is available at: http://www.sltpeis-eir.com/draftEIS-EIRMainText.pdf.

h. The RDEIR/SDEIS Fails to Adequately Analyze Impacts to San Francisco Bay[46]

Numerous outcomes of the project alternatives can reasonably be expected to produce effects downstream of the project area. For example, the projected declines in numerous forage fish species (including anadromous fish like salmon and partially anadromous fish like Longfin Smelt) may affect productivity and inter-annual variability among mammals (e.g. Orca whales, *see* NMFS Biological Opinion 2009), seabirds (Cury et al. 2011), waterfowl, and predatory fish species in San Francisco Bay and the Gulf of the Farallons. Indeed, recent research indicates that fresh water flows into the San Francisco Estuary have multiple effects that reach far downstream into marine environments:

> The effects of [freshwater outflow from the watershed] propagated further down the estuary salinity gradient than [effects from the Pacific Ocean] that propagated up the estuary salinity gradient, exemplifying the role of variable freshwater outflow as an important driver of biotic communities in river-dominated estuaries.

Feyrer et al. (2015) at 1. However, the RDEIR/SDEIS fails to adequately analyze or address the effects of changes to freshwater flow and related variables arising from project alternatives on the rest of the San Francisco Bay complex or the nearshore ocean environment.

On some issues, the RDEIR/SDEIS did add a minimal "assessment of constituent effects downstream of the Plan Area (i.e., in San Francisco Bay)." *See, e.g.*, RDEIR/SDEIS at 2-2, 2-5. For example, the analysis of water quality impacts for New Alternative 4A included a two-page section entitled, "Impact WQ-34: Effects on San Francisco Bay Water Quality Resulting from Facilities Operations and Maintenance and Environmental Commitments." RDEIR/SDEIS at 4.3.4-70 to 4.3.4-72; *see also id*. Appendix A at 8-308 to 8-312 (Alternative 4). However, the overly simplistic assumptions made in this section, i.e., that the level of pollutants in Delta outflow resulting from the Project would be minimal and thus not adversely affect Bay water quality, ignore the primary concerns associated with proposed conveyance facilities on the Bay ecosystem.

Total sediment load reaching the Delta would be reduced by up to approximately 9%, on average as a result of the new diversion point in the North Delta and this would result in increased water clarity. RDEIR/SDEIS Appendix A at 11-184; *id*. at 4.3.7-29. As described *supra*, the potential impacts of reduced suspended sediment concentrations within the Delta include: exposure of juvenile fishes (including, but not limited to, Delta Smelt, Chinook salmon, and larval Green Sturgeon and White Sturgeon) to increased predation pressure, increased growth of certain invasive macrophyte species, which in turn

[46] Pursuant to NEPA, an EIS must contain a detailed statement of "any adverse environmental effects" of a proposed action and its alternatives, including any direct and indirect effects. 42 U.S.C. § 4332(C)(ii); *see* 40 C.F.R. § 1502.16. "Indirect effects" are defined as those "which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable," and include "effects on air and water and other natural systems, including ecosystems." 40 C.F.R. § 1508.8(b). Similarly, CEQA requires that an EIR consider "[a]ll significant effects on the environment of a proposed project," regardless of the geographic scope of the project itself. Pub. Res. Code § 21100(b)(1); *see also* 14 Cal. Code Regs. § 15126.2.

further increase predation pressures; harmful algal blooms (e.g., *Microcystis*); reduced dissolved oxygen; and reduced resiliency of wetlands to erosion and sea level rise.

These same impacts are of significant concern to downstream portions of San Francisco Bay, as documented by the Independent Science Board and comments submitted by the Bay Conservation and Development Commission. BCDC 2014. These impacts to the Bay, however, are not adequately addressed in the RDEIR/SDEIS.

USGS researchers have observed a steep reduction in Bay suspended sediment concentrations and characterize San Pablo Bay as erosional. Barnard et al. 2014; Jaffe et al. 2007. BCDC has stated that with projected sea level rise, further reduction in Bay sediment inputs should be considered significant, given Bay wetland restoration targets, current subsided diked-baylands, and the overall Bay-Delta sediment budget. BCDC 2014; *see* Knowles 2010; Stralberg et al. 2011.

In addition to concerns over the loss of sediment available to supply wetlands surrounding the Bay margin and the Bay floor, SSC reductions are likely to increase water clarity, thus enhancing the likelihood for traditional signs of eutrophication (e.g. harmful algal blooms, increased primary productivity, and low dissolved oxygen). The common paradigm for the San Francisco Bay's estuary is that high SSC creates turbid conditions that limit light penetration, which inhibits primary production in nutrient rich waters that would otherwise be expected to exhibit signs of eutrophication. Senn and Novick 2014; Cloern 1987; Cole and Cloern 1984; Cloern and Jassby 2007. Recent analyses indicate, however, suspended sediment loads to the Bay have reduced significantly, with Bay-wide SSC reductions of ~35% since 1998, and up to 50% since 1975 in Suisun Bay. Schoellhamer 2011; Senn and Novick 2014. The explanation is that both external loads of suspended sediment and resuspension of material from the bed have decreased. The RDEIR/SDEIS fails to assess the effects of the projected reduction in sediment load on the northern embayments of San Francisco Bay. In the event of a 9% reduction in suspended sediment load in the Delta, San Francisco Bay would tend to increase the likelihood and magnitude of eutrophication indicators, *see* Cloern and Jassby 2007, including algal blooms, low dissolved oxygen, and the presence of toxins such as microcystin (*see above*) in the water column, sediment, and fish and wildlife species of the Bay. Current research indicates that microcystin is:

- Frequently detected in San Francisco Bay at levels beyond recommended "alert" thresholds;
- Found in a high proportion of mussels sampled in the Bay; and,
- Often detected in the Bay though it originates in the Delta.

UC Santa Cruz 2015. Given the potentially severe health effects of microcystin to human, fish and wildlife populations, including those in marine environments, *see, e.g.,* Miller et al. 2010, the RDEIR/SDEIS must be revised to adequately analyze and disclose the impacts from project alternatives on harmful algal bloom formation in the Delta and subsequent transfer of toxic substances to the Bay and beyond.

Second, the RDEIR/SDEIS fails to meaningfully analyze the effects of reductions in freshwater inflow to San Francisco Bay. As the RDEIR/SDEIS appears to recognize, climate change, drought, and sea level rise will also result in reduced freshwater flows through the Delta and increased salinity intrusion in the coming decades. *See* RDEIR/SDEIS at 4.2-4. Yet the RDEIR/SDEIS fails to properly evaluate how reduced flows resulting from the Project over time will impact the designated beneficial uses of San Francisco Bay, which include commercial and sport fishing, estuarine habitat, fish migration, navigation, preservation of rare and endangered species, water contact and non-contact recreation, shellfish harvesting, fish spawning, and wildlife habitat. *See* RDEIR/SDEIS at 4.3.4-70 – 4.3.4-71. Nor does the RDEIR fully consider how such reduced flows will affect existing impairments in the Bay, including invasive species, mercury, and selenium, given the unsubstantiated and summary conclusion in the RDEIR/SDEIS that "changes in Delta outflow [under Preferred Alternative 4A] would be similar" to existing conditions and the No Action Alternative." *Id*. at 4.3.4-71.

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