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March 17, 2017

Via Email and Hand Delivery

Jeanine Townsend, Clerk to the Board
State Water Resources Control Board
1001 I Street, 24th Floor
Sacramento, CA 95814
Email: commentletters@waterboards.ca.gov

Re: Comment Letter – 2016 Bay-Delta Plan Amendment & SED
San Joaquin Tributaries Authority

Dear Ms. Townsend:

On behalf of San Joaquin Tributaries Authority, please find attached a flash drive containing their *Comments on the Draft Substitute Environmental Document* along with the referenced attachments, which have also been submitted electronically.

If you have any questions, please do not hesitate to contact our office directly.

Very truly yours,

Tim O'Laughlin

TO/llw

Enclosure

cc: *SJTA*

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STATE WATER RESOURCES CONTROL BOARD

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Draft Substitute Environmental Document	)
In Support of Potential Changes to the Water	)
Quality Control Plan for the San Francisco Bay-	)
Sacramento/San Joaquin Delta Estuary; San	)
Joaquin River Flows and Southern Delta Water	)
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SAN JOAQUIN TRIBUTARIES AUTHORITY

Comments on the Draft Substitute Environmental Document

Dated: March 17, 2017

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1. INTRODUCTION

On September 15, 2016, the State Water Resources Control Board ("State Water Board" or "Board" or "SWRCB" or "SWB") released its draft revised substitute environmental document ("SED") in support of potential changes to the Water Quality Control Plan for the San Francisco Bay-Sacramento/San Joaquin Delta Estuary ("Bay Delta Plan"): San Joaquin River flows and southern Delta water quality (Phase I). The SED is characterized as a "recirculated SED", in reference to a draft substitute environmental document that was released by the State Water Board on December 31, 2012 ("2012 Draft SED"). (SED, at 1-2.) Contrary to the State Water Board's characterization, the SED is not a recirculation of the 2012 Draft SED in any sense of the word. The State Water Board received approximately 4,000 responses to the 2012 Draft SED. Apart from providing a summary of certain concerns raised in 119 of those 4,000 responses, the Board has neglected the thousands of comments and criticisms of the 2012 Draft SED, and has released an entirely new document that bears no resemblance to the original, other than the flawed and incomplete analysis that plagues both documents. (SED, at Appx. M, p. 1)

The stated purpose of the SED is to analyze the environmental impacts of the State Water Board's proposed revision to the Bay Delta Plan, and to fulfill the requirements of the California Environmental Quality Act ("CEQA") and the Porter-Cologne Water Quality Control Act ("PCWQA"). (SED, at ES-2.) The proposed revision to the Bay Delta Plan would, among other things, expand the geographic scope of 2006 Bay Delta Plan to cover certain tributary watersheds to the San Joaquin River, and replace the existing Lower San Joaquin River flow objective at the Vernalis compliance point with a requirement to maintain a percent of unimpaired flow between 30 and 50 percent on each of the Stanislaus, Tuolumne, and Merced Rivers from February through June. (SED, at Appx. K, p. 1, 18.) The SED purports to analyze the environmental impacts – on a "programmatic level" - of requiring a range of unimpaired flow between 20 and 30 percent (LSJR Alternative 2), between 30 and 50 percent (LSJR Alternative 3), and between 50 and 60 percent (LSJR Alternative 4). (SED, at ES-2, ES-14.) The SED has identified LSJR Alternative 3 as the "Recommended LSJR Alternative," with an initial unimpaired flow of 40 percent and an adaptive range of 30 to 50 percent on each of the three tributaries ("Tributary Flow Objective"). (SED, at ES-21.)

The San Joaquin Tributaries Authority ("SJTA")[1] provides the following comments on the SED. In sum, the SED should not be adopted by the State Water Board because the environmental analysis does not comply with CEQA, nor with the Board's obligations for analyzing the environmental impacts of a water quality control plan as a certified regulatory program. In addition, the SED should not serve as a basis for the adoption of the proposed amendments to the Bay Delta Plan. The proposed water quality objectives and the program of implementation violate the PCWQA, Article X, Section 2 of the California Constitution, the rules of water right priority, and various other laws and regulations. For these reasons and others, all of which are set forth in detail below, the Board should decline to adopt the SED and the proposed revisions to the Bay-Delta Plan.

The SJTA incorporates the comments of the City and County of San Francisco ("CCSF"), Modesto Irrigation District ("MID"), Turlock Irrigation District ("TID"), Oakdale Irrigation District ("OID"), and South San Joaquin Irrigation District ("SSJID").

The SJTA also incorporates by reference previous comments and information the SJTA and its member agencies provided the State Water Board in Phase 1 and Phase 2.

1.1. History of Water Quality Control Plans for the San Francisco Bay/Sacramento – San Joaquin Delta

The State Water Board has long recognized that California's two massive water projects, the Central Valley Project ("CVP") operated by the United States Bureau of Reclamation ("USBR") and the State Water Project ("SWP") operated by the Department of Water Resources ("DWR"), have had significant impacts on fish, wildlife and water quality in the Sacramento-San Joaquin Delta ("Delta").[2] Indeed, the State Water Board has stated that the protection of all fishery species

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[1] The San Joaquin Tributaries Authority is a California Joint Powers Authority, duly organized and existing in accordance with the provisions of Sections 6500 *et seq*. of the Government Code, and comprised of Modesto Irrigation District, Oakdale Irrigation District, South San Joaquin Irrigation District, Turlock Irrigation District and the City and County of San Francisco, a Public Utilities District, all of which are authorized by the laws of the State of California to administer water supplies and to appear and represent their landowners in matters relating to water resources.

[2] In 1959, the California Legislature fixed the legal boundaries of the Sacramento-San Joaquin Delta. (Water Code, § 12220.)

within the Delta, including the protection of salmon, "would require the virtual shutting down of the project export pumps" operated by USBR and DWR. (Water Rights Decision 1485, p. 13.) In recognition of these impacts, the Board has been developing and adopting water quality standards to protect the Delta since 1965. (*United States v. State Water Resources Control Bd.* (1986) 182 Cal.App.3d 82, 107 ("*Racanelli*".))[3]

The first set of comprehensive water quality standards for the Delta was developed by several agencies, including DWR and USBR. (*Racanelli, supra,* 182 Cal.App.3d at 110.) The State Water Board later incorporated these standards into DWR's permits for the operation of the SWP in Water Right Decision 1275. (*Ibid.)* In 1967, the State Water Board submitted these standards to the United States Secretary of the Interior for approval in accordance with the Federal Water Pollution Control Act, and the standards were approved on the condition that the Board consider adopting more stringent Delta salinity requirements. (*Ibid.)*

Several years later, in 1971, the State Water Board established new water quality standards for the Delta in Decision 1379. (*Racanelli, supra,* 182 Cal.App.3d at 110.) The standards were denominated as "State Delta Standards," and established protections for agriculture, municipal/industrial supply, and fish and wildlife. (Water Rights Decision 1379, p. 37.) The State Delta Standards used a set of compliance points exclusively within the Delta, the southernmost point of which is at Vernalis. (Water Rights Decision 1379, p. 53; Water Code, § 12220)

In 1976, the State Water Board convened an evidentiary hearing lasting 11 months for the purpose of formulating a water quality control plan for the Delta, and to assess whether the plan should be implemented by amending USBR and DWR's permits for operation of the CVP and SWP. (*Ibid.)* The hearing culminated in the Board's adoption of the 1978 Water Quality Control Plan for the Sacramento-San Joaquin Delta and Suisun Marsh, and Water Rights Decision 1485. (*Racanelli, supra,* 182 Cal.App.3d at 111.) As with the previously-adopted water quality standards for the Delta, the Board sought to protect agriculture, municipal/industrial supply, and fish and

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[3] Justice Racanelli's opinion in *United States v. State Water Resources Control Bd.* is commonly referred to as the "*Racenlli*" Decision, and that reference is used throughout these comments.

wildlife within the Delta. (Water Rights Decision 1485, p. 10.) In addition, the Board once again sought to implement the plan by imposing conditions on USBR and DWR's permits for the operation of the CVP and SWP, and established a set of water quality control stations exclusively within the boundaries of the legal Delta. (Water Rights Decision 1485, p. 21-30; Plate 1, Tables 1-3.) Subsequent litigation seeking to invalidate the water quality control plan and Decision 1485 resulted in a decision from the First District Court of Appeal holding that the Board defined the scope of its water quality role too narrowly by limiting it in terms of enforceable water rights. (*Racanelli,supra,* 182 Cal.App.3d at 119-120.) However, the First District declined to invalidate the plan, or D-1485, because the State Water Board had already announced its intention to conduct hearings in 1986 to establish new and revised water quality objectives for the Delta. (*Id.* at 120.)

The State Water Board adopted a Water Quality Control Plan for Salinity for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary on May 1, 1991, pursuant to State Water Board Resolution No. 91-34. (*State Water Resources Control Bd. Cases* (2006) 136 Cal.App.4th 674, 699-700; see Resolution 91-34.) As relevant here, water contributions from the San Joaquin River for the protection of the Bay-Delta estuary were controlled and measured at Vernalis (1991 Water Quality Control Plan, Table 6-3(B) & (C).) The United States Environmental Protection Agency (USEPA) approved the salinity and dissolved oxygen objectives in this plan, but disapproved the remaining fish and wildlife objectives. (*State Water Resources Control Bd. Cases*, 136 Cal.App.4th at 699-700.) In response, the Board reconvened proceedings to revise the water quality objectives for the Bay-Delta and adopted a new water quality control plan in May 1995. (*Id.* at 700.)

1.2. The 1995 Water Quality Control Plan and Water Right Decision 1641

In 1995, the State Water Board adopted the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary ("1995 Bay-Delta Plan"). The 1995 Bay-Delta Plan identified 17 beneficial uses "both within the Delta and throughout the state, to be served by the waters of the Delta." (*State Water Resources Control Bd. Cases, supra,* 136 Cal.App.4th at 701.) Consistent with past practice, and despite the broad reach of the beneficial uses to be protected, the Board confined all of the water quality control stations for its objectives to the legal Delta. (1995 Bay Delta Plan, p. 16-26, 45; Figure 2.) Again, water contributions from the San Joaquin River for the protection of the Bay-Delta estuary were controlled and measured at Vernalis, the southernmost point in the legal Delta. (1995 Bay Delta Plan, p. 19.)

In order to implement the 1995 Bay Delta Plan, the State Water Board issued Water Rights Decision 1641 ("D-1641"). As part of D-1641, the Board imposed responsibility for meeting the objectives on USBR and DWR by amending their permits for the operation of the CVP and SWP. (D-1641, p. 146-166.) Notably, instead of implementing the Vernalis pulse flow objective from the 1995 Bay-Delta Plan, the Board implemented the Vernalis Adaptive Management Plan ("VAMP") pursuant to the San Joaquin River Agreement ("SJRA"), which was a 12-year experimental program that would provide flows at Vernalis at a level that would not meet the pulse flow objective. (*State Water Resources Control Bd.*, *supra*, 136 Cal.App.4th at 706-709; D-1641, *passim*.) In subsequent litigation, the Third District Court of Appeal held that the Board had no authority to implement a lesser flow regime than was required by the 1995 Bay-Delta Plan because such an act would violate Water Code section 13247. (*State Water Resources Control Bd. Cases*, *supra*, 136 Cal.App.4th at 727-730.) The Board ultimately amended the plan to authorize a staged implementation of the Vernalis pulse flow objective "to allow for scientific experimentation by conducting the Vernalis Adaptive Management Plan (VAMP) experiment." (2006 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary, Plan Amendment Report, Appx. 1, p. 2.) None of the amendments changed USBR's responsibility for meeting the flow objectives at Vernalis, nor the location of the compliance point for San Joaquin River contributions at Vernalis.

1.3. Delta Reform Act

In 2009, the State passed the historic Sacramento-San Joaquin Delta Reform Act, codified in Water Code section 85000 *et seq*. An important component of the Bay-Delta Reform Act was Water Code § 85086[c]. This section required the State Water Board to, among other things, "develop new flow criteria for the Delta ecosystem necessary to protect public trust resources" based upon a "review [of] existing water quality objectives" and using "the best available scientific information." (Water Code, § 85086[c][1].) The flow criteria needed to "include the volume, quantity, and timing of water necessary for the Delta ecosystem under different conditions." (Water Code, § 85086[c][1].)

In 2010, the State Water Board adopted and sent to the Legislature a report entitled, "Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem" ("Delta Flow Criteria Report"). The purpose of the report was to inform decision makers about the flow necessary into the Delta to fully protect public trust resources. The State Water Board noted the scope of its report in the document itself:

> Due to the limited nine-month time period … the notice for the informational proceeding requested information on what volume, quality and timing of *Delta outflows* are necessary … Delta outflows are of critical importance to various ecosystem functions … This report recognizes the role of source inflows used to meet Delta outflows . . . (p. 14 [Emphasis added].)

1.4. The 2012 Draft SED

On December 31, 2012, the State Water Board released its draft substitute environmental document in support of potential changes to the San Joaquin River flow and southern Delta water quality objectives in the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary ("2012 Draft SED"). Consistent with prior iterations of the Bay-Delta water quality control plan, the 2012 Draft SED proposed a set of objectives with water quality control stations within the boundaries of the legal Delta, namely at Vernalis. (2012 Draft SED, Appx. K, p. 1). However, and for the first time, the 2012 Draft SED suggested that a set of objectives with water quality control stations might be established *outside* the boundaries of the legal Delta. Specifically, the 2012 Draft SED listed objectives for inflows from the Tuolumne, Merced and Stanislaus Rivers at locations to be decided later. (2012 Draft SED, Appx. K, p. 1.) Rather than addressing the needs of the Delta for the purpose of protecting fish and wildlife beneficial uses, the 2012 Draft SED concluded that “more flow is needed from the existing salmon and steelhead bearing tributaries in the LSJR watershed down to Vernalis.” (2012 Draft SED, Appx. K, p. 3.) In addition, and again for the first time, the 2012 Draft SED indicated that responsibility for meeting the objectives would be placed on parties *other* than USBR. The 2012 Draft SED stated that the plan would be implemented, in part, through Federal Energy Regulatory Commission (“FERC”) hydropower licensing processes. (2012 Draft SED). As USBR does not need a FERC license to operate its hydropower facilities on the Stanislaus River, and as DWR has no hydropower facilities on any of the tributaries to the San Joaquin, the plan of implementation clearly targeted water right holders on the Merced, Tuolumne and Stanislaus Rivers.

1.5. Recirculated Staff Draft

On September 16, 2016, State Water Board Staff (“Staff”) recirculated a revised Draft of the Bay-Delta Plan and a revised SED (“Proposed Project”). The shift from a Bay-Delta plan to some type of hybrid Basin/Bay-Delta planning effort - which began in 2012 - is solidified in the Proposed Project. Throughout these comments, it will become clear that the proposed water quality control plan, and the lack of focus therein on Bay-Delta issues, leads to unsolvable legal problems, procedural defects, and an un-implementable plan.

2. VIOLATIONS OF PORTER-COLOGNE WATER QUALITY CONTROL ACT

The Porter-Cologne Water Quality Control Act (“PCWQCA”), which is part of the California Water Code, controls the review and revision of water quality control plans (“WQCP”). Each WQCP must contain three components: (1) a list of beneficial uses to be protected by the plan, (2) water quality objectives to ensure the reasonable protection of those beneficial uses, and (3) a program of implementation for achieving the water quality objectives. (Water Code, §§ 13050[j], 13241, 13242.) Staff’s proposed revisions to the Bay-Delta Plan violate the Porter-Cologne Act requirements in several ways.

2.1. The Proposed Objectives Are Unclear and Will Not Protect the Beneficial Uses Identified in the Plan

The WQCP identifies numerous beneficial uses to be protected. (SED, at Appx. K, p. 10-11.) As relevant here, the revised water quality objectives in Table 3 are intended to protect fish and wildlife beneficial uses in the Bay-Delta Estuary, including (1) Estuarine Habitat (EST), (2) Cold Freshwater Habitat (COLD), (3) Warm Freshwater Habitat (WARM), (4) Migration of Aquatic Organisms (MIGR), (5) Spawning, Reproduction, and/or Early Development (SPWN), (6) Wildlife Habitat (WILD), (7) and Rare, Threatened, or Endangered Species (RARE). (SED, at Appx. K, p. 10-13.)

State Water Board Staff proposes three different objectives to protect these beneficial uses: (1) the Narrative Flow Objective; (2) the numeric Tributary Flow Objective (30-50% unimpaired flow from the Stanislaus, Tuolumne and Merced Rivers); (3) the Vernalis Flow Objective; and (4) the Salmon Doubling Objective. Staff also proposes a southern Delta salinity objective for the protection of agricultural beneficial uses.

The objectives intended to protect fish and wildlife beneficial uses are addressed in turn below. Each objective lacks the legally required clarity for a regulation. In addition, the analysis in the SED does not reflect a true implementation of these objectives, and thus does not demonstrate that the objectives will protect the beneficial uses as required by the Porter-Cologne Act. Even if the objectives were implemented in the manner set forth in the SED, the analysis fails to show that the identified beneficial uses will be protected. In response to Staff's failure to model a true implementation of the objectives, the SJTA and its member agencies have hired consultants to perform additional analysis of the proposed plan. That analysis shows that the revised objectives will not protect the beneficial uses identified in the plan, and will instead adversely affect those beneficial uses. Because the proposed objectives are unclear and do not protect the beneficial uses, the plan violates the Porter-Cologne Act (Water Code, § 13000 et seq.), and the Board should decline to adopt it.

2.1.1. Narrative Objective

The State Water Board proposes a Narrative Objective that reads as follows:

> "Maintain inflow conditions from the San Joaquin River watershed to the Delta at Vernalis sufficient to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta. Inflow conditions that reasonably contribute toward maintaining viable native migratory San Joaquin River fish populations include, but may not be limited to, flows that more closely mimic the natural hydrographic conditions to which native fish species are

> adapted, including the relative magnitude, duration, timing, and spatial extent of flows as they would naturally occur. Indicators of viability include population abundance, spatial extent, distribution, structure, genetic and life history diversity, and productivity." (SED, at Appx. K, p. 18.)

2.1.1.1. The Narrative Objective lacks clarity

Any water quality control plan, or revision thereof, adopted by the State Water Board must be submitted to the Office of Administrative Law ("OAL") for review and a determination of compliance with "the standards of necessity, authority, clarity, consistency, reference, and nonduplication . . .." (Government Code, § 11353[b][4]; see Government Code, § 11349.1[a].) The term "clarity" means "written or displayed so that the meaning of regulations will be easily understood by those persons directly affected by them." (Government Code, § 11349[c].) A regulation is presumed not to comply with the clarity requirement if any of the following conditions exist: (1) "the regulation can, on its face, be reasonably and logically interpreted to have more than one meaning," or (2) "the language of the regulation conflicts with the agency's description of the effect of the regulation," or (3) "the regulation uses terms which do not have meanings generally familiar to those 'directly affected' by the regulation, and those terms are defined neither in the regulation nor in the governing statute," or (4) "the regulation uses language incorrectly," or (5) "the regulation presents information in a format this is not readily understandable by persons 'directly affected,'" or (6) "the regulation does not use citation styles which clearly identify published material cited in the regulation." (Cal. Code Regs., tit., 1, § 16.)

The Narrative Objective is unlawful because, among other things, it can be interpreted to have more than one meaning, the language conflicts with the agency's description of the effect of the regulation, and it uses terms which do not have meanings generally familiar to those directly affected by the regulation. (Cal. Code Regs., tit. 1, § 16[a][1],[2],[3].)

2.1.1.1.1. The Narrative Objective can be interpreted to have different meanings

The phrase "support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta" is ambiguous, undefined, and could be logically interpreted to have multiple meanings.

First, the words “support and maintain” are unclear and could have various interpretations. Merriam-Webster defines “support” as “to provide a basis for the existence or subsistence of.” (http://www.merriam-webster.com/dictionary/support.) Thus, the regulated community could interpret the Narrative Objective to require the regulated entities provide a basis for the existence or subsistence of fish populations migrating through the Delta. The words “support and maintain” could also imply that upstream operations need to make up for losses in the Delta and the ocean (most notably, harvest) to support natural production. However, the Narrative Objective does not explain whether any of this is necessary, nor what must be done by regulated entities to provide support and maintenance, nor what level of support and maintenance is needed.

Second, the term “viable” is unclear and could have various interpretations. Merriam-Webster defines “viable” as “capable of existence and development in an independent unit.” (http://www.merriam-webster.com/dictionary/viable.) The Narrative Objective lists indicators to measure viability: “Indicators of viability include population abundance, spatial extent, distribution, structure, genetic and life history diversity, and productivity.” (SED, at Appx. K, p. 18.) However, the indicators do not have any benchmarks that must be achieved to ensure viability. For instance, there is no indication as to what level of population abundance is needed to achieve viability. Likewise, there is no indication as to what level of distribution, structure, diversity or productivity is needed to achieve viability. Without a specific measure of success, these indicators are meaningless and open to varied interpretations.

Third, the term “natural production” is not defined anywhere in the WQCP. Both of these words need to be defined. A reasonable interpretation of natural would be that hatchery fish are not included. However, it is unclear whether the offspring of hatchery fish would be considered natural. Similarly, it is unclear whether the offspring of a hatchery and non-hatchery fish would be considered natural.

Fourth, the phrase “flows that mimic the natural hydrographic conditions” is similarly confusing and vague. The extent to which the natural hydrograph needs to be mimicked is unclear. Specifically, it is unclear whether mimicking a general trend is sufficient, or whether exact quantities are required.

Fifth, the objective lacks clarity with regard to which fish populations are covered. Specifically, the Narrative Objective calls for the maintenance of inflow conditions from the San Joaquin River "sufficient to support and maintain the natural production of viable native San Joaquin River watershed fish populations **migrating through the Delta.**" (SED, at Appx. K, p. 18 [emphasis supplied].) Although the SED discusses many fish species in Section 19, most of these species are not targeted by the objective, primarily because most species do not migrate through the Delta. Of the fish species listed in Section 7.2.1, the following do not fall within the protection of the Narrative Objective because they do not migrate from the three eastside tributaries to the Delta:

Late Central Valley fall-run Chinook salmon	Late Central Valley fall-run Chinook salmon do not occur on the three Tributaries. Late Central Valley fall-run Chinook Salmon are not a separate Evolutionarily Significant Unit ("ESU") or Distinct Population Segment ("DPS") from Central Valley fall-run Chinook salmon. There is no evidence of genetic differences between Central Valley fall-run Chinook salmon that arrive late and those that arrive early.
Spring-run Chinook salmon	There are no spring-run Chinook salmon on the three tributaries. The tributaries are not designated as critical habitat. Rule 4[d] of the Endangered Species Act ("ESA) is currently in effect for an experimental population under the San Joaquin River Restoration Program ("SJRRP"). The SJRRP and its flows are not in the Plan Area and are not evaluated.
Green sturgeon	Do not migrate from the tributaries.
Delta smelt	Do not migrate from the tributaries.
Longfin smelt	Do not migrate from the tributaries.
Sacramento split-tail	Do not migrate from the tributaries.
Kern Brook lamprey	Do not migrate from the tributaries.
River lamprey	Do not migrate from the tributaries.
California roach	Do not migrate from the tributaries.
Hardhead	Do not migrate from the tributaries.
Rainbow trout	Do not migrate from the tributaries.
Largemouth bass	Do not migrate from the tributaries.

White sturgeon	Do not migrate from the tributaries.
American shad	Do not migrate from the tributaries.
Kokanee	Do not migrate from the tributaries.

Thus, it appears - but is not clear - that of the fish species listed in Section 7.2.1, the Narrative Objective is only intended to protect Central Valley fall-run Chinook salmon, Central Valley steelhead (*Oncorhynchus mykiss*) and Pacific lamprey, as these are the native San Joaquin River watershed fish that migrate through the Delta.

2.1.1.1.2. The language of the Narrative Objective conflicts with Staff's description of the effect of the regulation

The language of the Narrative Objective is unclear because it "conflicts with the agency's description of the effect of the regulation." (Cal. Code Regs., tit., 1, § 16.) Specifically, the Narrative Objective states that flows should more closely mimic the natural hydrograph from February through June by bypassing or releasing a percentage of unimpaired flow from the Stanislaus, Tuolumne and Merced Rivers. (SED, at Appx. K, p. 18.) However, the proposed program of implementation states that the percentage of unimpaired flow may be treated as a "total volume of water" that is shifted to other times of the year and shaped in such a way that is deemed – by some unspecified standard – to be better for fish than flows which mimic the natural hydrograph. (SED, at Appx. K, p. 30-31.) State Water Board Staff has repeatedly referred to the flow requirement as a "block" or "budget" of water that can be shifted or shaped, rather than an unimpaired flow requirement that tracks the natural hydrograph.[4] In comparing the unimpaired flow approach and the block of water approach, State Water Board Staff has explicitly stated, "you can't do both those things . . ." (Transcript of Public Hearing before SWRCB, January 3, 2017, p. 27, lns.

[4] Transcript of Public Hearing before the SWRCB, November 29, 2016, p. 14, lns. 5-7 [Chair Marcus: Staff conceive the proposal "as a block of water that they hope groups will come together to shape and use in the most effective way as possible."]; Transcript of Public Hearing before the SWRCB, November 29, 2016, p. 26, lns. 15-20 [Les Grober: "So it's not intended to be rigid adherence with say a flat 40 percent. But you can use that as a block of water for that February through June time period, so that you can have a much higher amount to achieve a pulse flow as makes sense and less at other times."]; Transcript of Public Hearing before SWRCB, December 16, 2016, p. 31, lns. 21-23 ["It's intended to provide some of the natural variability, but also a budget of water that can be shifted."]; Transcript of Public Hearing before SWRCB, January 3, 2017, p. 28, ln. 10 [Les Grober: "but it's also a block of water that can be used to the benefit of fish and wildlife."]

22-23.) Given these descriptions, it is apparent that the Narrative Objective is unclear and unlawful because "the language of the regulation conflicts with the agency's description of the effect of the regulation." (Cal. Code Regs., tit., 1, § 16.)

2.1.1.1.3. The Narrative Objective uses terms which do not have meanings generally familiar to those directly affected by the regulation

As noted above, the terms "support and maintain," "natural production," "viable," and "mimic the natural hydrographic conditions" are not defined in the WQCP. These terms do not have standard or consistent definitions within the regulated community, i.e., within the irrigation districts and water service providers that will be directly affected by the proposed project. The absence of any meaningful definition of these terms in the WQCP leaves the regulated community at a loss as to what must be accomplished to comply with the objective. For this reason, the Narrative Objective amounts to an unclear and unlawful regulation. (Cal. Code. Regs., tit. 1, § 16[a][3].)

2.1.1.1.4. The Narrative Objective is impermissibly vague

In addition to being unlawful for lack of clarity, the Narrative Objective is also impermissibly vague. Due process protections proscribe the enforcement of vague regulations like the Narrative Objective. (*Cranston v. City of Richmond* (1985) 40 Cal.3d 755 ("*Cranston*").) Similar to the clarity standard discussed above, due process precludes enforcement of a regulation based upon impermissible vagueness when the regulated party "could not reasonably understand that [their] contemplated conduct is proscribed." (*Cranston,* at 764.) The ambiguous terms, such as support, viable, natural production and mimic, make the Narrative Objective so vague the regulated community would not be able to understand whether their conduct is proscribed or authorized. To remedy this problem, the Narrative Objective needs to incorporate metrics by which the regulated community – and the regulators – can measure success or failure. As written, it will be impossible to determine if compliance has been achieved.

2.1.1.2. The Narrative Objective will not protect beneficial uses

As noted above, the objectives must "ensure the reasonable protection of beneficial uses." (Water Code, § 13241.) Although the WQCP identifies numerous beneficial uses to be protected by the Narrative Objective, the objective will not protect those uses.

Specifically, the objective provides no protection for cold or warm freshwater habitats (COLD and WARM). The language focuses solely on inflow to the Delta and does not include a water temperature component of any kind. Second, by focusing solely on inflows necessary to support native migratory San Joaquin River fish populations, the objective ignores all other conditions and components that are necessary to protect estuarine and wildlife habitat (EST and WILD), migration of aquatic organisms (MIGR), spawning, reproduction and/or early development of fish (SPWN), and rare, threatened or endangered species (RARE). The Narrative Objective lists conditions that will reasonably contribute towards maintaining viable native migratory San Joaquin River fish populations, but the list is extremely limited in scope, focusing exclusively on "flows that more closely mimic the natural hydrographic conditions . . . including the relative magnitude, duration, timing, and spatial extent of flows as they would naturally occur." (SED, at Appx. K, p. 18.) Critically, the list fails to include any non-flow measures, such as predator control, changes in salmon ocean harvest regulations, changes in hatchery operations, and floodplain habitat restoration work. The omission of any non-flow measures in the objective renders it insufficient to protect the beneficial uses. The SED states, "flow alone cannot solve the many issues that native fish populations face in the SJR Watershed. To reach the goal of achieving and maintaining viable populations of native fish, many other non-flow actions must be taken." (SED, at 19-88 [internal parentheticals omitted].) While the SED notes that the program of implementation identifies non-flow measures that should be taken to achieve the Narrative Objective (*Ibid.*) those measures should be identified in the objective itself in the same way that the flow measures are identified. A program of implementation need only describe the actions "necessary to achieve the objectives." (Water Code, § 13242.) If both flow and non-flow measures are needed to protect the beneficial uses (SED, at 19-88), then the Narrative Objective should contain a list of necessary non-flow measures as well. Without a list of the necessary non-flow measures, the Narrative Objective will not protect the beneficial uses.

Moreover, history demonstrates that the Board will not implement non-flow measures if they are not included as objectives. The 2006 Water Quality Control Plan includes several non-flow measures in its plan of implementation. These measures include installation of screening facilities on diversions, modification of existing commercial and sport fishing regulations, expansion of the illegal harvest program, improvement of hatchery programs, and expansion of gravel replacement and maintenance. (2006 Bay Delta Plan, at 34-37.) However, the State Water Board never took any action to implement these measures, nor did it encourage other agencies to implement the measures.

2.1.1.3. Narrative Objective Summary

As the Narrative Objective is both unclear and insufficient to protect the beneficial uses identified in the WQCP, the Board should decline to adopt it.

2.1.2. The Tributary Flow Objective

The Tributary Flow Objective in the water quality control plan is as follows: "A percent of unimpaired flow between 30% - 50%, inclusive, from each of the Stanislaus, Tuolumne and Merced Rivers shall be maintained from February through June" in accordance with a "[m]inimum 7-day running average flow rate." (SED, at Appx. K, p. 18.) Unimpaired flow is defined as "the natural water production of a river basin, unaltered by upstream diversions, storage, or by export or import of water to or from other watersheds." (SED, at Appx. K, p. 20 [fn. 14].)

2.1.2.1. The Tributary Flow Objective lacks clarity

As set forth below, the Tributary Flow Objective lacks clarity in several key respects.

2.1.2.1.1. Relationship between the Narrative Objective and the Tributary Flow Objective is Not Clear

Staff suggests that the Tributary Flow Objective (and the adaptive adjustments that can be made thereto) is in place to further the Narrative Objective. (SED, at Appx K, p. 30.) However, it is unclear whether compliance with the Tributary Flow Objective alone is intended to constitute compliance with the Narrative Objective, or whether the Narrative Objective might be unachieved despite compliance with the Tributary Flow Objective. It is also unclear whether other measures are required or otherwise intended to meet the Narrative Objective. For these reasons, Staff must revise the WQCP to more clearly explain the relationship between the Narrative Objective and the Tributary Flow Objective.

2.1.2.1.2. The Relationship between the Tributary Flow Objective and the Vernalis Flow Objective is unclear

It is unclear whether flows from the upper San Joaquin River will be counted for purposed of determining compliance with the Vernalis requirement, or whether only flows from the three eastside tributaries will count towards the Vernalis requirement. In the SED, Staff seems to assume that flows from upstream of the Tributaries will contribute to flows at Vernalis. (SED, at 5-1.) However, Appendix K states that the Tributary Flow Objective is "in addition to flows in the Lower San Joaquin River from sources other than the Lower San Joaquin River tributaries," and **"[w]hen the percentage of unimpaired flow requirement** is insufficient to meet the minimum base flow requirement" at Vernalis, then the three eastside tributaries must contribute additional flows to maintain the required based flow at Vernalis. (SED, at Appx. K, p. 29.) Since only the tributaries contribute to the unimpaired flow requirement, it is not clear whether flows from the upper San Joaquin River will go to meet the Vernalis flow requirement or whether the requirement is in "addition" to upstream flows. For these reasons, the relation between the Tributary Flow Objective and the Vernalis Flow Objective is not clear and the regulated community cannot reasonably interpret the two regulations together.

2.1.2.1.3. There is no agreement on how unimpaired flow is to be calculated

The WQCP defines "unimpaired flow" as "the natural water production of a river basin, unaltered by upstream diversions, storage, or by export or import of water to or from other watersheds." (SED, at Appx. K, p. 20.) At best, this definition allows for a generalized conceptualization of unimpaired flow. It provides no indication as to how unimpaired flow should be calculated. Instead, the WQCP defers this critical component to the Stanislaus, Tuolumne and Merced ("STM") Working Group, which is charged with creating annual adaptive operations plans that will "identify how unimpaired flows are calculated" (SED, at Appx. K, p. 34.) In order to provide clarity to the Tributary Flow Objective so that the regulated community can comply with the objective, the method of calculation for unimpaired flow needs to be set forth in the plan itself. There is currently no agreed upon method of calculation for unimpaired flow, and this critical issue cannot be deferred to an outside group which the Board has no authority to create or compel participation in.

2.1.2.1.4. The Quantity of Water Subject to Regulation Is Not Clear

A regulation will be deemed unlawful for lack of clarity if it "presents information in a format that is not readily understandable by persons 'directly affected'" by it. (Cal. Code Regs., tit. 1, § 16[a][5].) A regulation will also be deemed unclear if it "conflicts with the agency's description of the effect of the regulation." (Cal. Code Regs., tit. 1, § 16[a][2].) The Tributary Flow Objective violates these rules because it fails to clearly state the amount of water that the SJTA member agencies will be required to refrain from diverting to satisfy the objective. The objective states that between 30% and 50% of unimpaired flow must be left instream for the benefit of fish and wildlife. However, the objective does not specify the exact percentage within that range that must remain instream. Accordingly, based upon a plain reading of the language, the objective would seemingly be satisfied by simply maintaining any percentage of unimpaired flow at the compliance point between 30% and 50%, based on a running average of 7 days or more. However, the proposed program of implementation ("POI"), which is not a regulation, confuses the matter. The POI states, "[t]he LSJR flow objectives for February through June shall be implemented by requiring 40 percent of unimpaired flow, based on a minimum 7-day running average, from each of the Stanislaus, Tuolumne, and Merced Rivers." (SED, at Appx. K, p. 29.) This plan to implement a 40% unimpaired flow requirement conflicts with the language of the objective, which is written so broadly that compliance can be achieved with as little as 30% unimpaired flow. Accordingly, the proposal to require 10% more unimpaired flow through the POI creates confusion, rather than clarity. Simply stated, "the language of the regulation conflicts with the agency's description of the effect of the regulation." (Cal. Code Regs., tit., 1, § 16[a][2].)

The POI confuses the matter further by stating, "[t]his required percentage of [40%] unimpaired flow . . . may be adjusted within the range allowed by the LSJR flow objectives through adaptive methods . . .." (SED, at Appx. K, p. 29.) These adaptive adjustments to the flow requirements must be "approved by the State Water Board on an annual or long-term basis, or by the Executive Director . . . if all members of the Stanislaus, Tuolumne, and Merced Working Group (STM Working Group) . . . agree to the changes. (SED, at Appx. K, p. 30.)" (SED, at Appx. K, p. 30.) Thus, it appears that the range set forth in the objective is not a range of compliance that the *regulated* community must achieve, but rather a range that the *regulators* must stay within while continually modifying the required percentage of unimpaired flow that the regulated community must achieve. The purpose of setting objectives in a water quality control plan is to clearly set forth regulations with which the regulated community must comply (see generally Government Code, § 11353[b][4]; § 11349.1[a]), not to create a broad range that the regulators must comply with as they continually modify the regulation without further oversight by OAL.

2.1.2.1.5. The flow rate calculation is not clear

The method for calculating the required amount of unimpaired flow is unclear. The objective states that the chosen percentage of unimpaired flow must be maintained based upon a *minimum 7-day running average*. (SED, at Appx. K, p. 18.) A plain reading of this requirement indicates that the unimpaired flow percentage must be calculated using a running average of 7 days or more. Unlike the unimpaired flow percentage which has an upper and lower boundary (i.e., 30% and 50%), this requirement has only a lower boundary (i.e., 7 days). Standing alone, this characteristic does not make the objective unclear; the regulated community could achieve compliance by using any running average of at least seven days. However, other aspects of the requirement create significant confusion. For instance, it is unclear how the running average should be calculated during the first six days of the Feb.-June time period. Prior to February 7th, there will not be a sufficiently long historical record of unimpaired flows during the Feb.-June period to calculate a 7-day running average within the regulated time period. While it may be the regulators' intent that the initial running average be calculated using unimpaired flow data from January and the year before, that intent is not made clear in the WQCP. Moreover, if this is the intent of the regulators, then the absence of an upper boundary on the running-average requirement would theoretically allow for a calculation using unimpaired flow rates that date back to July of the previous year, when unimpaired flow is at its lowest due to minimal summer precipitation and runoff. While such a computation would be permissible under a plain reading of the Tributary Flow Objective, it would be antithetical to the Narrative Objective which prioritizes flows that mimic natural hydrographic conditions.

The program of implementation creates further confusion regarding the minimum 7-day running average component of the Tributary Flow Objective. The POI states that the required percentage of unimpaired flow from February to June "may be managed as a total volume of water" and "released on an adaptive schedule," rather than on a minimum 7-day running average of unimpaired flow. (SED, at Appx. K, p. 30.) However, the POI does not explain how the "total volume of water" (also known as a block or budget of water) will be calculated. While estimates of precipitation and snowmelt runoff can be made in February, such early estimates are frequently inaccurate. Moreover, the authority to make this change to the objective is granted to the Executive Director, provided that s/he receives a recommendation from "one or more members of the STM Working Group." (SED, at Appx. K., p. 18.) The plan does not specify what action the Executive Director should take if one member of the STM Working Group recommends the change, but all others recommend against it. Moreover, unlike the unimpaired flow percentage requirement, which has a range that the Executive Director must work within, the authority granted to the Executive Director to deviate from the minimum 7-day running average is unchecked by anything other than his or her own assessment as to whether "scientific information" indicates that another flow pattern would "better protect fish and wildlife beneficial uses." (SED, at Appx. K., p. 30.) This grant of authority to the Executive Director and the STM Working Group renders the 7-day running average component of the objective uncertain and unclear. At the very least, the language of the regulation (which speaks in terms of unimpaired flow based on a running average) conflicts with the agency's description of the effect of the regulation, insofar as the agency states that the water will be managed as a "total volume of water" that is "released on an adaptive schedule" with no requirement of adhering to a running average of any kind. (Cal. Code Regs., tit., 1, § 16[a][2] [a regulation is presumed to be unclear if "the language of the regulation conflicts with the agency's description of the effect of the regulation"].)

2.1.2.1.6. WSE modeling makes the Tributary Flow Objective unclear

The Tributary Flow Objective requires the maintenance of between 30% and 50% unimpaired flow on each of the Stanislaus, Tuolumne and Merced Rivers from February through June, based upon a minimum 7-day running average. (SED, at Appx. K, p. 18.) The analysis Staff presents in the SED does not portray an accurate implementation of these objectives. Instead, the analysis assumes the implementation of numerous operational constraints that are not required by the Tributary Flow Objective and, in some cases, contradict the Tributary Flow Objective, thereby making the objective unclear to the regulated community. The unrequired operational assumptions are as follows.

- Flow Shifting

The Tributary Flow Objective requires the maintenance of a percentage of unimpaired flow from February through June. The Water Supply Effect ("WSE") model used in the SED assumes that when the required unimpaired flow percentage is 40% or higher, some of the required instream flows (not to exceed 25% of the total quantity of instream flow required from Feb.-June) will be shifted to the *July-November* period, mostly in *wet years*. (SED, at Appx. F1, p. F.1-13, F.1-17, F.1-36-38, F.1-43-45.) In the SED, this modeling assumption is referred to as flow shifting. Staff also used another type of flow shifting in the SalSim model, where a full 25% of the required unimpaired flow from February through June was shifted to the months of *September-December* in *all water years*. (SED, at 19-80.) The document acknowledges that flow shifting is "not part of the unimpaired flow objective." (*Ibid.*) Nevertheless, it is used in the modeling "to provide temperature control, to reduce the likelihood of negative effects [on fish and wildlife], and to increase the overall potential benefit" of the objectives. (SED, at Appx. F1., p. F.1-17.) Flow shifting contradicts the Tributary Flow Objectives by (1) requiring flows outside the February through June time period, and (2) reducing the amount of unimpaired flow required during the February through June period to a lower percentage than would otherwise be required by the objective. It is unclear from the WQCP whether the regulated community should comply with the objectives which do not require flow shifting (and which will supposedly harm beneficial uses), or with the flow shifting modeling assumptions that are purportedly needed to ensure that the objectives do not adversely impact fish and wildlife.

- Minimum Reservoir Storage

The Tributary Flow Objective requires the maintenance of a percentage of unimpaired flow on the Stanislaus, Tuolumne and Merced Rivers, irrespective of how those flows might impact reservoirs on those rivers. However, the analysis in the SED assumes that reservoirs will be operated in such a way that adherence to the Tributary Flow Objective will not result in a drawdown of storage in New Melones Reservoir, New Don Pedro Reservoir and Lake McClure below certain points. (SED, at Appx. F1, p. F.1-2.) This minimum reservoir storage assumption is needed "to minimize impacts on instream temperature that would be caused by lower reservoir levels and a limited coldwater pool." (SED, at Appx. F1, p. F.1-31.) According to the SED, the minimum reservoir targets "*do not* represent regulatory requirements of how the reservoir storage and use system must be operated . . .." (SED, at Appx. F1, p. F.1-31, fn. 4.) In fact, the SED explicitly states, "[t]hese operational constraints, as components of modeling simulations, do not by themselves comprise a plan of implementation or otherwise carry the weight of regulatory requirements." (SED, at Appx. F1, p. F.1-31.) However, after the release of the SED, Staff has taken the opposite position, insisting that minimum reservoir storage is "very much a part of the project." (Transcript of Public Hearing before SWRCB, January 3, 2017, p. 22, ln. 17.) This contradiction creates confusion as to whether carryover storage – which is not included in the objectives – is nevertheless intended to constitute a requirement with which the regulated community must comply.

-Refill Criteria

The analysis in the SED assumes that when the required unimpaired flow percentage is 40 percent or higher, reservoir withdrawals will be restricted if reservoir levels are below a certain point. This assumption is not required by the Tributary Flow Objective, but it is included in the modeling of the Tributary Flow Objectives so that "coldwater pools recover more quickly after a drought," thereby avoiding adverse temperature impacts. (SED, at Appx. F1, p. F.1-32.) The inclusion of this modeling assumption creates confusion as to whether the regulated community must comply with the refill criteria or not.

-Minimum Base Flows

If adherence to the unimpaired flow requirement in the Tributary Flow Objective results in instream flows dropping below *current* instream requirements (such as instream flow requirements contained in Federal Energy Regulatory Commission ("FERC") licenses or in Biological Opinions issued as part of a Section 7 consultation under the Endangered Species Act), then the analysis in the SED assumes that the current regulatory requirements will be followed, rather than the Tributary Flow Objective. (SED, at Appx. F1, p. F.1-13.) The "[p]roposed percentages of unimpaired flow are considered an additional requirement, and thus the greater of either the baseline flow requirements or the unimpaired flow requirement was selected for each month" for modeling purposes. (*Ibid.*) However, these minimum flows are not included in the objectives and could be changed at any time through separate legal processes. It is unclear from the SED whether the regulated community should comply with Tributary Flow Objective or the minimum flows that are incorporated into the modeling. This confusion will create a significant problem if the current instream requirements that were modeled are ever changed through separate processes.

-Monthly Modeling

The Tributary Flow Objectives require that flows be maintained on the Stanislaus, Tuolumne and Merced rivers based upon a 7-day running average. (SED, at Appx. K, p. 18.) Adhering to a 7-day *running* average means that flows will change on a daily basis. Despite the fact that daily modeling programs are available, the analysis in the SED used a monthly model, where flows remain the same over the course of an entire month. Specifically, "the WSE model calculates monthly flow targets for each eastside tributary based on the existing regulatory minimum flow schedules or user-specified percent of unimpaired flow." (*Ibid.*) The SED states, "[t]he February – June minimum instream flow requirement is calculated as a percentage of that month's unimpaired flow, for each month in February – June." (*Ibid.*)

The difference between a daily model and a monthly model is striking. The following hypothetical demonstrates the discrepancies. Assume that in the month of March there is 60,000 acre-feet of unimpaired flow on the Stanislaus River. A monthly model would spread the 60,000 acre-feet evenly across the entire 31 days of March, resulting in approximately 2,000 acre-feet of water per day. Using a conversion rate of 1 cfs = 2 acre-feet/day, the flow rate would be approximately 1,000 cfs for the entire month. Assuming an unimpaired flow requirement of 40 percent, the model would assume releases of 400 cfs every day in the month of March (40% of 1,000 cfs). This assumption would remain in place even if total inflow during the first 10 days of March was 50,000 acre feet (i.e., 5,000 acre feet per day, or 2,500 cfs), and total inflow during the last 20 days was a mere 10,000 acre feet (i.e., 500 acre feet per day, or 250 cfs). If these flows were modeled based on the required 7-day running average, then the unimpaired flow requirement on March 7 would be 1,000 cfs (i.e., 40% of 2,500 cfs), while the unimpaired flow requirement on March 17 would be 100 cfs (i.e, 40% of 250 cfs). This result is drastically different than the steady 400 cfs under the monthly model.

The following graph shows the difference between using a monthly model and a daily model. The *dark* red and *dark* blue lines depict flows on the Tuolumne River at Modesto and LaGrange, respectively, in 1978 using the Tuolumne River Daily Flow model.[5] The *light* red and *light* blue lines depict flows at Modesto and LaGrange, respectively, in the same year using the monthly WSE model. It is evident from this graph that the monthly WSE model fails to capture the numerous high and low flow events that occurred in February, March and April of that year.

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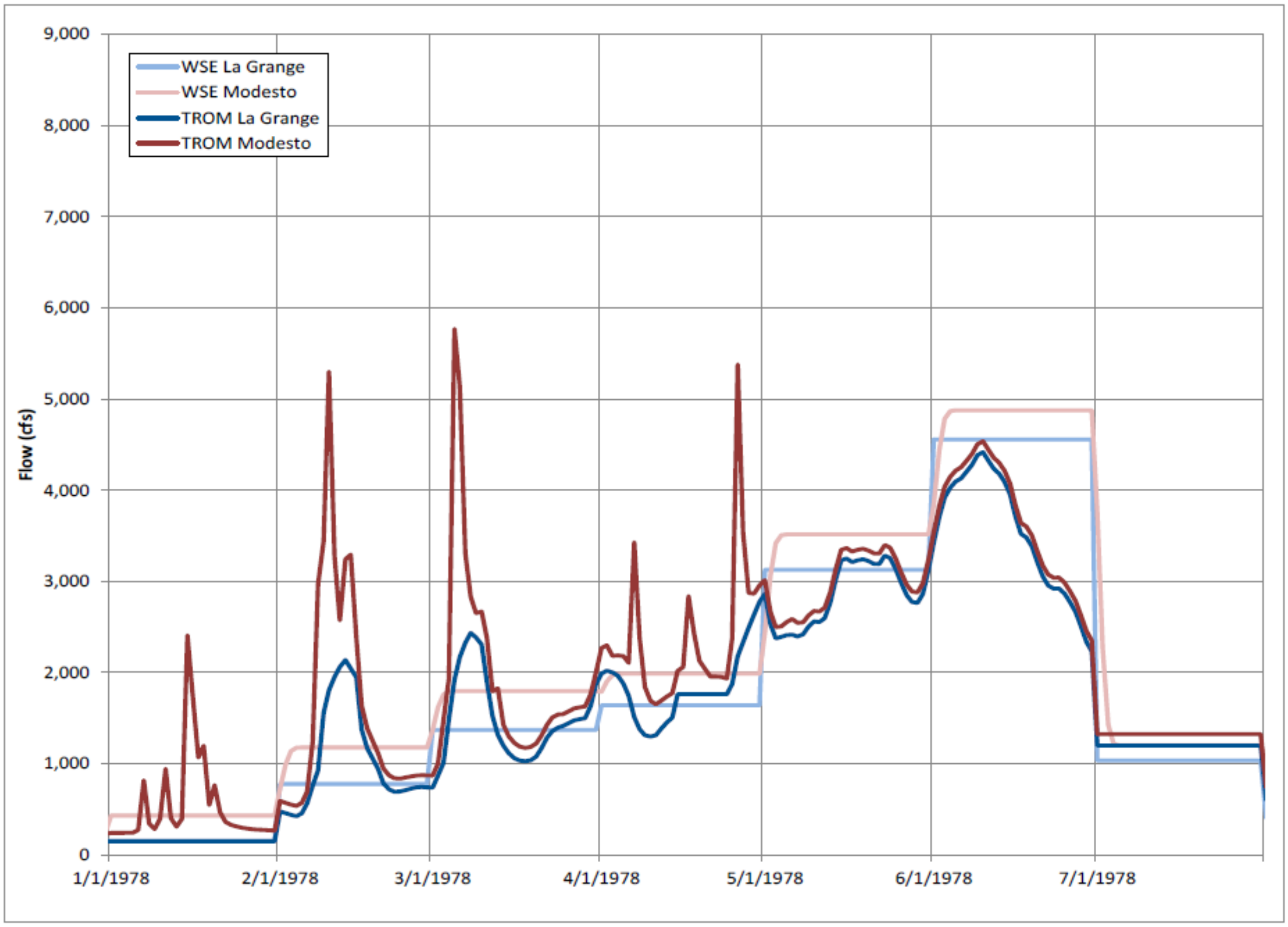
[5] Additional examples of the inconsistency between monthly and daily flow modeling is presented in the comments submitted by MID and TID.



SJTA Figure 2-1

The conflict between the minimum 7-day running average requirement and the monthly model used in the SED creates confusion as to which flow regime should be followed. This is particularly true because the supposed benefits of the project set forth in the SED are based on monthly modeling, and the "minimum" 7-day running average requirement would technically allow for a smoothing of the flows by using a 30, 60, or even 90-day running average that more closely mimics the SED's monthly model.

2.1.2.1.7. The time period of compliance is not clear

The objective states unimpaired flow will be required from February through June. However, the February-June component of the objective is made uncertain by the program of implementation. Specifically, the POI states that "a portion of the February through June unimpaired flow may be delayed until after June" or even "until the following year." (SED, at Appx. K, p. 30-31.) The authority to make this change to the temporal component of the objective is again granted to the Executive Director, provided s/he receives a recommendation from one or more members of the STM Working Group. This grant of authority to the Executive Director and the STM Working Group to change the time period of the objective renders it uncertain and unclear. Again, the language of the regulation is in direct conflict to the agency's description of the effect of the regulation. (Cal. Code Regs., tit., 1, § 16[a][2].)

It is also unclear when and to what extent flood flows will reduce the unimpaired flow requirement. The program of implementation states:

> The required percentage of unimpaired flow does not apply to an individual tributary during periods when flows from that tributary could cause or contribute to flooding or other related public safety concerns as determined by the State Water Board or Executive Director through consultation with federal, state, and local agencies and other persons or entities with expertise in flood management.

(SED, at Appx. K, p. 29.)

The text states the unimpaired flow requirement would "not apply" when flows contribute to flooding. It is unclear whether the requirement would "not apply" to the localized area that was experiencing flood flows or if it would not apply to the entire tributary. It is unclear whether the requirement would "not apply" for a whole year or just until the flood risk subsided. It is unclear which public health and safety concerns would trigger the relaxation of the requirement. Therefore, the flood and public safety component of the regulation is not clear and the regulated community can reasonably interpret the regulation to have more than one meaning.

2.1.2.1.8. The compliance point location is not clear

The objective identifies specific compliance points on each of the three tributaries. (SED, at Appx. K, p. 18.). However, the program of implementation allows the Executive Director to change the compliance locations on the regulated rivers "if information shows that another location . . . more accurately represents the flows of the LSJR tributary at its confluence with the LSJR." (SED, at Appx. K., p. 29.) The Executive Director's authority to make this change is not tied to a recommendation or consultation with the STM Working Group, and is entirely unchecked. This arrangement fails to provide any certainty to the regulated community with respect to the location of the compliance points.

In sum, *every* component of the Tributary Flow Objective (i.e., the percentage of unimpaired flow, the 7-day running average, the regulated months, and the compliance points) is rendered unclear by the POI and/or subject to further change by the Executive Director. This lack of clarity or certainty with respect to every component of the objective contravenes the stated purpose of the objective, which is to "provide certainty to the regulated community . . .." (SED, at 3-2.) More importantly, the objective lacks clarity and will not be approved by OAL pursuant to Government Code section 11353[b][4].

2.1.2.2. The State Water Board's analysis of the Tributary Flow Objective fails to demonstrate protection of beneficial uses

As noted above, the Board must set water quality objectives that provide reasonable protection to beneficial uses. (Water Code, §§ 13000, 13241.) Although the WQCP identifies several beneficial uses to be protected by the Tributary Flow Objective (SED, at Appx. K, p. 13), Staff does not analyze the impact of this objective on these beneficial uses. Instead, Staff focuses exclusively on the impact that the objective will have on water temperature and floodplain inundation. (SED, at 19.2 and 19.3.) Staff then uses the SalSim program in an attempt to extrapolate the changes to water temperature into benefits to Central Valley fall-run Chinook salmon production. (SED, at 19.4.) In focusing exclusively on the impacts to water temperature, floodplain inundation and production of fall-run Chinook salmon, Staff fails to demonstrate that the specific beneficial uses identified in the WQCP will be protected by the objectives. Moreover, to the extent that cooler water temperatures, additional floodplain inundation and improvements to salmon production might serve as proxies for the protection of the various beneficial uses identified in the WQCP, the State Water Board's own analysis shows no benefits to water temperature, floodplain habitat or Central Valley fall-run Chinook salmon production.

Prior to commenting on the results of Staff's analysis, several comments are warranted on (1) how Central Valley fall-run Chinook salmon became the sole focus of Staff's analysis (Section 2.1.2.2.1), (2) the current status of Central Valley fall-run Chinook salmon (Section 2.1.2.2.2), and

(3) the results of the Delta Flow Criteria Report from 2010 addressing the flows necessary at Vernalis to protect juvenile fall-run Chinook salmon (Section 2.1.2.2.3). Following the discussion of these issues are comments on (1) the SED analysis of water temperature (Section 2.1.2.2.4), (2) the SED analysis of floodplain habitat (Section 2.1.2.2.5), and (3) the SalSim analysis regarding fall-run Chinook salmon production (Section 2.1.2.2.6).

2.1.2.2.1. Central Valley fall-run Chinook salmon are the sole focus of the SED analysis

The purpose of the Tributary Flow Objective and the Narrative Objective is to protect native fish migrating to and from the eastside tributaries through the Delta. The Narrative Objective explicitly states that Delta inflow conditions from the San Joaquin River watershed must be "sufficient to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta." (SED, at Appx. K, p. 18.) The Tributary Flow Objective is similarly singular in its protective goal; the WQCP states that the Tributary Flow Objective will be adaptively implemented "to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta," i.e., the Tributary Flow Objective will be adaptively implemented to achieve the Narrative Objective. (SED, at Appx. K, p. 30.)

The SED lists 16 native and nonnative fish species that are present in the lower San Joaquin River, the three eastside tributaries and the southern Delta. (SED, at 7-9 – 7-29) As written, the objectives concede they offer no protection to any of the nonnative species. Furthermore, of the 16 species listed in the SED, only 3 migrate to and from the eastside tributaries: Central Valley fall-run Chinook salmon[6] ("CVFRCS"), Central Valley steelhead[7] (*Oncorhynchus mykiss*) and Pacific lamprey (*Entosphenus tridentatus*). Thus, of the 16 species listed in Section 7.2.1 of the SED, only 3 fit the description of the fish populations to be protected by the objectives.

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[6] Late Central Valley fall-run Chinook salmon do no occur on the three tributaries, and are not a separate evolutionarily significant unit (ESU) or distinct population segment (DPS). There is no evidence of genetic differences between Central Valley fall-run Chinook salmon that arrive late and those that arrive early. Moreover, Central Valley spring-run Chinook salmon do not occur in the three eastside tributaries.

Staff's analysis narrows the focus of protection even further. Chapter 19 of the SED, which addresses benefits to native fish populations, does not discuss Pacific lamprey at all. With respect to Central Valley steelhead (*O. mykiss*), the Stanislaus River is the only one of the three eastside tributaries that has a self-sustaining population, and that population is admittedly small. (SED, at 7-18.) The SED asserts that there is a "paucity" of information regarding C.V. steelhead run sizes (SED, at 7-17), and *O. mykiss* production was not analyzed in the SED. In short, the SED focuses solely on the protection afforded by the objectives to the production of fall-run Chinook salmon. Accordingly, a review of the current status of C.V. fall-run Chinook salmon is set forth below so that the results of Staff's analysis can be put into perspective.

2.1.2.2.2. Current status of Central Valley fall-run Chinook salmon

CVFRCS are the predominate focus of the Proposed Project and therefore must be put into context. The evolutionarily significant unit ("ESU") of Central Valley fall-run/late fall-run Chinook salmon includes all fall-run Chinook salmon in the Sacramento and San Joaquin River Basins; there is no independent ESU for *San Joaquin River* fall-run Chinook salmon, nor for *late* fall-run Chinook salmon. (SED, at 7-9, 7-15.) CVFRCS are not a Distinct Population Segment ("DPS") under the ESA. (SED, at 7-9.) Because CVFRCS are only identified as a species of concern under the ESA (SED, at 7-9), the ESU is not currently protected under the ESA because it was not found to be at risk of extinction or at risk of becoming endangered in the foreseeable future.

Average annual production[8] of CVFRCS from 1976-2014 was 707,598.[9] The vast majority of these fish were harvested. Under current fishing regulations, CVFRCS cannot be legally harvested in the Plan Area[10], and thus provide no harvest value in the Plan Area itself. As for the harvest value outside the Plan Area, average annual commercial ocean harvest from 1976-2014 was

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[7] Rainbow Trout do not migrate. The anadromous form of Rainbow Trout, referred to in the SED as steelhead, do migrate from the Stanislaus River (SED, at 7-3.) The Tuolumne River does not have a viable, sustainable *O. mykiss* population. (SED, at 7-18.)

[8] Production is defined as ocean commercial harvest, ocean sport harvest, in-river harvest, escapement and returns to hatchery.

[9] Chinookprod, June 2016, available at http://www.casalmon.org/PDFs/Chinookprod_CompleteDraft2015Reports6.30.16.pdf

[10] California Freshwater Sport Fishing Regulations, 2016-2017; California Department of Fish and Wildlife, available at https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=117095&inline

426,949 (SED, at 20-62); average annual recreational ocean harvest over the same time period was 128,189 (SED, at 20-65); and average annual in-river catch from 1992-2010 was 64,900. (SED, at 20-65.) Using these figures, the average annual harvest is approximately 620,038 CVFRCS. Thus, on average, slightly more than 700,000 CVFRCS are produced each year, with more than 600,000 being harvested.

The Staff analysis estimates that the Proposed Project will result in an additional production of 1,103 CVFRCS annually (SED, at 19-84), at the cost of reducing water supply by 293,000 acre feet annually (assuming supply is subsidized by maximum groundwater pumping). (SED, at 5-73.) With average annual production of more than 700,000 CVFRCS, the increase in production expected to be achieved from the objectives amounts to an incremental gain of approximately 0.15%, or less than a quarter of 1 percent.

The average dress weight of CVFRCS is approximately 10.7 pounds.[11] The SED states that the price per pound at the dock is $5.54. (SED, at 20-63.) Using these numbers and the average annual commercial ocean harvest number of 426,949 to calculate a crude estimate of annual economic value, the amount exchanged at the dock is approximately $25.4 million annually (426,949 fish * 10.7 lbs/fish = approx. 4.57 million lbs. * $5.54/lb = approx. $25.4 million). Assuming an increase in production of 1,103 fish, and assuming a commercial ocean harvest rate of 60%, the total increase in commercially harvested fish would be approximately 662 fish. With an average dress weight of 10.7 pounds, the increase in food production would be approximately 7,083 pounds. At a price per pound of $5.54, the increase in economic production would be approximately $39,2442.00, which is 0.15% of the $25.4 million that is exchanged annually.

A review of the scientific data on migration of CVFRCS juveniles in the San Joaquin River system is also illuminating, as juvenile migration is a common subject of study and analysis. California Department of Fish and Wildlife ("CDFW") has estimated the number of CVFRCS juveniles entering the Delta on the San Joaquin River at Mossdale. The yearly numbers, as well as

[11] Review of 2015 Ocean Salmon Fisheries: Stock Assessment and Fishery Evaluation Document for the Pacific Coast Salmon Fishery Management Plan, Table D-1, p. 309 (available at http://www.pcouncil.org/wp-content/uploads/2016/02/Review_of_2015_Salmon_Fisheries_FullDocument.pdf)

the average annual number, are depicted below in SJTA Table 2-1. The numbers vary from as low as 13,286 to as high as 2,677,063.

Year	Juveniles at Mossdale
1996	1,146,584
1997	637,072
1998	2,677,063
1999	437,853
2000	484,712
2001	852,639
2002	738,640
2003	554,246
2004	335,313
2005	770,728
2006	2,058,741
2007	920,006
2008	388,548
2009	141,250
2010	89,417
2011	1,736,274
2012	722,432
2013	1,031,458
2014	273,452
2015	13,286
2016	38,857
Average	**764,218**

SJTA Table 2-1[12]

The total number of juvenile Chinook salmon from the entire Central Valley that migrate through the Delta can be measured at Chipps Island. As shown in SJTA Table 2-2 below, the average annual number of juvenile Chinook salmon from the *entire Central Valley* is more than 4 million, which is more than 5 times the number that leave the San Joaquin River.

[12] Unpublished data provided by California Department of Fish and Wildlife to FishBio; estimates calculated using efficiency tests conducted at Mossdale trawl. (SJTA Attachment 1, CDFW unpublished Mossdale data to FishBio.)

Year	Chipps Island Estimate
2007	3,905,855
2008	1,631,739
2009	3,403,357
2010	6,865,558
2011	9,985,473
2012	5,320,060
2013	4,185,417
2014	2,928,438
2015	1,119,249
Average	4,371,683

SJTA Table 2-2[13]

In addition, fall-run Chinook salmon are raised at five major Central Valley hatcheries that release more than 32,000,000 smolts each year. (SED, at 7-15.)

Year	Total Hatchery Releases in Central Valley
2007	32,611,297
2008	26,888,531
2009	27,960,923
2010	34,854,314
2011	46,644,134
2012	29,625,104
2013	28,813,281
2014	25,624,498
Average	31,627,760

SJTA Table 2-3[14]

The SED is silent as to how many more juveniles will be produced at Mossdale or Chipps Island by the increase in flow. However, an independent SalSim run conducted by SJTA consultants (SJTA Attachment 3 [summarized below]), showed an average increase in the number of juveniles at Mossdale under the SWB's 40% unimpaired flow of 146,503 over the SWB baseline (SJTA

[13] Chipps Island is the westernmost edge of the Delta. The juvenile numbers at Chipps Island represent fish from the entire Central Valley. Numbers are from unpublished data provided by United States Fish and Wildlife to FishBio on March 23, 2016. (SJTA Attachment 2, USFWS unpublished Chipps Island data to FishBio.)

[14] Regional Mark Processing Center RMIS database accessible at http://www.rmpc.org

Attachment 3.) If survival through the Delta is roughly 5% (Ferguson, et al. 2016[15]), then approximately 7,325 of these juveniles would be expected to survive to Chipps Island. With hatchery releases of approximately 32,000,000, the additional 7,325 fish at Chipps Island are essentially immeasurable, amounting to approximately 0.02% of the hatchery releases alone.

2.1.2.2.3. Delta Flow Criteria Report on protection of Chinook salmon

The State Water Board's Delta Flow Criteria Report from 2010 analyzes the flows necessary at Vernalis to protect juvenile fall-run Chinook salmon moving down the San Joaquin River into and through the Delta. (Delta Flow Criteria Report, at 55.) In Section 5.3 of the Report, the State Water Board sets forth the flows necessary at Vernalis. On page 119, the Report states:

> "San Joaquin River inflows are important for much of the year to support various life stages of San Joaquin basin fall-run Chinook Salmon … However, given the focus of this proceeding on inflows to the Delta and the lack of information received concerning spring-run flow needs on the San Joaquin River, the San Joaquin River inflow criteria included in this report focus on flows needed to support migrating fall-run Chinook Salmon from and to natal streams through the Delta." (Delta Flow Criteria Report, at p. 119.)

As this paragraph makes clear, there was no analysis conducted on the flows needed from the three eastside tributaries; the focus was solely on flows from the San Joaquin River at Vernalis.

Focusing on inflow to the Delta, the Report makes two key findings. First, the Report states that average March through June flows of 5,000 cfs on the San Joaquin River at Vernalis is a "flow threshold" where survival of juveniles and adult abundance of fall-run Chinook salmon is "substantially improved." (Delta Flow Criteria Report, p. 119.) Second, the Report states that average flows of 10,000 cfs at Vernalis during the same time period may provide conditions necessary to double San Joaquin basin fall-run. (Delta Flow Criteria Report, p. 119.)

The State Water Board then determined what percentage of unimpaired flow would be necessary to achieve these flow rates of 5,000 and 10,000 cfs at Vernalis. In doing so, the drafters of the Report examined all of the flows in the San Joaquin Valley. Specifically, unimpaired flow was

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[15] Ferguson et al 2016. see page 235 at http://scienceconf2016.deltacouncil.ca.gov/sites/default/files/2016-10-29-Accepted-Oral-Abstracts.pdf

computed as “the sum of estimates from **nine** sub-basins in the watershed and are understood to represent the flow that would occur on the San Joaquin River at Vernalis.” (Delta Flow Criteria Report, p. 97.) The nine sub-basins include “the Stanislaus River at Melones Reservoir, San Joaquin Valley Floor, Tuolumne River at Don Pedro Reservoir, Merced River at Exchequer Reservoir, Chowchilla River at Buchanan Reservoir, Fresno River near Daulton, San Joaquin River at Millerton Reservoir, Tulare Lake Basin Outflow, [and the] San Joaquin Valley West Side Minor Streams.” (Delta Flow Criteria Report, p. 97.)[16] The report concluded that “60% of the unimpaired flow [of the entire San Joaquin River basin upstream of Vernalis] from February through June is needed in order to achieve a threshold flow of 5,000 cfs or more in most years (over 85% of years) and flows of 10,000 cfs slightly less than half of the of time (45% of years).” (Delta Flow Criteria Report, p. 120.)

The analysis presented in the SED demonstrates that these flow thresholds of 5,000 cfs and 10,000 cfs will rarely be met by requiring 40% unimpaired flow from only the Stanislaus, Tuolumne and Merced Rivers (three of the nine sub-basins that contribute to San Joaquin River flows at Vernalis). Figure F.1.4-4a in the SED, reproduced below, shows that average flows of 5,000 cfs from February to June (or 1,500 TAF) are only achieved in about 50 percent of water years under a 40% unimpaired flow requirement.[17] (see also SED, at Appx. F1, Table F.1.4-4, p. F.1-168.) The graph also shows that average flows of 10,000 cfs (or 3,000 TAF) are only achieved in about 15% of water years under a 40% unimpaired flow requirement. (see also SED, at Appx. F1, Table F.1.4-4, p. F.1-168.)

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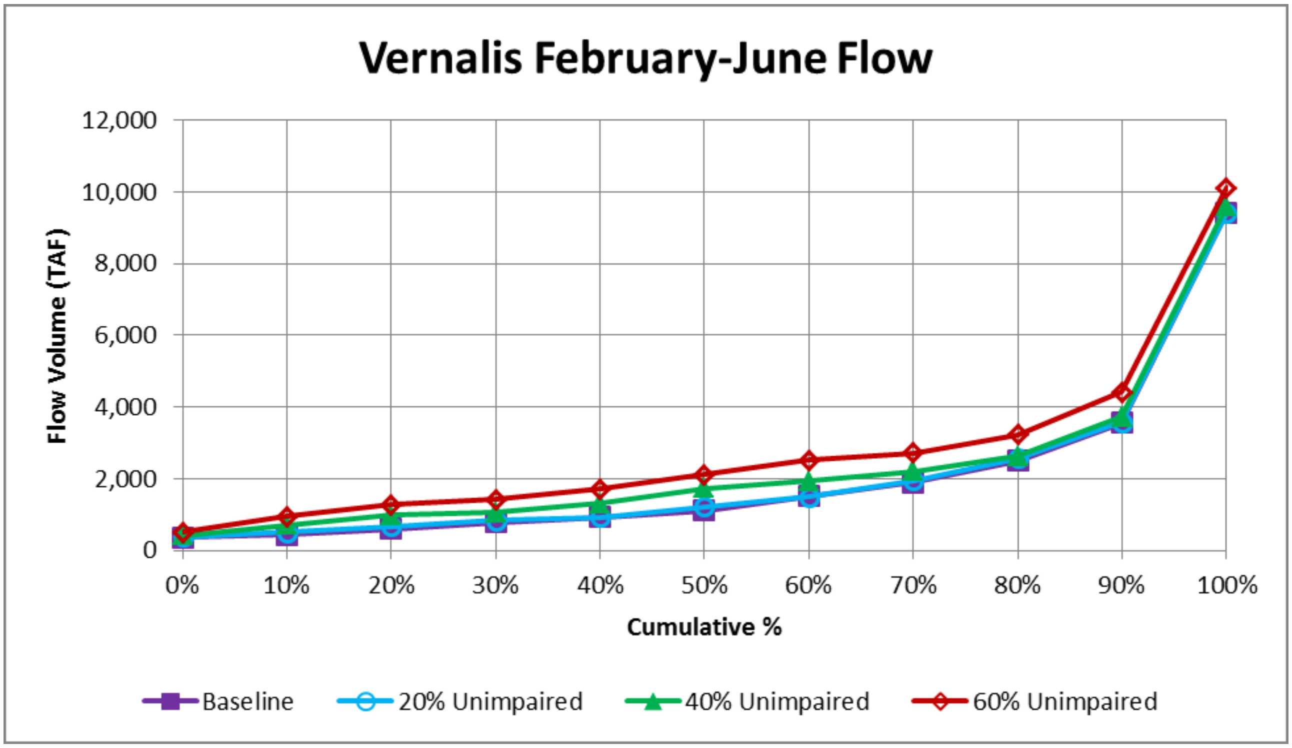
[16] The average unimpaired flow at Vernalis for the months of February through June (1921 – 2003) is 529,000 acre feet (February), 668,000 acre feet (March), 929,000 acre feet (April), 1,467,000 acre feet (May), 1,117,000 acre feet (June), for a summed average amount of 4,710,000 acre feet over all five months. (Delta Flow Criteria Report, p. 97; *California Central Valley Flow Data,* Fourth Edition Draft (May 2007), p. 45.)

[17] The flows in Figure F.1.4-4a are expressed in acre feet, not cfs. Using a conversion rate of 1 cfs = 2 acre feet per day, which is the same conversion rate used in Appendix F1 (SED, at F.1-143), average flows of 5,000 cfs are equivalent to approximately 1,500 TAF because there are 150 days in the February to June time period: 5,000 cfs * 2 acre feet/day = 10 TAF/day * 150 days = 1,500 TAF. The SED does not contain a similar graph for the February to June time period using cfs.



SED Figure F.1.4-4a. WSE-Simulated Cumulative Distribution of SJR at Vernalis February-June Flow Volumes (TAF) for Baseline Conditions and 20%, 40%, 60% Unimpaired Flow (LSJR Alternatives 2-4)

The frequency of achieving 5,000 cfs and 10,000 cfs flow thresholds are significantly lower under the Proposed Project than under the 60% unimpaired flow proposal in the Delta Flow Criteria Report where the flow thresholds were expected to be achieved in 85% of years and 45% of years, respectively. This reduction is due in large part to the fact that only three basins are contributing to the flows at Vernalis, as opposed to all nine. Indeed, the median annual unimpaired flow of the upper San Joaquin (which is not required to contribute any percentage of unimpaired flow under the objectives) is 1.44 MAF, whereas the Stanislaus, Tuolumne and Merced are only 1.08 MAF, 1.72 MAF, and 0.85 MAF, respectively.

The Delta Flow Criteria Report concludes that the benefit to fall-run Chinook salmon migrating through the Delta is dependent on Vernalis flow. The SED fails to explain how the Vernalis-centric flow analysis which covered the entire San Joaquin River basin evolved into a narrowly focused objective covering only the three eastside tributaries. There is also no explanation of the impact of reducing unimpaired flow from 60% of the entire San Joaquin basin to 30-50% of the three eastside tributaries. If there will not be significant improvements to fall-run Chinook salmon under the proposed flow objectives because the flow thresholds from the Delta Flow Criteria Report will rarely be met, then there is a disconnect between the proposed objectives and the beneficial uses that they are intended to protect.

2.1.2.2.4. The water temperature analysis in the SED is flawed and does not show improvements that will benefit fall-run Chinook salmon

Staff has asserted in several public hearings that the Tributary Flow Objective will protect fall-run Chinook salmon by improving water temperature conditions on the Stanislaus, Tuolumne and Merced Rivers, irrespective of the fact that the SalSim analysis only shows an increase in production of 1,103 fish.[18] Before addressing the results of the temperature analysis in the SED, it must be noted again that the analysis does not presume implementation of the Tributary Flow Objective as written. Rather, flows were shifted outside the February-June period to the July-November period to avoid "an undesirable result of elevated temperatures when compared to baseline." (SED, at Appx. F1, p. F.1-43.) In other words, Staff found that without the flow shifting measures, water temperatures were cooler under Baseline conditions than under the Tributary Flow Objective conditions. Since flow shifting is "not part of the unimpaired flow objective" (SED, at Appx. F1, p. F.1-17), any assertion by Staff that the Tributary Flow Objective itself will improve water temperature conditions is belied by the information in the SED, assuming acceptance of Staff's premise that cooler temperatures are universally better for Chinook salmon production. In any event, even with the flow shifting measures, the analysis in the SED does not demonstrate that the temperature changes will result in improved conditions for fall-run Chinook salmon.

First, the temperature analysis in the SED uses monthly data and converts the monthly output to daily values. (SED, at 19-18.) As a result, the model assumes that the same flow rate will occur every day of the month. This result is contrary to the Tributary Flow Objective which requires

[18] Transcript of Public Hearing before SWRCB, November 29, 2016, p. 272, lns. 15-23 [Les Grober: "the main thing to say is that we're not relying on [SalSim results] to say this is the benefit. We're relying on the things that we showed that we have temperature improvements, we have floodplain habitat improvements, and these are things that have been shown to lead to increases in populations and resiliency and all sorts of measures elsewhere in other systems. So that's what we're relying upon to show the benefit."]

a percentage of unimpaired flow based upon a minimum 7-day running average. Using a daily running average approach means that flows will change every day, not once per month. Accordingly, the analysis in the SED does not capture the daily changes in flow that would occur if the Tributary Flow Objective were implemented. As these changes in flow will cause corresponding changes to water temperature, the results shown in the SED are not reflective of what temperature impacts might occur, and thus do not demonstrate that the Tributary Flow Objective will protect beneficial uses. .

Furthermore, in modeling the temperature impacts, State Water Board Staff used the San Joaquin River Basin-Wide Temperature and EC Model, also known as the SJR HEC-5Q model. (SED, at 19-17.) The temperature thresholds were based on the USEPA recommended temperature criteria for protection of salmonids using the 7-day average of the daily maximum (7DADM) metric. (SED, at 19-18.) The analysis presented in the SED examines the percentage of days during each month over the modeled 34-year period that USEPA criteria are expected to be met at various locations on the Stanislaus, Tuolumne and Merced Rivers. (SED, at 19-18.) The SED characterizes a "significant benefit" as being a 10% change in the amount of time that USEPA criteria are met. (SED, at 19-18.) However, there was no legitimate or scientific basis for characterizing a 10% change as a "significant benefit", or a benefit at all. Specifically, the SED acknowledges there is no data to support the position that a 10% change will have any impact on population metrics such as survival or abundance. (SED, at 19-18 [noting that there is a lack of "quantitative relationships between a given change in environmental conditions and relevant population metrics (e.g. survival or abundance)"].) The only apparent reason for choosing 10% as a marker is that it purportedly covers the expected margin of error of the model, although this reasoning seems to be based on guesswork rather than statistics. (SED, at 19-18 ["Ten percent was selected because it accounts for a reasonable range of potential error associated with the assumptions used in the various analytical and modeling techniques"].) In acknowledging these many uncertainties, the drafters of the SED provided the following statement for the State Water Board to consider: "a 10% change was considered sufficient to *potentially result* in beneficial or adverse effects to sensitive species at the population level." (SED, at 19-18 [emphasis supplied].) In light of the significant impacts to water supply that will be caused by the proposed objectives, the Board should demand a more reliable and scientifically-grounded conclusion as to what measure of temperature change will result in a benefit to salmon population. The *potential* for a benefit does not justify the drastic reduction to surface water supply, nor the significant impact to groundwater supply, that will be caused by the objectives.

In any event, a review of the SED analysis demonstrates that this 10% change is rarely achieved under Alternative 3. [19] For instance, on the Stanislaus River, the 10% change over Baseline is only consistently achieved under 40% UIF in the month of October, and only for purposes of adult migration. (SED, at Table 19-3, p. 19-22.) The month of October is not targeted by the objectives, and presumably this increase in temperature is only achieved as a result of the flow shifting that is not part of the Proposed Project. Notably, the percentage of time when the USEPA criteria is met in October for adult migration purposes under Baseline is already fairly high, i.e., it is achieved between 71% and 88% of the time at all locations on the river. (SED, at Table 19-3, p. 19-22.) Apart from the 12% change seen in October for adult migration purposes, the 10% change threshold is only achieved at two other times and locations on the Stanislaus River under 40% UIF, namely for spawning, egg incubation, and fry emergence in March at the ½ and ¾ locations on the river. (SED, at Table 19-3, p. 19-22.) On the Tuolumne River, there are no reported improvements in February at 40% unimpaired flow, and there are no relevant temperature changes in March for the simple fact that the temperature threshold of 60.8 degree Fahrenheit for fall-run Chinook juvenile rearing is already established under baseline conditions. (SED, at 19-26, Table 19-7.) As explained in the comments submitted by MID and TID, the remainder to the Tuolumne temperature results reported in the SED do not demonstrate a benefit to fall-run Chinook salmon.[20]

[19] The temperature analysis is also addressed in the comments from Oakdale Irrigation District and South San Joaquin Irrigation District at 19-34. The Board's temperature analysis is also addressed in comments submitted by MID and TID

[20] See Comments submitted by MID and TID.

Given the results reported in the SED, and given the fact that there is no evidentiary support for the assertion that a 10% improvement will have a positive impact on survival or abundance of salmonids, it cannot be said that the Tributary Flow Objectives – even as modeled in the SED – protect the beneficial uses identified in the plan.

2.1.2.2.5. The SED's floodplain habitat analysis is flawed and does not show improvements to floodplain habitat

Section 19.3 of the SED describes expected benefits to salmon and steelhead from floodplain inundation under the Alternatives. Achieving a certain amount of floodplain inundation is not a WQCP objective. Rather, the State Water Board provides an analysis of floodplain inundation as justification for the proposed instream flows. Based on the analysis, the SED concludes that:

> "Implementation of the proposed project will produce substantial increases in floodplain *habitat* which is available to native fish and wildlife populations, and it is expected that there will be significant positive population responses by native salmonids, and other native fishes." (SED, at 19-74 [emphasis supplied].)

The SED does not provide adequate support for this conclusion. Specifically, the SED (1) does not define floodplain *habitat*, nor does it properly distinguish between inundated land and habitat, (2) does not consider the quality of newly inundated areas, omitting factors such as depth, flow rate, timing, duration, dissolved oxygen, temperature and substrate; (3) does not integrate findings of the temperature assessment with the floodplain assessment to evaluate the expected thermal suitability of inundated areas; (4) does not consider other reasonable measures such as floodplain restoration to create more frequently inundated off-channel habitats, and (5) does not address empirical findings which validate that wetted area does not always equate to usable habitat. These critiques are addressed in turn below.

2.1.2.2.5.1. The SED does not define floodplain habitat

In order to properly assess whether the additional flows required by the proposed objectives will create floodplain *habitat*, as opposed to inundated land unsuitable as habitat, the term floodplain habitat must first be defined and distinguished from inundated land. However, the SED does not provide such a definition. Before the Board makes any decision as to whether the proposed objectives provide reasonable protection to fish and wildlife due to the creation of additional floodplain habitat, the term floodplain habitat must first be defined so that the Board can assess whether the objectives merely inundate more land or create habitat that will be beneficial to fish and wildlife.

Floodplain habitat is characteristically broad flat, low-lying land that is accessible to rising river conditions (Sommer et al. 2001[21], Jeffres 2008[22], Katz et al. 2013[23]). The otherwise dry area becomes inundated and floods terrestrial invertebrates, providing an abundant, otherwise inaccessible, food-source for fish. As waters warm, productivity increases key food sources like zooplankton in densities greatly exceeding the main channel. The relatively shallow, open-water habitat, spread over a large expanse also creates several important features. First, it allows for water to warm from ambient exposure. Second, the large area has slower moving water (low-velocity) requiring minimum effort for juveniles to search for food or hold in place. Finally, the inundated terrestrial vegetation and broad expanse lower the potential for predator-prey interactions. None of these key factors are addressed in the SED's determination of how floodplain habitat is identified.

The SED compares floodplain creation on the three eastside tributaries to the Yolo Bypass. This is not a proper or helpful comparison. The Yolo Bypass is a 59,000-acre area that doubles the inundated area of the Delta and is "equivalent to about one-third the area of the San Francisco and San Pablo bays" (Sommer et al. 2001). The sum of the fragmented, wetted areas in the San Joaquin Basin that the SWRCB is referencing is not comparable in size or function. This disparity alone highlights a fundamental misunderstanding of what floodplain habitat is and how it works. This misunderstanding was further highlighted in the SED when it stated, "…exactly how much faster salmon grow on a floodplain depends on many variables that are not completely understood in

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[21] Sommer, T. R., Nobriga, M. L., Harrell, W. C., Batham, W., & Kimmerer, W. J. (2001). Floodplain rearing of juvenile Chinook salmon: Evidence of enhanced growth and survival. Canadian Journal of Fisheries and Aquatic Sciences, 58(2), 325-333.
[22] Jeffres, C. A., Opperman, J. J., & Moyle, P. (2008). Ephemeral floodplain habitats provide best growth conditions for juvenile Chinook salmon in a California river. Environmental Biology of Fishes, 83(4), 449-458.
[23] Katz, J., Jeffres, C., Conrad, L., Sommer, T., Corline, N., Martinez, J., Brumbaugh, S., Takata, L., Ikemiyagi, N., Kiernan, J., & Moyle, P. (2013). Experimental agricultural floodplain habitat investigation at Knaggs Ranch on Yolo Bypass, 2012-2013. Sacramento, CA: US Bureau of Reclamation.

California…" (SED, at 19-74). As just explained, the "many variables" are understood from past research, but clearly not addressed within the SED analyses.

2.1.2.2.5.2. The SED does not examine the quality of the inundated areas, nor the suitability of the inundated areas as habitat

The SED analysis relies upon the United States Fish & Wildlife Service ("USFWS") (2013) model to estimate floodplain inundation for the Stanislaus River. (SED, at 19-57.) The USFWS abandoned use of its own model in light of a superior model being developed by NewFields (2013). The USFWS used the NewFields model in its assessment of survival relative to floodplain inundation. (*Identification of the Instream Flow Requirements for Anadromous Fish in the Streams Within the Central Valley of California and Fisheries Investigations* (2014) USFWS Annual Progress Report Fiscal Year 2014, Sacramento, CA ("USFWS 2014").) Annual Progress Report Fiscal Year 2014. Sacramento, CA.) The SED references the USFWS 2014 analysis, and therefore the SWRCB must be aware that the NewFields model exists. It is unclear why the SWB chose not to use the best available science in its assessment of floodplain inundation in the Stanislaus River. A presentation by Paul Frank (NewFields, February 2014) of the reported conclusions of the NewFields (2013) findings state that rearing habitat is best increased by creating perennially accessible habitat through habitat restoration, not temporary habitat from elevated overbanking flows.

Even if the SWRCB accurately identified the quantity of created floodplain habitat (which appears highly unlikely), there is little consideration of the habitat quality differences that occur across a river. The SWRCB briefly broached the idea of 'differences in habitat quality' by stating, "…as an example, flooding a parking lot with sufficient timing, frequency, magnitude, and duration necessary for fish will not produce the kinds of ecosystem responses that are desired" (SED, at 19-55). Each river does have its 'parking lots' of unusable habitat. For such an important model, outputs should be validated in the field. At a minimum, the SED should provide a reasonable correction factor to its floodplain estimates bringing numbers into a more realistic representation. Not only did the SED not conduct any validation, but it assumed *100 percent* of the newly wetted area was not only usable by juvenile Chinook salmon or other native fishes, but that it provided greater benefit than other wetted areas. As a result, the modeled wetted area increases from additional flow cannot be confirmed as quality usable habitat or verified as floodplain habitat at all.

One of the key factors in determining whether a newly inundated area will create suitable floodplain habitat is timing. The proposed objectives require significant amounts of additional flow with questionable resulting benefits to floodplain habitat that are poorly timed. Under current conditions in the San Joaquin River basin the total capacity for floodplain creation is relatively limited. Even under the most optimistic scenario, the maximum amount of floodplain that is predicted to be inundated on the Stanislaus River is 789 acres during the month of May. (SED, at 7-87, Table 7-15a [Alternative 4].) This figure represents the amount of area that is inundated with water, not necessarily the amount of area that will provide significant ecological benefits to native fish. Moyle et al. (2007)[24] stated that "Re-creation of floodplains with a high degree of ecological function is not easily accomplished…" and provided a set of guidelines for restoring native fishes to floodplains. The most relevant recommendations were to: (1) provide early opportunities for flooding, primarily from January through April, which were important to increase algal and invertebrate production; and (2) maintain a mosaic of habitats, with a primary focus on large open areas covered with annual terrestrial plants. The authors also note that limited sampling in more forested habitats yielded few fish, relative to the nearby open areas. These considerations should be more fully recognized in the SED as quality of floodplain habitats are not addressed and the timing of inundation may tend to favor non-native species over native species based on results from Moyle et al. (2007).

The timing of floodplain inundation is a critical component to restoring this particular habitat for native fish. For Chinook salmon in particular, usage of the floodplain in the Cosumnes River occurred primarily in late-winter and early spring with most fish observed in February and March (Moyle et al. 2007, Table 4 therein). Native fish (e.g., Splittail, Sacramento sucker, and Chinook salmon) made up less than half of the observed catch beginning in the month of May (Moyle et al. 2007; Figure 3 therein). By June, a high proportion of observed catches were made up

[24] Moyle, P., Crain, P., & Whitener, K. (2007). Patterns in the use of a restored California floodplain by native and alien fishes. San Francisco and Estuary Watershed Science, 5(3), 1-29.

of non-native fishes. While Jager (2014)[25] showed increased recruitment of Chinook salmon under a pulse flow scenario (used for floodplain inundation) that had relatively late timing, the author also found that a late-winter pulse was also associated with increased recruitment rates. These differing viewpoints highlight the need for a more thorough evaluation of the timing of floodplain inundation in the SED. Jager (2014) also noted "the natural hydrograph may not always be the best solution for fishes in regulated rivers because relationships with mediating factors have changed."

Under the proposed alternative, floodplain inundation appears to increase more substantially (over baseline conditions) during the months of April and May (SED, at Tables 7-15a-d, p. 7-87 – 7-90.) Slight decreases, increases, or no change in available floodplain habitat are predicted to occur during the months of February and March. The impact of creating more inundated areas in the later months, while achieving similar available floodplain habitat in the earlier months, needs to be further evaluated. There may be more benefit to more-numerically-abundant fry- and parr-sized Chinook salmon during the early months, and an increase in the risk of favoring non-native species during the later months.

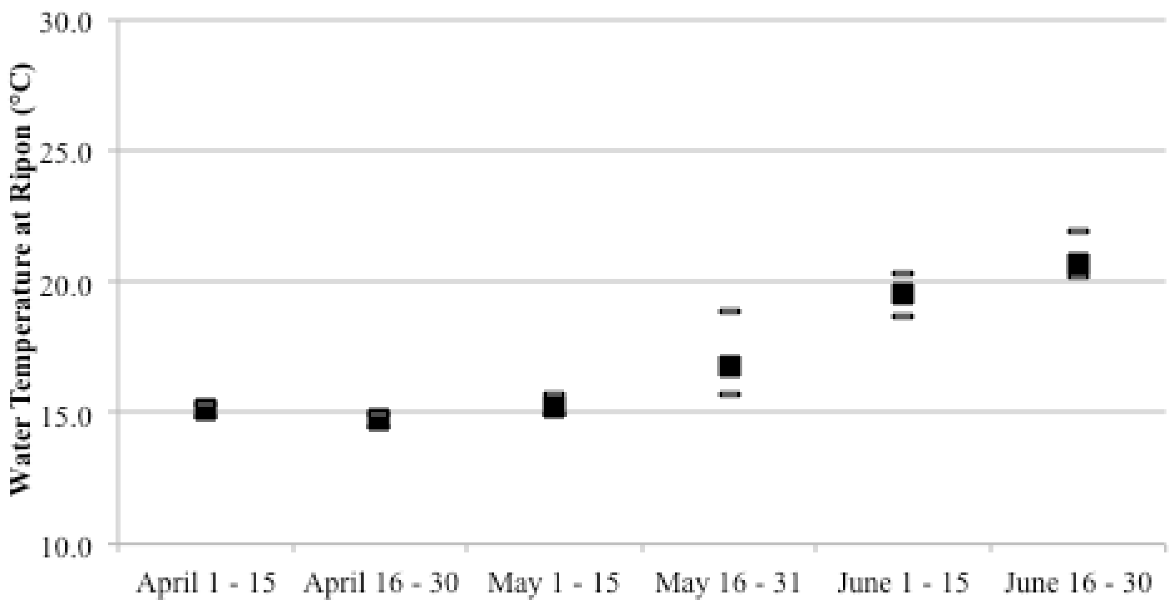
2.1.2.2.5.3. The SED does not consider the physical and biological interconnected relationships between temperature and flow as they relate to floodplain habitat

The SED does not fully consider the effect of temperature and flow in the timing and presence of juvenile salmon in the river. Floodplain created in later months from mid-April through June offers little benefit to juvenile salmon. As shown above, this is the time when the greatest amount of wetted area is created under the objectives. (SED, at Tables 7-15a-c, p. 7-87 – 7-89.) This oversight occurs because the SED addresses interrelated factors (such as flow and temperature) individually and cites to segments of scientific findings without providing much needed empirical results from the rivers being analyzed. This error further ignores the implicit and fundamental relationship of flow, temperature, rearing habitat, and food resources in the development and migration of a young salmonid.

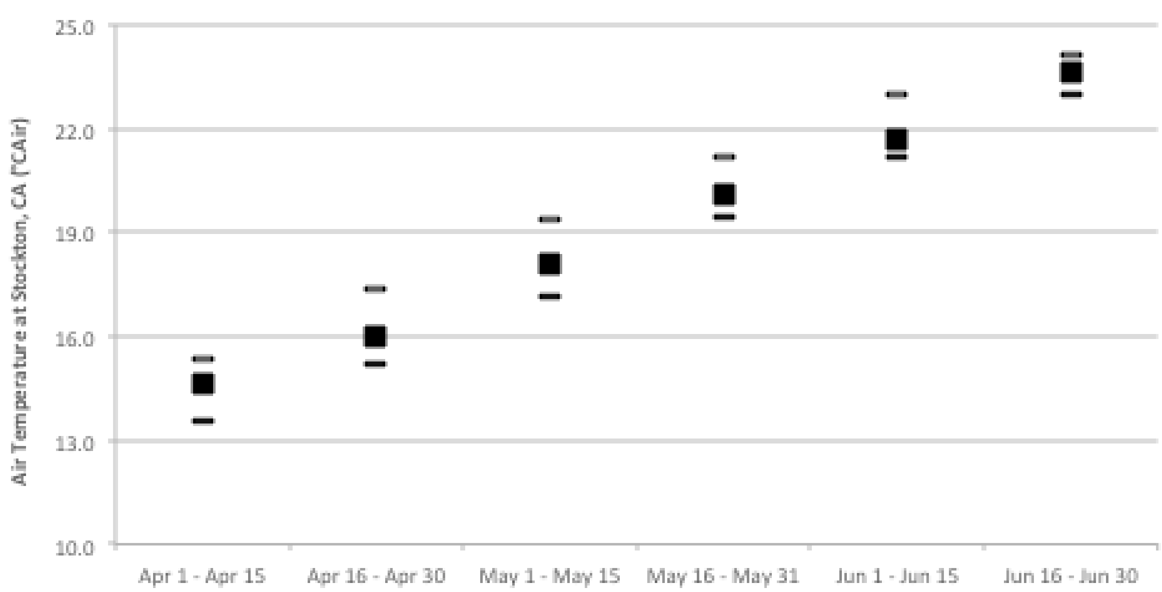
[25] Jager, H. I. (2014). Thinking outside the channel: Timing pulse flows to benefit salmon via indirect pathways. Ecological Modelling, 273, 117-127.

The SED inappropriately attributes survival to floodplain acre-days. On page 19-53, the SED states: “On the Stanislaus River, USFWS (2014) found a significant relationship between juvenile survival and floodplain acre-days, with floodplain acre-days explaining 77% of the year to year variation in juvenile survival.” While the statistical correlation may be valid, the biological causation or underlying mechanism may be different. Survival indices are almost entirely driven by whether fry survive during migration, not while rearing. In wetter years with freshets, fry have shown good survival rates to the lower rotary screwtrap at Caswell. This is not due to floodplain inundation. These fry are actively migrating and quickly moving from the primary spawning and rearing reach to the Delta. These fry are not rearing on the floodplains, they are exiting the system.

In addition to the freshet-influenced survival of fry, temperature also becomes an issue in May and June. The SED states that 14°C (57.2°F) should be maintained to the confluence of all eastside tributaries from April to June for smoltification (SED, at 7-122 – 7-125). While most outmigration already occurs in February and March, water temperature conditions in the Stanislaus River historically remain cool (mean of approximately 15°C or 59°F) through April (SJTA Figure 2-2, below) as remaining fish leave the system as smolts. Ambient warming drives elevated water temperature in May through June (SJTA Figure 2-3, below) beyond the control of reservoir releases and outside of desirable outmigration conditions. By failing to integrate results of the temperature assessment with the floodplain assessment, the SED neglects to recognize that temperatures in most of the floodplain areas will exceed the criteria set forth in Tables 19-1 and 19-2. For example, on the Stanislaus river at Ripon (RM 16) water temperatures exceed 14°C (57.2°F) from April-June which is the primary period that the SWB concluded that the majority of floodplain inundation and benefit to salmon would occur.



SJTA Figure 2-2. Minimum, average and maximum of daily water temperatures at Ripon (RM 16) 1998-2016 (USGS Station 11303000).[26]

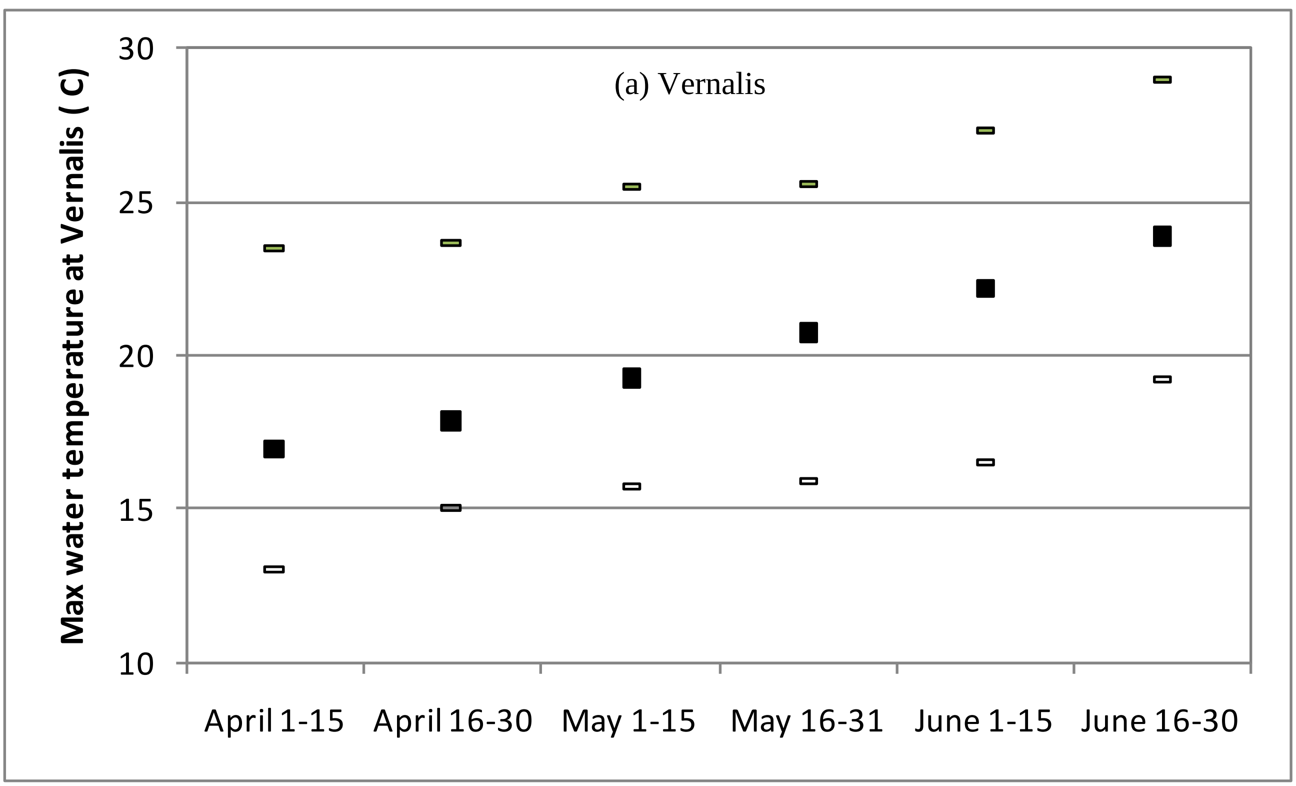


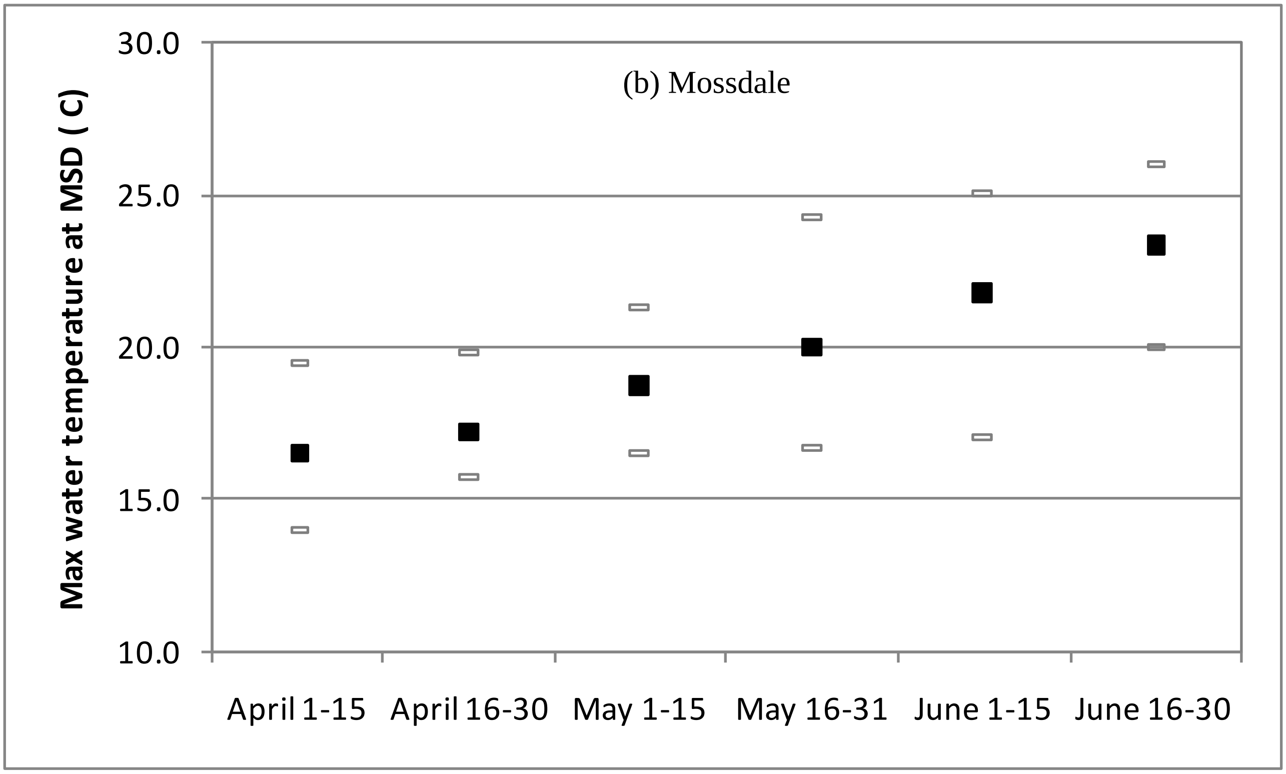
SJTA Figure 2-3. Minimum, average and maximum average air temperatures at Stockton Metro Airport, 1950-2016.[27]

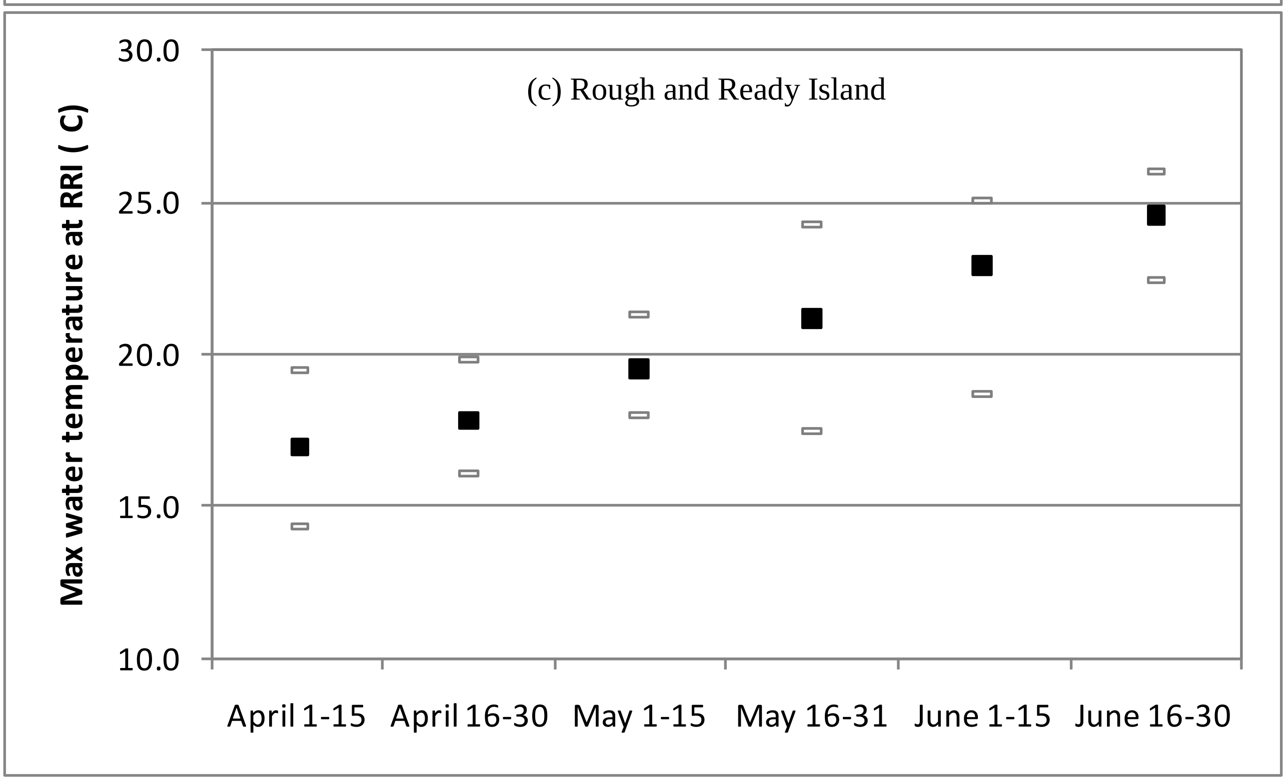
[26] Data for SJTA Figure 2-2 available at https://waterdata.usgs.gov/nwis/dv/?site_no=11303000&agency_cd=USGS&referred_module=qw. Figure prepared by FishBio, Inc.

[27] Data for SJTA Figure 2-3 available at http://www.wrcc.dri.edu/climatedata/climsum/. Figure prepared by FishBio, Inc.

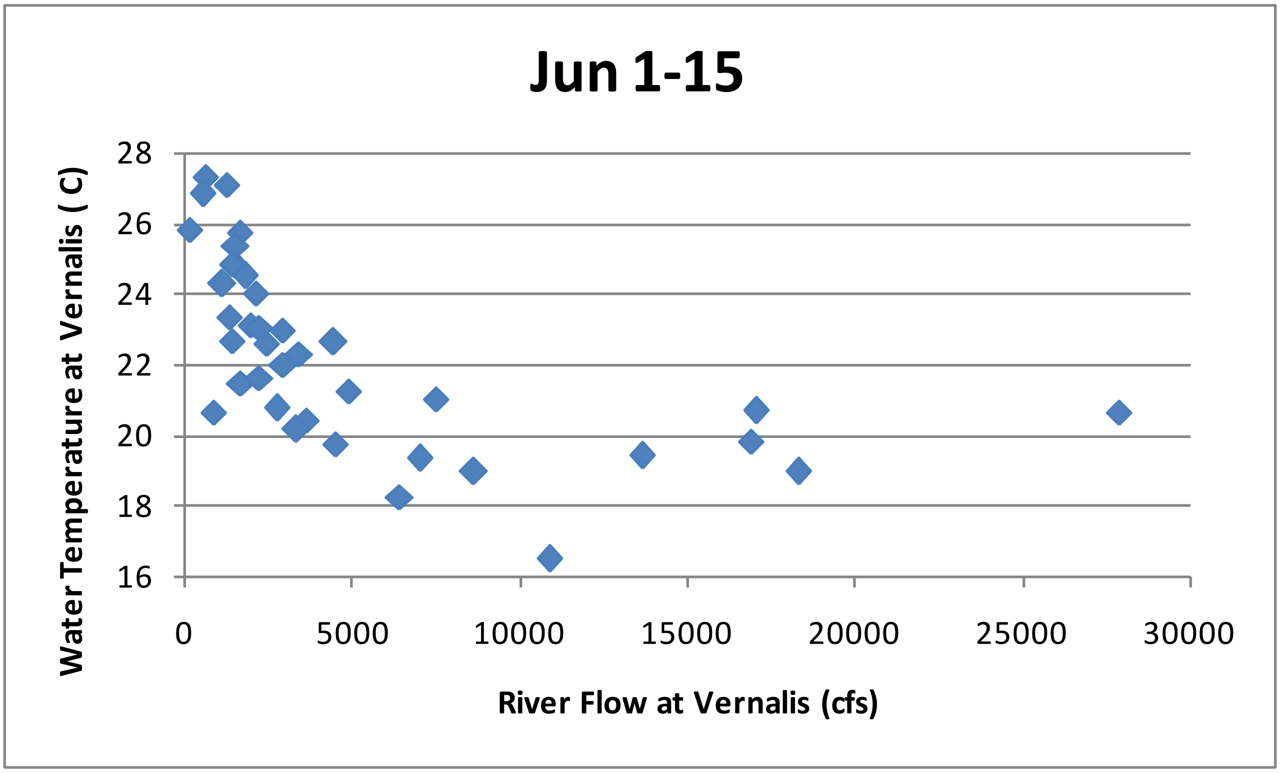
Outside of the Stanislaus River, warming occurs earlier and more rapidly. In the San Joaquin River, water temperature steadily rises from median temperatures near 16°C (60.8°F) in early April to approaching 20°C (68°F) by early May (SJTA Figure 2-4, below). Again, increased flow releases did not appear to counteract the ambient warming conditions. Monthly water temperatures collected at Vernalis show a nonlinear pattern, with a clear threshold at which water temperature operates independently of discharge. Monthly discharge levels below 2,500 cfs appear to have a strong negative relationship with water temperatures. However, above 2,500 cfs, the relationship between monthly discharge and water temperature changes to a different pattern. Data in this portion of the relationship clearly shows that water temperature is not associated with increased discharge (SJTA Figure 2-5, below). This result also shows that the water temperature above approximately 20°C (68°F) cannot be reliably managed by flow and any out-migrant salmonid in May and June will experience uncontrollably high and potentially undesirable water temperature conditions in the San Joaquin River.



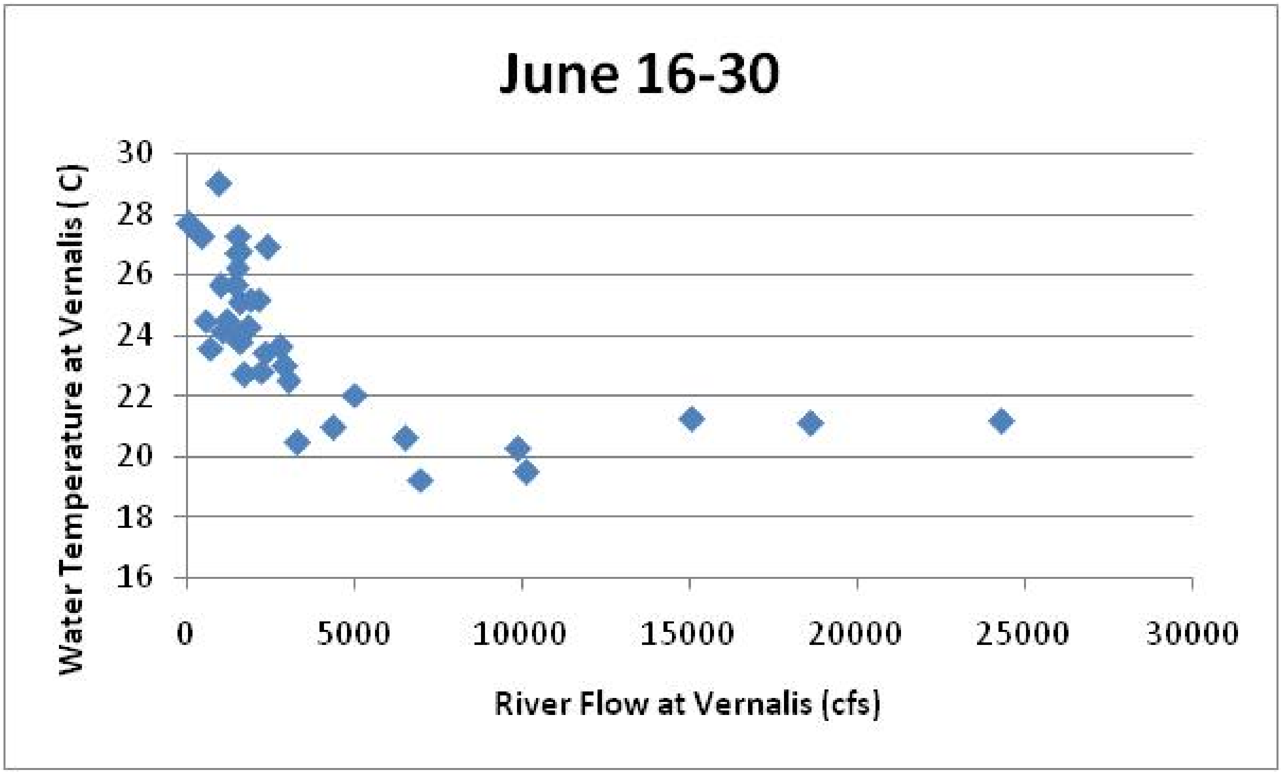

(b) Mossdale
Max water temperature at MSD (C)
30.0
25.0
20.0
15.0
10.0
April 1-15
April 16-30
May 1-15
May 16-31
June 1-15
June 16-30


(c) Rough and Ready Island
Max water temperature at RRI (C)
30.0
25.0
20.0
15.0
10.0
April 1-15
April 16-30
May 1-15
May 16-31
June 1-15
June 16-30

STJA Figure 2-4. Minimum, mean, and maximum of average maximum water temperatures at (a) Vernalis 1973-2011 (USGS station 113035000), (b) Mossdale 2002-2011 (CDEC station MSD), and (c) Rough and Ready Island 2001-2011 (CDEC station RRI).[28]



[28] USGS data is available at https://waterdata.usgs.gov/nwis and CDEC data is available at http://cdec.water.ca.gov/cgi-progs/selectQuery. Figure provided by FishBio, Inc.



SJTA Figure 2-5. Average river flow (cfs) and average maximum water temperature (°C) at Vernalis, 1973-2011 (USGS station 113035000).[29]

The SWRCB's goal to increase floodplain and to meet unreasonable water temperature thresholds during the latter portion of the outmigration period will provide little benefit to a numerically small number of native salmonids and may carry with it higher risks than other potential alternatives. The primary risk is to the coldwater pool in the upstream rim reservoirs, a risk that may carry many unintended consequences that will affect summer rearing areas of *O. mykiss* and fall migration and spawning conditions for adult Chinook salmon. A secondary risk is that later inundation of floodplains may favor non-native fish species, not the native species that it is intended to benefit. Therefore, a more biologically beneficial alternative is to provide off-channel habitat that is available at a wide range of flows, specifically designed to function for multiple life stages of native salmonids.

2.1.2.2.5.4. The proposed objectives ignore the only viable solution of bringing habitat to flow, rather than flow to the habitat

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[29] Data is available at https://waterdata.usgs.gov/nwis. Figure provided by FishBio.

The objectives narrowly focus on using sizeable flows to bring water to floodplain habitat. This focus ignores other potential solutions that should be considered in a resource-limited landscape. The SED acknowledges that the Central Valley historically contained approximately one million hectares (2.47 million acres) of floodplain habitat, and that 90% of this habitat has been lost due to land-use changes and habitat conversion. (SED, at 19-53). This leaves 247,105 acres remaining in the entire Central Valley. Combined, the Yolo bypass (59,305 acres) and Cosumnes River Preserve (45,999 acres) amount to approximately 105,000 acres, or nearly 43 percent of the total floodplain habitat. The combined inundated areas on the Stanislaus, Tuolumne, Merced, and San Joaquin Rivers at flows of 5,000 cfs on the tributaries and 15,000 cfs on the San Joaquin (which is well above 60% unimpaired flow), equal 11,418 acres of fragmented "floodplain" habitat – less than 5% of the remaining floodplain habitat in the Central Valley. (SED, at Tables 19-22 – 19-27, p. 19-63 – 19-68.)

Instead of focusing exclusively on flow, the objectives should include restoration of off-channel habitat, which has already been shown to provide salmonid habitat at base case flow levels in the Stanislaus River. Recent restoration projects, including Honolulu Bar, Russian Rapids side-channel complex, and Lancaster Road restoration area, have utilized alterations to channel morphology and the riparian community to provide continuously wetted and accessible habitat for native fish. These projects are a more appropriate and reasonable means of providing salmonid habitat for multiple life stages, year-round rather than increasing flows to provide relatively small amounts of temporary marginal floodplain habitat.

2.1.2.2.5.5. Empirical findings validate that wetted area does not always equate to usable habitat

The analysis in the SED fails to acknowledge empirical findings which have shown that wetted area does not always equate to usable habitat. On the Stanislaus River, FISHBIO was able to sample fish use of off-channel "floodplain" habitats identified from NewFields model outputs (2013) during periods of increased flow from Goodwin Dam in 2013 and 2014. A report on this sampling was sent to the Stanislaus River Forum and is attached hereto as SJTA Attachment 4. Sampling in 2013 occurred between April 25 and May 9 at flows ranging from 3,009 to 3,045 cfs at

Goodwin Dam. No juvenile fall-run Chinook salmon were observed in 2013 despite an estimated passage of over 145,000 individuals at the Oakdale rotary screw trap between April 25 and May 10. Sampling in 2014 occurred between April 21 and April 30 at flows ranging from 2,400 to 2,700 cfs. With an estimated passage of 48,600 individuals at the Oakdale rotary screw trap during the sampling period, a total of 265 juvenile fall-run Chinook salmon were observed in off-channel habitats during 2014. However, 199 of the 265 fish were observed in recently restored side-channel habitats (i.e., Honolulu Bar, Russian Rapids side-channel complex, and Lancaster Road restoration area) that remain connected at all flow levels. Therefore, the presence of fish in these areas cannot be attributed to increased flow from Goodwin Dam.

Non-restored off-channel areas surveyed in the Stanislaus River did not have the characteristics of productive and beneficial floodplain habitat that was assumed from the NewFields model outputs. Large, shallow, warm-water floodplains (like Yolo Bypass) provide refuge from high flows, high biotic diversity, and abundant food sources, which have been shown to be ideal conditions for growth of juvenile salmonids (Jeffres 2008, Katz et al. 2013, Sommer et al. 2001). However, floodplain areas in the Stanislaus River were generally comprised of narrow bands of flooded margin habitat where riparian encroachment, resulting in very dense vegetation, was common.

Temperatures in the off-channel areas remained low (12.0 – 18.7°C or 53.7 – 65.7°F) throughout the duration of each sampling period. Water temperatures on average were less than 0.55°C (1°F) warmer in off-channel habitats compared to surface waters of the main channel, though some areas with limited water circulation (i.e., backwater areas with no current) warmed to greater than 2.8°C (7°F) above in-river temperatures. Sampling of specific habitat types in 2014 showed that in wetted margin habitat and side channels, average temperatures were only 0.144°C and 0.10°C (0.26°F and 0.18°F) warmer than the main channel. Temperatures in this range do not promote optimal growth rates in juvenile salmonids, but they are within tolerable limits for rearing. Thermal benefits (i.e., warmer water temperatures) are frequently associated with floodplain rearing of juvenile salmonids, and are thought to provide increased food productivity and, subsequently, improved growth conditions compared to the main channel (Sommer et al. 2001). The minimal differences in temperature between most off-channel areas and the corresponding mid-channel were indicative of the lack of suitable floodplain at 2,400 to 3,000 cfs.

Although it is clear that fragments of off-channel habitat, some of which may be considered floodplain, are created by increasing discharge out of Goodwin Dam, the quality and usefulness of this habitat is questionable. Environmental conditions of inundated areas varied greatly (i.e., relative quality or potential for usage of habitats). While most sampled locations were determined to have conditions that were within thresholds for juvenile salmonid rearing, most lacked the warmer temperatures, shallow depths, and open sunlit areas more typical of the larger floodplain areas in the Sacramento – San Joaquin basin. Essentially the habitats did not ecologically function like a floodplain.

Throughout the duration of the study, no Chinook salmon were documented in any of the off-channel habitats sampled below Oakdale (river mile 42.4), despite large numbers of juvenile salmon migrating through the system. This finding is consistent with findings by Moyle et al. (2007), who reported prevalence of non-native species on floodplains and very limited habitat use by Chinook salmon after April. A limited number of Chinook salmon were observed in side channels in 2014, with the majority of these fish seen in recently restored areas including Honolulu Bar, the Russian Rapids side-channel complex, and Lancaster Road restoration area in the upstream reaches (i.e., between Oakdale and Knights Ferry). Given that the majority of juvenile salmon that remain in the system after April are smolts, and considering evidence that larger migrating juveniles typically use mid-channel, higher velocity areas for migration (Kemp et al. 2005[30]; Svendsen et al. 2007[31]), it is likely that these salmon do not utilize the floodplain habitat for extended rearing, but instead migrate rapidly through the lower reaches of the Stanislaus River.

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[30] Kemp, P. S., Gessel, M. H., & Williams, J. G. (2005). Seaward migrating subyearling Chinook salmon avoid overhead cover. Journal of Fish Biology, 67(5), 1381-1391.
[31] Svendsen, J. C., Eskesen, A. O., Aarestrup, K., Koed, A., & Jordan, A. D. (2007). Evidence for non-random spatial positioning of migrating smolts (Salmonidae) in a small lowland stream. Freshwater Biology, 52(6), 1147-1158.

2.1.2.2.5.6. Summary of Floodplain Habitat Analysis in SED

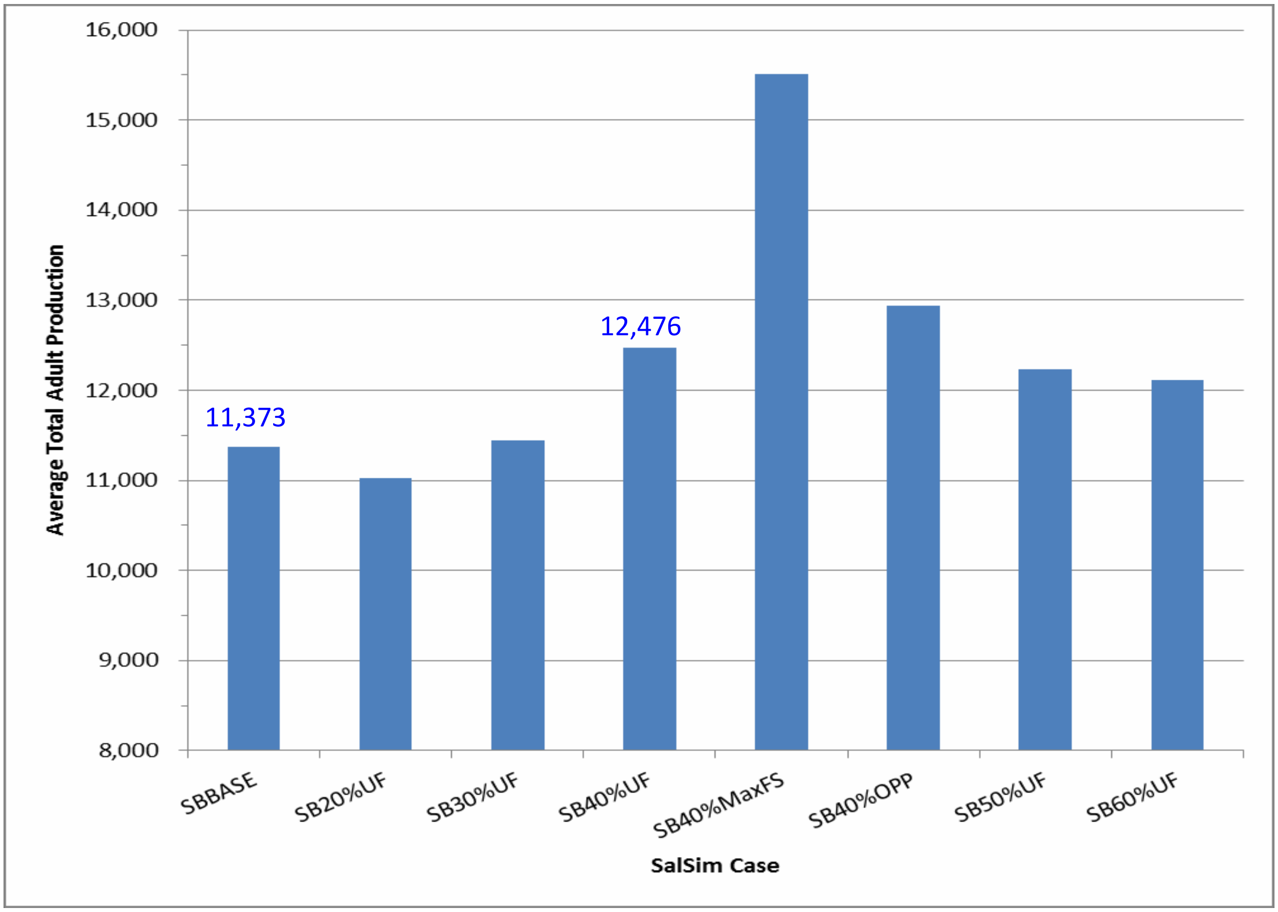
In sum, the floodplain habitat analysis in the SED fails to examine whether the additional flows required by the Tributary Flow Objective will create suitable floodplain habitat on any of the three eastside tributaries. Inundating more land with higher flows does not translate directly into suitable habitat for Salmonids. The Board should consider the studies cited above and the work performed by outside entities such as FishBio, which perform the vast amount of studies on the impacted tributaries. Without proper consideration of this work, the Board cannot determine whether the Tributary Flow Objective will create suitable floodplain habitat, much less determine that the objective provides reasonable protection to the beneficial uses identified in the Water Quality Control Plan.

2.1.2.2.6. The SalSim analysis in the SED shows no benefit to Central Valley fall-run Chinook salmon production

The Narrative Objective states that flows are needed to "support and maintain" the migratory fish population from the San Joaquin River through the Delta. (SED, at Appx. K, p. 18.) Table 19-32 shows the current population under Baseline conditions. Approximately 11,373 Central Valley fall-run Chinook salmon are produced annually on the three tributaries. There is no indication or analysis that the current flow regimes on the three tributaries would not "support and maintain" this population. If Baseline conditions are continued with no changes to the systems, there will be 11,373 Central Valley fall-run Chinook salmon annually, on average. It can be inferred from the document that the current flow regimes will maintain this productivity on the three tributaries.

The SED goes further than the Narrative Objective of "support and maintain" the population. It states there will be a *benefit* to the Central Valley fall-run Chinook salmon. Reading between the lines, this means that the Narrative Objective is not the standard being analyzed. Instead, the analysis focuses on *improving* production, not supporting and maintaining the population. The SED states, "it is expected that there will be **substantial** increases in fall-run Chinook salmon abundance on these tributaries from unimpaired flows at or greater than 40%." (SED, at 19-87 [emphasis supplied].)

The supposed substantial increase in Central Valley fall-run Chinook salmon production is depicted in Figure 19-13 of the SED, which is reproduced below with the addition of the specific numbers taken from Table 19-32.



SED Figure 19-13. SalSim average total adult fall-run Chinook salmon production per year from 1994 to 2010 resulting from different flow cases. These results are the combined results for the Stanislaus, Tuolumne, and Merced Rivers. (Actual numbers from Table 19-32)

The total increase in production from the baseline (SBBASE) to the 40% unimpaired flow requirement (SB40%UF) will be 1,103 Central Valley fall-run Chinook salmon annually. (SED, at Table 19-32, p. 19-84.) Given average annual production of CVFRCS of 707,598 (yrs. 1976-2014),[32] an increase of 1,103 is essentially immeasurable, amounting to an increase of less than a quarter of one percent, or 00.16%.

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[32] http://www.casalmon.org/PDFs/Chinookprod_CompleteDraft2015Reports6.30.16.pdf

For purposes of SalSim analysis only, SWB Staff created an alternative flow-shifting scenario where 25% of the total volume of unimpaired flow from the February-June period was shifted to the months of September through December on all three eastside tributaries and in all water years. (SED, at 19-80.) This flow-shifting scenario, known as maximum flow shifting (SB40%MaxFS) differs from the flow shifting scenarios modeled in the rest of the SED, where *up to* 25% of the volume of unimpaired flow from the February-June period was shifted to July-November, mostly in wet years. (SED, at Appx. F1, p. F.1-43.) The maximum flow shifting scenario was not modeled for any other purpose, and the impacts of maximum flow shifting on water temperature, floodplain habitat, storage, agriculture, groundwater pumping and hydropower were never analyzed in the SED.

In touting the benefits of maximum flow shifting, Staff has failed to point out that by shifting 25% of the February-June flow to later in the year, much of the floodplain habitat that is supposedly created by the 40% unimpaired flow from February through June will be forfeited. Reducing February-June flows by 25% will reduce unimpaired flow from 40% to 30%. The SED measures floodplain inundation changes in acre*days. The percentage increase in acre*days under 40% unimpaired flow as compared to baseline is 35%. (SED, at 19-71.) However, the percentage increase in acre*days under *30% unimpaired flow* as compared to baseline is only 16%. (SED, at 19-71.) Since maximum flow shifting under 40% unimpaired flow will reduce unimpaired flow during the February-June period to 30%, Staff cannot claim both the 35% increase in floodplain inundation under 40% unimpaired flow, *and* the supposed increase in Chinook salmon production under maximum flow shifting. Simply put, Staff cannot have it both ways. This trade-off should be identified in the SED. Before the Board decides whether it will adopt the water quality control plan, Staff should analyze how maximum flow shifting will impact floodplain inundation, water temperature, storage, agriculture, groundwater pumping and hydropower.

In sum, the benefits to Chinook salmon production under the 40% unimpaired flow requirement are essentially immeasurable, amounting to an increase of less than a quarter of one percent. Although the SED suggests that production numbers could be increased under the maximum flow shifting scenario, Staff failed to account for the impact of such flow shifting on floodplain inundation. Since Staff has indicated that benefits should be measured in terms of floodplain creation and water temperature improvements (rather than SalSim results),[33] the benefit of maximum flow shifting, if any, is unknown. As the SalSim analysis fails to demonstrate that the Tributary Flow Objective will achieve any meaningful benefit to Chinook salmon production (which Staff has used as a proxy for protection of all fish and wildlife beneficial uses), the Board should decline to adopt the proposed objective because it does not protect a beneficial use.

2.1.2.3. The SJTA Analysis demonstrates that the objectives do not protect the beneficial uses

The SED does not analyze a true implementation of the Tributary Flow Objective. The various modeling assumptions which Staff added to the Objective are outlined above. Accordingly, the SJTA hired consultants to analyze the impacts of implementing the Tributary Flow Objective without the various modeling assumptions included in the SED analysis. The SJTA consultants evaluated impacts on reservoir storage, water temperature, Chinook salmon production, and the fate of San Joaquin River flows in the Delta. Consulting engineer Daniel B. Steiner coordinated the development of two modeling runs on the Stanislaus, Tuolumne and Merced Rivers: (1) a baseline run, and (2) a 40% unimpaired flow run. Mr. Steiner performed the studies for the Stanislaus and Tuolumne Rivers, and MBK Engineers performed the studies for the Merced River. The tributary studies were combined with information from a contemporary CalSim study to derive results for the San Joaquin River and Vernalis. The results were used to examine impacts to storage on the Stanislaus River at New Melones Reservoir, Don Pedro Reservoir on the Tuolumne River, and Lake Exchequer on the Merced River. Consultant Avry Dotan of AD Consultants used the two sets of modeling runs to perform temperature analysis using HEC-5Q, and Chinook salmon production

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[33] Transcript of Public Hearing before SWRCB, November 29, 2016, p. 272, lns. 15-23 [Les Grober: "the main thing to say is that we're not relying on [SalSim results] to say this is the benefit. We're relying on the things that we showed that we have temperature improvements, we have floodplain habitat improvements, and these are things that have been shown to lead to increases in populations and resiliency and all sorts of measures elsewhere in other systems. So that's what we're relying upon to show the benefit."]

analysis on all three tributaries and the San Joaquin River using SalSim. Using Mr. Steiner's data, consultant Dr. Susan Paulsen performed an analysis of the fate of San Joaquin River flows in the Delta.

The first run reflects current baseline conditions (SJTA Baseline). The full set of modeling assumptions and results of the SJTA Baseline can be found in SJTA Attachment 5. Stated briefly, the SJTA Baseline conditions on the Stanislaus River at times differ from the WSE baseline conditions: (1) VAMP flow requirements were not used, (2) CVP contractor allocations were revised to current assumptions (0-49-155 at <1,400<1,800>), and (3) a flow surrogate was used to represent minimum releases (June-September) for satisfaction of dissolved oxygen requirements. Differences in the modeling of Baseline conditions on the Tuolumne River were again VAMP-related and associated with water demand and water diversion protocols. The same differences occurred with the Merced River modeling.

The second set of modeling runs (SJTA 40% UIF) reflected the Tributary Flow Objective assuming the 40% unimpaired flow requirement, without several modeling assumptions embedded into the WSE model. The modeling assumptions and results of the SJTA 40% UIF condition can be found in SJTA Attachment 5. Briefly stated, the differences between the STJA 40% UIF and the SED's Alternative 3 on the Stanislaus River were as follows: (1) the carryover storage requirement at New Melones Reservoir was reduced from 700 TAF to 80 TAF, effectively eliminating the carryover storage requirement, while retaining a minimum reservoir level to ensure continued operation of the model, (2) the refill criteria used in the WSE was eliminated entirely, (3) the minimum required diversions to OID and SSJID were eliminated, (4) flow shifting was eliminated, (5) CVP contractor allocation was revised to current assumptions (0-49-155 at <1,400<1,800>), and (6) a flow surrogate was used to represent minimum releases (June-September) for satisfaction of dissolved oxygen requirements. Differences in the modeling of the SJTA 40% UIF and the SED's Alternative 3 on the Tuolumne River included a reduction of the required carryover storage target at Don Pedro Reservoir, elimination of reservoir refill criteria and minimum diversion requirements, and elimination of the flow shifting. Similar differences occurred with the Merced River modeling.

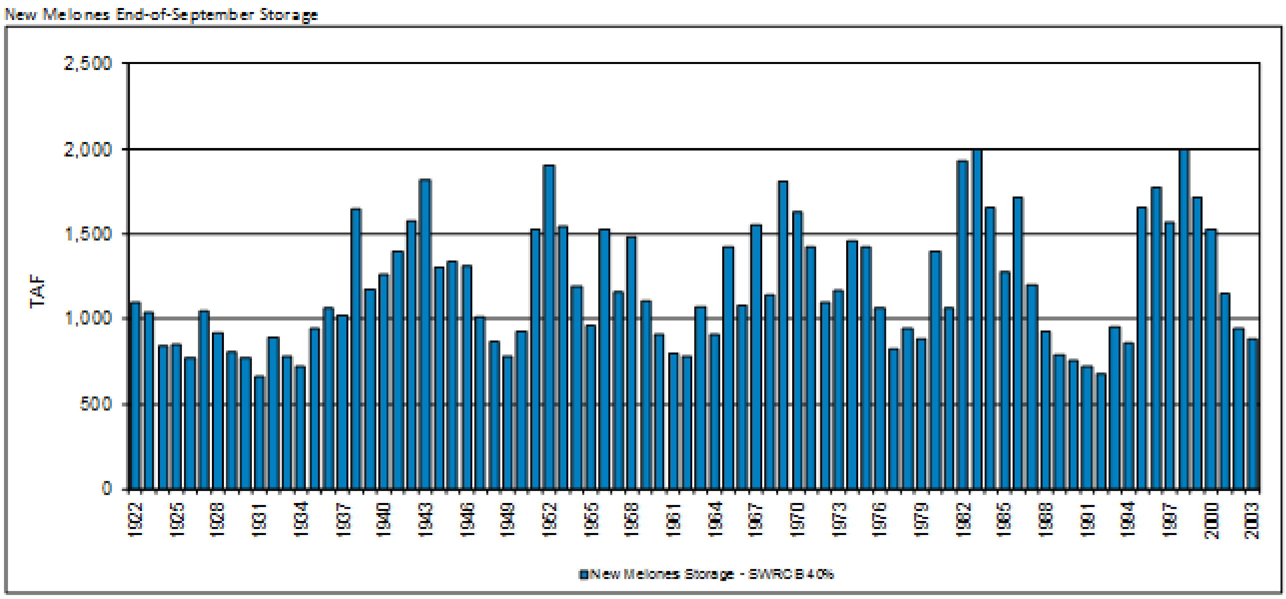
The SJTA's results show drastically different impacts to reservoir storage than those shown in the SED. In addition, the SJTA's water temperature analysis shows increases in temperature across the entire stretch of the Stanislaus River from July through January that are not reflected in the Alternative 3 results. With respect to Chinook salmon production, the SJTA Baseline conditions show *higher* production numbers than the SJTA 40% UIF, *and* all the alternatives analyzed in the SED except for the maximum flow shifting alternative known as SB 40%MaxFS. The SJTA analysis also showed that San Joaquin River flows do not support the migration of fish through the Delta, insofar as approximately 1% of San Joaquin River flow would contribute towards Delta outflow under a true 40% unimpaired flow regime. The STJA's analyses for reservoir storage, water temperature, Chinook salmon production, and the fate of San Joaquin River flows in the Delta are summarized in turn below.

2.1.2.3.1. Reservoir Storage

The Stanislaus River was chosen as an example for examining impacts to reservoir storage caused by the Tributary Flow Objective. The modeling assumptions used in Alternative 3 of the SED to avoid depleting New Melones Reservoir were removed in the STJA 40% UIF model run. Among the assumptions eliminated were carryover storage, refill criteria, flow shifting and minimum diversions for OID and SSJID (SJTA Attachment 5). A comparison of 40% unimpaired flow with those conditions and without those conditions is below.

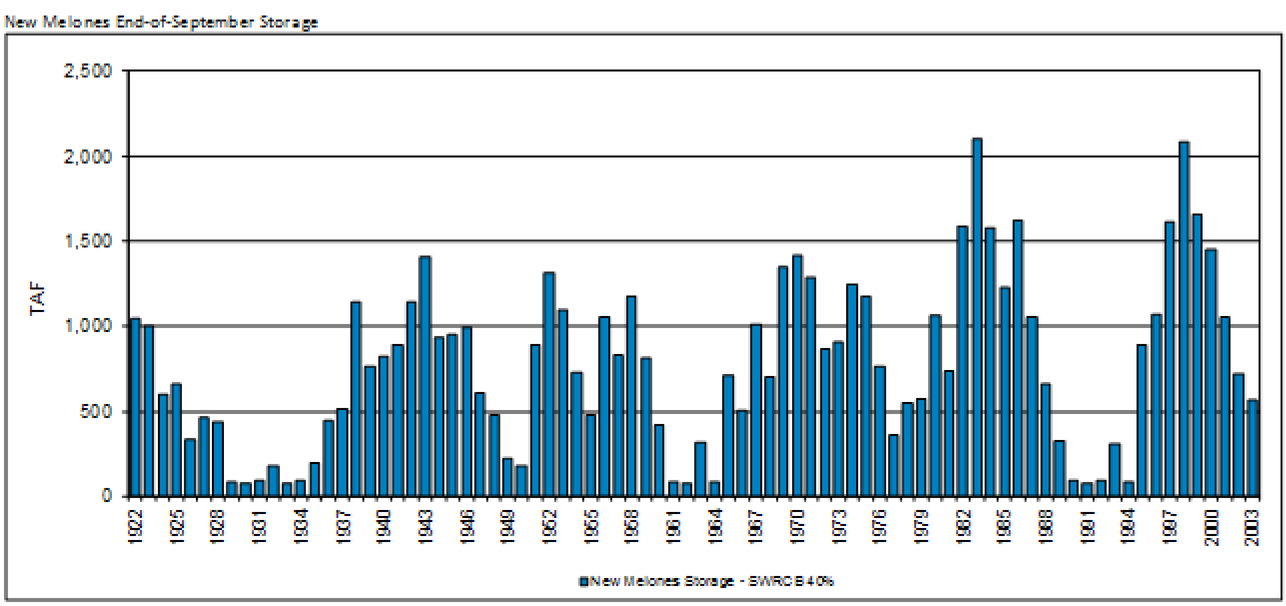
2.1.2.3.1.1. New Melones Storage under 40% unimpaired flow

A complete summary of would-be storage levels in New Melones Reservoir at the end of September for the years 1922 through 2003 under a 40% unimpaired flow regime is reported in the SED in Appx. F1, Attachment 1 thereto, pages 7-9, Table 3. The storage levels reflected in this Table include all the assumptions in the WSE model, including carryover storage, refill criteria, flow shifting, and minimum district diversions. (SED, at Appx. F1, p. F.1-36.) The end-of-September storage levels were plotted on the graph below (SJTA Figure 2-6).



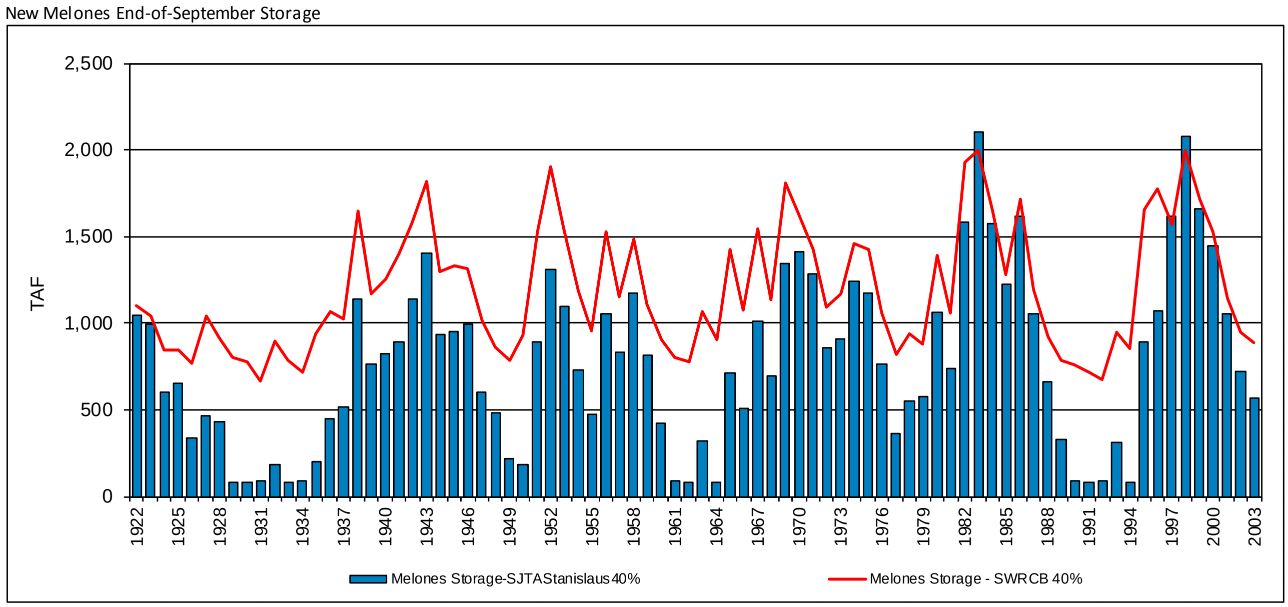
SJTA Figure 2-6. Storage levels (TAF) for New Melones Reservoir under 40% unimpaired flow, as reported in the SED for Alternative 3.

When the WSE storage target modelling assumptions are removed, storage in New Melones Reservoir changes drastically. The following graph (SJTA Figure 2-7) shows reservoir storage under SJTA 40% UIF, i.e., without carryover storage, refill criteria, flow shifting, or minimum district diversions.



SJTA Figure 2-7. Storage levels (TAF) for New Melones Reservoir with SJTA 40% UIF assumptions (no carryover storage, no refill criteria, no flow shifting and no minimum district diversions)

The difference between SED Alternative 3 and SJTA 40% UIF are shown in the following graph (SJTA Figure 2-8), where the blue bars represent end-of-September Storage in New Melones Reservoir under SJTA 40% UIF, and the red line represents storage under SED Alternative 3.



SJTA Figure 2-8. Comparison of New Melones Reservoir storage – SJTA 40% UIF v. SED Alternative 3

The impact of the WSE modeling assumptions in Alternative 3 is clear. Without carryover storage requirements, refill criteria and various other assumptions that are not required by the water quality objectives, New Melones storage is repeatedly depleted down to the 80 TAF level used as a minimum for purposes of the SJTA model run. In other words, the model shows that New Melones Reservoir will repeatedly drain to dead pool in drier years if the Tributary Flow Objective is implemented at 40% unimpaired flow.

SWB Staff did not model a 40% unimpaired flow requirement without carryover storage, refill criteria or flow shifting, and thus the true impact of the Tributary Flow Objective on reservoir storage is not included in the SED. As shown in this example for New Melones, the difference between the Tributary Flow Objective with carryover storage and refill criteria, and the Tributary Flow Objective without carryover storage and refill criteria, is substantial. Before the Board decides whether to adopt the proposed changes to the Bay-Delta Plan, Staff needs to present the Board with an analysis that shows the true impact of the Tributary Flow Objective on *all* the reservoirs impacted by the project, without carryover storage, refill criteria and the other modeling assumptions designed to mitigate the impact of the project on storage.

2.1.2.3.2. Water Temperature

Consultant Avry Dotan of AD Consultants performed an analysis of water temperature on the Stanislaus River using HEC-5Q, the same modeling program used to perform the temperature analysis in the SED (SJTA Attachment 3). The Stanislaus River modeled operations simulation developed by Mr. Steiner for the SJTA 40% UIF were used for this analysis, meaning that carryover storage, refill criteria and flow shifting were not included in the modeling assumptions.

In the table below (SJTA Table 2-4), SJTA Baseline was compared to SJTA 40% UIF, with increases in temperature shown in red, and decreases in temperature shown in blue. The results show increases in temperature across the entire stretch of the Stanislaus River from July through January, i.e., the months during which unimpaired flows are not required under the Tributary Flow Objective. Without flow shifting, carryover storage and refill criteria, there will be higher temperatures in all months outside the February-June period.

Stanislaus Average 7DADM	Life Stage	Month/USEPA Criteria (°F)	Confluence (RM0)		1/4 River (RM13.3)		1/2 River (RM28.2)		3/4 River (RM 43.7)		Below Goodwin (RM 58.5)	
			Base (F)	40%UF (F)	Base (F)	40%UF (F)	Base (F)	40%UF (F)	Base (F)	40%UF (F)	Base (F)	40%UF (F)
Sep	AM	64.4	69.8	0.9	69.0	1.0	67.5	1.2	63.6	1.3	56.6	1.5
Oct	AM / R	64.4 / 55.4	62.1	1.0	61.6	1.1	60.5	1.2	58.8	1.4	56.5	1.6
Nov	R	55.4	56.7	0.6	56.6	0.7	56.3	0.8	55.9	1.0	55.2	1.4
Dec	R	55.4	50.9	0.2	51.1	0.3	51.2	0.3	51.7	0.5	52.3	0.6
Jan	R	55.4	49.8	0.0	49.9	0.1	49.7	0.1	49.5	0.1	48.9	0.1
Feb	R	55.4	52.5	-0.7	52.3	-0.7	51.7	-0.7	50.5	-0.5	48.7	0.0
Mar	R / CR	55.4 / 60.8	56.3	-1.2	55.9	-1.2	54.9	-1.3	53.1	-1.0	50.4	-0.4
Apr	CR / S	60.8 / 57.2	58.8	-1.1	58.2	-1.0	56.8	-1.0	54.6	-0.7	51.4	-0.2
May	CR / S	60.8 / 57.2	61.6	-1.5	60.8	-1.4	59.2	-1.3	56.5	-0.8	52.5	0.0
Jun	S / SR	57.2 / 64.4	67.2	-1.8	66.4	-1.8	64.4	-1.6	60.4	-0.9	53.7	0.4
Jul	SR	64.4	73.2	0.1	72.3	0.2	70.3	0.4	65.0	0.6	54.9	0.9
Aug	SR	64.4	73.2	0.7	72.3	0.7	70.3	0.9	65.1	1.1	55.9	1.3

SJTA Table 2-4. Comparison of water temperature on the Stanislaus River under SJTA Baseline and SJTA 40% UIF

The SED assumes that higher water temperatures are adverse to fish and wildlife beneficial uses. These adverse impacts are not reflected in the SED's analysis because SWB Staff used a trial and error approach to avoid these impacts by iteratively tweaking the modeling assumptions to minimize (or mitigate against) adverse impacts to water temperature caused by implementation of the Tributary Flow Objective. Staff refers to this trial and error approach as an iterative process: "we had to iterate multiple times to find a set of operational constraints that did not make temperatures worse." (Transcript of Public Hearing before SWRCB, November 29, 2016, p. 62, lns. 5-7 [Will Anderson, Water Resources Control Engineer].) Of course, one of the many problems with this approach is that real-world operations do not allow for an iterative process where different constraints are tested in real time to minimize or avoid adverse results. This is critical because the temperature modeling is for "comparative analysis" purposes; it is not a predictive tool. (SED, at Appx. F1, p. F.1-190.) Thus, even if operators chose to follow all the operational constraints devised by State Water Board Staff during the iterative process, the water temperature results shown in the SED would not necessarily be achieved, and the model would not necessarily provide any guidance as to how they could be achieved.

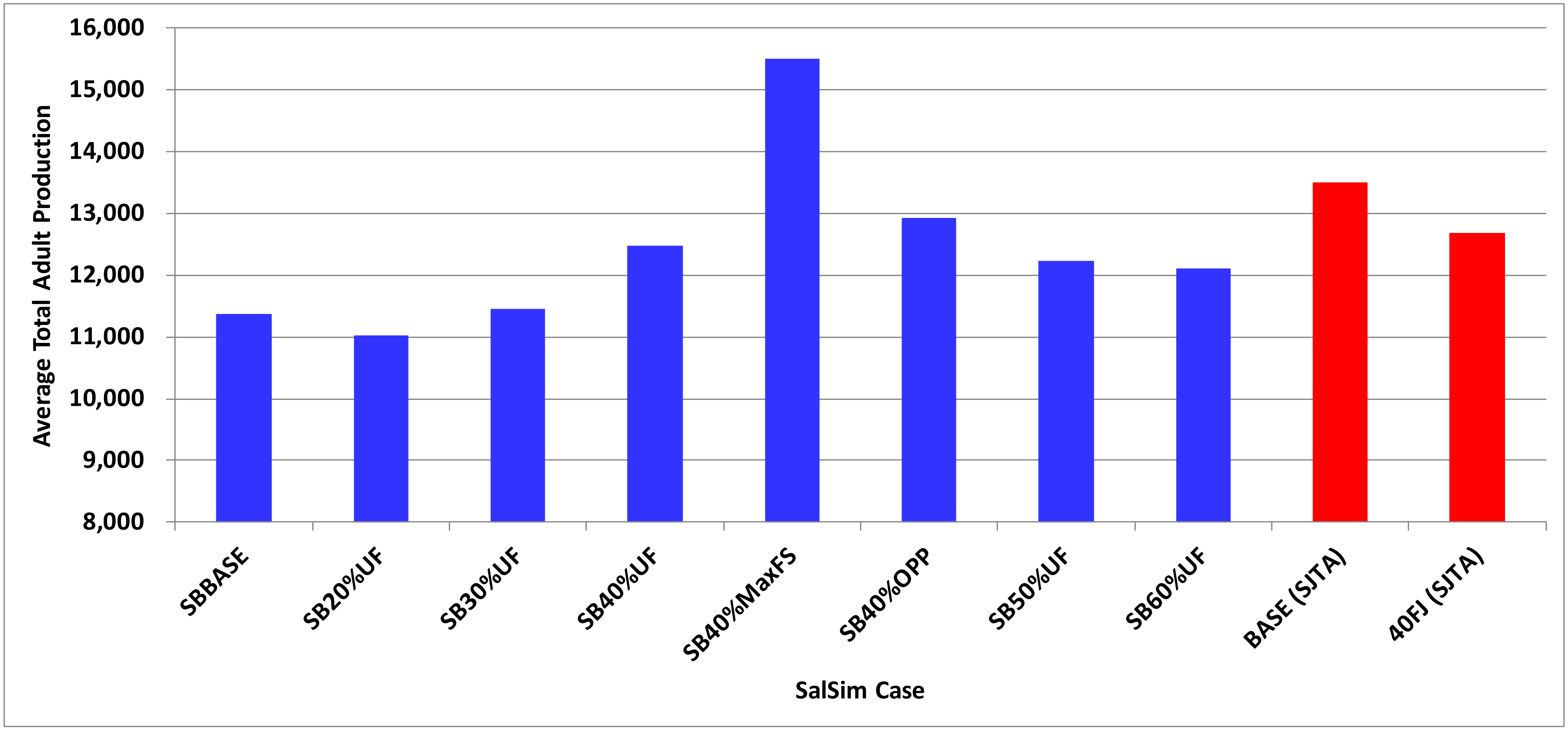
Before the State Water Board decides whether to adopt the proposed revisions to the Bay-Delta, Staff must present the Board with an analysis that shows the actual impact of the Tributary Flow Objective on water temperature in all three tributaries – without the operational constraints that were added to the model through trial and error to mitigate against higher instream temperatures.

2.1.2.3.3. Floodplain Habitat

The SJTA incorporates the comments of TID, MID, OID, and SSJID on floodplain habitat into these comments.

2.1.2.3.4. SalSim

SJTA consultant Avry Dotan performed a SalSim analysis for SJTA Baseline and SJTA 40% UIF. (SJTA Attachment 3.) As explained above, the SJTA Baseline does not include VAMP flows, as that program has ended. As shown in SJTA Figure 2-9, the SJTA Baseline run produces higher numbers (13,490) than all of the State Water Board's runs, except for the SB40% MAX Flow Shifting run. SJTA Baseline also produces more fish than SJTA 40% UIF (12,680). (SJTA Figure 2-9). The specific production numbers for each model run for water years 1994 through 2009 are set forth in SJTA Table 2-5.



SJTA Figure 2-9. SalSim for SJTA Baseline and SJTA 40% UIF compared to SalSim results in SED

SalSim Case	Total Adults Production by Year																
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Average
SBBASE	5,365	10,250	14,328	28,745	8,433	21,001	33,753	17,892	14,289	11,075	6,613	1,129	461	161	3,812	4,665	11,373
SB20%UF	5,696	10,571	14,407	25,499	8,685	19,983	30,996	16,007	14,507	11,349	6,850	1,173	680	169	4,008	5,755	11,021
SB30%UF	6,334	10,460	14,843	26,121	9,357	20,253	33,125	16,984	15,289	11,983	7,436	1,278	952	185	2,587	5,922	11,444
SB40%UF	7,213	10,484	15,170	30,888	9,872	22,289	38,824	19,996	15,801	12,613	8,072	1,392	579	216	2,594	3,611	12,476
SB40%MaxFS	6,843	10,540	15,474	38,226	10,704	26,833	56,691	24,875	18,557	17,604	11,252	1,332	693	194	2,499	5,870	15,512
SB40%OPP	7,212	11,664	14,106	31,598	10,122	25,432	36,359	20,923	16,689	13,248	8,198	1,479	489	323	2,696	6,399	12,934
SB50%UF	7,462	10,791	14,632	29,908	8,959	22,803	36,206	19,362	15,411	13,252	8,486	1,517	671	219	2,681	3,460	12,239
SB60%UF	7,229	11,162	14,441	28,770	7,473	23,601	35,632	18,404	14,633	14,258	9,158	1,575	723	204	2,834	3,677	12,111
BASE (SJTA)	5,966	10,313	13,848	37,450	8,580	24,764	39,997	22,624	14,369	11,081	6,693	2,354	2,222	634	6,571	8,376	13,490
40FJ (SJTA)	6,016	10,990	14,038	26,280	9,500	22,369	33,601	18,625	16,938	13,980	9,107	2,708	698	799	7,888	9,344	12,680

SJTA Table 2-5. SalSim results for SJTA Baseline and SJTA 40% UIF compared to SalSim results in SED

These SalSim results suggest that current conditions will result in higher Chinook salmon production numbers (13,490 fish) than Staff's proposed project, regardless of whether that project is modeled *with* carryover storage, refill criteria and WSE flow shifting (SB40% UF) (12,476 fish), or *without* those assumptions (SJTA40% UIF) (12,680 fish). The only conditions under which SalSim produces better results than current conditions are under Staff's maximum flow shifting scenario, where 25% of the volume of unimpaired flow from February-June is shifted to September-December in all water years. (SED, at 19-80.) This maximum flow shifting scenario differs from Staff's other flow shifting scenario where no more than 25% of the volume of unimpaired flow from February-June is shifted to July-November in wet water years. Notably, Staff did not analyze the impacts of its maximum flow shifting scenario on floodplain habitat. Thus, any benefits to floodplain habitat that Staff perceived from Alternative 3 will not coexist with these supposed benefits to Chinook salmon production shown in SalSim under maximum flow shifting. Moreover, Staff did not analyze the impacts of maximum flow shifting on any other components, including water temperature, storage, agriculture, groundwater or hydropower. As such, it is not a viable option for the SWB to choose at this time.

If the SalSim model is to be trusted, then the current conditions, as reflected in SJTA Baseline, are superior to any of the analyzed options set forth in the SED. Before the State Water Board decides whether it will adopt the proposed revisions to the Bay-Delta Plan, these results need to be analyzed. If current conditions would result in higher production numbers for Chinook salmon, and if the goal of the water quality control plan is to increase those production numbers, then Staff's proposed plan does not achieve the goal and must be rejected.

2.1.2.3.5. Fate of San Joaquin River flows in the Delta

Dr. Susan Paulsen is a renowned expert in the hydrodynamics, hydrology, and water quality of the Delta. In collaboration with Dan Steiner, Dr. Paulsen used the Delta Simulation Model II (DSM2)[34] to analyze the fate of San Joaquin River flows that reach the Delta under baseline conditions (Case 1) and under the SJTA's 40% unimpaired flow scenario (Case 2). (SJTA

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[34] For more information, see http://baydeltaoffice.water.ca.gov/modeling/deltamodeling/models/dsm2/dsm2.cfm

Attachment 6.) Specifically, she examined the fate of San Joaquin River inflow in a below normal year (1966), a dry year (1968), and a critically dry year (1988). The results demonstrate that very little San Joaquin River inflow to the Delta – even at 40% unimpaired flow on the three eastside tributaries (Case 2) – moves through the Delta and exits via the San Francisco Bay.

The table below is a summary of Dr. Paulsen's results comparing Delta Inflow from the San Joaquin River, Delta exports and Delta outflow under baseline (Case 1) and 40% unimpaired flow (Case 2) conditions.

	DELTA INFLOW – SJR[a] (TAF)		**EXPORTS - CVP, SWP, Contra Costa Canal (TAF)[b]**		**SJR CONTRIBUTION TO DELTA OUTFLOW (TAF)[c]**	
	Base	**40%**	**Base**	**40%**	**Base**	**40%**
1966 (BN)	884	1491	723	1014	2	19
1968 (Dry)	816	1223	647	837	3	15
1988 (Critical)	456	843	304	462	0.6	7

[a] San Joaquin River water that enters the Delta between February 1 and June 30.
[b] Amount of San Joaquin River water that entered the Delta between February 1 and June 30 and that was exported or diverted from the Delta during the given water year.
[c] Volume of San Joaquin River water that entered the Delta between February 1 and June 30 that left the Delta as Delta outflow.

SJTA Table 2-6: Summary of Delta Inflow, Exports and Outflow derived from SJTA Attachment 6.

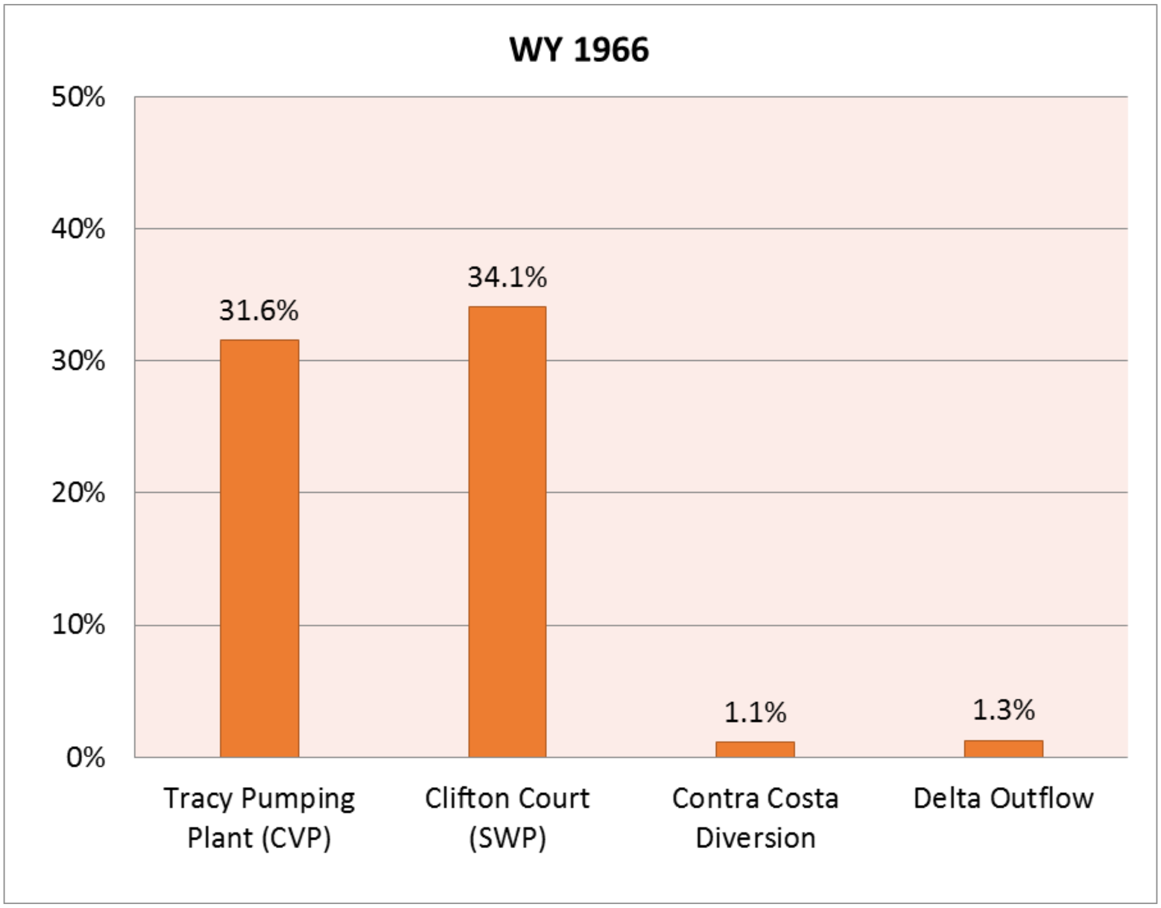
As can be seen in the table above, very little San Joaquin River inflow to the Delta contributes to Delta outflow under baseline *or* 40% unimpaired flow conditions. Instead, most of the water is exported by the CVP and SWP. (SJTA Attachment 6, p. 7, 18.) In fact, under 40% unimpaired flow, *more* water is exported by the CVP and SWP than under baseline conditions. The increased Delta inflow from the San Joaquin River under 40% unimpaired flow simply does not translate to an increase in Delta outflow for the benefit of fish "migrating through the Delta." (SED, at Appx. K, p. 18.) As shown in the table below – also derived from Dr. Paulsen's results – approximately 1% of San Joaquin River inflow contributes to Delta Outflow. (SJTA Attachment 6, p. 7, 17.)

	Base			40% UIF		
	Delta Outflow (TAF)[a]	**San Joaquin River contribution to outflow (TAF)[b]**	**% of SJR Inflow[c]**	**Delta Outflow (TAF)[a]**	**San Joaquin River contribution to outflow (TAF)[b]**	**% of SJR Inflow[c]**
1966 (BN)	4288	2	0.055%	4804	19	0.39%
1968 (Dry)	6742	3	0.047%	7087	15	0.21%
1988 (Critical)	2848	0.6	0.022%	3157	7	0.22%

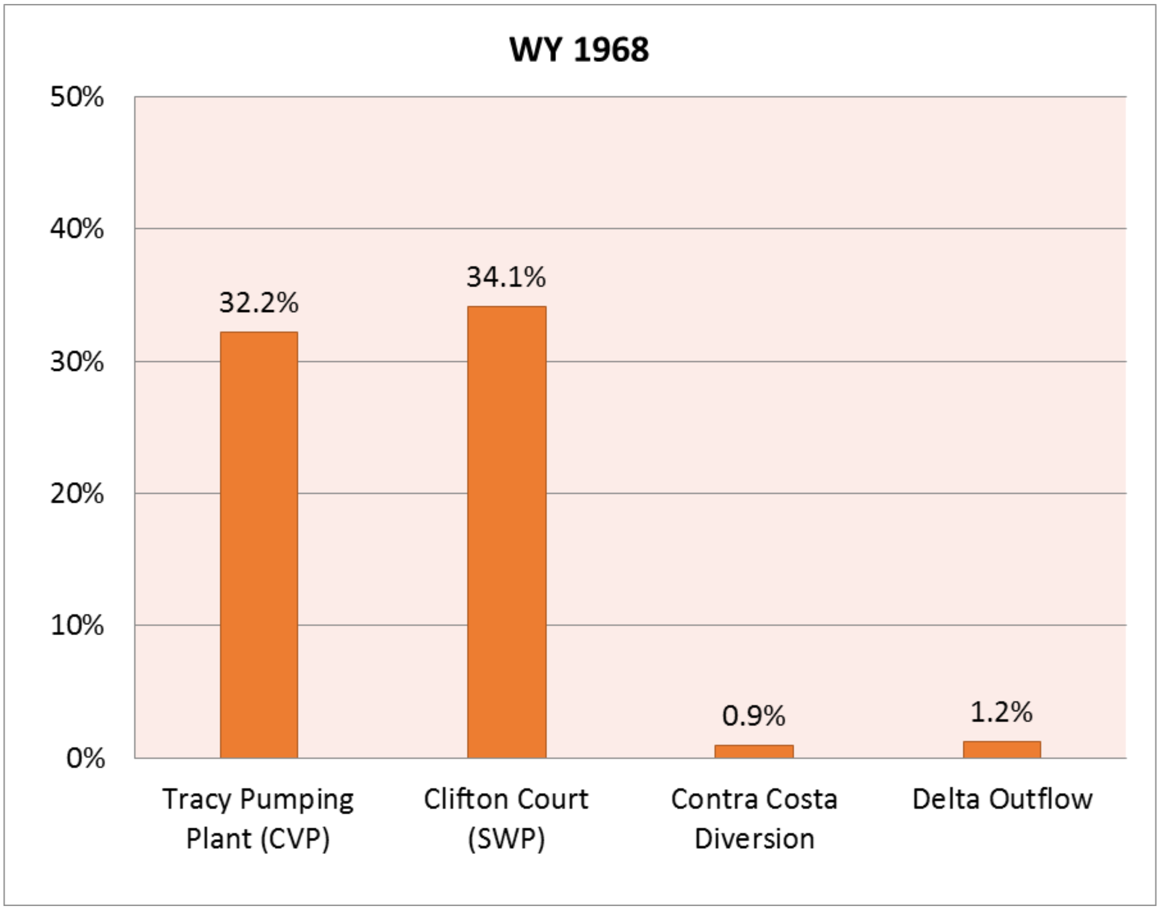
[a] Delta outflow is total outflow from February 1 through June 30.
[b] San Joaquin River outflow is the volume of water that entered the Delta between February 1 and June 30 and that flowed out of the Delta during the water year.
[c] Calculated as San Joaquin River contribution to outflow divided by Delta outflow.

SJTA Table 2-7: Summary of Delta Outflow in TAF; Percentage of SJR inflow contributing to Delta Outflow

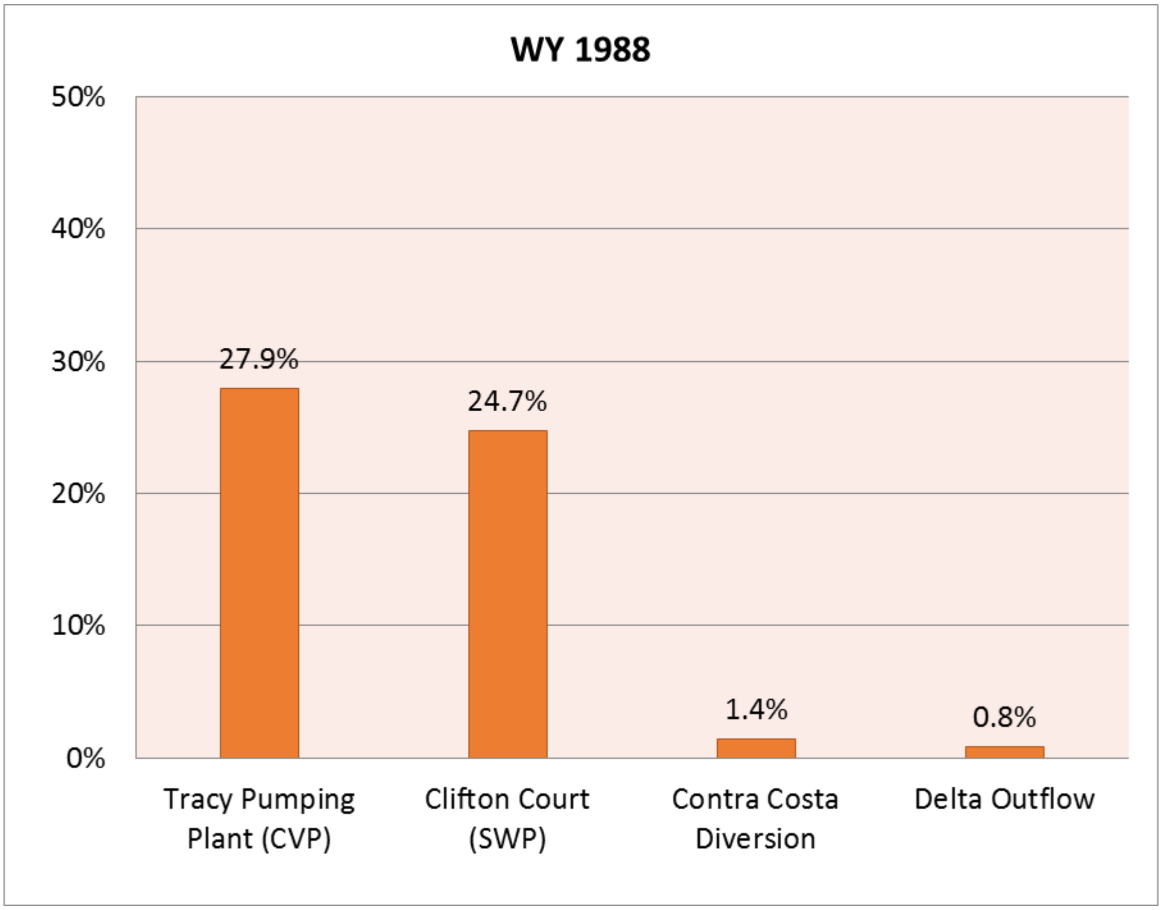
The following graphs depict the amount of San Joaquin River inflow (February 1 – June 30) that leaves the Delta via exports, diversions, and as Delta outflow in the three exemplar water years under 40% unimpaired flow.



SJTA Figure 2-10: Consumption of San Joaquin River inflow that reaches Vernalis under 40% unimpaired flow in a below normal year (1966)



SJTA Figure 2-11: Consumption of San Joaquin River inflow that reaches Vernalis under 40% unimpaired flow in a dry year (1968)



SJTA Figure 2-12: Consumption of San Joaquin River inflow that reaches Vernalis under 40% unimpaired flow in critically dry year (1988)

Without any analysis, the WQCP assumes that the Tributary Flow Objective can be adaptively implemented to support and maintain San Joaquin River watershed fish "migrating through the Delta." (SED, at Appx. K, p. 30.) In light of Dr. Paulsen's results regarding the fate of San Joaquin River inflow, the SJTA submits that the Board should reject this assumption. The imposition of a 40% unimpaired flow requirement on the three eastside tributaries will increase the amount of San Joaquin River water contributing to Delta outflow by 1.1% or less (e.g., from 0.2% to 1.3% in WY 1966) compared to baseline conditions in below normal, dry and critically dry years. (SJTA Table 2-7.) Even with the increased inflow under 40% unimpaired flow, far less than 2 percent of San Joaquin River inflow will leave the Delta as Delta outflow. In stark contrast, more than 50% of San Joaquin River inflow will be exported out of the Delta by the CVP and SWP under

40% unimpaired flow. In fact, with the increased flows at Vernalis under 40% unimpaired flow, exports and diversion (CVP + SWP + CCWD) can be expected to increase by 291,000 acre-feet in below normal years, by 190,000 acre feet in dry years, and by 158,000 acre feet in critically dry years. (SJTA Table 2-6.) The real beneficiary of the increase in San Joaquin River flows is the exporters, not the fish migrating through the Delta.

Moreover, Dr. Paulsen's results call into question the conclusions from the Board's Delta Flow Criteria Report of 2010, which found that 60% unimpaired flow from the San Joaquin River would result in significant benefits to fall-run Chinook salmon migrating through the Delta. The Delta Flow Criteria Report focused solely on San Joaquin River inflow, neglecting to analyze Delta outflow. It is evident from Dr. Paulsen's results that San Joaquin River inflow provides very little contribution to Delta outflow, and thus the Delta Flow Criteria Report does not provide a complete picture of what is necessary to create significant benefits to migrating Chinook salmon.

In sum, the Board should reject the assumption in the WQCP that the Tributary Flow Objective can be adaptively adjusted to benefit San Joaquin River watershed fish in their migration through the Delta. San Joaquin River flows do not provide any significant contributions to Delta outflow, and will not assist in migratory fish moving through the Delta, even at 40% unimpaired flow.

2.1.2.4. Summary: Comparison of SWB results and SJTA results for Tributary Flow Objective

The analysis provided by the SJTA demonstrates that when the Tributary Flow Objective is modeled without the various operational constraints that are not required by the objective itself, such as carryover storage, refill criteria and flow shifting, the impact to reservoir storage is far more significant than what is portrayed in the SED. In addition, the supposed benefits of the project, such as lower water temperatures, will not be achieved in the manner suggested in the SED. Specifically, water temperatures in the July-January period will increase compared to baseline. Moreover, the

SalSim results show that current conditions are actually superior to any of the analyzed proposals set forth in the SED. Assuming Staff is correct that improved conditions for fall-run Chinook salmon will translate to protection of all the beneficial uses identified in the water quality control plan, then the proposed project needs to be rejected. The SJTA analysis demonstrates that the supposed temperature benefits achieved by the Tributary Flow Objective will not occur, nor will the supposed benefits to Chinook salmon production numbers. Finally, as nearly none of the San Joaquin River water contributed to Delta outflow, the Board should reject the assumption in the SED that increased flows on the three eastside tributaries will assist fish migrating through the Delta. Given the SJTA's analysis, the Board must decline to adopt the proposed Tributary flow objective.

2.1.3. Salmon Doubling Objective

The narrative objective for the protection of salmon is set forth as:

> "Water quality conditions shall be maintained, together with other measures in the watershed, sufficient to achieve a doubling of natural production of chinook salmon from the average production of 1967-1991, consistent with the provisions of State and federal law." (SED, at Appx. K, p. 17.)

The 2012 version of the draft WQCP did not reference the salmon doubling objective and was silent on whether it would remain a requirement or not. However, the 2016 draft version makes clear that Staff "expects that implementation of the numeric flow-dependent objectives and other non-flow measures will implement this objective." (SED, at Appx. K, p. 53.) This statement was written in reference to the flows required under D-1641, but it remains unchanged in the revised WQCP, suggesting that the Board anticipates the implementation of the new flow objectives will result in doubling of the natural production of Chinook salmon. (SED, at Appx. K, p. 52-53.) Both the history of the salmon doubling objective, and existing science (as reported in the 2010 Delta Flow Criteria Report), demonstrate that the Doubling Objective cannot be achieved through the implementation of the proposed flow objectives. When the Board chooses a method of implementation that is shown to be incapable of meeting the objectives, then that aspect of the program of implementation will be deemed "illusory" and in violation of the Board's obligation to implement its own plan. (*State Water Resources Control Bd. Cases* (2006) 136 Cal.App.4th 674, 734 [if it had been shown that DWR and USBR were incapable of meeting the salinity objectives in the water quality control plan, then the Board's allocation of that responsibility to DWR and USBR in D-1641 would have been "illusory" and a violation of the Board's obligation to implement its own plan]; see Water Code, § 13247 [requiring the Board to comply with its own water quality control plan].) By choosing a method of implementation that has been shown to be incapable of achieving the Salmon Doubling Objective, the revised WQCP will violate Water Code section 13247, which requires the Board to comply with its own water quality control plan.

2.1.3.1. The Doubling Objective lacks clarity

As a preliminary matter, it is noted that the Doubling Objective lacks clarity. The plain language of the objective is clear that it refers only to the natural production of Chinook salmon. (SED, at Appx. K, p. 17.) Fish & Game Code section 6900, et seq., and the Central Valley Project Improvement Act ("CVPIA") are also clear that the regulation is limited to the natural population.

As part of these comments on the WQCP, the SJTA submits a letter from the San Joaquin River Group Authority to Charlie Hoppin of the State Water Resources Control Board, dated October 12, 2011, which more fully summarizes the legislative history of SB 2661, Fish & Game Code § 6900 et seq. (SJTA Attachment 7). The Pacific Coast Federation of Fisherman's Association requested the word "natural" be inserted in front of "production" throughout the bill. The legislation was changed accordingly to include the modifier of "natural" before the word "production" throughout the bill. In every section except the "Definitions" section, the term "natural production" occurs. In the "Definitions" section, the term "Production" is not limited to "natural." (Fish & Game Code, § 6911.) This change to "natural production" made the ascertainment of the Doubling Objective impossible to discern.

The interpretation of the regulation with regard to natural production has lacked clarity and is simply fraught with error. The Department of Fish & Game was tasked with determining the elements of the fish doubling program and transmitting a report to the Legislature describing those elements. (Fish & Game Code, § 6924.) The report includes a fundamental flaw: it makes no distinction between hatchery fish and natural fish. The Department of Fish & Wildlife relied on carcass surveys on the three tributaries to arrive at a population number. Carcass surveys are inherently unreliable due to the level of effort extended, timing of the survey, expertise of the spotters and predation. Carcass surveys are conducted by two to three people in a boat moving downstream looking for carcasses. When a carcass is found, it is counted and the head is removed for otolith sampling and its body is returned to the River. This leads to human error, double counting and the inability to distinguish between hatchery and natural fish populations.

In contrast, the Stanislaus and Tuolumne Rivers have weirs which automatically count and photograph every Central Valley fall-run Chinook salmon returning to the river to spawn. While not 100% accurate, direct counts from the weirs are more accurate and precise than estimates from the Department of Fish & Wildlife carcass surveys.

Comparing the direct counts at the weirs and the estimates generated by the carcass surveys with the early Department of Fish & Wildlife carcass survey reveals a large margin of error which may have overstated the 1967-1991 population by more than 50% due to the lack of distinction between natural and hatchery fish. This renders the baseline unreliable.

	Tuolumne			Stanislaus		
Monitoring Season	**Weir**	**Carcass Survey**	**% Difference**	**Weir**	**Carcass Survey**	**% Difference**
2010	782	540	-31%	1,355	1,086	-20%
2011	2,906	893	-69%	815	1,309	61%
2012	2,304	783	-66%	7,249	4,006	-45%
2013	3,742	1,926	-48%	5,459	2,845	-48%
2014	673	438	-35%	5,534	3,060	-45%
2015	437	113	-74%	12,708	6,136	-52%

SJTA Table 2-8: Comparison of weir data and carcass survey data[35]

This failure violates the Fish and Game Code section 6901[e][f], which requires distinction:

> "[e] Proper salmon and steelhead trout resource management requires maintaining adequate levels of natural, as compared to hatchery, spawning and rearing.
>
> "[f] Reliance upon hatchery production of salmon and steelhead trout in California is at or near the maximum percentage that it should occupy in the mix of natural and artificial hatchery production in the state. Hatchery production may be an appropriate means of protecting and increasing salmon and steelhead in specific situations; however, when both are feasible alternatives, preference shall be given to natural production."

Department of Fish & Wildlife made no such distinction. The numbers to set the goal are wrong.

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[35] Sources for SJTA Table 2-8: (1) Peterson, Matthew L., Andrea N. Fuller, and Doug Demko. Environmental Factors Associated with the Upstream Migration of Fall-Run Chinook Salmon in a Regulated River. North American Journal Of Fisheries Management_Vol. 37 , Iss. 1,2017; (2) Azat, J. 2016. GrandTab 2016.04.11. California Central Valley Chinook Population Database Report. California Department of Fish and Wildlife (available at http://www.dfg.ca.gov/fish/Resources/Chinook/CValleyAssessment.asp); (3) TID/MID (Turlock Irrigation District and Modesto Irrigation District). 2016. 2015 Lower Tuolumne River Annual Report Pursuant to Article 58 of the License for the Don Pedro Project, No. 2299 (available at http://www.tuolumnerivertac.com/documents.htm); (4) FISHBIO unpublished data. (SJTA Attachments 8A and 8B.)

2.1.3.2. The Doubling Objective Cannot be Met

The salmon doubling objective cannot be met for many reasons.

2.1.3.2.1. Doubling requires state-wide contribution

The doubling requirement contemplates the doubling of natural salmon production across the entire State, not merely the San Joaquin River or the three eastside tributaries. (see Fish & Game Code, § 6912 [defining the term "program" as "the program protecting and increasing the naturally spawning salmon and steelhead trout **of the state**"]; CVPIA, P.L. 102-575, § 3402[a] [stating the purpose of the act as being "to protect, restore, and enhance fish, wildlife, and associated habitats in the Central Valley and Trinity River basins in California"].) Thus, if the total natural production of salmon in the Central Valley is doubled, the statute will be satisfied irrespective of whether the natural production is doubled in any particular river. The SJTA provided a letter to the State Water Board to this effect on October 12, 2011, when the Board indicated that it was considering adoption of a doubling objective. (SJTA Attachment 7.)

2.1.3.2.2. The fishery is dominated by hatchery fish

There is no natural production of Central Valley fall-run Chinook Salmon. The entire Central Valley fall-run Chinook salmon fishery has been overrun by hatchery practices. Currently, hatcheries dump 32,000,000 smolts (not fry or parr) into the Bay-Delta. (SED, at 7-15.) The natural production of Central Valley fall-run Chinook salmon smolts pales in comparison to this number.

In determining whether a natural population exists, the term "natural production" must be explained and examined. In the true sense of the word "natural," there is no such production on the tributaries. Starting in Spring 2007, Department of Fish & Wildlife began the Constant Fractional Marking ("CFM") program to determine, among other things, the proportions of hatchery and natural origin returning fish. Under the program, 25% of hatchery releases for fall-run Chinook salmon were marked by the removal of the adipose fin (ad-clipped) and tagged with an internal Code Wire Tag ("CWT"). Since 2010, the Stanislaus River weir has recorded 22% to 86% ad-clipped fish, and the Tuolumne River weir has recorded 11% to 50% ad-clipped fish.

Year	Total Chinook Observed	Total Ad-clip Observed	Percent Ad-clipped
2010	1,355	341	25%
2011	815	698	86%
2012	7,249	4782	66%
2013	5,459	1272	23%
2014	5,534	1223	22%
2015	12,708	3279	26%
2016	14,396	3718	26%

SJTA Table 2-9. Stanislaus River weir data[36]

Year	Total Chinook Observed	Total Ad-clip Observed	Percent Ad-clipped
2010	782	258	33%
2011	2,906	1454	50%
2012	2,304	615	27%
2013	3,742	407	11%
2014	673	101	15%
2015	437	100	23%
2016 (Dec. 8)	3,241	771	24%

SJTA Table 2-10. Tuolumne River weir data[37]

[36] Sources for Table 2-0: (1) Peterson, Matthew L., Andrea N. Fuller, and Doug Demko. Environmental Factors Associated with the Upstream Migration of Fall-Run Chinook Salmon in a Regulated River. North American Journal Of Fisheries Management_Vol. 37 , Iss. 1, 2017; (2) FISHBIO unpublished data. (SJTA Attachment 8A.)

[37] Source for SJTA Table 2-10: (1) TID/MID (Turlock Irrigation District and Modesto Irrigation District). 2016. 2015 Lower Tuolumne River Annual Report Pursuant to Article 58 of the License for the Don Pedro Project, No. 2299 (available at http://www.tuolumnerivertac.com/documents.htm); (2) FISHBIO unpublished data. (SJTA Attached 8B.)

Approximately 25% of hatchery production is marked through the CFM Program. So only 1 out of 4 hatchery fish released is identifiable by an adipose fin clip. As the proportions of tagged fish observed at the Stanislaus and Tuolumne weirs in recent years is also roughly 25%, (and sometimes higher) this indicates that adult abundance in these streams continues to be dominated by hatchery fish. There are no hatcheries on the Stanislaus or Tuolumne Rivers so these are fish straying to these streams to spawn.

2.1.3.2.3. Ocean harvest impedes achievement of the doubling goal

The initial population levels (should be production levels) for San Joaquin River Central Valley fall-run Chinook salmon could not be done because Department of Fish & Wildlife did not know how many fish were being harvested. (DFW (1994) p. 26, 32.)[38] Harvest plays a key role in determining "production." "Production" is all adult Central Valley fall-run Chinook salmon. It includes harvest, both in the ocean and inland, recreational and commercial.

The doubling goal will never be achieved because the Magnusson-Stevens Act directs National Marine Fisheries Service to maximize the harvest of Central Valley fall-run Chinook salmon. NMFS has determined that 122,000 to 180,000 natural and hatchery spawners is sufficient to maintain ocean harvest of 50-65% Central Valley fall-run Chinook salmon. (see SJTA Attachment 9, p. 4) [Combined Memorandum of Federal Defendants' Cross-Motion for Summary Judgment and Opposition to Plaintiff's Motion for Summary Judgment, *San Joaquin River Group Authority v. National Marine Fisheries Service, et al.*, U.S. District Court, Eastern Dist. of California, Case 1:11-cv-00725 (Document 73-1), filed 8/19/11].) Given the number of spawners and the ocean harvest rates set by NMFS, the doubling of production itself cannot be achieved.

2.1.3.2.4. The Delta Flow Criteria Report demonstrates the Implementation of the flow objectives will not achieve the Salmon Doubling Objective

The 2010 Delta Flow Criteria Report drafted in accordance with Water Code section 85086[c][1] concluded that an average of 10,000 cfs at Vernalis from the period of March through

[38] As explained in the letter, Department of Fish & Wildlife focused on 1967-1991 population, i.e., escapement, or adult fish returning to the streams. Why they looked at population and not production is unknown.

June "may provide conditions necessary to achieve doubling of San Joaquin basin fall-run." (Delta Flow Criteria Report, p. 119.) The report also concluded that 10,000 cfs at Vernalis from March through June could be achieved in approximately 45% of water years with an unimpaired flow of 60% from the San Joaquin Valley. (Delta Flow Criteria Report, p. 121, Figure 20a.) Critically, this calculation assumed 60% unimpaired flow contributions from the entire San Joaquin Valley, comprising nine sub-basins, including the Stanislaus River at Melones Reservoir, the San Joaquin Valley Floor, the Tuolumne River at Don Pedro Reservoir, the Merced River at Exchequer Reservoir, the Chowchilla River at Buchanan Reservoir, the Fresno River near Daulton, the San Joaquin River at Millerton Reservoir, the Tulare Lake Basin Outflow, and the San Joaquin Valley West Side Minor Streams. (Delta Flow Criteria Report, p. 97.) From all of these sources, the average unimpaired flow at Vernalis for the months of February through June (1921 – 2003) was 529,000 acre feet (February), 668,000 acre feet (March), 929,000 acre feet (April), 1,467,000 acre feet (May), 1,117,000 acre feet (June), for a summed average amount of 4,710,000 acre feet over all five months. (Delta Delta Flow Criteria Report, p. 97; see also *California Central Valley Flow Data,* Fourth Edition Draft, California Department of Water Resources (May 2007), p. 45.)

When unimpaired flow contributions from the San Joaquin Valley are reduced from nine sub-basins to three, as Staff is proposing in Phase 1, the flow rate of 10,000 cfs can only be achieved at Vernalis in the wettest of water years. For instance, under a requirement of 40% unimpaired flow, 10,000 cfs is only achieved at Vernalis from February through June at the 90% exceedance level and above. (SED, at Appx. F1, p. F-129.) Even under a requirement of 60% unimpaired flow from the Stanislaus, Tuolumne and Merced Rivers, 10,000 cfs is only achieved at Vernalis from February through June at the 90% exceedance level and above, although 10,000 cfs can be achieved in the months of May and June at the 80% exceedance level as well. (SED, at Appx. F1, p. F.1-142.) Thus, maintaining 30% to 50% unimpaired flow from the Stanislaus, Tuolumne and Merced Rivers will never achieve the doubling goal.

2.2. The Proposed Objectives are unreasonable and violate the Porter-Cologne Act

In the Porter-Cologne Water Quality Control Act (the "Porter-Cologne Act"), the Legislature declared that the people of the state have "a primary interest in the conservation, control, and utilization of the water resources of the state," and that the quality of the waters must be protected for "use and enjoyment by the people . . .." (Water Code, § 13000.) The Legislature has charged the State Water Board, and the regional water boards, with the "primary responsibility for the coordination and control of water quality." (Water Code, § 13001.) The authority of the water boards to regulate water quality is not unchecked. The boards must adhere to specific policies, the most fundamental of which is that the regulation of any activities affecting water quality must be "**reasonable, considering all demands** being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible." (Water Code, § 13000; see also Water Code, § 13001, 13140.) Moreover, while the boards have primary responsibility for controlling water quality, they must "consult with and carefully evaluate the recommendations of concerned federal, state and local agencies." (Water Code, § 13144, 13240.)

The mechanism provided to the water boards for protecting water quality is the "water quality control plan." (Water Code, § 13170, 13240.) A water quality control plan must include (1) a set of beneficial uses to be protected by the plan, (2) a set of objectives designed to protect those beneficial uses, and (3) a program of implementation for achieving those objectives. (Water Code, § 13050[j], 13241, 13242.) In establishing the objectives, the boards must "ensure the reasonable protection of beneficial uses and the prevention of nuisance." (Water Code, § 13241.) The boards must also consider, at a minimum, all of the following factors: (1) past, present and probable future beneficial uses of water[39], (2) environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto, (3) water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water

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[39] The requirement that the Board consider past, present and future beneficial uses of water under Water Code section 13241 is similar to the mandate that the Board consider all demands being made upon the waters involved under Water Code section 13000, but the latter requirement is slightly broader because not every demand being made on the waters involved constitutes a beneficial use in and of itself.

quality in the area, (4) economic considerations, (5) the need for developing housing within the region, and (6) the need to develop and use recycled water. (Water Code, § 13241.) Simply put, the objectives must be "reasonable" in their protection of the identified beneficial uses, considering all relevant factors. (Water Code, § 13000, 13241.)

The State Water Board acts in a legislative capacity in setting water quality objectives, and is thus accorded a measure of deference in doing so. (*Racanelli,* 182 Cal.App.3d at 112.) However, this deference has several concrete limitations: (1) the Board must act within the scope of its delegated authority, (2) the Board must employ fair procedures, and (3) and the Board's action must be reasonable. (*Ibid.*) The courts have authority to assess whether the Board's action meets the reasonableness standard, and will not uphold the agency's action if it is "arbitrary, capricious, or lacking in evidentiary support." (*Id.* at 113, citing *California Hotel & Motel Assn. v. Industrial Welfare Com.* (1979) 25 Cal.3d 200, 212.) When assessing reasonableness, courts "must ensure that an agency has adequately considered all relevant factors, and has demonstrated **a rational connection** between those factors, the choice made, and the purposes of the [Porter-Cologne Act]" (*Ibid.* [emphasis supplied].)

As demonstrated below, the analysis in the SED is insufficient for the Board to conclude that the revised objectives for the protection of fish and wildlife are reasonable considering all relevant factors. The SED does not demonstrate any rational connection between the objectives chosen and the factors that must be considered when setting water quality objectives. Accordingly, the Board must decline to adopt the proposed objectives set forth in Appx. K of the SED.

2.2.1. The SED fails to consider whether the objectives provide reasonable protection considering all the demands and other beneficial uses of the waters involved

The Tributary Flow Objective and the Vernalis Flow Objective target the waters of the Stanislaus, Tuolumne and Merced Rivers. (SED, at Appx. K, p. 18, 29.) Specifically, the Tributary Flow Objective requires that a percentage of unimpaired flow between 30% and 50% (calculated on a minimum 7-day running average) be maintained from each of the Stanislaus, Tuolumne and Merced Rivers from February through June. (SED, at Appx. K, p. 18.) The Vernalis Flow Objective requires a minimum base flow between 800 and 1,200 cubic feet per second ("cfs") at Vernalis from

February through June, notwithstanding the unimpaired flow requirement. (SED, at Appx. K, p. 18.) The Vernalis Flow Objective requires contributions from the Stanislaus, Tuolumne and Merced Rivers, at 29 percent, 47 percent and 24 percent, respectively. (SED, at Appx. K, p. 29.)

The WQCP states that fish and wildlife beneficial uses will be protected by the flows required from these objectives. (SED, at Appx. K, p. 18.) However, the analysis in the SED fails to properly consider whether the protection afforded to fish and wildlife by these objectives is reasonable, considering all the demands placed on the waters involved (Water Code, § 13000), and all the past, present and potential future beneficial uses. (Water Code, § 13241[a].) The absence of a proper analysis will render the administrative record in this matter devoid of the necessary "evidentiary support" for the Board's decision as to whether the required instream flows provide protection that is reasonable. (*Racanelli, supra*, 182 Cal.App.3d 82, 113.) Courts will refuse to uphold Board decisions that have no evidentiary support, as there is no means of ensuring that "the agency has adequately considered all relevant factors, and has demonstrated a rational connection between those factors, the choice made, and the purposes of the enabling statute." (*Ibid.*) Simply put, the Board's determination of reasonableness – and the evidence supporting that determination – must be in the document that forms the basis for the Board's decision. As explained below, the SED fails to provide sufficient evidentiary support or analysis for a determination that the proposed objectives are reasonable in light of all demands being made on the waters involved. Accordingly, the Board must decline to adopt the WQCP and the proposed revisions to the objectives therein.

2.2.1.1. The SED fails to analyze whether the proposed objectives are reasonable considering the demand for municipal supply

The SED properly acknowledges that the SJTA members supply local municipalities with surface water. (SED, at Table 2-3; 22-2.) There are also multiple municipal service providers upstream of the rim dams in the "extended plan area." (SED, at Table 13-6, p. 13-20.) The SED states that the proposed alternatives (namely, Alternative 2 with adaptive implementation, and Alternatives 3 and 4 with or without adaptive implementation) would cause "substantial reductions of surface water" and impact municipal supplies. (SED, at 22-13.) In fact, municipal suppliers on the three tributaries "would likely be greatly affected" by a reduction in surface supply caused by

Alternatives 2 and 3. (SED, at 13-61, 13-66.) The SED also states that the water supply reductions caused by the LSJR Alternatives could be "shifted from agricultural uses downstream in the plan area to consumptive domestic and municipal uses upstream in the extended plan area," thereby increasing the impact to municipal service providers in the extended plan area. (SED, at 13-89.)

Although the SED recognizes that municipal surface supply will be greatly impacted by the proposed objectives, it dismisses those impacts in two ways. First, the SED states that the impact of reduced surface water supply on municipal suppliers is only "a function of their ability to use existing alternative supplies (e.g. groundwater) or develop alternative water supplies." (SED, at 13-49.) In other words, the analysis effectively dismisses the demand for municipal supply by assuming that it will be satisfied from another source, such as groundwater. Second, the WQCP suggests that the Board will protect against any impacts to municipal supply by prioritizing municipal uses over other beneficial uses, without consideration of water right priority. Specifically, the WQCP states that the State Water Board will "take actions as necessary to ensure that implementation of the [LSJR] flow objectives does not impact supplies of water for minimum health and safety needs, particularly during drought periods." (SED, at Appx. K, p. 28; 13-61, 13-66.) The WSE Model implements this proposed protection of municipal uses as follows: "Volumes of water assumed not to be subject to a water shortage (e.g., municipal and industrial water supply, riparian rights) are subtracted from the total diversions for each river to calculate the remaining water. Any water left over is then delivered to the irrigation districts to be used for applied water demands . . .." (SED, at 11-36.) As explained below, providing this assurance of protection to municipal supplies, regardless of the priority of the water rights that currently serve those supplies, constitutes an unlawful prioritization of a municipal beneficial use over other beneficial uses, such as agricultural uses, without due consideration of the priority of the water rights that serve those beneficial uses, and without consideration of any contracts which control distribution to municipal suppliers.

As stated in the SED, California recognizes domestic water use as the most important use, with irrigation as the second most important. (SED, at 13-61; Water Code, § 106.) However, this hierarchy cannot be used as a basis for altering water right priority, nor for diverging from the rule of first in time, first in right. As stated by one commentator, “there is no legislative or judicial authority in California for the enforced advancing of the priority of an appropriation for one beneficial purpose over that of a prior appropriation for another beneficial purpose, either in time of water shortage or otherwise, without making due compensation.” (Hutchins, *California Law of Water Rights,* p. 174.) The only mechanism by which the State Water Board can assign a higher priority to a later appropriation serving a more preferred beneficial use is through the imposition of permit terms and conditions on the earlier appropriation. (see *Racanelli, supra,* 182 Cal.App.3d at 132 [recognizing the very limited authority of the Board to impose permit conditions that give a higher priority to a more preferred beneficial use even though later in time].) Thus, where a water right is not based on a permit issued by the State Water Board or its predecessor agency, the Board has no authority to prioritize one beneficial use over another where doing so would contravene water right priority. (*Young v. State Water Resources Control Bd.* (2013) 219 Cal.App.4th 397, 404 [“the Water Board does not have jurisdiction to regulate riparian and pre-1914 appropriative rights”].)

By establishing a set of objectives for the benefit of fish and wildlife that will have an impact on municipal uses, and then dismissing that impact by proposing a method of protection that the Board has no authority to implement, the Board has circumvented its statutory obligation to set water quality objectives that provide “reasonable” protection to fish and wildlife, considering all demands and other beneficial uses. (Water Code, § 13000, 13241.) The assessment of whether the proposed objectives for fish and wildlife are reasonable considering all demands will depend upon, among other things, the extent of the impact on municipal supply. The Board has ignored the impact on municipal supply by (1) assuming the demand will be satisfied from another source of water, and (2) improperly assuming that municipal uses can be systematically protected at the expense of other beneficial uses, such as agriculture. However, the Board has no authority to prioritize municipal uses over other beneficial uses based on the preference for municipal supply, as such an act would violate the rules of water right priority. Because the Board lacks this authority, the Board must reexamine the municipal demand for the waters of the Stanislaus, Tuolumne and Merced Rivers without the assumed systematic protection of municipal uses. As the SED improperly assumes the impact on municipal supply can be effectively eliminated, further consideration by the Board is necessary to determine whether the proposed objectives offer a reasonable level of protection for fish and wildlife considering the impact on municipal demand.

2.2.1.2. The SED fails to analyze whether the proposed objectives are reasonable considering the demand for agricultural supply

According to the information provided in the SED, there are approximately 516,722 acres of farmland in the area that will be impacted by the Tributary Flow Objective and the Vernalis Flow Objective. (SED, at Table 11-15, p. 11-48.) These areas include the lands serviced by OID, SSJID, TID and MID. The SED recognizes that the proposed objectives will have significant and unavoidable impacts on agricultural resources across these areas. (SED, at Table ES-20, p. ES-52.) Succinctly stated, “any increases in unimpaired flows would reduce surface water supplies that are available for irrigation purposes.” (SED, at 11-1.) The SED estimates that “approximately 22,879 acres, on average, of Prime or Unique Farmland of Statewide importance requiring irrigation could have reduced surface water diversions” under LSJR Alternative 3 (40% UIF), and that this impact would be significant and unavoidable irrespective of whether the alternative is adaptively implemented. (SED, at 11-5.) These estimated impacts to agriculture are significantly understated in the SED, and as a result the document fails to provide the Board with sufficiently accurate information to determine whether the objectives are reasonable in light of the agricultural demand being made on the waters involved.

As stated above, the Board is tasked with setting water quality objectives that ensure the reasonable protection of beneficial uses, such as fish and wildlife, “considering all demands being made and to be made on those waters.” (Water Code, § 13000, 13241.) The Stanislaus, Tuolumne and Merced Rivers provide surface water that supports a vast and diverse agricultural industry in the affected area, as evidenced by Table 11-5 of the SED which shows that there are more than 500,000 acres of farmland that will be impacted by the proposed LSJR objectives. These figures demonstrate that the agricultural demand on the waters of the Stanislaus, Tuolumne and Merced Rivers is significant. Instead of giving consideration to this demand for surface water, as is required by Water Code section 13000, the SED preemptively diminishes the agricultural demand for surface water in the affected area by assuming that groundwater will serve as a substitute for the lost surface water. (SED, at 11-36.) By doing so, the SED fails to assess the actual agricultural demand for the waters affected by the objectives. Specifically, the WSE Model assumes that agricultural demands could be "satisfied by surface water and groundwater, or a combination of the two." (SED, at 11-36.) The SED states that, within the irrigation districts in the affected area, including OID, SSJID, TID and MID, "there is a minimum amount of groundwater pumping that occurs every year." (SED, at 11-37.) Under the WSE Model, when the amount of available surface water, combined with the minimum amount of groundwater pumping, is insufficient to meet the irrigation demands in a particular district, "then additional groundwater pumping" is assumed to occur up until the point that the irrigation demands are satisfied or the maximum capacity of groundwater pumping is reached. (SED, at 11-37.) Under the SED, agricultural demands are only deemed to be impacted when the additional groundwater pumping is maximized, and when there is still insufficient water to satisfy all irrigation demands. (SED, at 11-37.) The flaw in this assumption is twofold.

First, irrespective of whether the assumed maximum capacity for groundwater pumping is accurate or legally permissible under SGMA, proper consideration of the agricultural demands under Water Code section 13000 requires an assessment of those demands in their undiminished capacity and without an assumption that supply can be subsidized by groundwater. While the Board is afforded some deference in determining what constitutes a reasonable measure of protection for fish and wildlife considering all the demands being made on the waters involved, its determination cannot be "arbitrary, capricious, or lacking in evidentiary support." (*Racanelli*, 182 Cal.App.3d at 113, citing *California Hotel & Motel Assn. v. Industrial Welfare Com.* (1979) 25 Cal.3d 200, 212.) This deference is premised upon "the separation of powers between the Legislature and the judiciary, [and] the legislative delegation of administrative authority to the agency . . ." (*California Hotel*, *supra*, 25 Cal.3d at 212.) The mandate from the legislature to the State Water Board in this instance is to set reasonable objectives "considering **all demands** being made and to be made on those waters." (Water Code, § 13000 [emphasis supplied].) The directive to consider "all demands" compels an objective assessment of all the agricultural demands being made on the surface waters involved, and precludes the State Water Board from tinkering with the demand figures in such a way as to diminish the total demand when deciding what objectives are reasonable. This issue of downwardly adjusting values where an agency has been directed consider *all* values in determining what is reasonable has been addressed in other legal contexts. For instance, in a case involving Proposition 39's requirement that school districts provide charter schools with "reasonably equivalent" facilities, the Sixth District Court of Appeal held that a school district improperly understated the amount of "non-teaching" space at "comparison" schools when determining the amount of "non-teaching" space that should be made available to the charter school. (*Bullis Charter School v. Los Altos School Dist.* (2011) 200 Cal.App.4th 1022, 1046-1047.) Pursuant to the implementing regulations for Proposition 39, the school district was required to consider "all of the space that is not identified as teaching station space . . . [including, but not limited to] administrative space, kitchen, multi-purpose room, and play area space" when calculating "non-teaching station space." (*Bullis Charter School, supra,* 200 Cal.App.4th at 1046-1047; Cal. Code Regs., tit. 5, § 11969.3[b][3].) Instead of taking "an objective look at all of such space available" at the comparison schools, the district employed a "common usage approach" where it only considered the "non-teaching" spaces that were common to all of the schools in the comparison group. (*Bullis Charter School*, *supra*, 200 Cal.App.4th at 1047.) Under this approach, the comparison group schools could control the "reasonably equivalent" analysis by changing their use of non-teaching space. (*Ibid*.) The example provided by the court was as follows: if all schools in the comparison group had tennis courts, but one school chose to use the court only for badminton, then the school district would not consider that space to be "non-teaching" space for Proposition 39 analysis. (*Id*.) The effect of this methodology was that the school district excluded a substantial amount of "non-teaching" space from its analysis, thereby reducing the resources that it needed to provide to the charter school in order to attain the reasonably equivalent requirement. (*Id.*) The court concluded that this was error and that the school district acted arbitrarily. (*Id.*) The Court also determined that the school district erred by failing to consider the overall site size for the charter school in relation to the comparison schools because the regulations for Proposition 39 state that the school district "'shall' use as a factor 'school site size.'" (*Id.* at 1051-1052.)

Like the regulations for Proposition 39, which require school districts to consider "all" non-teaching space, as well as site size, when determining "reasonably equivalent" school facilities for charter schools, Water Code, § 13000 requires the State Water Board to consider "all demands" being made on the waters involved when determining what constitutes a "reasonable" water quality objective. (Water Code, § 13000, 13241.) In *Bullis,* the court determined that the school district acted arbitrarily by failing to consider "all" of the non-teaching space held by the comparison schools, instead relying on a reduced number that was subject to alteration. The SED makes a similar error. Rather than using the actual agricultural demands being made of the surface waters of the Stanislaus, Tuolumne and Merced Rivers, the SED uses a reduced demand number that is effectively subsidized by an estimated "maximum" groundwater pumping capacity. (SED, at 11-37.) As in *Bullis*, any determination that the proposed LSJR objectives are "reasonable, considering all demands" being made on the waters involved would be arbitrary in the absence of any consideration of the *actual* agricultural demand, i.e., the agricultural demand without the assumption that a portion of that demand will be satisfied by maximum groundwater pumping. In addition, any such determination would be beyond the scope of the authority granted to the State Water Board to set water quality objectives insofar as that authority is constrained by the requirement that the Board consider all demands being made on the waters involved. (*California Hotel, supra,* 25 Cal.3d at 212 [an agency must act "within the scope of its delegated authority"].) The Board's decision to only examine impacts to Prime or Unique Farmland of Statewide importance also improperly diminishes the agricultural demand for the same reasons.

Second, the assumption that the agricultural demands from the surface waters of the Stanislaus, Tuolumne and Merced Rivers can be satisfied, at least in part, from the pumping of groundwater is inaccurate and legally unsupportable. The issue of whether agricultural demands can be satisfied by available groundwater in the affected area is a technical matter which requires expert analysis. “[A]bsent any indication of arbitrariness or evidentiary or procedural defect, in these technical matters requiring the assistance of experts and the collection and study of statistical data, courts let administrative boards and officers work out their problems with as little judicial interference as possible.” (*Racanelli, supra,* 182 Cal.App.3d at 113 [internal quotations omitted], citing *Industrial Welfare Com. v. Superior Court* (1980) 27 Cal.3d 690, 702.) However, a determination will be deemed arbitrary if the evidentiary support upon which it is based “is physically impossible or inherently improbable and such inherent improbability plainly appears.” (*California Sportfishing Protection Alliance v. State Water Resources Control Bd.* (2008) 160 Cal.App.4th 1625, 1640, quoting *Kunec v. Brea Redevelopment Agency* (1997) 55 Cal.App.4th 511, 518.) The SED acknowledges that the estimated groundwater needed to supplement the lost surface water supply is not physically attainable. Specifically, in assessing maximum groundwater pumping capacity, the SED uses two different approaches, one of which is based upon groundwater pumping infrastructure and estimated capacity under 2009 conditions, and another which is based upon groundwater pumping infrastructure and estimated capacity under 2014 conditions. (SED, at 11-37.) The groundwater pumping capacity estimates are higher under 2014 conditions than under 2009 conditions due to the drilling of additional wells over the course of those years in response to drought conditions. (SED, at 11-37.) The SED openly acknowledges that exercising groundwater pumping capabilities under 2014 conditions is not “a sustainable practice given groundwater conditions.” (SED, at 11-52.) Given the acknowledgement of this physical impossibility, or at least the inherent improbability of it, the Board currently lacks the necessary information and analysis needed to make a decision that is not arbitrary or capricious on the issue of whether the proposed objectives are reasonable considering demands being made on the surface waters involved. (*California Sportfishing, supra*, 160 Cal.App.4th at 1640.)

Furthermore, the Sustainable Groundwater Management Act (“SGMA”) (Water Code, § 10720 et seq.) “will impact groundwater management as it places a mandatory duty upon local agencies in high- and medium- priority groundwater basins to form groundwater sustainability agencies (GSAs) by June 30, 2017, in order to adopt and implement groundwater sustainability plans (GSPs) to sustainably manage groundwater resources." (SED, at 9-2.) GSAs will have the ability to "control groundwater extractions by regulating, limiting, or suspending extractions from wells." (SED, at 9-2, citing Water Code, § 10726.4.) The agricultural analysis performed in the SED does not account for the potential regulations and restrictions on groundwater pumping that will inevitably result from the implementation of SGMA. Accordingly, the assumption that the proposed objectives for unimpaired flow can be built on the back of the dwindling groundwater supply is legally untenable. The State Water Board should decline to adopt water quality objectives that would directly contradict the goals of SGMA, including (1) "[t]o provide for the sustainable management of groundwater basins," (2) "[t]o avoid or minimize subsidence," and (3) "[t]o increase groundwater storage and remove impediments to recharge." (Water Code, § 10720.1.)

In sum, the SED fails to account for the true agricultural demand being made on the surface waters of the Stanislaus, Tuolumne and Merced Rivers, and overestimates the extent to which the demand can be satisfied by groundwater. As a result, the SED does not include a proper assessment of the agricultural demands being made of the waters impacted by the water quality control plan, and thus cannot support a decision by the State Water Board that the protections afforded to fish and wildlife beneficial uses are reasonable in the face of all demands as required by the Water Code.

2.2.1.3. The SED fails to analyze whether the proposed objectives are reasonable considering the impact to groundwater recharge

The Water Code requires that the State Water Board consider "all demands" being made on the waters subject to a water quality control plan when determining what constitutes a reasonable protection of a beneficial use such as fish and wildlife. (Water Code, § 13241.) While passive groundwater recharge, in itself, is not a beneficial use, it is incidental to irrigation, the second-most preferred beneficial use. (Water Code, § 106.) As such, it is part of the demands being made on the waters subject to the objectives and must be considered in determining what constitutes a reasonable protection for fish and wildlife.

The SED states that "sustainable yield estimates [for groundwater] are highly dependent on recharge from surface water applications for irrigation and seepage from distribution systems [and] if surface water applications are modified, then the subbasin's sustainable yield changes." (SED, at

9-15.) According to the information in the SED, total average recharge in SSJID from applied irrigation water and seepage from canals and reservoirs is approximately 97 TAF annually. (SED, at 9-25.) Groundwater recharge within OID, on average, is estimated to be 87 TAF annually. (SED, at 9-27.) Because of OID's contributions, "groundwater levels in portions of the Eastern San Joaquin Subbasin underlying the OID service area have decreased much less than groundwater levels in the rest of the subbasin." (SED, at 9-27.) In MID, groundwater recharge has increased significantly in recent years, from approximately 81 TAF in 2012, to 152 TAF in 2015, the majority of which comes from MID irrigation water. (SED, at 9-28.) Total recharge in TID is estimated to be 238 TAF annually, most of which comes from applied surface water. (SED, at 9-29.) Across these four irrigation districts, total recharge is approximately 574 TAF annually. Except in dry years, the irrigation districts are net rechargers, adding more water to the groundwater basin than they extract from it. (SED, at Figure 9-9, p. 9-53.) This net recharge helps "compensate for groundwater pumping outside of the irrigation district lands." (SED, at 9-54.) However, the proposed objectives will drastically reduce the amount of recharge to groundwater due to the reduction in applied surface water. (SED, at Figure 9-10 –9-12, p. 9-55 – 9-56; and Table 9-12, p. 9-58.) Specifically, under a 40% unimpaired flow requirement, the districts would still be net positive rechargers in most years, but the positive balance would decrease and "be detrimental because it could reduce the amount of compensation for groundwater pumping that happens outside of the irrigation district lands." (SED at 9-62.) Moreover, the irrigation district groundwater balance would be negative in the Eastern San Joaquin and Extended Merced Subbasins in approximately the driest 40 percent of years." (SED,at 9-62.) A reduction in groundwater levels can cause a "degradation of groundwater quality." (SED, at 9-63.) The SED notes that a 40% unimpaired flow requirement could "substantially deplete groundwater supplies and interfere with groundwater recharge and affect groundwater quality" in the affected subbasins. (SED, at 9-63.)

This impact to groundwater recharge must be considered by the Board in determining whether a 40% unimpaired flow requirement for the protection of fish and wildlife is reasonable. Apart from noting that the impact is significant and unavoidable for purposes of CEQA, the SED contains no analysis of whether a different objective, such as a functional flow approach, would provide the same protection for fish and wildlife with less impact on groundwater recharge. This analysis needs to be performed before the Board can find that the objectives are reasonable considering all demands being made upon the waters affected by the WQCP.

2.2.1.4. The SED fails to analyze whether the proposed objectives are reasonable considering the impact to water storage

On the Stanislaus and Tuolumne Rivers there are at least eight major reservoirs with a total storage capacity of more than 5 million acre feet. (SED, at 2-3.) This storage is critical to maintaining a robust agricultural industry and ensuring a reliable municipal supply, especially in dry years and sequential dry years. The ability of water users to store water in these reservoirs for later use is one of the many demands being made on the waters of the Stanislaus and Tuolumne Rivers. However, the SED provides no analysis of whether the 40% unimpaired flow requirement for the benefit of fish and wildlife is reasonable considering the impact that it will have on storage. In fact, the modeling in the SED assumes that reservoir operators will adhere to certain minimum carryover storage targets in New Melones Reservoir and New Don Pedro Reservoir, even though those storage targets are not required by the objectives. (SED, at Appx. F1, p. F.1-36, F.1-37.) By modeling a minimum storage target that is not required by the objectives, the analysis fails to demonstrate the real impact of the objectives on storage. Without any modeling or analysis to show how the 40% unimpaired flow requirement will impact storage, the Board cannot determine whether the objectives are reasonable in light of their impact to storage. For this reason, the Board cannot fulfill its obligation under Water Code section 13000 of setting an objective that is reasonable considering all demands being made on the waters, and must therefore decline to adopt the WQCP.

2.2.1.5. The SED fails to analyze whether the proposed objectives are reasonable considering the impact they will have on water transfers

The SED fails to consider the impact that the objectives will have on the ability of water right holders to effectuate water transfers. The Water Code allows for water transfers where the water will be put to beneficial use. (Water Code, § 1725.) These water transfers can have significant economic benefits to the transferor, as well as the transferee. Additionally, some water transfers can be used to benefit fish and wildlife. As indicated in the comments submitted by OID and SSJID, water transfers can help fund water delivery system projects and water conservation projects. (OID/SSJID Joint Comments, District Revenue Impacts Section.) The SED does not consider the impact that the 40% unimpaired flow requirement will have on the ability of water right holders to effectuate water transfers. The failure to consider the impact of the objectives on this demand is a violation of Water Code section 13000.

2.2.1.6. The SED fails to properly consider whether the proposed objectives are reasonable considering the impact they will have on hydropower

There are numerous hydropower plants on the Stanislaus and Tuolumne Rivers, including one at each of the rim dams (New Melones and New Don Pedro) and one below each of the rim dams (Tulloch and La Grange). (SED, at 14-6.) The SED fails to properly analyze the impact of the objectives on hydropower. The modeling presented in the SED assumes that reservoir operators will adhere to certain end-of-September carryover storage requirements on the rim dams. (SED, at 14-30; Appx. F1, p. F.1-36, F.1-37.) These carryover storage requirements will have a direct effect on hydropower generation because they create constraints on the release of water. However, the carryover storage targets are not required by the objectives, and thus the modeling presents an unrealistic scenario of how hydropower generation will be impacted, both in timing and quantity. Moreover, the carryover targets ensure that the reservoirs are not drawn down to dead-pool levels during dry and sequential dry years, which is an unrealistic occurrence if the 40% flow requirement is implemented, as shown in the SJTA's analysis set forth above. Thus, the SED analysis improperly assumes the availability of water for hydropower generation in years where such water would likely not be available if the objectives were implemented.

Furthermore, the SED states that the timing of hydropower generation will shift from baseline conditions if the proposed objectives are implemented, with a general increase in production during the February through June period, and a decrease in production during the July to September period. (SED, at 14-32.) The SED notes that this shift has the "potential of stressing the gird" because peak demand for energy occurs during the summer months of June to August. (SED, at 14-32.) There is no discussion in the SED of the reasonableness of increasing the risk of stress to the grid during summer months in exchange for ostensibly providing protection to fish and wildlife earlier in the year. This is type of assessment is necessary if the Board is to demonstrate a "rational connection" between the chosen objective and the cost of attaining the benefits achieved by that objective. (*Racanelli,* 182 Cal.App.3d at 113.)

2.2.2. The SED fails to consider whether the objectives are reasonable considering the environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto

The SED is devoid of any data or analysis of this component of the WQCP. The closest the State Water Board comes is in Chapter 5. Chapter 5 describes the Water Quality issues: salinity, pesticides/herbicides and water temperature.

Salinity is not a component of the flow objective. Salinity is dealt with as a constituent and is the sole responsibility of Reclamation. (Water Rights Decision 1641, p. 87-88.) Pesticides/herbicides as described on page 5-10 of the SED are not addressed. Storage and or releases of water instream do not cause these pollutants to be in the river.

Water temperature is addressed in the SED as a water quality characteristic that may be improved by the proposed flow objectives. Water Temperature on the tributaries and San Joaquin River have been a source of longstanding controversy. In 2010, the State Water Board declined to list the San Joaquin River or its tributaries (the Merced, Tuolumne and Stanislaus) as impaired water bodies for temperature for which total maximum daily loads ("TMDLs") must be set under Clean Water Act section 303[d]. (SWRCB Resolution 2010-0040.) EPA disapproved the Board's decision and listed the Lower San Joaquin River and tributaries as impaired for water temperature using the Pacific Northwest objectives. (SJTA Attachment 10 [USEPA Letter to SWRCB, October 11, 2011, Encl., p. 1.])

The San Joaquin River Group Authority ("SJRGA") challenged the EPA's listing of the San Joaquin River and its tributaries as temperature impaired water bodies under CWA Section 303(d). (SJTA Attachment 11.) The United States District Court for the Eastern District of California dismissed the suit, finding that the issue was not ripe for review because the SWRCB had not yet developed TMDLs for the newly listed water bodies. (SJTA Attachment 11, p. 2.) The Eastern District explained that California must develop TMDLs in response to the EPA's listing decision, after which the State will submit those TMDLs to the EPA for approval or disapproval. (SJTA Attachment 11, p. 2.) Because the State had not yet developed any TMDLs for temperature on the San Joaquin River or its tributaries, the Court dismissed the suit. (SJTA Attachment 11, p. 2-3.)

The CWA does not set a deadline for the development of TMDLs following a listing decision by EPA. (33 U.S.C. § 1313[d]; 40 C.F.R. § 130.7[d].) To date, the SWRCB has not started developing temperature-related TMDLs for the San Joaquin River or its tributaries in response to EPA's listing decision. (SED, at Table 5-5, p. 5-12.) If the Board intends to address the issue of water temperature on the San Joaquin River and the three eastside tributaries, it should do so within the TMDL process, not through the WQCP process using flow as a surrogate for temperature, as is being attempted here. Notably, the proposed objective of 40% unimpaired flow from February-June will not obtain the Pacific Northwest water temperature guidelines which formed the basis of the 303[d] listing. (See SJTA Table 2-4, above.)

In setting the Tributary Flow Objectives with the aim of attempting to control water temperature in the San Joaquin River and three eastside tributaries, the SED fails to properly account for the temperature characteristics of the waters involved. The analysis in the SED shows that there will be small incremental reductions in water temperatures downstream of the rim dams on the Stanislaus, Tuolumne and Merced Rivers at 40% unimpaired flow. (SED, at 19-22 – 19-30.) This analysis was done with a carryover storage target, reservoir refill criteria and flow shifting. (SED, at Appx. F.1, p. F.1-36 – F.1-38.) As pointed out elsewhere in these comments, this is the wrong analysis as none of those components are required by the objectives. When the temperature modeling is run without these components, many of the supposed temperature benefits are lost (see SJTA Table 2-4, above), and by the SED's own account, water temperatures are worse than under baseline conditions (SED, Appx. F1, p. F.1-42).

The SED provides three tables purportedly showing the anticipated temperature changes on the San Joaquin River, including at Vernalis. (SED, at 19-31 – 19-33.) As this is the Bay-Delta Plan designed to protect migration of native San Joaquin River watershed fish through the Delta, the quality of the waters on the San Joaquin River through the Delta need to be examined if the Board is to fulfill its statutory obligation of setting reasonable objectives considering the "[e]nvironmental characteristics of the hydrographic unit under consideration." (Water Code, § 13241[b].) However, the SED provides no analysis of the temperature results on the San Joaquin River, instead limiting its analysis to the temperature results on the three eastside tributaries. Specifically, in Chapter 19, Staff explains the water temperature benefits for each significant life stage of Central Valley fall-run Chinook salmon on the three tributaries. (SED, at 19-34 – 19-43.) However, with respect to the anticipated water temperature changes on the San Joaquin River, the SED provides no analysis as to how such changes (if any) would impact adult migration (SED, at 19-34), reproduction (SED, at 19-34 – 19-35), core rearing (SED, at 19-37 – 19-38), or smoltification (SED, at 19-39 – 19-40). The absence of any analysis on the San Joaquin River is explained by the acknowledgment in the SED that 40% unimpaired flow is "not expected to produce significant benefits or impacts on optimal salmonid temperature habitat." (SED, at 19-43.) The reason that no significant benefits or impacts to temperature occur is because San Joaquin River water temperatures, including those at Vernalis, are almost entirely a function of ambient air temperature. In fact, in the 1991 Bay Delta Plan, the SWRCB stated, "controlling water temperature in the Delta utilizing reservoir releases does not appear to be reasonable, due to the distance of the Delta downstream of reservoirs, and uncontrollable factors such as ambient air temperature, water temperature in the reservoir releases, etc." (SWRCB, 1991 Bay-Delta Plan, p. 5-16.) The Board went so far as to say that it "considers reservoir releases to control water temperatures in the Delta a waste of water." (SWRCB, 1991 Bay-Delta Plan, p. 5-16.) There is no mention of this previous State Water Board finding in the SED. Clearly, the inability to control temperature in the Delta (which includes Vernalis) via reservoir releases is an environmental characteristic which must be considered by the Board in setting water quality objectives designed to protect fish migrating through the Delta. The failure to consider this fact is a violation of Water Code Section 13241[b].

Thus, on the one water quality constituent the State Water Board identified, i.e., water temperature, it completely whiffed when providing data or analysis as to how the proposed flow objectives would make water quality (water temperature) better as San Joaquin River water enters the Delta. State Water Board staff fails again to understand the planning process is the Bay-Delta Plan, not the Lower San Joaquin River Basin Plan.

2.2.3. The SED fails to consider water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area (Water Code, § 13241[c])

2.2.3.1. Failure to coordinate control of all water resources in the Bay-Delta

The Porter-Cologne Act requires the State Water Board to consider "[w]ater quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area." (Water Code, § 13241[c].) In setting the LSJR objectives, the State Water Board failed to fulfill its obligation of considering all factors that affect water quality in the area.

The State Water Board's Narrative Objective defines the *area* in which water quality is targeted by the proposed water quality control plan. Specifically, the Narrative Objective states that certain inflow conditions are to be maintained "from the San Joaquin River watershed to the Delta at Vernalis sufficient to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta." (SED, at Appx. K, p. 18.) Thus, the area to be protected by the objectives is the San Joaquin River watershed and the migratory path of native San Joaquin River watershed fish through the Delta. In other words, the geographic scope of the area targeted extends from the farthest reaches of the San Joaquin River watershed, all the way through the Delta.

Pursuant to Water Code section 13241[c], the State Water Board was required to consider "all factors which affect water quality" in the San Joaquin River watershed through the Delta. Similarly, the Board must consider "all demands being made and to be mode on those waters"

(Water Code, § 13000.) The First District Court of Appeal addressed this issue in *Racenelli*, in which the State Water Board employed a "without project" standard, meaning the number of days in a year that suitable water quality would be available in the Delta if the Central Valley Project and State Water Project had never been constructed. (*Racanelli, supra,* 182 Cal.App.3d at 116.) The *Racanelli* court held that the Board "erroneously based its water quality objectives upon the unjustified premise that upstream users retained unlimited access to upstream waters, while the projects and Delta parties were entitled only to share the remaining water flows." (*Racanelli*, *supra,* 182 Cal.App.3d at 118.) In other words, the Board considered "only the water use of the Delta parties . . . and the needs of the customers served by the projects . . ." without giving any attention "to water use by the upstream users." (*Racanelli, supra,* 182 Cal.App.3d at 118.) The Court stated that, to remedy this problem, the Board must "take the larger view of the water resources in arriving at a reasonable estimate of all water users." (*Racanelli*, *supra,* 182 Cal.App.3d at 119.) As it did in setting the "without project" standards, the State Water Board has again failed to consider all the factors that might affect water quality in the area targeted, and all demands being made on those waters.

2.2.3.1.1. Failure to coordinate control of all water resources in the San Joaquin River watershed

While the area to be protected by the LSJR Objectives covers the entire Delta and San Joaquin River watershed (SED, at Appx. K, p. 18), the Tributary Flow Objective and the Vernalis Flow Objective are significantly more narrow in scope. To begin, these objectives do not call for any contributions from the San Joaquin River watershed upstream of its confluence with the Merced River. The Tributary Flow Objective only targets the waters of the Merced, Tuolumne and Stanislaus Rivers, and the Vernalis Flow Objective only requires contributions from those same three tributaries. (SED, at Appx K, p. 18, 29.) Similarly, neither objective requires any contribution from water users on the mainstem of the San Joaquin River downstream of its confluence with the Merced River, including any diverters on the west side of the San Joaquin River. The objectives also do not require any contributions from water users in the Delta, despite the Board's assertion that the objectives are to protect fish and wildlife beneficial uses through the Delta. By ignoring the water users and resources in these areas, the objectives fail to achieve “the coordinated control of all factors which affect water quality in the area” that is required by Water Code, § 13241[c].

2.2.3.1.2. Phasing of the WQCP update precludes coordinated control of all water resources in the Bay- Delta

Historically, the State Water Board has performed its review of the Bay Delta Plan in one comprehensive process. (SWRCB, 2006 Bay Delta Plan; see also 1995 Bay Delta Plan; 1991 Bay Delta Plan; and 1978 Bay Delta Plan.) Although the objectives are complex and multi-faceted, the Bay Delta Plan is a single plan that sets forth water quality objectives which contribute to the beneficial uses in the Bay Delta Estuary. (*See* 1995 Bay Delta Plan, at 3.) Because the purpose of the water quality objectives is to benefit a Bay Delta watershed, the objectives are often inextricably interrelated. For example, the San Joaquin River objectives are affected by and affect the objectives which set reverse flows, export/inflow ratios, and floodplain habitat flows.

The revised objectives do not require any new contributions from water users on the Sacramento River or its tributaries, which also contribute to water quality in the Delta. The purported reason for this exclusion is that revisions to all other parts of the Bay-Delta Plan (including contributions from the Sacramento River watershed, Delta outflows and export restrictions) will be addressed in a separate phase of the update, namely Phase II. (SED, at 1-3.) “Phases I and II are independent of each other, addressing different water quality objectives and associated programs of implementation.” (SED, at 1-3.)

This phased approach to addressing conditions in the Bay-Delta violates the Board’s obligation to consider “all factors which affect water quality in the area.” (Water Code, § 13241[c].) Separating south Delta and San Joaquin River flows from the remainder of the basin plan review results in a piece-mealed analysis that is non-comprehensive. The San Joaquin River is one of the two rivers whose confluence makes up the Delta. Separating the flow objectives on the San Joaquin River from the larger “comprehensive” review of the remainder of the Bay Delta Plan makes little sense. The quantity of San Joaquin River flows that will reasonably be required to protect the beneficial uses in the Delta is affected by reverse flows, exports, and other factors being reviewed in the “comprehensive” review including inflow from the Sacramento River. The Board cannot make a decision as to what contributions are necessary (or reasonable) from the San Joaquin River watershed for the protection of fish migrating through the Delta, without a corresponding assessment of what contributions are necessary (or reasonable) from the Sacramento River watershed. Indeed, "[p]ast experience has shown that piecemeal efforts to address the Bay-Delta's problems have failed because those problems are interrelated and because conflicting interest groups and stakeholders can block actions that promote some interests at the expense of others" (*In re Bay-Delta*, *supra*, 43 Cal.4th at 1165 [acknowledging that CALFED properly "determined that the four primary project objectives had to be addressed concurrently"].) For this reason, evaluating San Joaquin River flows in isolation, without considering the other basin-wide mechanisms that are interrelated, violates the Board's obligation to set objectives that consider "the coordinated control of all factors which affect water quality in the area." (Water Code, § 13241[c].)

The phasing process is problematic for other reasons as well. Separating the processes will require water users on the San Joaquin River to expend twice the resources to achieve the same result. Notably, the Board intends to address Delta outflows and interior Delta flows in Phase II. (SED, at Appx. K, p. 6.) To the extent that the Board believes San Joaquin River inflow may play a role in these components of the plan, SJTA members will be officially part of the Phase II update as well. Moreover, the WQCP states that the San Joaquin River flow objectives may even be updated as part of Phase II. (SED, at Appx. K, p. 6.) Because SJTA interests will be subject to all "phases" of the Bay Delta Plan review, it will be required to participate in two different review processes in front of the State Water Board, review at least two different environmental documents, and to the extent the adoption and/or implementation of any revised objectives do not comply with law, the SJTA will have to challenge two different actions adopting objectives and two different implementation plans. This unfairly prejudices the regulated parties on the LSJR.

2.2.3.2. Failure to coordinate control of factors other than flow

One of the Water Quality impairments listed by the State Water Board in Chapter 5 is invasive species. (SED, at 5-11.) In the State Water Board SED there is no discussion of how controlling this pollutant will benefit native fish migrating to and from the tributaries and through the Delta.

The Board has repeatedly recognized in the 1995 Bay-Delta Plan, the 2006 Bay-Delta Plan, and now in this update that predation is a problem in the Bay-Delta. Nevertheless, the Plan consistently fails to tackle the issue directly through the objectives, and as a result, the discussion about predation has never translated into action by the State Water Board. The failure of the Board to directly address the issue of predation by invasive species through an amendment of the objectives is a violation of the Board's obligation to coordinate control of all factors which affect water quality in the area. (Water Code, § 13241[c].)

2.2.4. The SED fails to properly consider the economic impact of the objectives

The Water Code requires that the economic impact of the objectives be examined. (Water Code, § 13000, 13241[d].) As noted above, courts will strike down a Board's decision as unreasonable if it is "arbitrary, capricious, or lacking in evidentiary support." (*Racanelli, supra,* 182 Cal.App.3d at 113, citing *California Hotel & Motel Assn. v. Industrial Welfare Com.* (1979) 25 Cal.3d 200, 212.) As shown below, the economic analysis in the SED lacks the necessary evidentiary support to demonstrate that the objectives are reasonable in light of their economic impact, and otherwise fails to show that there is a "rational connection" between the objectives chosen and the economic cost of attaining the benefits anticipated to be achieved by the objectives. (*Racanelli, supra,* 182 Cal.App.3d at 113.)

The SED states that the economic analysis contained in Chapter 20 will "help inform the State Water Board's consideration of potential changes to the 2006 Bay-Delta Plan related to LSJR flow and southern Delta water quality objectives." (SED, at 20-3.) However, it also states that there is no analysis of the economic impact of *implementing* the objectives, as that type of "project-level" change will be addressed in subsequent proceedings. (SED, at 20-3.) The level of analysis contained in the SED is problematic for two reasons.

First, although the SED states that the economic analysis is intended to assist the Board in its consideration of the proposed changes to the water quality objectives, it also states – in the preceding paragraph – that the analysis should not be used to compare "costs and benefits of the LSJR alternatives." (SED, at 20-2.) The document states that the new objectives will result in potential *costs* (e.g. reduced agricultural production) and potential *benefits* (e.g. improved fisheries), but the analysis does not attempt to compare those costs and benefits, nor does it attempt "to sum values across resource topics." (SED, at 20-12.) In fact, "the reader is strongly discouraged from trying to draw conclusions across topics concerning the overall net benefits of a particular alternative." (SED, at 20-2.) Of course, the problem with this limitation in the analysis is that the Board is required to perform this exact type of cost-benefit assessment in fulfilling its obligation under the Water Code to set objectives that provide *reasonable* protection to beneficial uses considering the economic impact of the objectives, as well as the other demands and beneficial uses of the water. (Water Code, § 13000, 13241.) If the cost-benefit assessment is not contained in the document that the Board relies upon to adopt the objectives, then the record will be devoid of evidentiary support for the Board's ultimate decision. A court will not assume from the Board's adoption of the WQCP that the Board members must have silently and internally conducted the very cost-benefit analysis that the drafters of the SED strongly discouraged. Courts must be assured that the Board "adequately considered all relevant factors, and . . . demonstrated a rational connection between those factors, the choice made, and the purposes of the [Porter-Cologne Act]" (*Racanelli, supra*, 182 Cal.App.3d at 113.) Without a discussion of the cost-benefit analysis, there is no such assurance. Accordingly, the Board should decline to adopt the WQCP based on the insufficient economic analysis provided.

Second, the economic impact of implementing the objectives cannot be delayed to subsequent proceedings. As the Board is required to adopt a WQCP that includes both objectives and a program of implementation, the economic impact of the entire plan needs to be assessed to determine if the objectives are reasonable considering their economic impact. (Water Code, §§ 13050(j), 13241(d).)

Moreover, the analysis understates the impact to the agricultural economy in several ways. First, Board staff used a model known as the Statewide Agricultural Production ("SWAP") model to analyze the impacts to agriculture. (SED, at 20-15.) The SWAP model optimizes available land and water so that net returns to farmers are maximized. (SED, at 20-15.) It achieves this result by assuming that crops which use large amounts of water and generate low net revenue per acre, such as pasture, alfalfa and rice, are fallowed when water is more scarce. Higher-revenue crops are fallowed last under the model. The SWAP model employs this trade-off method across the entire system, not within individual farms. Accordingly, it assumes that some farmers will fallow fields while others will not, based entirely on the type of crops being grown. It also assumes that farmers will act rationally and with perfect information in directing water towards the highest value crops in times of shortage. None of these assumptions are likely to occur in the real world, or even permitted to occur within the irrigation districts impacted, and thus the model significantly understates the economic impact on agriculture. The analysis also assumes that surface water reductions are offset by maximum groundwater pumping rates at 2009 capacity levels, without any analysis as to whether pumping at this rate would be lawful under SGMA. (SED, at 20-16.) This assumption likely overstates the amount by which surface water will be replaced by groundwater, and thus understates the economic impact to agriculture.

For these reasons, the economic analysis is insufficient, and the Board should decline to adopt the WQCP.

2.2.5. The Proposed Objectives Fail to Consider the need for developing housing within the region

SWB Staff has failed to consider the need for developing housing within the region as required under Water Code section 13241, subdivision [e] of the Water Code. In developing a water quality control plans the SWB must take into consideration the beneficial uses to be protected, and the water quality objectives reasonably required to achieve that purpose. Of the factors necessary for consideration by the SWB in establishing water quality objectives is the need for developing housing within the region. (Water Code, §13241[e].) The scant analysis of the growth-inducing effects of the proposed alternatives in the SED (SED, at 17-68.) is insufficient to comply with this directive.

Currently, consideration and analysis of the need for developing housing within the region is of critical importance. California is suffering from a serious housing shortage. (Taylor, *Perspectives on Helping Low-Income Californians Afford Housi*ng (Legislative Analyst's Office 2016) p. 1.) This is due in part to environmental protection policies that constrain new housing development. (*Id.* at 6.) The WQCP will increase dependence on groundwater resources within the region, thus, reducing the water source relied on for domestic use within the plan area. As an example, the Planada Community Service District in Merced County recently dealt with major challenges in meeting its community water service needs. Several of its wells went dry due to the increased dependence on groundwater, resulting in a need for emergency funding in order to put new wells in place. Without reliable water sources, future residential development may be restrained.

The Board should not adopt the WCQP until the SWB has considered the need for developing housing within the region as required by the Water Code.

2.2.6. The Proposed Objectives Fail to Consider the need to develop and use recycled water

The Water Code requires consideration of "the need to *develop* and use recycled water. (Water Code, §13241[f] [emphasis supplied].) The SWB's proposed objectives only consider the need to use recycled water as an offset for reduced surface water. The WQCP, as written, passes on the necessary consideration of development to waste water treatment plants ("WWTPs"). It states, "[m]odifications required for existing WWTPs cannot be known at this time because they would depend on the type of wastewater treatment currently conducted at a WWTP, the availability of resources (e.g., funding and space), and the management of the WWTP by the local wastewater treatment special district or municipality." (SED, at 16-49.) It goes on to say "details of the modifications to existing WWTPs and respective distribution systems to support the development of recycled water sources, are unknown at this time. It is assumed these modifications may be carried out by the municipalities and wastewater treatment service providers." (*Ibid*.) Merely alluding to unknown, but available, information is insufficient to comply with the directive to consider the need to develop recycled water. Accordingly, the Board should not adopt the WQCP until proper consideration is given to this factor.

2.2.7. Intangible Considerations

The State Water Board SED claims benefits to the ecosystem. The beneficial use is to be in the Bay-Delta, not the Lower San Joaquin River. Other than FPH and water temperature, the State Water Board SED has no discussion of how the ecosystem will be improved other than the belief that flow is the master variable and if there is more flow the ecosystem will be better.

2.2.8. SUMMARY

In sum, the Water Code requires that the Board set reasonable water quality objectives to protect beneficial uses, considering all demands being made on the waters involved, and all other relevant factors. (Water Code, §§ 13000, 13241.) As highlighted above, the SED fails to properly consider the impacts of the objectives on municipal and industrial supply, agricultural supply, groundwater recharge, water storage, water transfers and hydropower. The SED also fails to consider whether the objectives are reasonable considering past, present and future beneficial uses, environmental characteristics of the hydrographic unit under consideration, water quality conditions that can be reasonably achieved through the coordinated control of all factors, the economy, the need for housing, and the need to develop and use recycled water. The Board needs to balance all of these factors against the supposed benefit achieved by the objectives, which is the additional production of 1,103 fall-run Chinook Salmon, i.e., an increase of less than a quarter of 1% of the average annual production of one species. The SED does not present sufficient information for the Board to conduct this weighing and balancing, primarily because SWB Staff never modeled the actual project. Nevertheless, the information and analysis provided by the SJTA and its member agencies clearly demonstrates that the proposed objectives are not reasonable. The significant impacts are simply not justified by the supposed benefits to one fish species.

2.3. The Program of Implementation violates the Porter-Cologne Act

A Water Quality Control Plan must include a program of implementation. (Water Code, § 13050[j].) The POI is a road map for achieving the objectives in the plan, and must include (1) a "description of the nature of actions which are necessary to achieve the objectives, including recommendations for appropriate action by any entity, public or private," (2) a "time schedule for the actions to be taken," and (3) a "description of surveillance to be undertaken to determine compliance with objectives." (Water Code, § 13242.) All three of these components must be in the plan itself. (see e.g., *State Water Resources Control Bd. Cases, supra,* 136 Cal.App.4th at 727 [holding that the time schedule for implementing the objectives must be in the plan itself, not constructed after the adoption of the plan].)

As demonstrated in detail below, the proposed POI is deficient for numerous reasons and the Board should not adopt the proposed water quality control plan.

2.3.1. The Program of Implementation is unlawful because it does not describe the actions necessary to achieve the objectives, and instead allows for changes to the objectives without a properly noticed hearing

The Water Code mandates that the program of implementation describe the actions "necessary to achieve the objectives." (Water Code, § 13242.) The proposed WQCP violates this rule by treating the program of implementation as a tool for modifying the objectives, not achieving the objectives. Revisions to a WQCP, including any revisions to the objectives therein, can only be made after a properly noticed and conducted hearing. The proposed POI, which would allow for changes to the objectives without a properly noticed hearing, is unlawful and should not be approved by the Board.

When the State Water Board decides upon a plan of action that is "necessary to achieve the objectives" (Water Code, § 13242[a]), and adopts that plan of action as part of its water quality control plan, it must adhere to it. (Water Code, § 13247 ["in carrying out activities which may affect water quality," the State Board "shall comply with water quality control plans approved or adopted by the state board . . ."]; *State Water Resources Control Bd. Cases, supra,* 136 Cal.App.4th at 730 ["having determined in a water quality control plan that a water rights proceeding was necessary to achieve the water quality objectives in that plan," the Board cannot decide that it will not fully allocate responsibility for the objective in the water right proceeding and thereby "refuse to enforce its own plan"].) The Board cannot refuse to take the actions it has deemed necessary to achieve the objectives, as doing so would "make a de facto amendment to a water quality objective." (*State Water Resources Control Bd. Cases, supra,* 136 Cal.App.4th at 732.) Such amendments are unlawful because a plan cannot be changed "without complying with the procedural requirements for amending a water quality control plan." (*State Water Resources Control Bd. Cases, surpa*, 136 Cal.App.4th at 734; see Water Code, § 13244.) Where the method of implementation would "fundamentally alter[] [the] objectives, such an alteration [can] be accomplished only through a properly noticed and conducted regulatory proceeding." (*State Water Resources Control Bd. Cases, supra*, 136 Cal.App.4th at 729.)

Here, the POI states that the LSJR flow objectives for February through June will be implemented by 2022 through water rights actions or water quality actions. (SED, at Appx. K, p. 28.) Specifically, the LSJR flow objectives on the tributaries will be implemented "by requiring 40% unimpaired flow, based on a minimum 7-day running average, from each of the Stanislaus, Tuolumne and Merced Rivers." (SED, at Appx. K, p. 29.) The LSJR base flow objective will be implemented "by requiring a minimum base flow of 1,000 cfs, based on a minimum 7-day running average, at Vernalis at all times." (SED, at Appx. K, p. 29.) This plan is designed to satisfy the requirement of describing the actions necessary for achieving the objectives. (Water Code, § 13242.) However, the plan also describes a series of "[a]daptive adjustments" that can be made to the flow requirements as part of implementing the objectives. (SED, at Appx. K, p. 30.) These adaptive adjustments render the POI unlawful.

The POI identifies four adaptive adjustments that can be made after implementation of the 40% unimpaired flow and 1,000 cfs requirements: (a) adjusting the required percent of unimpaired flow to any value between 30 percent and 50 percent, (b) managing the required percent of unimpaired flow as "a total volume of water" that can be released on "an adaptive schedule" in the February through June time period, (c) delaying the release of a portion of the February through

June unimpaired flow "until after June to prevent adverse effects to fisheries, including temperature, that would otherwise result from implementation of the February through June flow requirements," and (d) adjusting the required base flow at Vernalis for February through June to any value between 800 and 1,200 cfs. (SED, at Appx. K, p. 30-31.)

Two of these adjustments fall within the broad constraints of the objectives themselves. For example, adjustment "*a*" merely allows for a change in the required unimpaired flow from February through June from 40% (the initial implementation number) to some other percentage within the permitted range of the objective itself, i.e., between 30% and 50%. Similarly, adjustment "*d*" merely allows for a change in the required base flow from 1,000 cfs (the initial implementation number) to some other flow requirement within the permitted range of the objective, i.e., between 800 cfs and 1,200 cfs. Making these adjustments would not change the objectives because the changes would be within the permissible range of the objective.

However, the other two adjustments in the POI allow for actual changes to the objectives. For instance, adjustment "*b*" allows for the required percent of unimpaired flow from February through June to be "managed as a total volume of water and released on an adaptive schedule during that [time] period where scientific information indicates that a flow pattern *different* from what would occur by tracking the unimpaired flow percentage would better protect fish and wildlife beneficial uses." (SED, at Appx. K, p. 30 [emphasis supplied].) This adjustment allows for two fundamental changes to the Tributary Flow Objective. First, the objective requires a "*percent of unimpaired flow* . . . be maintained from February through June." (SED, at Appx. K, p. 18 [emphasis supplied].) This adjustment would allow for a change to the unimpaired flow component of the objective. Pursuant to this adaptive adjustment, a percent of unimpaired flow would no longer be required, and flow could be released on some unspecified schedule entirely unrelated to unimpaired flow. Second, the objective requires a percent of unimpaired flow to be maintained based upon *a minimum 7-day running average*. (SED, at Appx. K, p. 18.) On its face, the objective allows for an upward adjustment of the number of days used to compute the running average. However, adaptive adjustment "*b*" allows for a complete repudiation of the minimum 7-day running average component of the objective. In other words, it allows for managing releases from February through June based on a total volume of water, without adherence to a running average of any kind. This adjustment method constitutes an actual change to the objective insofar as it dispenses with the two components that define it, i.e., THE unimpaired flow percentage and minimum 7-day running average.

Similarly, adjustment "*c*" impermissibly enlarges the time period applicable to the February-June objectives. By their terms, the Tributary Flow Objective and the Vernalis Base Flow Objective are limited to requiring the maintenance of certain flows from February through June. (SED, at Appx. K, p. 18.) However, adjustment "*c*" allows for the required releases to be delayed "until after June," and, in certain circumstances, "until the following year." (SED, at Appx. K, p. 30-31.) This is a change to the actual objectives, which only require the maintenance of flows from February through June.

There are several other components of the POI that are not set forth as adaptive adjustments, but nevertheless allow for – and in some circumstances require – modification of the objectives. For instance, the POI states that the Executive Director "may approve changes to the compliance locations and gage station numbers set forth in Table 3 if information shows that another location and gage station more accurately represent the flows of the LSJR tributary at its confluence with the LSJR." (SED, at Appx. K, p. 29.) This change is not identified as part of the adaptive implementation methods, but it nevertheless allows for a change to the actual objectives which have predefined compliance points. (SED, at Appx. K, p. 18.) Changing the location of the compliance point will change the amount of flow required, as it will adjust the accretions/depletions which occur between the bypass/release point and the compliance point.

Another example of an improper modification of the objectives through the POI is the carryover storage requirement. The POI states, "[w]hen implementing the LSJR flow objectives, the State Water Board **will include** minimum reservoir carryover storage targets or other requirements to help ensure that providing flows to meet the flow objectives will not have adverse temperature or other impacts on fish and wildlife or, if feasible, on other beneficial uses." (SED, at Appx. K, p. 28

[emphasis supplied].) Because the plan states that the Board "will include" carryover storage requirements, and because Water Code section 13247 requires the Board to comply with all aspects of its water quality control plan once approved, the Board will be required to create carryover storage requirements, despite the assertion in the SED that carryover storage is "not intended in a regulatory sense but, rather, to provide an example of reservoir operations . . ." (SED, at Appx. F.1, p. F.1-4, fn. 2.) Requiring minimum carryover storage in a reservoir will, under certain hydrologic conditions, directly conflict with the Tributary Flow Objective requiring the maintenance of 30% to 50% unimpaired flow. For instance, if requiring 30% unimpaired flow (i.e., the minimum allowable unimpaired flow percentage) would result in a drawdown of a reservoir to a level below the carryover storage requirement, then this implementation component (which is required by the plan) would directly conflict with the 30% to 50% unimpaired flow objective.[40] Neither the objective, nor the program of implementation, specifies which of these requirements would control in the case of a conflict. In this regard, the POI not only allows for changes to the objectives without a properly noticed hearing, it actually compels that the objectives be changed in certain circumstances.

The POI is not saved by the fact that it only calls for changes to the objectives in order to avoid adverse impacts to fish and wildlife beneficial uses. The three components of a water quality control plan (the beneficial uses, the objectives, and the program of implementation) have different purposes. The purpose of the objectives is to provide "reasonable protection of the beneficial uses of water." (Water Code, § 13050[h].) In turn, the purpose of the program of implementation is to "achieve the objectives." (Water Code, §§ 13242,13050[j][3].) Through this two-step process designed by the legislature, the beneficial uses are protected. The current proposal subverts this statutorily-required two-step process, and improperly uses the program of implementation as a

[40] For example, the carryover storage requirement at New Melones is 700 TAF. (SED, at Appx. F1, p. F.1-36, Table F.1-2-23a.) Minimum diversions on the Stanislaus River are set at 210 TAF. (*id.*) Assume New Melones reservoir is at 700 TAF on February 1. If total inflow from February through June is 270 TAF, then instream releases for unimpaired flow would be 81 TAF if the UIF requirement was set at 30%. However, if carryover storage of 700 TAF is to be maintained with an inflow of only 270 TAF, and an outflow of 210 TAF for minimum diversions, then instream releases would need to be reduced from 81 TAF to 60 TAF (270 TAF inflow – 210 TAF diversions = 60 TAF available for instream releases). As 60 TAF only amounts to approximately 22% of the 270 TAF inflow, the carryover storage requirement would compel a violation of the UIF objective.

means of directly protecting the beneficial uses, irrespective of the objectives. This procedure is unlawful for several reasons. First, it violates Water Code section 13242, which states that the POI must include a description of the actions necessary to achieve the objectives, not a description of the actions necessary to directly protect the beneficial uses. Second, Water Code section 13241 requires that water quality objectives be established for the "reasonable protection" of beneficial uses, after balancing and considering all beneficial uses of water. (Water Code, § 13241.) There is no balancing required when establishing a program of implementation, mainly because the balancing is achieved in the prior step. (Water Code, § 13242.) Thus, by constructing a program of implementation with adaptive adjustments that can be used to change the objectives (or create new objectives), the critical step of weighing and balancing is skipped. The proposed POI reflects this very point. It focuses solely on adaptive adjustments (i.e., changes to the flow objectives) that are needed to protect fish and wildlife beneficial uses. There is no corresponding requirement that impacts to other beneficial uses be considered before making the change: "[t]he adjustments in (a), (b), and (c) may . . . be made independently on each of [the tributaries], so long as the flows are coordinated to achieve beneficial results in the LSJR *related to the protection of fish and wildlife beneficial uses*." (SED, at Appx. K, p. 31 [emphasis supplied].) In other words, the weighing and balancing of other beneficial uses of water is not required before changing the objectives via the adaptive adjustments allowed by the POI. By setting up a procedure where the POI (rather than an objective) is used as a direct means of protecting beneficial uses, Board staff has effectively skipped the weighing and balancing that must be conducted when determining what level of protection for fish and wildlife beneficial uses is "reasonable." (Water Code, § 13241.) This error is compounded by the granting of authority to the Executive Director to modify the objectives as part of the program of implementation. Specifically, adjustments "*b*" and "*c*" allow the Executive Director to approve changes to the objectives on an annual basis if the change is "recommended by one or more members of the STM Working Group." (SED, at Appx. K, p. 30-31.) However, the State Water Board is the only entity that has been granted authority by the legislature to approve revisions to the water quality control plan. (Water Code, § 13245.) As such, the State Water Board is the final authority on whether "reasonable protection" has been provided for beneficial uses. (Water Code, § 13240.) The legislature has not authorized the Executive Director, nor the STM Working Group, to revise objectives, nor to weigh and balance other beneficial uses in order to determine whether the protection afforded to fish and wildlife beneficial uses is reasonable. Even if the Water Code granted the Board the authority to preemptively conduct the necessary balancing of interests as part of a broad grant of authority to the Executive Director to change the objectives (which it does not), the unlimited number of changes permissible under the adaptive adjustments would render such a task impossible.

In sum, the program of implementation is unlawful because it does not contain a description of the actions necessary to achieve the objectives, and instead allows for changes to the objectives without a properly noticed hearing, and without the statutorily required weighing and balancing of all demands being made on the waters involved. (Water Code, §§ 13000, 13241.)

2.3.2. The program of implementation fails to describe the actions necessary to achieve the Narrative Objective

The program of implementation includes a plan of action for purportedly achieving the February through June unimpaired flow objectives (SED, at Appx. K, p. 28-31), and the October pulse flow objective (SED, at Appx. K, p. 34). However, there is no plan of action for achieving the newly created Narrative Objective. Notably, the POI states that the narrative objective for the protection of salmon, referred to herein as the Doubling Objective (SED, at Appx. K, p. 17), is expected to be achieved through the "implementation of the numeric flow-dependent objectives and other non-flow measures." (SED, at Appx. K, p. 53.) The POI does not contain a similar plan of action for the new Narrative Objective. Water Code section 13242 requires a description of the actions necessary to achieve the objectives, a time schedule for the actions, and a description of the surveillance to determine compliance with the objectives. The failure to include any of these components in the POI for the Narrative Objective is a violation of Water Code section 13242.

Even if the unstated intention of Board staff is that the Narrative Objective will be implemented through the implementation of the Tributary Flow Objectives, such a plan is inadequate. The Narrative Objective enlarges the scope of the protected area beyond the compliance points on the tributaries, stating that inflow conditions should be maintained in the San Joaquin River watershed "to the Delta at Vernalis sufficient to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta." (SED, at Appx. K, p. 18.) Although the POI states that the State Water Board "will exercise its water right and water quality authority to help ensure that the flows required to meet the LSJR flow objectives are used for their intended purposes and are not diverted for other purposes" (SED, at Appx. K, p. 28), the POI does not include the required description of surveillance measures that will be undertaken to ensure that the flows which reach the compliance points on the tributaries are not diverted for other purposes as soon as they hit the San Joaquin River. Such a description is required under Water Code section 13242[c].

2.3.3. The State Water Board overstates its authority to implement the objectives

The State Water Board has overstated its implementation authority in several key respects which render the POI unlawful. The POI identifies two primary implementation methods. The first method is a water right proceeding where the Board will assign responsibility for contributing flows to water right permit and license holders, taking into consideration "the requirements of the Public Trust Doctrine and the California Constitution, article X, section 2." (SED, at Appx. K, p. 26.) The second method is assigning responsibility through water quality certifications under Clean Water Act section 401. For the various reasons stated below, the Board has overstated its authority to implement the objectives through these methods.

2.3.3.1. The Water Code does not grant the State Water Board continuing jurisdiction to amend water right licenses

Water Code section 1394 allows the State Water Board to amend, revise or supplement water right *permit* terms and conditions after a permit has been issued. However, the Water Code does not grant a similar authority to change the terms and conditions of a water right *license*. Specifically, the Water Code states, "in no case shall [this continuing] jurisdiction be exercised after the issuance of the license." (Water Code, § 1394[b]; Water Code, § 1600, et seq.)

Most of the water diverted in the geographic area of the proposed project is diverted pursuant to licensed or pre-1914 water rights. Accordingly, the State Water Board will only be able to make limited use of its continuing jurisdiction under Water Code section 1394 when implementing the flow objectives, and will not have control over a sufficient quantity of water to compel compliance with the unimpaired flow requirements.

2.3.3.2. The Board's authority to prevent waste and unreasonable use of water does not permit the Board to compel the use of water to meet an objective that protects a particular beneficial use

The POI states that the Board will consider the requirements of article X, section 2 of the California Constitution during any water right proceeding initiated to assign responsibility for meeting the objectives. (SED, at Appx. K, p. 26.) Article X, section 2 of the California Constitution prohibits the "waste or unreasonable use or unreasonable method of use of water." (Cal. Const., art. X, § 2.) Pursuant to this Constitutional provision, the State Water Board has the authority to prevent waste or unreasonable use of water. (Water Code, § 275; *California Farm Bureau Federation v. State Water Resources Control Bd.* (2011) 51 Cal.4th 421, 429.) However, the State Water Board's authority under the doctrine of waste and unreasonable use is limited, and the Board should not assume that this authority will permit it to implement the proposed water quality objectives. The determination of whether a use is reasonable is a question of fact and must be made according to the circumstances of each particular case. (*Joslin v. Marin Mun. Water Dist.* (1967) 67 Cal.2d 132, 139.) Therefore, before curtailing water use pursuant to a finding of waste and/or unreasonable use, the State Water Board will need to make a factual determination based on the specifics of each use it seeks to curtail. The State Water Board cannot make a broad determination that a type of use is unreasonable without a case-specific analysis. (see *Imperial Irrigation Dist. v. State Water Resources Control Bd.* (1990) 225 Cal.App.3d 548, 554 ("*Imperial*"); *Light v. State Water Resources Control Board* (2014) 226 Cal.App.4th 1463, 1482-1487.)

In addition, the power to curtail a specific use of water because it is being wasted or unreasonably used should not be equated with an authority to reallocate that water to a different beneficial use; the two powers are fundamentally distinct. For example, the State Water Board may determine a specific water use is unreasonable under certain circumstances. This determination would allow the Board to prohibit a water user from using water in the manner determined unreasonable. (*Imperial*, *supra*, 225 Cal.App.3d at 554-55.) That determination would not, however, prohibit the water user from using the water in a different manner that is reasonable and beneficial under the circumstances. In other words, a State Water Board determination that a use is unreasonable only curtails that particular use under the set of circumstances analyzed; it does not extinguish the underlying right and does not provide the State Water Board the authority to otherwise control the water that was the subject of the unreasonable use finding. The unreasonable use doctrine only empowers the State Water Board to ensure water is used reasonably under a particular right of use; it does not empower the State Water Board to permanently curtail a right or compel that water be put to a specific beneficial use. For this reason, the doctrine of unreasonable use will be of limited value to the State Water Board in implementing water quality objectives.

2.3.3.3. The State Water Board has limited authority to implement water quality objectives using the Public Trust doctrine

The State "owns all of its navigable waterways and the lands lying beneath them as trustee of a public trust for the benefit of the people." (*Nat'l Audubon Society v. Superior Court* (1983) 33 Cal.3d 419, 433-434.) This is known as the public trust doctrine and it imposes "an affirmative duty" on the State "to take the public trust into account in the planning and allocation of water resources, to protect public trust uses whenever feasible." (*Id.* At 446.) In accordance with this duty, the State Water Board possesses the authority "to exercise supervision over appropriators in order to protect fish and wildlife." (*United States v. State Water Resources Control Bd.*, *supra*, 182 Cal.App.3d at 150.)

To the extent the Board intends to rely on its continuing authority to amend the terms and conditions of a permit or license in order to protect public trust uses, the Board must provide notice and a hearing to the affected parties, and determine that such amendments are "*necessary* to preserve or restore the uses protected by the public trust." (Cal. Code Regs., tit. 23, § 780[a][emphasis supplied].) The "necessary" threshold is more stringent than the standard under which the State Water Board establishes water quality objectives; the latter standard requires the State Water Board to "establish such water quality objectives . . . as in its judgment will ensure the *reasonable* protection" of the identified beneficial use. (Water Code, § 13241 [emphasis added].)

Therefore, even if the analysis in the SED was sufficient to support the establishment of the objectives (which it is not), the State Water Board could not rely on that same analysis to implement the objectives under its public trust authority. Instead, the State Water Board would need to notice and perform separate public trust proceedings to determine whether the objectives were *necessary* to protect the public trust values.

The scope of the Board's continuing authority over appropriations under the public trust doctrine is limited to preventing appropriations that are "harmful to the interests protected by the public trust." (*United States v. State Water Resources Control Bd., supra,* 182 Cal.App.3d at 151.) Thus, the State Water Board may not employ its continuing authority over appropriations in order to increase instream flows with the aim of merely *improving* fish and wildlife beneficial uses. Rather, the State Water Board must show that fish and wildlife are specifically *harmed* by the particular diversion targeted. This greatly limits the State Water Board's authority to implement the objectives pursuant to its public trust authority.

Even if the State Water Board could demonstrate that certain flows were *necessary* to protect the public trust resources and the diversions by certain users specifically *harmed* public trust resources, the State Water Board must further find that the curtailment of the targeted water rights is in the "public interest." (*United States v. State Water Resources Control Bd., supra,* 182 Cal.App.3d at 151; Water Code, § 1253; Cal. Code Regs., tit. 23, § 780[a].) "As a matter of practical necessity, the state may have to approve appropriations [of water] despite foreseeable harm to public trust uses." (*Nat'l Audubon Society v. Superior Court, supra,* 33 Cal.3d at 446.) Therefore, "in determining whether it is 'feasible' to protect public trust values like fish and wildlife in a particular instance," as is the Board's charge, "the Board must determine whether protection of those values, or what level of protection, is 'consistent with the public interest.'" (*State Water Resources Control Bd. Cases, supra,* 136 Cal.App.4th at 778, quoting *Nat'l Audubon Society v. Superior Court, supra,* 33 Cal.3d at 446-447.) A great majority of the water supply that will be affected by the proposed objectives is used for municipal and agricultural uses, which a vast segment of the populace depends upon for their livelihood and health and safety. On the other hand, the quantifiable benefit of the objectives to fish and wildlife is extremely limited. Specifically, the analysis in the SED projects that, on average, the implementation of the objectives will result in an increase of fall-run Chinook salmon production of approximately 1,103 fish. (SED, at Appx. K, p. 19-84.) The established benefit of existing uses, combined with the minimal benefit expected for fish and wildlife, compels a finding that the proposed objectives are not "consistent with the public interest." (S*tate Water Resources Control Bd. Cases, supra,* 136 Cal.App.4th at 778.)

Thus, the public trust doctrine is not a tool the State Water Board can use to implement the objectives. In order to implement flows through the State Water Board's public trust authority, the State Water Board would need to notice public trust proceedings. The Board would need to weigh and balance the information coming out of those proceedings to determine: (a) the objectives are necessary to protect fish and wildlife; (b) the diversions of certain water users are causing harm to the native fishery; and (c) the objectives promote the public interest. Because that evidence does not exist, the State Water Board's reliance on the public trust doctrine is misplaced.

2.3.3.4. The Program of Implementation ignores the State Water Board's limited jurisdiction over pre-1914 and riparian rights

The State Water Board "was created as the State Water Commission in 1913 to administer the appropriation of water for beneficial purposes." (*Light v. State Water Resources Control Bd., supra,* 226 Cal.App.4th at 1481.) Under California's system of water rights, "[r]iparian users and pre-1914 appropriators need neither a permit [from the State Water Board] nor other governmental authorization to exercise their water rights." (*Id.* At 1478.) Moreover, the Board "does not have jurisdiction to regulate riparian and pre-1914 appropriative rights." (*Young v. State Water Resources Control Bd.*, 219 Cal.App.4th 397, 404.) The Board has long recognized this limitation in its regulatory authority. (State Water Board Resolution 96-028 ["The SWRCB has limited jurisdiction over disputes regarding riparian and pre-1914 water rights. The relative priority and authorized diversion quantities of riparian and pre-1914 water rights are under the jurisdiction of the courts"].)

Thus, to the extent the State Water Board intends to utilize water right proceedings to implement the LSJR flow objectives and require contributions from water right holders, it will have no authority to compel such contributions from riparian and pre-1914 appropriative right holders. A significant portion of the water rights held on the Stanislaus, Tuolumne and Merced Rivers are pre-

1914 and riparian rights. As such, there are not sufficient flows under the Board's control for it to implement the unimpaired flow requirements via a water right proceeding.

2.3.3.5. The State Water Board does not have the authority to control reservoir operations by requiring carryover storage requirements

As noted above, the POI indicates that the State Water Board "will include minimum reservoir carryover storage targets or other requirements to help ensure that providing flows to meet the flow objectives will not have adverse temperature or other impacts on fish and wildlife or, if feasible, on other beneficial uses." (SED, at Appx. K, p. 28.) For several reasons, the Board lacks the authority to require that reservoirs be operated with minimum carryover storage requirements.

2.3.3.5.1. Implementing minimum carryover storage requirements could modify the unimpaired flow objectives without a noticed hearing and without balancing the impact of the changed objective on other beneficial uses of water

As set forth in above, minimum carryover storage requirements could conflict with the unimpaired flow objectives under certain hydrologic conditions, assuming minimum diversions are maintained as modeled in the SED. To the extent that the carryover storage requirements would be controlling over the unimpaired flow objectives, they would effectively change the objective. A water quality control plan, including the objectives contained therein, cannot be changed without a noticed hearing. (Water Code, § 13245.) In addition, objectives must be established considering, among other things, "[p]ast, present, and probable beneficial uses of water." (Water Code, § 13241[a].) Permitting the unimpaired flow objectives to be changed through an implementation measure, such as the minimum carryover storage requirement, subverts this statutorily mandated balancing of beneficial uses. Accordingly, the Board does not have the authority to establish minimum carryover storage requirements through a program of implementation.

2.3.3.5.2. The Board cannot implement a minimum carryover storage requirement for the purpose of protecting a beneficial use

The purpose of an objective is to provide reasonable protection to beneficial uses. (Water Code, § 13241.) The purpose of a POI is to describe the actions "necessary to achieve the objectives." (Water Code, § 13242.) This is the two-step process mandated by the legislature for protecting beneficial uses. As explained below, carryover storage requirements will not achieve any of the objectives, and thus the Board has no authority to implement them.

The stated purpose of requiring carryover storage is to "help ensure that providing flows to meet the flow objectives will not have adverse temperature or other impacts on fish and wildlife, or, if feasible, on other beneficial uses." (SED, at Appx. K, p. 28.) Because the purpose is to directly protect beneficial uses rather than achieve objectives, establishing carryover storage requirements would subvert the two-step process described above for protecting beneficial uses. In addition, establishing a carryover storage requirement through the POI, rather than through an objective, subverts the required balancing that must be done when determining what level of protection for fish and wildlife is reasonable. (Water Code, § 13241.) This issue is compounded by the fact that the POI simply states that the Board "will include minimum reservoir carryover storage targets," but does not actually set those targets. (SED, at Appx. K, p. 28.) The amount of carryover storage that is required each year will have a direct impact on other beneficial uses, such as agriculture. Accordingly, the Board is required by law to consider whether the specific carryover storage targets provide a "reasonable" level of protection for fish and wildlife. (Water Code, § 13241.) The balancing must be performed now and incorporated into the water quality control plan as an objective; it cannot be deferred to a water right proceeding where no such balancing is required.

Furthermore, to the extent that the purpose of requiring carryover storage is to prevent adverse temperature impacts, the requirement would be improper. The POI must describe "actions which are necessary to achieve the objectives." (Water Code, § 13242.) As there is no temperature objective in need of implementation, the Board has no authority to implement carryover storage requirements.

Even though carryover storage requirements are not identified as objectives in the WQCP, the POI states that the requirements are intended to protect beneficial uses. Protecting beneficial uses is the purpose of an objective, not the POI. (Water Code, § 13241.) Nevertheless, for the limited purpose of providing the following comments, the carryover storage requirement is examined as if it were a stand-alone objective. When establishing an objective for the "reasonable" protection of fish and wildlife beneficial uses, the Board must consider, among other things, all other past, present and probable beneficial uses. (Water Code, § 13241.) The SED models the project with certain carryover storage requirements in place. (SED, at Appx. F1, p. F.1-36 to F.1-38.) However, there is no comparison between the project with carryover storage requirements and without carryover storage requirements. Without such a comparison, the Board cannot weigh and balance the impact of requiring carryover storage on other beneficial uses. Thus, to the extent the carryover storage requirement can be treated as an objective, the requisite balancing is absent.

2.3.3.5.3. The Board does not have the authority to control reservoir operations

Apart from the jurisdiction issue, the State Water Board authority to control reservoir operations is limited to its reserved jurisdiction over water storage licenses held by the Irrigation Districts. (Cal. Code Regs., tit. 23, § 780.) Two reservations of jurisdiction are relevant to this discussion. The first authorizes the State Water Board to exercise continuing jurisdiction over the license to protect public trust uses or to prevent waste or unreasonable use. (Cal. Code Regs., tit. 23, § 780(a).) It is unlikely the State Water Board will be able to justify the curtailment of water provided to irrigators because the water is beneficially used to grow crops. Furthermore, it is unlikely the fluctuation of reservoir levels will impede upon any public trust uses because the reservoirs already fluctuate and the public interest balancing required by the public trust doctrine will not likely inure to the State Water Board's argument in its application.

The second license condition under which the State Water Board may assert its continuing jurisdiction authorizes the State Water Board to modify "the quantity of water diverted" under the license where "such modification is necessary to meet water quality control objectives." (Cal. Code Regs., tit. 23, § 780(b).) This condition, unlike the one discussed above, does not authorize the State Water Board to insert new conditions into the license; the State Water Board may *only* modify the *amount diverted* under the license. Because the Tributary Flow Objective requires the Irrigation Districts to bypass water for fish and wildlife, the limited ability to curtail diversion to storage will not aid in the meeting of the Tributary Flow Objective. Furthermore, even if this curtailment could be considered "necessary" to accomplish the objectives, it would not have an effect on the Irrigation

Districts' ability to fully control reservoir operations. Thus, this license condition does not empower the State Water Board to control reservoir operations.

Therefore, the State Water Board may only control reservoir operations through modifying the conditions existing in some of the Irrigation Districts' licenses if it can justify the modification through its public trust authority. Even if such a modification could be justified, the action is not authorized under the license condition unless the State Water Board shows "that such specific requirements are physically and financially feasible and are appropriate to the particular situation." (*See* Cal. Code Regs., tit. 23, § 780(a).) Curtailing the ability to deliver water to irrigators is not financially feasible for the thousands of members of the Irrigation Districts who will lose their livelihood if they are unable to receive reservoir water. Furthermore, a condition requiring the Irrigation Districts to curtail their deliveries to their irrigators simply to reduce fluctuation of reservoir levels is not appropriate, as it would deprive thousands of irrigators of their livelihood and impact state and local economies. Therefore, the State Water Board does not have the authority to control reservoir operations.

2.3.3.5.4. The Board cannot impose a minimum reservoir storage requirement through a Section 401 certification because such a requirement does not ensure compliance with a water quality objective adopted by the Board

Section 401 of the CWA states, "[a]ny applicant for a Federal license or permit to conduct any activity . . . which may result in any discharge into the navigable waters shall provide the licensing or permitting agency *a certification* from the State in which the discharge originates." (33 USC 1341[a][1][emphasis supplied].) This certification is often referred to as a *Section 401 certification* and, in California, it is issued by the SWRCB. The United States Supreme Court has held that dams being operated to produce hydroelectricity require a federal license from FERC, and raise the potential for a discharge into navigable waters, thereby requiring state certification under CWA section 401. (*S.D. Warren Co. v. Me. Bd. of Envtl. Prot.*, (2006) 547 U.S. 370.)

A state's authority to impose conditions on a water user through a CWA 401 certification is "not unbounded" (*Pud No. 1 v. Wash. Dep't of Ecology* (1994) 511 U.S. 700, 712.) The state can only impose conditions that "ensure that the project complies with 'any applicable *effluent* *limitations* and *other limitations*, under [CWA § 301, 302]' or certain other provisions of the Act, 'and with any other appropriate requirement of State law." (*PUD No. 1, supra,* 511 U.S. at 712 [emphasis supplied], citing 33 U.S.C. § 1341[d]). "[S]tate water quality standards adopted pursuant to § 303 [of the CWA] are among the 'other limitations' with which a State may ensure compliance through the § 401 certification process." (*Pud No. 1, supra,* 511 U.S. at 712-713.) Thus, as relevant here, the SWRCB may only impose conditions through a CWA 401 certification if the conditions ensure compliance with water quality standards adopted pursuant to Section 303 of the CWA, or other requirements of State law.

Under the CWA, water quality standards "consist of a *designated use or uses* for the waters of the United States and *water quality criteria* for such waters based upon such uses." (40 C.F.R. § 131.3[i][emphasis supplied]; see 40 C.F.R. § 131.6.) The State Water Board treats the establishment of beneficial uses and water quality objectives as satisfying its obligation to adopt water quality standards (i.e., designated uses and water quality criteria) under the CWA. The POI, however, is not a component of a water quality standard (40 C.F.R. §§ 131.3[i], 131.6), and thus cannot be the basis for imposing a condition through a 401 certification. (33 U.S.C. § 1341[d]; *Pud No. 1 v. Wash. Dep't of Ecology, supra,* 511 U.S. at 712-713.) Since the carryover storage requirement is part of the POI, and not an objective itself, the Board cannot use its 401 authority under the CWA to assure compliance with *water quality standards* as a basis for imposing carryover storage requirements. Similarly, because the water quality control plan does not contain any temperature objectives, the Board cannot use its authority to assure compliance with *water quality standards* as a basis for imposing carryover storage requirements.

Furthermore, the Board has taken the position that CWA Section 303(c) is not intended to regulate pollution caused by reduction of flow. (SJTA Attachment 12.) Thus, to the extent the carryover storage requirements might be interpreted as a component of regulating flow, it is not a water quality standard under CWA § 303(c) with which the State can ensure compliance through a 401 certification.

Likewise, since the carryover storage targets are not objectives of the Water Quality Control Plan, they will not be requirements of state law with which the State can ensure compliance through the 401 certification.

2.3.3.5.5. The requirement of carryover storage is a taking that requires just compensation

The final clause of the Fifth Amendment to the United States Constitution provides that "private property" shall not be "taken for public use, without just compensation." (U.S. Const., 5th Amend.) This provision is applicable to the states through the Fourteenth Amendment. (*Chicago, B. & Q. Railrod Co. v. Chicago* (1897) 166 U.S. 266.) The law distinguishes between two types of takings: (1) a *physical* taking of an interest in property by the government, and (2) and a regulatory taking that affects an owner's *use* of his or her property. (see generally *Tahoe-Sierra Pres. Council v. Tahoe-Reg'l Planning Agency* (2002) 535 U.S. 302, 322-323.)

With respect to physical takings, the Supreme Court has held that "a permanent physical occupation authorized by government is a taking [per se] without regard to the public interests that it may serve." (*Loretto v. Teleprompter Manhattan Catv Corp.* (1982) 458 U.S. 419, 426 [holding that a state law which permitted a cable television provider to attach cables to apartment buildings constituted a regulatory taking which required just compensation].) In other words, "when the physical intrusion reaches the extreme form of a permanent physical occupation, a taking has occurred." (*Loretto, supra,* 45 U.S. at 426.) As for the second type of taking, i.e., a regulatory taking which affects the *use* of an owner's property, courts will make an "ad hoc, factual inquiry" to determine if a taking has occurred. (*Penn Cent. Transp. Co. v. New York City* (1978) 438 U.S. 104, 124.) All relevant facts are considered and balanced to determine if a taking has occurred, but there are several factors of particular importance, including (1) the economic impact of the regulation on the claimant, (2) the extent to which the regulation interferes with investment-backed expectations, (3) the character of the governmental action. (*Penn Cent., supra,* 438 U.S. at 124; *Tahoe-Sierra, supra,* 535 U.S. at 322.)

The proposal to impose carryover storage requirements constitutes a physical taking requiring just compensation. Moreover, even if a court were to determine that a carryover storage requirement did not constitute a physical taking, a balancing of the relevant factors would lead to the conclusion that a regulatory taking affecting use of property has occurred.

2.3.3.5.5.1. A taking of reservoir storage space

The California Supreme Court has held that the ability to store water in a reservoir is a property right, and that the right must be valued in a condemnation proceeding. (*Marin Water & Power Co. v. Railroad Com. of California* (1916) 171 Cal. 706, 715 [to the extent that the railroad commission held that the ability of "water storage" derived from the features of the land "was not a property right, it was in error"].) Because the ability to store water is a property right, the government cannot take that property for public use without providing just compensation. (U.S. Const., 5th Amend.) The United States Supreme Court has a long history of finding that the permanent flooding of private property by the government is a physical occupation of that property and thus a taking. For instance, in the case of *Pumpelly v Green Bay Co.* (1872) 13 Wall. 166, a dam was constructed across a river causing flooding on the plaintiff's land. The Supreme Court stated, "where real estate is actually invaded by superinduced addition of water, earth, sand, or other material, or by having any artificial structure placed on it, so as to effectually destroy or impair its usefulness, it is a taking" (*Pumpelly v. Green Bay Co.* 13 Wall. at 181.). In the more recent case of *Loretto*, the Supreme Court observed that in every one of its prior flooding cases "involving a permanent physical occupation . . . [a] taking has always been found" (*Loretto v. Teleprompter Manhattan Catv Corp.* (1982) 458 U.S. 419, 428, citing *United States v. Lynah* (1903) 188 U.S. 445, 468-470; *Bedford v. United States* (1904) 192 U.S. 217, 225; *United States v. Cress* (1917) 243 U.S. 316, 327-328; *Sanguinetti v. United States* (1924) 264 U.S. 146, 149; *United States v. Kansas City Life Ins. Co.* (1950) 339 U.S. 799, 809-810.) By contrast, where the flooding does not result in an actual entry onto an owner's land, but merely impedes access to the land temporarily, no taking will be found to occur. (*Northern Transportation Co. v. Chicago* (1879) 99 U.S. 635.) The distinction has been stated as follows: in order to be a taking, the flooding must "constitute an actual, permanent invasion of the land, amounting to an appropriation of, and not merely an injury to, the property." (*Sanguinetti v. United States* (1924) 264 U.S. 146, 149.)

The carryover storage requirements proposed in the WQCP would require SJTA members to hold a certain amount of water in their reservoirs at all times, thereby occupying physical space in the reservoirs. (SED, at Appx. F.1, p. F.1-36 – F.1-37.) Additionally, the Board will have effectively taken possession of the use of that water (i.e., the water right) because the districts will no longer be able to put it to beneficial use. By effectively taking possession of the water right, and by using that water right to occupy physical space in the districts' reservoirs, the Board will have committed a physical taking *per se* of the reservoir space requiring just compensation.

Moreover, even if a court were to find that a carryover storage requirement did not constitute a physical taking, a court would likely find a taking under the multifactor balancing test used for regulations that effect an owner's use of his or her property. In conducting the multifactor balancing test, courts examine "the economic impact of the regulation on the claimant and particularly, the extent to which the regulation has interfered with distinct investment-backed expectations," as well as "the character of the governmental action." (*Penn Cent.*, *supra*, 438 U.S. at 124; *Tahoe-Sierra*, *supra*, 535 U.S. at 322.) The carryover storage requirement will cause substantial interference with distinct investment-backed expectations. Specifically, the regulation would interfere with the districts' expectations as to the amount of water they can capture in their reservoir and put to beneficial use. Each reservoir has a capacity limit, and that limit was chosen, in part, to accommodate the owners' needs and water rights; it was not chosen to accommodate a carryover storage requirement by the SWRCB. Adjusting the capacity limit of a reservoir in order maintain initial expectations regarding available storage would come at considerable financial expense. In short, there is a substantial investment-backed expectation that parties who own reservoirs will be able to use and operate those reservoirs within their dead pool and flood-control capacity limits, rather than within artificial limits created by the SWRCB.

2.3.3.5.5.2. A taking of water rights

A carryover storage requirement would reduce a party's water rights in two ways: (1) it would effectively raise the minimum pool level of a reservoir, and thus restrict a party's ability to capture water during a high-flow event if the presence of the carryover water caused a spill that would not have occurred in the absence of that water, and (2) it would prevent a party from withdrawing water from storage and putting it to beneficial use.

With respect to the first type of taking (i.e., raising the minimum pool and restricting the capture of water), the ruling from *Casitas Mun. Water Dist. v. United States* (2008) 543 F.3d 1276 (*Casitas III*) demonstrates that a carryover storage requirement would constitute a physical appropriation of a water right and a taking *per se.* In *Casitas III*, the Bureau of Reclamation admitted that its proposed operation of a fish ladder "did not merely require some water to remain in stream, but instead actively caused the physical diversion of water away from the Robles-Casitas-Canal – after the water had left the Ventura River and was in the Robles-Casitas-Canal – and towards the fish ladder, thus reducing Casitas's water supply." (*Casitas III*, 543 F.3d at 1291-1292.) The court in *Casitas III* concluded that "[t]he government requirement that Casitas build the fish ladder and divert water to it should be analyzed under the physical takings rubric." (*Id.* at 1296.) Similarly, if the SWRCB required a reservoir operator to divert and hold a certain amount of water in storage, and if the presence of that storage thereafter caused the reservoir to spill during a high-flow event in such a way that would not have occurred if "carryover" water was not present, then the carryover storage requirement will have caused a physical diversion away from the water right owner's reservoir, thus reducing its supply. This will result in repeated losses of water rights each time a spill occurs that would not have occurred if the carryover water had not been present.

With respect to the second type of taking (i.e., preventing a water right holder from withdrawing water from storage), a carryover storage requirement would cause water to be lost to the bottom of the reservoir and become permanently impounded by the Board in satisfaction of the minimum pool requirement. A carryover storage requirement would effectively transfer possession of the water at the bottom of the reservoir from the water right holder to the State, since the State would be making use of the water and preventing the reservoir owner from putting it to beneficial use, as would be the reservoir owner's right. This would result in a one-time loss of a water right. The recent case of *Klamath Irrigation v. U.S.*, 129 Fed.Cl. 722 (2016) provides ample support for this proposition that restricting the use of water will constitute a physical taking.

2.3.3.6. The State Water Board has limited authority to implement water quality objectives through FERC relicensing

The POI states that the Board will implement water quality objectives through FERC relicensing processes. (SED, at Appx. K, p. 28.) The 401 certification process allows the State Water Board to include water quality measures in the FERC license. However, 401 certification is not intended to be the mechanism through which water quality objectives are implemented. (*State Water Resources Control Board Cases supra,* 136 Cal.App.4th at 734 [stating water quality objectives are usually implemented by amending water right permits].) Further, there are serious limitations to the State Water Board's 401 certification powers.

The rules of water right priority require the State Water Board to undertake a water right proceeding before looking to FERC to satisfy water quality objectives. The State Water Board cannot require senior water rights holders to dedicate water to instream uses before junior water right holders simply because the senior right is tied to a project being relicensed under FERC. (*El Dorado Irr. Dist. v. State Water Resources Control Bd.* (2006) 142 Cal.App.4th 937, 963-964.) Therefore, regardless of the timing of relicensing, the State Board cannot use the FERC proceedings to require senior water right holders to contribute water to meet water quality objectives without first requiring all junior water right holders to cease diversions.

In addition, the 401 certification is limited to conditioning project-related impacts. (Water Code, § 13160 [authorizing the State Water Board to grant any certificate required by any federal agency when "there is a reasonable assurance that an **activity… will not reduce** water quality below applicable standards…" (emphasis added)]; *See also* Cal. Code Regs., tit. 23, § 3855[b][2][B].) Therefore, to the extent the State Water Board wishes to use the FERC proceedings to implement the Tributary Flow Objective, the State Board must first establish that the project undergoing relicensing is preventing the achievement of the Tributary Flow Objective. The State Water Board has not made this finding and the SED does not provide sufficient information upon which such a finding could be made.

2.3.3.7. The State Water Board cannot use the POI to protect flows past Vernalis because there is no objective past Vernalis

"Although the lowest downstream compliance location for the Lower San Joaquin River flow objectives is at Vernalis, the objectives are intended to protect Lower San Joaquin River fish in a larger area, including the Delta, where fish that migrate to or from the Lower San Joaquin River watershed depend on adequate flows from the Lower San Joaquin River …" (Appx. K, p. 28-29). This statement alone in the POI is not sufficient to protect fish and wildlife beneficial uses in the Delta. If the Board intends to protect beneficial uses in a larger area, including the Delta, then it must establish objectives to protect those beneficial uses. It cannot simply declare in the POI the intent of the objectives.

2.3.3.8. The State Water Board has no authority to establish the STM Working Group

The program of implementation states that the State Water Board "will establish" a Stanislaus, Tuolumne and Merced Working Group "to assist with the implementation, monitoring and effectiveness assessment of the February through June LSJR flow requirements." (SED, at Appx. K, p. 32.) The group is to be comprised of California Department of Fish and Wildlife ("DFW"), NMFS, USFWS,, and water users on the Stanislaus, Tuolumne and Merced Rivers, the latter of which would include OID, SSJID, MID, TID and CCSF. (SED, at Appx. K, p. 32.)

While the program of implementation states that the Board "will establish" this group, the Board cannot compel these agencies to join or participate in such a group. The Board has fairly wide authority in its "planning role to identify activities" of water users that may require correction in order to protect water quality. (*United States v. State Water Resources Control Bd.*, *supra*, 182 Cal.App.3d at 124.) However, the Board's "enforcement powers" are far narrower. (*Ibid.*) Apart from regulating water rights and waste discharges, the Board's authority "to implement water quality standards seems limited to *recommending* actions by other entities." (*Id.* At 124-125.) [emphasis in original], citing Water Code, § 13242[a].) Thus, although the Board can recommend that all of the agencies identified above participate in the STM Working Group, it cannot compel them to join or participate in such a group. Since the Board must adhere to its plan once approved

(Water Code, § 13247), it would be acting in excess of its authority if it adopted a plan stating that it "will establish" the STM Working Group.

2.3.3.9. The State Water Board cannot impose carryover storage requirements to manage temperature without a TMDL

If the State Water Board wishes to assert jurisdiction to control instream water temperatures, then it must do so through the Clean Water Act TMDL process. As explained above, this process is ongoing. No water temperature objectives have been set, nor have any maximum daily loads for the Stanislaus, Tuolumne, Merced or San Joaquin Rivers. . Until the TMDL is completed through the Central Valley Regional Water Quality Control Board, or until the State Water Board sets such quality objectives in its Basin Plan, there is no authority for the State Water Board to implement Carryover Storage and other requirements as a surrogate for addressing temperatures. Since the State Water Board cannot require carryover storage in this process as mitigation for its projects' impacts, the requirement that it will be done in the Program of Implemention as mitigation for the project must be deleted.

2.3.3.10. The proposed use of Biological Goals is unlawful

The program of implementation provides that the State Water Board "will seek recommendations on . . . biological goals from the STM Working Group, State Water Board staff, and other interested persons." (SED, at Appx. K, p. 33.) Within 180 days after the OAL approves the amendments to the WQCP, the Board will consider approval of the biological goals. (SED, at Appx. K, p. 33.) These biological goals "will be used to inform the adaptive methods" that are part of the program of implementation. (SED, at Appx. K, p. 33.)

As set forth above, adaptive methods (b) and (c) allow for modifications to the approved objectives. For the various reasons already stated, such changes are unlawful. Moreover, to the extent that the biological goals will be used to inform the changes, their creation is improper. By statute, the Board must consider a multitude of factors before establishing or changing objectives. (Water Code, § 13241.) The biological goals are not one of the factors to be considered in setting objectives, and therefore any consideration of the biological goals when modifying the objectives as part of the POI is improper. Moreover, even if the biological goals could be characterized as constituting one or more of the statutory factors to be considered when setting water quality objectives under Water Code section 13241, the POI does not call for the establishment of the biological goals until *after* the Board and OAL approve the WQCP. In that sense, the biological goals are an improper post-hoc consideration in the process of establishing objectives to ensure the "reasonable" protection of beneficial uses. (Water Code, § 13241.)

This biological goals are a clear example that the WQCP is not a plan, but rather an outline for creating a plan sometime in the future.

2.3.3.11. The Program of Implementation does not include a sufficient time schedule for implementation

A program of implementation must include "[a] time schedule for the actions to be taken." (Water Code, § 13242[b].) The POI states, in relevant part, "[b]y 2022, the State Water Board will fully implement the February through June LSJR flow objectives through water right actions or water quality actions, such as FERC hydropower licensing processes." (SED, at Appx. K, p. 28.) The POI expands slightly on this 2022 deadline by stating that the "February through June LSJR flow objective may be phased in over time, but must be fully implemented by 2022." (SED, at Appx. K, p. 28, fn. 8.)

A single deadline for the implementation of all objectives is not a "time schedule for the actions to be taken." (Water Code, § 13242[b].) The deadline does not create a path or schedule for all of the actions that will be necessary to achieve the objectives. Apart from the final deadline, there is no time schedule for creating or implementing carryover storage targets, nor for "funding and development of water conservation efforts and regional water supply reliability projects and regulation of public drinking water systems and water rights," nor for requiring 40% unimpaired flow on the three eastside tributaries, nor for requiring 1,000 cfs at Vernalis, nor for adaptively adjusting the objectives, nor for creating the STM Working Group. (SED, at Appx. K, p. 28-34.) The failure to include a time schedule for any of these actions is a violation of Water Code section 13242[b].

2.3.3.12. The Program of Implementation fails to include a description of the surveillance to be undertaken to determine compliance with the unimpaired flow objectives

The program of implementation must include, among other things, a "description of surveillance to be undertaken to determine compliance with objectives." (Water Code, § 13242[c].) Under the subheading "Unimpaired Flow Compliance," the program of implementation states, "[i]mplementation of the unimpaired flow requirement for February through June will require the development of information and specific measures to achieve the flow objectives and to monitor and evaluate compliance." (SED, at Appx. K, p. 33.) The plan further states that the "STM Working Group, or State Water Board staff as necessary, will, in consultation with the Delta Science Program, develop and recommend such proposed measures" to the Board for consideration and approval within 180 days of OAL's approval of the amendments to the Bay-Delta Plan. (SED, at Appx. K, p. 33.) This proposal is substantively inadequate and procedurally improper.

First, the program of implementation fails to include the requisite "description of the surveillance to be undertaken to determine compliance" with the unimpaired flow objective. (Water Code, § 13242.) Instead, it asserts that compliance measures have not been established and will require further development. Second, the Water Code requires that the compliance measures be included in the water quality control plan *before* it is adopted by the Board and sent to OAL for approval, not after. Specifically, the WQCP must include a program of implementation (Water Code, § 13050[j]), and the program of implementation must include a description of the compliance measures. (Water Code, § 13242[c].) The Board may only adopt a water quality control plan that complies with these provisions. (Water Code, § 13170.) Accordingly, delaying consideration of the compliance measures until after the plan amendments are approved by the Board and OAL is procedurally improper.

2.3.3.13. The Program of Implementation includes a San Joaquin River Monitoring and Evaluation Program ("SJRMEP") which is not sufficient to satisfy the monitoring requirement

The program of implementation contains a heading entitled, "San Joaquin River Monitoring and Evaluation Program." (SED, at Appx. K, p. 35.) However, the POI does not describe how or when this program will be created, nor does it indicate who will be responsible for running it or participating in it. Furthermore, the program fails to include a description of the specific surveillance that will be "undertaken to determine compliance with the objectives." (Water Code, § 13242[c].) Instead, it merely states that "monitoring, special studies and evaluations" will occur to determine whether compliance with the Narrative Objective is being achieved. (SED, at Appx. K, p. 35.) This statement is nothing more than an assertion that surveillance will be undertaken to determine compliance with the objective; it is not a description of the specific surveillance that will occur, which is the requirement of Water Code section 13242[c].

In addition, the SJRMEP contains annual and comprehensive reporting requirements. (SED, at Appx. K, p. 36.) The POI states that "parties are encouraged to work collaboratively in one or more groups and in consultation with the STM Working Group, USBR and DWR, in meeting" these reporting requirements. (SED, at Appx. K, p. 36.) However, the POI does not actually assign responsibility to any particular party for satisfying these reporting requirements. In addition, the annual and comprehensive reports are to review "progress toward meeting the biological goals. . .." (SED, at Appx. K, p. 36.) These reports will be insufficient. Water Code section 13242[c] requires a description of the surveillance that will be undertaken to determine compliance with the *objectives*, not with biological goals.

Finally, the POI states that the comprehensive reports will recommend "changes to the implementation of the flow objectives." (SED, at Appx. K, p. 36.) To the extent that these recommendations would allow for changes to the objectives without a hearing to amend the water quality control plan, the recommendations would be improper.

2.3.3.14. The Procedure for Implementation of Adaptive Methods is unnecessary and confuses the purpose of the Program of Implementation

The program of implementation includes a "Procedure for Implementation of Adaptive Methods." (SED, at Appx. K, p. 34.) The section states that the Board will consider and approve a set of procedures for allowing the "adaptive adjustments" to the LSJR flow objectives within one year of OAL's approval of the WQCP. These procedures are to be developed by either the STM

Working Group, or State Water Board staff if necessary. The inclusion of this section is unnecessary and improper.

The "adaptive adjustments" are part of the program of implementation. (SED, at Appx. K, p. 26-31.) Under Water Code section 13242, the program of implementation must describe the procedure for implementing the objectives; it should not require its own program of implementation. The inclusion of this section appears to be an outgrowth of Staff's decision to create a program of implementation that improperly allows for changes to the objectives after the WQCP is approved. The notion that the Board can set up a new procedure for making changes to the objectives as part of a program of implementation demonstrates a misunderstanding of the current process. The purpose of the current proceeding is to amend the water quality control plan. Once the Board approves the amendments, it must follow the procedure established by the legislature if it desires to change those objectives again, i.e., a properly noticed and conducted hearing. (Water Code, § 13244.) The Board cannot create a new set of procedures for revising objectives in a water quality control plan under the guise of implementing a component of a program of implementation.

2.3.3.15. The Program of Implementation unlawfully delegates authority to the Executive Director

The WQCP unlawfully delegates several duties to the Executive Director. Pursuant to Resolution No. 2012-0061, the State Water Board has delegated specific authorities to the Executive Director. Resolution No. 2012-0061 delegates the authority to: notice Board meetings and hearings, manage State Water Board staff, meet with other agency officials, implement the State Water Board's policies and regulations, meet with Regional Water Quality Control Board Executive Officers, and approve Clean Water Act section 205 final products. (Resolution No. 2012-0061, at 1.) However, the resolution does not authorize the Executive Director to set policy or change regulations; those authorities are reserved for the State Water Board. (*Id.*) The Executive Director is specifically prohibited from "adopting or approving water quality control plans or plan amendments." (Resolution No. 2012-0061, at 3.3.) This is consistent with Water Code section 13245, which provides that only the State Water Board may approve water quality control plans.

The POI improperly seeks to delegate several duties to the Executive Direction in violation of Resolution 2012-0061 and Water Code section 13240 et seq. First, the POI states that the Executive Direct may approve changes to the compliance locations that are set forth in Table 3. (SED, at Appx K, p. 29.) The compliance locations are part of the objectives, and thus cannot be modified by the Executive Director, nor can they be changed without a new hearing. (Water Code, § 13244.)

Second, the POI states that the Executive Director may approve "[a]daptive adjustments to the flow requirements." (SED, at Appx. K, p. 30.) As explained above, adaptive adjustments *b* and *c* allow for changes to the objectives themselves. Since the objectives are part of the water quality control plan, they can only be amended by the State Water Board; the authority to make such amendments has not been - and cannot be - delegated to the Executive Director. (Water Code, § 13240 et seq.; Resolution 2012-0061.)

Third, the POI states that "[i]mplementation of the unimpaired flow requirement for February through June will require the development of information and specific measures to achieve the flow objectives and to monitor and evaluate compliance." (SED, at Appx. K, p. 33.) The STM Working Group is granted the authority to develop and recommend these measures, and the Executive Director is granted the authority to approve the measures within 180 days of OAL's approval of the amendments to the WQCP. (SED, at Appx. K, p. 33.) This procedure is improper. Two of the required components of the POI are (1) a description of the actions necessary to achieve the objectives, and (2) a description of the surveillance to be undertaken to determine compliance. (Water Code, § 13242.) The State Water Board is supposed to review those descriptions and approve them as part of the water quality control plan – before OAL approves plan. (Water Code, § 13245.) The Board cannot delegate these tasks to the STM Working Group, nor can it delegate to the Executive Director the responsibility of approving components of the POI, especially after the WQCP is approved by OAL. These components of the WQCP should be approved by the Board, not approved by the Executive Director after the adoption of the plan.

Fourth, the POI states that the STM Working Group, or Board staff if necessary, will develop a set of procedures for allowing adaptive adjustments to the February through June flow objectives. For the various reasons stated above, it is improper to create a new set of procedures for revising objectives in a WQCP under the guise of implementing a component of a program of implementation. To the extent that the POI purports to grant the Executive Director the authority to approve these procedures, such grant of authority is also improper.

Fifth, the POI grants the Executive Director the authority to approve annual adaptive operations plans. (SED, at Appx. K, p. 34.) To the extent that the annual operations plans will allow for changes to the objectives, it is improper for the Executive Director to approve those changes, as any modifications to the WQCP must be approved by the State Water Board. (Water Code, § 13240 et. seq.)

2.3.3.16. The Proposal for Annual Adaptive Operations Plans is not Enforceable

The Annual Adaptive Operations Plan proposal is not enforceable. Only the STM Working Group, or members thereof, are required to submit proposed annual plans for adaptive implementation actions. (SED, at Appx. K, p. 34.) However, the State Water Board cannot compel participation in the STM Working Group, and can only recommend participation. (Water Code, § 13242[a]; *United States v. State Water Resources Control Bd.*, *supra*, 182 Cal.App.3d at 124-125). Accordingly, there may not be any participating entities required to submit annual plans. The entire proposal is not enforceable.

2.3.3.17. The Program of Implementation does not identify a responsible party for completing the required annual and comprehensive reports

The program of implementation includes an "[a]nnual reporting" requirement. (SED, at Appx. K, p. 36.) It states, in part, "[t]o inform the next year's operations and other activities, the State Water Board will require the preparation and submittal of an annual report to the State Water Board by December 31 of each year." (SED, at Appx. K, p. 36.) However, the WQCP does not identify who is responsible for preparing this report. There is a list of agencies that are supposed to work together to meet this reporting requirement, but the plan does not place responsibility on any particular party. (SED, at Appx. K, p. 36.) This deficiency should be corrected.

In addition to the annual reporting requirement, the POI requires a comprehensive report every three to five years. (SED, at Appx. K, p. 36.) Again, the WQCP does not identify who is responsible for preparing this report. This deficiency should be corrected.

The comprehensive report is intended to review any progress made toward meeting the "biological goals" and to identify recommended "changes to the implementation of the flow objectives." (SED, at Appx. K, p. 36.) This reporting requirement does not satisfy the compliance monitoring requirement of Water Code section 13242. The program of implementation must describe the "surveillance to be undertaken to determine compliance with *objectives*." (Water Code, § 13242[c][emphasis supplied].) As written, the comprehensive report will not inform the Board of compliance with the objectives, but rather of compliance with the "biological goals," which are not objectives. Moreover, although the report will recommend changes to the "implementation of the flow objectives," it must be noted that neither the objectives, nor the program of implementation, can be changed by the Board without a properly noticed hearing under Water Code section 13244. Thus, to the extent that the purpose of the comprehensive report is "to inform potential adaptive changes to the implementation of the flow objectives" without revising the Bay-Delta Plan (SED, at Appx. K, p. 36), no such changes can be made. (Water Code, § 13244.)

2.3.3.18. The POI does not call for implementation of all the operational criteria included in the project that was modeled in the SED

There are several modeling assumptions included in the SED that are not included in the objectives or the program of implementation. If Board Staff intends for these assumptions to be the water quality control plan, then they should be included as objectives so that the Board can determine whether the protection afforded to beneficial uses as a result of these components is reasonable in light of their impact on other beneficial uses. (Water Code, § 13241.) The components include: (1) minimum diversions, (2) minimum carryover storage requirements, (3) maximum storage draw, (4) shifting of flows outside the February to June period to the fall, and (5) reservoir refill criteria. (SED, at Appx. F1, p. F.1-36 – F.1-38.) Only two of these components are mentioned in the water quality control plan: carryover storage and flow shifting. Both of these components are referenced solely in the program of implementation; they are not included as objectives.

Furthermore, the POI does not identify a quantity of water for carryover storage or flow shifting. Without a specific quantity, the reference is hollow and meaningless. If the modeling assumptions are intended to be part of the water quality control plan, then they must be included as objectives, and the program of implementation must include a description of the actions that are necessary to achieve them.

In addition, the model assumes that the proposed percentages of unimpaired flow are an "additional requirement" to the baseline flow requirements on each tributary. (SED, at Appx. F.1-13.) As a result, the model assumes that flows will be "the greater of either the baseline flow requirements [i.e., FERC and/or ESA requirements], or the unimpaired flow requirement." (SED, at Appx. F.1-13.) This assumption is problematic because the State Water Board has no jurisdiction over these baseline flow requirements, and those requirements could change. For instance, USBR has reinitiated consultation under Section 7 of the ESA on the Long-Term Operation of the CVP, (SJTA Attachment 13), and thus the flow requirements currently set forth in Appx. 2e of the 2009 NMFS BO could change. (*Consol. Salmonid Cases v. Locke* (2011) 791 F.Supp.2d 802, 940 ["If . . . Reclamation's predictions prove incorrect and make the RPAs' implementation infeasible . . . Reclamation must then re-initiate consultation"].) If the baseline flows are intended to be a part of the project, then they must be included as objectives, and there must be a plan of implementation to achieve them.

2.3.3.19. The Program of Implementation fails to explain how the objectives will be implemented without contravening the Sustainable Groundwater Management Act ("SGMA")

The program of implementation must describe the actions that are necessary to achieve the objectives. (Water Code, § 13242.) The SED acknowledges that the unimpaired flow objectives will cause significant and unavoidable impacts to groundwater resources. However, the POI fails to describe how the unimpaired flow requirements will be implemented without contravening the SGMA. The failure to address this issue renders the POI unworkable and unviable.

2.3.3.20. The Program of Implementation fails to adequately explain the emergency relief component

The POI contains a "State of Emergency" section which allows the Board to authorize a "temporary change in the implementation of the LSJR flow objectives in a water right proceeding" under certain conditions. This procedure for emergency relief is inadequate. The plan proposes that some of the objectives be implemented through a certification process under Section 401 of the Clean Water Act. "The limitations included in the certification become a condition on any federal license." (*PUD No. 1 v. Wash. Dep't of Ecology, supra*, 511 U.S. 700, 708.) Thus, if the objectives are implemented in this fashion, the Board will not be able to relax the requirements through a water right proceeding. Additional emergency measures need to be included in the plan.

2.3.3.21. The Program of Implementation does not address implementation of any recommended non-flow measures

The POI contains a list of recommended non-flow actions, including restoration of floodplain habitat, reducing unwanted vegetation, providing coarse sediment for salmonid spawning, and reducing predation and invasive species. (SED, at Appx. K, p. 59-63.) Presumably, these actions are intended to achieve the Narrative Objective because they have no relation to achievement of the flow-related objectives. However, the POI does not include a time schedule for any of these actions, nor a method of surveillance to ensure that these actions assist with compliance with the objectives, as required by (Water Code, § 13242.) Moreover, the State Water Board has an "obligation to implement its own water quality control plan." (*State Water Resources Control Bd. Cases, supra*, 136 Cal.App.4th at 734.) If the Board chooses a method of implementation that is shown to be incapable of meeting the objectives, then that aspect of the program of implementation will be deemed "illusory" and in violation of the Board's obligation to implement its own plan. (*Ibid.* [if it had been shown that DWR and USBR were incapable of meeting the salinity objectives in the water quality control plan, then the Board's allocation of that responsibility to DWR and USBR in D-1641 would have been "illusory" and a violation of the Board's obligation to implement its own plan].)

The 2006 Bay Delta Plan did not include a time schedule or surveillance methods for the non-flow implementation measures. As a result, these measures were never implemented. (SWRCB, 2006 Bay Delta Plan, at 35-41.) The State Water Board is required to fully implement its water quality control plan. (*State Water Resources Control Bd. Cases,* (2006) 136 Cal.App.4th 674, 733.) The State Water Board cannot fully implement its plan if it does not even attempt to require compliance with its recommended actions. Although the State Water Board may not force other agencies or entities to comply with its recommendations, it has tools available to incentivize compliance. For instance, the State Water Board could use flow requirements as leverage by refusing to implement the Tributary Flow Objective until non-flow actions were taken. Conversely, the Tributary Flow Objective could expire upon a date certain if particular non-flow actions are not taken. The State Water Board could enter into an agreement or memorandum of understanding with agencies tasked with non-flow measures which set forth deadlines and reporting requirements. In addition, the State Water Board could modify appropriative permits held by these agencies or entities if they failed to implement the non-flow actions. Because the State Water Board has not included any of these actions in the program of implementation it is deficient. The State Water Board has failed to do anything for the last twenty years regarding its recommendations to other agencies. As is pointed out elsewhere in these comments, until other actions are taken, the narrative objectives cannot be met.

2.3.3.22. Components of the Program of Implementation are unclear and require further clarification before adoption

The following sentence also makes no sense given the objectives proposed by the State Water Board:

"The required percentage of unimpaired flow is in addition to flows in the Lower San Joaquin River from sources other than the Lower San Joaquin River tributaries." (SED, Appx. K, p. 29.)

This sentence makes no sense as there is no flow objective for the Lower San Joaquin River for percentage of flow, only minimum flow. If minimum flows are being met at Vernalis by flows other than flows from the tributaries, then do the tributaries have to release water? If so, what would it be? As to the percentage of UIF flow objective, this makes no sense.

2.3.3.23. Summary of POI

For the various reasons set forth above, the POI is unlawful and should not be adopted by the Board.

3. WASTE AND UNREASONABLE USE

3.1. The Proposed Objectives are Unlawful Because they are a Waste and Unreasonable Use of Water in Violation of Article X, Section 2 of the California Constitution

Article X, section 2 of the California Constitution prohibits the "waste or unreasonable use or unreasonable method of use of water." (Cal. Const., art. X, § 2.) This constitutional mandate knows no exceptions and applies to "the use of all water, under whatever right the use may be enjoyed." (*Peabody v. Vallejo,* 2 Cal.2d 351, 367.) Accordingly, the rule must be followed by water users, the State Water Board and the courts of this State. Specifically, a water user is limited to taking "only such amount [of water] as he [or she] reasonably needs for beneficial purposes." (*Pasadena v. Alhambra* (1949) 33 Cal.2d 908, 925; see also *City of Barstow v. Mojave Water Agency* (2000) 23 Cal.4th 1224, 1241). The State Water Board is statutorily bound to "to prevent waste, unreasonable use, unreasonable method of use, or unreasonable method of diversion of water," and is thus prohibited from requiring water to be used unreasonably. (Water Code, § 275; see *State Water Resources Control Bd. Cases, supra,* 136 Cal.App.4th at 761-762 [analyzing whether the State Water Board's order to use water from New Melones reservoir to dilute salinity at Vernalis and meet the requirements of D-1641 amounts to an unreasonable use of water]; see also *Baldwin v. County of Tehama* (1994) 31 Cal.App.4th 166, 183.) Likewise, the courts of this State are precluded from imposing any physical solution or injunction "if its effect will be to waste water that can be used." (*Rancho Santa Margarita v. Vail* (1938) 11 Cal.2d 501, 558-559.) The purpose of this constitutional provision is "to make it possible to marshal the water resources of the state and make them available for the constantly increasing needs of all of its people." (*Meridian, Ltd. v. San Francisco* (1939) 13 Cal.2d 424, 449.)

The measure of what constitutes a “reasonable use” is a question of fact, to be determined according to the circumstances of each particular case. (*Environmental Defense Fund, Inc. v. East Bay Mun. Utility Dist.* (1980) 26 Cal.3d 183, 194, citing *Joslin v. Marin Municipal Water Dist.* (1967) 67 Cal.2d 132, 139-140; see *Jordan v. City of Santa Barbara* (1996) 46 Cal.App.4th 1245, 1268.) A reasonable beneficial use in areas where water is in excess may not be a reasonable beneficial use “in an area of great scarcity and great need.” (*Tulare Irrigation Dist. v. Lindsay-Strathmore Irrigation Dist.* (1935) 3 Cal.2d 489, 567.) Similarly, “[w]hat is a beneficial use at one time may, because of changed conditions, become a waste of water at a later time.” (*Tulare Irrigation Dist. supra,* 3 Cal.2d at 567.) The circumstances that must be considered when evaluating whether a use is reasonable include: (1) the quantity of water needed for the beneficial use served (*Lodi v. East Bay Municipal Dist.* (1936) 7 Cal.2d 316, 339-340 [releasing a large quantity of water to force a small quantity of water into the surrounding underground water table is a waste]; *City of Barstow v. Mojave Water Agency* (2000) 23 Cal.4th 1224, 1241); (2) a comparison of other potential uses (*Imperial Irrigation Dist. v. State Wat. Resources Control Bd.* (1990) 225 Cal.App.3d 548, 570-571 [the mere fact “that a diversion of water may be for a purpose ‘beneficial’ in some respect . . . does not make such use ‘reasonable’ when compared with demands, or even future demands, for more important uses”]); and (3) local environmental conditions (*Tulare Irr. Dist. v. Lindsay-Strathmore Irr. Dist.* (1935) 3 Cal.2d 489, 567), among others.

In analyzing whether the proposed objectives in the WQCP comport with Article X, section 2 of the Constitution, the first step requires an identification of the beneficial uses to be protected by the proposed objectives, and the quantity of water being required by the proposed objectives to protect those beneficial uses. Once the quantity of water required to protect each beneficial use is identified, the analysis shifts to whether using that quantity of water to protect that beneficial use is a reasonable use of that water under the circumstances. For the reasons stated below, the proposed objectives violate Article X, section 2 of the Constitution because they require waste and unreasonable use of water.

3.1.1. Beneficial Uses to be Served by the Proposed Objectives

As relevant here, the WQCP states that the objectives in Table 3 "provide reasonable protection of fish and wildlife beneficial uses in the Bay-Delta Estuary including EST [estuarine habitat], COLD [cold freshwater habitat], WARM [warm freshwater habitat], MIGR [migration of aquatic organisms], SPWN [spawning, reproduction, and/or early development], WILD [wildlife habitat], and RARE [rare, threatened or endangered species]." (SED, Appx. K, at 13.) The WQCP states that parameters such as dissolved oxygen, temperature and toxic chemical all have threshold levels "beyond which adverse impacts to the beneficial uses occur." (SED, at Appx. K, p. 13.) However, the flow objectives have "no defined threshold conditions that [can] be used to set objectives" and therefore are "based on a subjective determination of the reasonable needs of all the consumptive and nonconsumptive demands on the waters of the Estuary." (SED, at Appx. K, p. 13.)

In sum, the WQCP states that the Narrative Flow Objective, the Tributary Flow Objective, and the Vernalis Flow Objective, all of which are contained in Table 3, protect the seven aforementioned beneficial uses.

3.1.2. Quantity of Water Needed for the Beneficial Use Served

The proposed amendments to the WQCP for the Lower San Joaquin River include a new Narrative Objective, the Tributary Flow Objectives and the Vernalis Flow Objective. (SED, at Appx. K, p. 18.) The Tributary Flow Objective and the Vernalis Flow Objective are quantitative in nature, with the former requiring 30% to 50% unimpaired flow from each of the Stanislaus, Tuolumne and Merced Rivers from February through June based on a minimum 7-day running average, and the latter requiring a minimum flow of 800 to 1,200 cfs at Vernalis from February through June. (SED, at Appx. K, p. 18.) The WQCP states that the Tributary Flow Objectives will be adaptively adjusted to in order to implement the Narrative Objective (SED, at Appx K, p. 30.) The quantity of water needed to satisfy each of these objectives is addressed in turn below.

3.1.2.1. Quantity needed to satisfy the Narrative Objective

The Narrative Objective states,

> "Maintain inflow conditions from the San Joaquin River watershed to the Delta at Vernalis sufficient to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta. Inflow conditions that reasonably contribute toward maintaining viable native migratory San Joaquin River fish populations include, but may not be limited to, flows that more closely mimic the natural hydrographic conditions to which native fish species are adapted, including the relative magnitude, duration, timing, and spatial extent of flows as they would naturally occur. Indicators of viability include population abundance, spatial extent, distribution, structure, genetic and life history diversity, and productivity."

(SED, at Appx. K, p. 18.)

If the Narrative Objective is to be achieved only through the adaptive implementation of the Tributary Flow Objective and the Vernalis Flow Objective (SED, at 11-38 – 11-39), then the quantity of water needed to satisfy the Narrative Objective can only be determined through an examination of the two flow objectives.

3.1.2.2. Quantity needed to satisfy the Tributary Flow Objective

The Tributary Flow Objective requires 30% to 50% unimpaired flow from each of the Stanislaus, Tuolumne and Merced Rivers to be maintained from February through June, based on a minimum 7-day running average. (SED, at Appx. K, p. 18.) A plain reading of this objective requires nothing more than the maintenance of at least 30% unimpaired flow on each of the rivers, based on a minimum 7-day running average, provided that the unimpaired flow never exceeds 50% percent. However, the program of implementation in the WQCP indicates that the Tributary Flow Objective will be implemented by requiring a minimum of 40% unimpaired from each of the Stanislaus, Tuolumne and Merced Rivers, based on a minimum 7-day running average. (SED, at Appx. K, p. 29.)

In spite of the quantitative nature of this objective, the SED does not focus on the volume of water necessary to meet it, but instead on the difference between the flows currently required in each of the three tributaries and the flows that would be required if the proposed objectives were satisfied. Specifically, the SED states that the long-term mean annual *reduction* in surface water supplies under a 40% unimpaired flow requirement would be 293,000 acre feet. (SED, at ES-21.) While the *reduction* in surface supply is the focus of the SED, a thorough examination of the document reveals the total quantity of water necessary to meet the Tributary Flow Objective, assuming that the analysis in the SED is correct. The following tables shed light on the total amount of water needed to satisfy the Tributary Flow Objective at 40% unimpaired flow from February to June.

Merced River	Sum of Unimpaired Flow from Feb. - June[41]	40% of Sum of UIF from Feb. - June
Minimum	94,556	37,822
10	284,014	113,606
20	359,596	143,838
30	467,768	187,107
40	562,150	224,860
50	670,780	268,312
60	763,960	305,584
70	892,006	356,802
80	1,081,452	432,581
90	1,318,660	527,464
Maximum	2,389,214	955,686

SJTA Table 3-1: Merced River cumulative distribution of unimpaired flows and 40% unimpaired flow

[41] The sum of unimpaired flow for February through June is derived from Table 5-8a, showing monthly cumulative distributions of Merced River unimpaired flow at Stevinson in cfs for 1922-2003. The flow rate identified for each month in cfs was converted to acre feet/day using a conversion rate of 1 cfs = 2 acre/feet day, which is the same conversion rate used in Appendix F1 (SED, at F.1-143.) The acre feet/day amount was then multiplied by the number of days in each month to determine the volume of water for each month. The volumes for each month were then added together to arrive at the total volume of water for February through June at each exceedance level.

While the above table shows the cumulative *distribution* of flows, the estimated *median* unimpaired flow from February to June on the Merced River is 969 cfs in February, 1,303 cfs in March, 2,391 cfs in April, 3,955 cfs in May, and 2,451 cfs in June. (SED, at 5-19.) In terms of volume, the median amount would be 54,264 acre feet in February (969 cfs * 2 = 1,938 af/day * 28 days), 80,786 acre feet in March (1,303 cfs * 2 = 2,606 af/day * 31 days), 143,460 acre feet in April (2,391 cfs * 2 = 4,782 af/day * 30 days), 245,210 acre feet in May (3,955 cfs * 2 = 7,910 af/day * 31 days), and 147,060 acre feet in June (2,451 cfs * 2 = 4,902 af/day * 30 days), for a total median volume of 670,780 acre feet for February through June. At an unimpaired flow rate of 40%, the required median amount of water would be 268,312 acre feet.

Tuolumne River	Sum of Unimpaired Flow from Feb. – June[42]	40% of UIF from Feb. - June
Minimum	234,878	93,951
10	594,694	237,878
20	793,418	317,367
30	991,142	396,457
40	1,152,664	461,066
50	1,339,878	535,951
60	1,517,058	606,823
70	1,689,750	675,900
80	1,947,940	779,176
90	2,296,642	918,657
Maximum	3,842,384	1,536,954

SJTA Table 3-2: Tuolumne River cumulative distribution of unimpaired flows and 40% unimpaired flow

[42] The sum of unimpaired flow for February through June is derived from Table 5-9a, showing monthly cumulative distributions of Tuolumne River unimpaired flow in cfs for 1922-2003. The same methodology was used for Tuolumne as was used for the Merced.

The estimated *median* unimpaired flow from February to June on the Tuolumne River is 2,085 cfs in February, 2,566 cfs in March, 4,498 cfs in April, 7,343 cfs in May, and 5,648 in June. (SED, 5-23.) In terms of volume, the median amount would be 116,760 acre feet in February (2,085 cfs * 2 = 4,170 af/day * 28 days), 159,092 acre feet in March (2,566 cfs * 2 = 5,132 af/day * 31 days), 440,580 acre feet in April (7,343 cfs * 2 = 14,686 af/day * 30 days), 455,266 acre feet in May (7,343 cfs * 2 = 14,686 af/day * 31 days), and 338,880 acre feet in June (5,648 cfs * 2 = 11,296 af/day * 30 days), for a total median volume of 1,510,578 acre feet for February through June. At an unimpaired flow rate of 40%, the required median amount of water would be 604,231 acre feet.

Stanislaus River	Sum of Unimpaired Flow from Feb. – June[43]	40% of UIF from Feb. - June
Minimum	106,302	42,521
10	316,710	126,684
20	451,714	180,686
30	561,468	224,587
40	687,036	274,814
50	824,678	329,871
60	950,562	380,225
70	1,058,694	423,478
80	1,195,410	478,164
90	1,482,742	593,097
Maximum	2,609,734	1,043,894

SJTA Table 3-3: Stanislaus River cumulative distribution of unimpaired flows and 40% unimpaired flow

[43] The sum of unimpaired flow for February through June is derived from Table 5-10a, showing monthly cumulative distributions of Stanislaus River unimpaired flow in cfs for 1922-2003. The same methodology was used for Stanislaus as was used for the Merced and Tuolumne.

The estimated *median* unimpaired flow from February to June on the Stanislaus is 1,251 cfs in February, 1,704 cfs in March, 3,247 cfs in April, 4,657 cfs in May, and 2,757 cfs in June. (SED, at 5-26.) In terms of volume, the median amount would be 70,056 acre feet in February (1,251 cfs * 2 = 2,502 af/day * 28 days), 105,648 acre feet in March (1,704 cfs * 2 = 3,408 af/day * 31 days), 288,734 acre feet in May (4,657 cfs * 2 = 9,314 af/day * 31 days), and 165,420 acre feet in June (2,757 cfs * 2 = 5,514 af/day * 30 days), for a total median volume of 629,858 acre feet. At an unimpaired flow rate of 40%, the required median amount of water would be 251,943 acre feet

The total quantity needed to meet the proposed Tributary Flow Objective is as follows:

Three Tributaries	Total[44]
Minimum	174,294
10	478,167
20	641,891
30	808,151
40	960,740
50	1,134,134
60	1,292,632
70	1,456,180
80	1,689,921
90	2,039,218
Maximum	3,536,533

SJTA Table 3-4: Cumulative distribution of unimpaired flows for all three tributaries combined and 40% unimpaired flow

[44] The total for each exceedance level is computed by adding the total amount required from each tributary under 40% unimpaired flow for that particular exceedance level.

The **total *median* amount** required from all the tributaries under a 40% unimpaired flow regime would **be 1,124,486 acre feet** (268,312 af [Merced], 604,231 af [Tuolumne], and 251,943 af [Stanislaus]).

3.1.2.3. Quantity needed to satisfy the Vernalis Flow Objective

Notwithstanding the Tributary Flow Objective, the Vernalis Flow Objective requires "a minimum base flow value between 800 – 1,200 cfs, at Vernalis . . . at all times during February through June." (SED, at Appx. K, p. 18.) The program of implementation states the Vernalis Flow Objective will be implemented by requiring a "base flow of 1,000 cfs, based on a minimum 7-day running average, at Vernalis at all times." (SED, at Appx. K, p. 29.) The program of implementation also states that "[w]hen the percentage of unimpaired flow requirements is insufficient to meet the minimum base flow requirement, the Stanislaus River shall provide 29 percent, the Tuolumne River 47 percent and the Merced River 24 percent of the additional total outflow needed to achieve and maintain the required base flow at Vernalis." (SED, at Appx. K, p. 29.)

There are 150 days from February 1 to June 30, except during a leap year when there are 151 days. Using a conversion rate of 1 cfs equals 2 acre-feet/day, the quantity of water needed to meet the 1,000 cfs requirement is at least 300,000 acre feet (2,000 acre feet/day * 150 days = 300,000 acre feet). This number underestimates the amount of water necessary because it assumes no seepage or other losses between the release points on the Stanislaus, Tuolumne and Merced Rivers and the compliance point at Vernalis.

3.1.2.4. Quantity needed to satisfy the October pulse flow objective

The objectives also contain a requirement that a flow rate of 1,000 cfs be maintained at Vernalis in the month of October in all water years. (SED, at Appx. K, p. 18.) Using a conversion rate of 1 cfs equals 2 acre-feet/day, the quantity of water needed to meet the 1,000 cfs requirement is at least 62,000 acre feet (2,000 acre feet/day * 31 days = 62,000 acre feet). Again, this number likely underestimates the amount of water necessary because it assumes no seepage or other losses between the release points on the Stanislaus, Tuolumne and Merced Rivers and the compliance point at Vernalis.

3.1.2.5. Total Quantity needed to satisfy all the objectives

Assuming that the flows from the Tributary Flow Objectives are sufficient meet the Vernalis Flow Requirement from February through June, and assuming that the Narrative Objective is achieved by the satisfaction of all the flow-related objectives, then the total quantity of water needed to satisfy the objectives will be equal to the sum of the amount required for the Tributary Flow Objective and the October pulse flow objective.

As noted above, the total *median* amount required to satisfy the Tributary Flow Objectives under a 40% unimpaired flow regime would be 1,124,486 acre feet. After adding the 62,000 acre feet required each year for the October pulse flow, the median amount required to satisfy the objectives would be 1,186,486 acre feet, or approximately 1.2 MAF.

As an aside, it is noted that this number is not referenced anywhere in the SED. Instead, the reader is left to compute the number independently. This is a significant deficiency and should be rectified.

3.1.2.6. Instream Flow Incremental Methodology

The results of the Instream Flow Incremental Methodology ("IFIM") conducted by USFWS also require releases of approximately 250 cfs, or approximately 500 acre feet/day, from each of the Stanislaus, Tuolumne and Merced Rivers during the remainder of the year, for a total of 1,500 acre feet per day from the three tributaries combined. Excepting the months of February through June, and October, there are 184 days in the remainder of the year. At a rate of 1,500 acre feet per day, the total amount of water required during the remainder of the year is approximately 276,000 acre feet. These contributions are in addition to the WQCP objectives.

3.1.3. The State Water Board must decline to adopt the revisions to the WQCP under Article X, Section 2 of the Constitution because the analysis in the SED is insufficient to assess whether requiring 40% UIF (or 1.2 MAF) for the protection of beneficial uses constitutes a waste of water

The circumstances that must be considered when evaluating whether a particular use of water is reasonable (and not a waste) include the quantity of water needed for the beneficial use served. (see *Lodi v. East Bay Municipal Dist, supra*, 7 Cal.2d at 339-340 [releasing a large quantity of water to force a small quantity of water into the surrounding underground water table is a waste of water].) The SED does not provide any analysis of whether 40% unimpaired flow (or 1.2 MAF) from the Stanislaus, Tuolumne and Merced Rivers is needed to protect estuarine habitat (EST), cold freshwater habitat (COLD), warm freshwater habitat (WARM), migration of aquatic organisms (MIGR), spawning, reproduction, and/or early development (SPWN), wildlife habitat (WILD), or rare, threatened or endangered species (RARE). Instead, the document focuses on how the chosen amount of water (i.e., 40% unimpaired flow) can be used to inundate more land (ostensibly creating floodplain habitat for fall-run Chinook salmon) without simultaneously depleting reservoirs and adversely affecting instream water temperatures that could harm fall-run Chinook salmon. To the extent that the success of fall-run Chinook salmon can adequately serve as a proxy for protecting all the beneficial uses identified in the plan (a proposition that the SJTA rejects), the analytical approach in the SED is still backwards. It is apparent that Board staff chose the 40% unimpaired flow requirement first - without determining whether that amount of water was necessary to protect any of the beneficial uses - and then attempted to model a way in which that amount of water could be used without causing adverse impacts to instream temperatures that would harm fall-run Chinook salmon. (SED, at Appx. F1, p. F.1-12, F.1-13, F.1-31.) Although the SED acknowledges that requiring 40% unimpaired flow from February through June will deplete reservoirs and adversely affect instream water temperatures, the SED does not contain any analysis of whether a lesser amount of instream flow (such as 20% UIF) during above-normal or wet water years could achieve the same or better results for fall-run Chinook salmon by minimizing the drawdown on reservoirs. Instead, Board staff adhered to the 40% unimpaired flow requirement, and then attempted to mitigate the adverse effects of requiring such a large quantity of water for instream purposes by assuming the implementation of unrequired operational constraints, such as flow shifting, carryover storage and reservoir refill criteria. If the objectives require mitigation in order to avoid harmful effects to beneficial uses, then it is self-evident that the objectives are not protecting those beneficial uses. Moreover, if the same results could be achieved using less water in certain water years, then an objective which requires 40% unimpaired flow in all years would constitute a waste of water, at least to the extent that the same results could be achieved with a lesser amount. Without any analysis in the SED as to whether the same results could be achieved using less water, the Board cannot fulfill its constitutional obligation of ensuring that the objectives do not result in a waste of water. For this reason, the Board should decline to adopt the revisions to the WQCP which will require approximately 1.2 MAF of water.

The 2010 Delta Flow Criteria Report provides an additional point of reference for assessing whether 40% unimpaired flow is necessary to protect the beneficial uses without resulting in a waste of water. The DFCR states that "[a]vailable scientific information indicates that average March through June flows of 5,000 cfs on the San Joaquin River at Vernalis represent a flow threshold at which survival of juveniles and subsequent adult abundance is substantially improved for fall-run Chinook salmon . . . " (2010 Flow Criteria Report, p. 119.) In the report, the San Joaquin River unimpaired flow was computed as "the sum of estimates from nine sub-basins in the watershed and are understood to represent the flow that would occur on the San Joaquin River at Vernalis. These nine sub-basins include the Stanislaus River at Melones Reservoir, San Joaquin Valley Floor, Tuolumne River at Don Pedro Reservoir, Merced River at Exchequer Reservoir, Chowchilla River at Buchanan Reservoir, Fresno River near Daulton, San Joaquin River at Millerton Reservoir, Tulare Lake Basin Outflow, San Joaquin Valley West Side Minor Streams." (2010 Flow Criteria Report, p. 97.) The average unimpaired flow at Vernalis for the months of February through June (1921 – 2003) was 529,000 acre feet (February), 668,000 acre feet (March), 929,000 acre feet (April), 1,467,000 acre feet (May), 1,117,000 acre feet (June), for a summed average amount of 4,710,000 acre feet over all five months. (2010 Delta Flow Criteria Report, p. 97; *California Central Valley Flow Data,* Fourth Edition Draft (May 2007), p. 45.)

The Delta Flow Criteria report chose 60% UIF as a target because, at that rate of unimpaired flow, the average flow at Vernalis (in cfs) for the entire period of February through June is at, or above, 5,000 cfs in 85% of the water years. (2010 Flow Criteria Report, p. 119-122, Figure 20a.) In other words, the amount of water needed at Vernalis was determined first (5,000 cfs from February through June), then the percentage of unimpaired flow at which that flow rate could be achieved in most years was determined. An unimpaired flow of 60% would also meet or exceed 10,000 cfs from

February to June in approximately 45% of years, which the report noted would be needed to achieve the doubling fall-run Chinook salmon in the San Joaquin Valley. (2010 Flow Criteria Report, p. 121, Figure 20a.) However, the report stated that additional information was necessary "to determine whether these flows could be lower or higher and still meet the Chinook salmon doubling goal in the long term." (2010 Flow Criteria Report, p. 121.)

A review of some of the tables in the SED indicates that the DFCR goal of 5,000 cfs can be achieved at Vernalis with much less water than 40% unimpaired flow. For instance, under a 20% unimpaired flow regime, an average of 4,837 cfs (nearly 5,000 cfs) can be achieved at Vernalis at the 60% exceedance level and above. (SED, at Appx. F.1, Table F.1.3-6m, p. F.1-117.) Thus, in years where the unimpaired flow is at the 60% exceedance level and above, the 5,000 cfs target could be nearly achieved with a requirement of only 20% unimpaired flow on the three eastside tributaries. If the information in the 2010 Flow Criteria Report is correct that "[a]vailable scientific information indicates that average March through June flows of 5,000 cfs on the San Joaquin River at Vernalis represent a flow threshold at which survival of juveniles and subsequent adult abundance is substantially improved for fall-run Chinook salmon" (2010 Flow Criteria Report, p. 119), then the SED should have included an analysis of whether more than 20% unimpaired flow was necessary in wetter years where the total unimpaired flow is at the 60% exceedance level or above. Moreover, if 5,000 cfs at Vernalis from March through June will substantially improve survival and abundance of fall-run Chinook salmon, and if that flow can largely be achieved with a 20% unimpaired flow requirement, then requiring additional unimpaired flow, i.e., 30% to 50%, would constitute a waste and unreasonable use of water insofar as the additionally required flow is not needed to protect other beneficial uses. The absence of any analysis in the SED of whether the objectives can be achieved with less unimpaired flow under certain hydrologic conditions leaves the State Water Board without any way to assess whether requiring 40% unimpaired flow in all water years constitutes a waste of water, as the Board is required to do under Article X, Section 2 of the California Constitution.

3.1.4. Comparison of Other Potential Uses

When evaluating whether a use of water is reasonable, there must be a comparison of the current or proposed uses with other potential uses of the same water. The mere fact "that a diversion of water may be for a purpose 'beneficial' in some respect . . . does not make such use 'reasonable' when compared with demands, or even future demands, for more important uses." (*Imperial Irrigation Dist. v. State Wat. Resources Control Bd.* (1990) 225 Cal.App.3d 548, 570-571.) This rule invokes the principle of diminishing marginal returns. For instance, assume it were reasonable to use 20% unimpaired flow from a river to help establish habitat that supports an annual return of 10,000 fall-run Chinook salmon. Further assume that requiring 40% unimpaired flow would help establish habitat that would support an annual return of an additional 15 fish. It is clear that the *additional* 20% unimpaired flow produces *some* benefit to fish and wildlife by ensuring the return of an additional 15 fish. However, in analyzing whether the 40% unimpaired flow requirement constitutes a waste of water under the principle of diminishing returns, the question presented would be whether requiring an *additional* 20% unimpaired flow to protect an additional 15 fish is reasonable considering the other demands being made upon that water.

Apart from the beneficial uses that are identified as being protected by the Table 3 objectives, the WQCP also identifies the following beneficial uses in the plan area: municipal and domestic supply; industrial service supply; industrial process supply; agricultural supply; ground water recharge; navigation; recreation; shellfish harvesting; and commercial and sport fishing. (SED, at Appx. K, p. 10-11.). As explained below, the SED fails to properly analyze whether using 40% unimpaired flow to protect fish and wildlife beneficial uses is reasonable when compared to the other demands being made on the same water because the WSE model includes operational assumptions that are not required by the objectives. As such, the Board cannot assess – as it is required to do – whether requiring 40% unimpaired flow constitutes a waste of water. In any event, even if the operational assumptions included in the WSE were implementable as part of the WQCP, the modeling in the SED demonstrates that requiring 40% unimpaired flow would provide trivial incremental benefits to Central Valley fall-run Chinook salmon, and would constitute a waste of water when compared to the other uses that could be made of the water.

The success of Central Valley fall-run Chinook salmon serve as a proxy in the SED for the protection of all beneficial uses identified as being protected by the revised objectives in Table 3. Accordingly, the benefits to fall-run Chinook salmon that result from using 40% unimpaired flow for instream purposes must be compared to the other beneficial uses that could be protected using the same water. The benefits to fall-run Chinook salmon are quantified using the computer model SalSim, as set forth in Chapter 19 of the SED. However, as with the rest of the analysis in the SED, the SalSim model incorporates various operational assumptions from the WSE model that are not required by the objectives, including carryover storage and flow shifting. As stated in Chapter 19, flows were modeled in SalSim using the same flow constraints as used in the WSE model. (SED, at 19-78). Thus, the SalSim modeling results referred to as SB20%UIF and SB30%UIF include carryover storage requirements that are not part of the objectives. (SED, at Appx. F1, p. F.1-36 – F.1-38). Similarly, the SalSim modeling results referred to as SB40%UIF, SB50%UIF and SB60%UIF include carryover storage requirements *and* flow shifting requirements that are not part of the objectives. (SED, at Appx. F1, p. F.1-36 – F.1-38). In addition, the SalSim model run referred to as SB40%MaxFS includes *additional* flow shifting outside the February through June period that is not required by the objectives, while SB40%OPP includes instream temperature targets that are not required by the objectives. (SED, at 19-80). As these model runs do not reflect a true implementation of the 40% UIF objective without unrequired operational constraints, the State Water Board has no information upon which to decide whether the use of 40% UIF to achieve incremental improvements to fall-run Chinook salmon populations constitutes a waste of water when compared to other beneficial uses that could be protected using the same water.

In any event, the SalSim model results in the SED demonstrate that using 40% UIF to achieve trivial incremental benefits to fall-run Chinook salmon constitutes a waste of water when compared to the other beneficial uses that could be protected using the same water. The metric used in the SED to assess improvements in fall-run Chinook salmon is "total adult salmon production." (SED, at 19-81.) Production includes annual SJR Basin produced commercial and recreational harvest numbers, annual SJR Basin produced salmon that stray out of basin as adults, and total SJR Basin produced escapement (hatchery and in-river). (SED, at 19-81.) The SalSim results show that the benefits to salmon production of dedicating 40% UIF to instream uses are insignificant. Average annual production of Central Valley fall-run Chinook salmon is 707,598 (for the years 1976 through 2014).[45] The SalSim analysis in the SED shows that dedicating 40% UIF to instream uses (SB40%UIF) will increase salmon production by 1,103 fish above baseline conditions. (SED, at 19-84.) When compared to annual production of 707,598, this increase is a mere 0.15%, or less than a quarter of 1 percent. In other words, dedicating 40% UIF to instream uses will result in 15 additional fish for every 10,000 fish currently produced under baseline conditions each year. Even using the maximum flow shifting model results (SB40%MaxFS) which show the greatest incremental increase in salmon production, the results are still trivial. The anticipated increase in production under maximum flow shifting conditions is 4,139 fish over baseline. (SED, at 19-84.) Compared to the average annual production number for all Central Valley fall-run Chinook salmon of 707,598, the increase under maximum flow shifting is a mere 0.6%, or slightly more than one-half of 1 percent.

In contrast to these small incremental increases in production, the anticipated average reduction in water availability for agricultural purposes under 40% UIF is 293,000 acre feet annually, which is a 14% average annual reduction from baseline. (SED, at Appx. F1, p. F.1-69.) In dry and critically dry years, the average annual reduction in water supply jumps to 30% and 38%, respectively, below baseline water supply. (SED, at Appx. F1, p. F.1-72.) Notably, these calculations are based upon the assumption that the reduced surface water supply will be offset, in part, by groundwater pumping at maximum capacity. (SED, at 11-36 – 11-37.) Specifically, the analysis in the SED assumes that groundwater pumping will be used to meet the entire shortage in water surface supply up until the point that maximum groundwater pumping capacity achieved. (SED, at 11-37.) However, the SED recognizes that groundwater pumping at maximum capacity is not sustainable (SED, at 11-52), and thus the impact to water supply and agriculture in the SED is

[45] http://www.casalmon.org/PDFs/Chinookprod_CompleteDraft2015Reports6.30.16.pdf

significantly understated. Nevertheless, when the average annual reduction in water supply of 14% is compared to the minimal increase in fall-run Chinook salmon of 0.15%, or even 0.6%, it is evident that raising the amount of water dedicated to instream uses from baseline to 40% UIF constitutes a waste of water. While the benefit to fall-run Chinook salmon is nearly imperceptible, the impact to water supply will be significant and will be felt by the agricultural community.

The analysis provided by the SJTA in these comments is different than the State Water Board analysis. For comparison of other beneficial uses, the SJTA analysis is the correct analysis because it examines the 40% UIF and Vernalis base flows without additional operational assumptions that are not required by the objectives.

As demonstrated in the table below, the real impact of the proposed project is significantly greater than reported in the SED. Just as the results from the SED make the case that the objectives will constitute a water of water, the SJTA's analysis makes an even stronger case.

SUMMARY SHEET

WQCP IMPACTS[1]

TOPIC	STATE WATER BOARD ANALYSIS	SJTA Analysis[2]
Economics	Total: $106.2 Million	Total: $12.9 Billion
• Agricultural	• $36 million loss in annual revenues • $6.2 million increase in groundwater pumping costs. • $64 million total loss in economic output. Average annual loss of $55 million within TID and MID service area No Analysis of Bay Area	• Loss in Ag. Output: $2 Billion • Loss in Total Income: $4.78 Billion • Loss in Tax Revenue: $1.18 Billion • Decrease in property value: $ 4.94 Billion • Groundwater pumping cost increase: $10.7 million annually Average annual loss of $401.5 million within TID and MID service area[3]
• Employment	Total lost jobs: 558 • Lost jobs due to increase groundwater pumping costs: 125 • Lost jobs due to loss in agricultural production: 433	Total lost economic output in Bay Area from sequential dry years: $43 billion Total lost jobs in Plan Area: 4,000+ • Animal commodity lost jobs: 1,200 • Food and beverage processing lost jobs: 2,500 Total lost jobs in Bay Area from sequential dry years: 120,063

Municipal & Industrial Supply	None[4]	Potential reduction of 60% of urban water supply to City of Modesto Potential reduction of 60% of urban water supply to the cities of Escalon, Lathrop, Manteca, and Tracey[5]. San Francisco's water supply in sequential dry years would be reduced by 129,884 AF/year. Resulting in 50% decrease in deliveries to RWS.
Groundwater	Mean annual groundwater pumping increase of 105 TAF No Analysis of subsidence impacts	Groundwater pumping increase in sequentially dry years of 1.572 million acre feet within the Plan Area[6] Increase in subsidence impacts
Hydropower	Loss of 4,000 megawatt hour (MWh) Loss of revenue: Not Analyzed	TID and MID hydropower generation reduction total damages $397.4 million Tulloch Dam only: Critically Dry Year: 47,951 MWh loss Lost Revenue: $3.3 million New Melones only: Critically Dry Year: 195,510 MWh loss Lost Revenue: $6 million Reduced hydropower generation annually of 11% on SFPUC facilities. Lost revenue of $2 million in dry years.

Greenhouse gas emissions	Additional 16,948 metric tons of CO_2 annually.	CO_2 Increase due to hydropower offsets on New Melones Dam and Tulloch Dam[7] Critically Dry Year: 68,457 metric tons Sequential Dry Years: 204,745 metric tons (6-year period)[8] Growth displacement in CCSF would release CO_2 the equivalent of 1.3 million cars on the road annually.
Reservoir Storage	New Melones never runs dry	New Melones runs dry 12 out of 95 years[9].
Agricultural	Loss of 23,679 acres of irrigated land within the Plan Area. Extended Plan Area not analyzed	Loss of 132,706 acres of irrigated land within the Plan Area[10]. Potential loss of 293,100 acres of agricultural land in the Bay Area from growth displacement.
Climate Change	No Analysis[11]	Greater focus on critically dry and sequential dry years impacts as climate change will inflict more frequent and intense droughts.
Disadvantaged Communities[12]	No Analysis	Major challenges meeting community water service needs and increased water supply costs[13].
Fish Populations	Increase of 1,103 fish	**Unknown**

[1] All numerical figures and impact results are derived from analysis of LSJR Alternative 3 unless otherwise noted

[2] All numerical figures were obtained from the following documents: San Joaquin Tributary Authority's WQCP/SED comments; Oakdale Irrigation District and South San Joaquin Irrigation District's WQCP/SED comments; Turlock Irrigation District's WQCP/SED comments; Modesto Irrigation District's WQCP/SED comments; and City and County of San Francisco's WQCP/SED comments.

[3] The SED assumes that growers will transfer water to keep "high valued" tree, fruit and vegetable crops in production and let the acres of "lower valued" animal feed decline. This is incorrect for two reasons: 1) many irrigation districts do not allow grower-to-grower water transfers; and 2) dairy and cattle operations are dependent on "lower valued" crops for animal feed. This loss of crop commodity value alone accounts for $166 million annually.

[4] Staff state that the Water Supply Effects model "assumes that municipal water providers would not experience a reduction in surface water supply" (SED, at 9-44; 11-36 [where Staff state that for purpose of modeling groundwater and agricultural impacts, "[v]olumes of water assumed not to be subject to a water shortage (e.g., municipal and industrial water supply, riparian rights) are subtracted from the total diversions for each river to calculate the remaining water."]

[5] SSJID provides 50-70% of the annual water supply to its partner cities with surface water from the Stanislaus River. During drought years the WQCP will radically alter the current sustainable conditions placing increased reliance on already overdrafted groundwater basins.

[6] Staff estimates a 40% UIF will result in an increase of 302 TAF of groundwater pumping annually from a baseline of 221 TAF in dry years. This results in 524 TAF of groundwater pumping in a single dry year and 1.572 MAF in three sequentially dry years. (SED, at Table G.2-5, G-15.) However, Staff fails to analyze if this is sustainable or if this much groundwater is even available.

[7] These figures only show the net increase of CO_2 from Tulloch and New Melones Dams. As other hydropower facilities on the Merced and Tuolumne Rivers will be similarly impacted GHG emissions will increase exponentially.

[8] Tulloch Dam Figures: critically dry year – 47,951 metric tons; sequential dry years 16,105 metric tons – New Melones Dam Figures: critically dry year – 54,974 metric tons; sequential dry years 188,640 metric tons. (*See* Attachments 10 and 11 of OID/SSJID comments on SED.)

[9] SJTA modeling analysis without SWB-assumed carryover, refill, diversion, and flow shifting constraints used in the WSE model for the SED. New Melones is assumed to be at zero storage at the end of September in a year when OID/SSJID diversions under their water rights would have been curtailed to maintain Reclamation's release obligations, including river releases. (Steiner Report, Exhibit A, p. 10.)

[10] The SWRCB assumes the loss of surface water is fully offset by increased groundwater pumping except in a few years such as when hydrological conditions are critical. The SWRCB assumption is not consistent with the experience of Westlands Water District who has been facing volatile surface water supplies since the 1990s. Groundwater pumping in Westlands offsets 50% of the change in surface water supplies, not 100%. As such, significantly more land may be fallowed on average based on 40% UIF requirement.

[11] Staff state that the adaptive management process will appropriately respond and address climate change impacts.

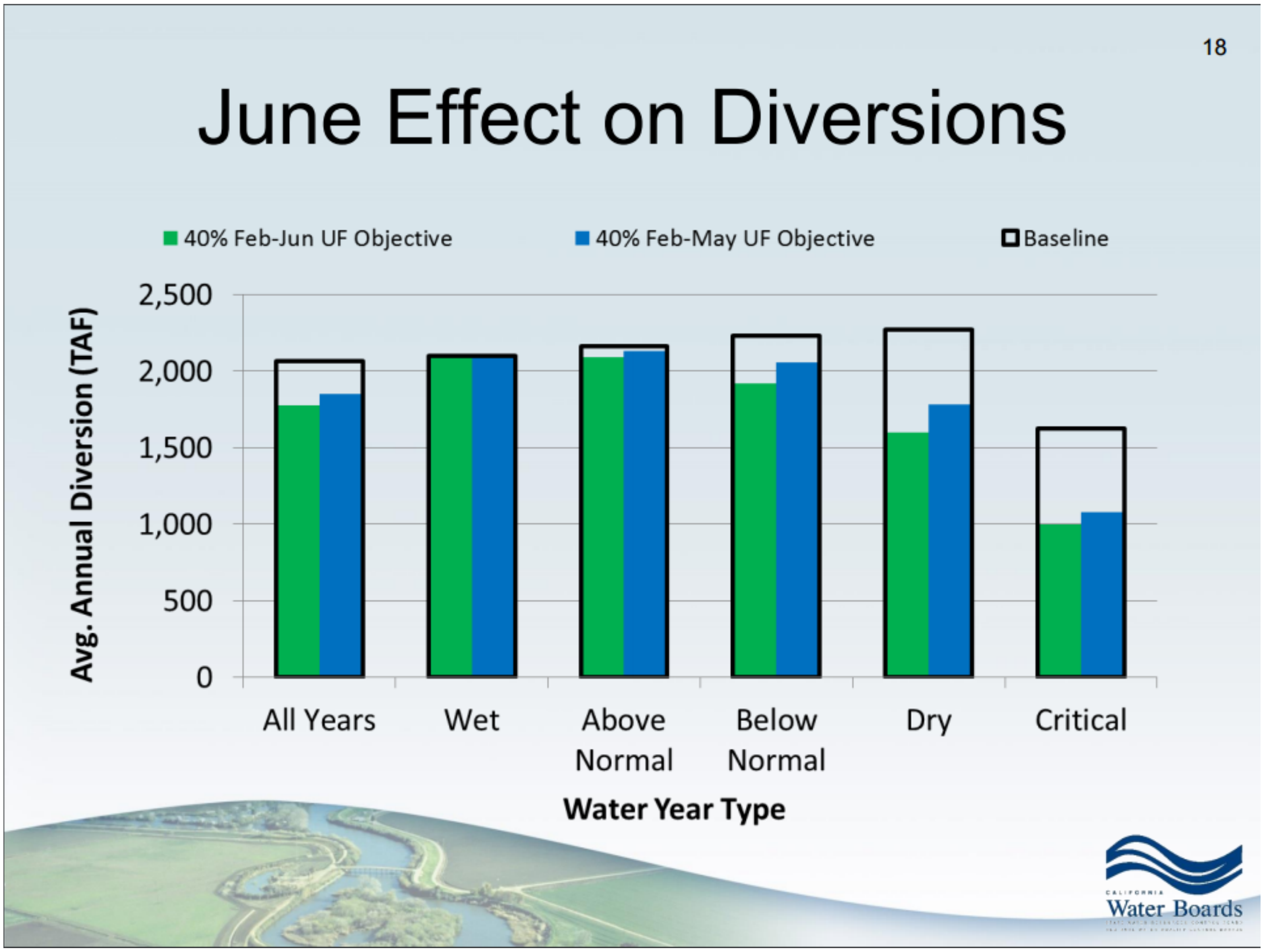
[12] Counties within the Plan Area (e.g. Merced and Stanislaus) are predominantly demarcated disadvantaged and severely disadvantaged communities (*See* https://gis.water.ca.gov/app/dacs/)

[13] The Planada Community Service District (PCDS) in Merced recently dealt with several wells going dry, thus, requiring the need to find emergency funding to put in new wells. A groundwater pumping increases to offset surface water losses the affects seen by PCSD will become more frequent. Additionally, Stanislaus and Merced Counties have some of the highest unemployment rates in the State (9%-18%) the WQCP will increase unemployment significantly.

In the end, the analysis presented by the SJTA and its member agencies demonstrates that the proposed objectives will result in a waste and unreasonable use of water in violation of Article X, Section 2 of the California Constitution.

4. June Flows

As explained in the prior two sections, the State Water Board has an obligation to set water quality objectives that (1) ensure the "reasonable protection of beneficial uses" considering all other demands being made on the waters involved (Water Code, § 13000, 13241), and (2) prevent waste or unreasonable use of water. (Cal. Const., art. X, § 2.) The Tributary Flow Objective and the Vernalis Flow Objective both require the release and/or bypass of water during the February through June period. (SED, at Appx. K, p. 18.) According to the water quality control plan, the purpose of these flows is to support and maintain the natural production of viable native San Joaquin River watershed fish migrating through the Delta. The plan makes this point clear by stating that the flow objectives should be adaptively adjusted to achieve this goal. (SED, at Appx. K, p. 30.) The SED - which measures success by examining the impact of the flow objectives on fall-run Chinook salmon production and their habitat - fails to set forth any data, analysis or facts which would support the establishment of these flow objectives during the month of June. As explained below, the benefit of providing 40% unimpaired flow during June migration is minimal to nonexistent. The SED should have included an analysis of the Tributary Flow Objective running from February through *May*, so that the Board could compare the impacts of such a requirement with the impacts of a February through *June* requirement. In the course of the hearing process, SWB Staff presented the Board with additional information intended to demonstrate the impacts on water supply of requiring flows in June versus not requiring flows in June. The only information provided was the following graph:



SWB Slide No. 18, January 3, 2017 presentation.

Staff did not explain how the impacts reflected in this graphic were calculated. If Staff performed a modeling run where the Tributary Flow Objective was imposed from February-*May*, rather than February-*June*, then all of that information should be made available to the public and to the Board members. As indicated during the January 3, 2017 hearing, "staff agrees that to understand the effects of the proposal you need to understand more than just the long-term averages." (Transcript of Public Hearing before SWRCB, p. 45, lns. 5-7.) The graphic above, which only shows averages for each year type, in insufficient. Staff should provide all of the results from a February-*May* modeling run, including the cumulative distribution charts such as those shown in Table F.1.3-4(a)-(c), and the summary tables provided in Attachment 1 to Appx. F. Only by reviewing the results of a complete modeling for the February-*May* period can the Board determine whether requiring unimpaired flows of 40% during month of June is reasonable, as the Board is required to do under Water Code section 13241. As with all the other modeling runs that the Board should review, the February-*May* run should reflect a true 40% unimpaired flow requirement as directed by the objective, not a modified requirement with carryover storage, reservoir refill criteria, flow shifting and the other modeling constraints devised to mitigate the effects of the project.

The SJTA provides the following information to demonstrate that there is no factual or scientific basis that requiring these flows in the month of June will assist in the migration of fall-run Chinook salmon, and that the objectives are therefore unreasonable considering the other demands made on the waters involved (Water Code, §§ 13000, 13241), and constitute a waste and unreasonable use of water. (Cal. Const., art. X, § 2.)

Central Valley fall-run Chinook salmon exhibit two distinct outmigration strategies (Lindley 2009):[46] (1) ***fry migrants***, which are typically the most abundant, migrate from the tributaries soon after emergence (i.e., January through March) to rear in the Delta; (2) ***smolt migrants*** remain near freshwater spawning areas for several months, migrating primarily from the tributaries during April and May and passing quickly (i.e., approximately seven days) through the Delta (SJRGA 2011).[47]

Generalized timing of juvenile outmigration based on abundance estimates from rotary screw trap sampling in the Stanislaus and Tuolumne Rivers shows that in all but wet and above normal years, at least 99.3% of all juvenile salmon (i.e., fry, parr and smolts) migrate from late January through May, and 99.2% of smolts have migrated by May 31. (See SJTA Attachment 14, p. 3, Figure 1, Tables 1-5).

During years of extremely high flows, such as during spring 1998 and 2006 when San Joaquin River flows at Vernalis were at or near flood monitor stage (approx. 22,000 cfs) or flood stage (approx. 34,000 cfs), smolt outmigration occurred later, with 90% of smolts migrating by June

[46] Lindley S. T., Grimes C. B., Mohr M. S., Peterson W., Stein J., Anderson J. T., Botsford L. W., D.L. Bottom, C.A. Busack, T.K. Collier, J. Ferguson, J.C. Garza, A.M. Grover, D.G. Hankin, R.G. Kope P.W. Lawson, A. Low, R.B. MacFarlane, K. Moore, M. Palmer-Zwahlen, F.B. Schwing, J. Smith, C. Tracy, R. Webb, B.K. Wells, and T.H. Williams. What Caused the Sacramento River Fall Chinook Stock Collapse? NOAA Technical Memorandum. NOAA-TM-NMFS-SWFSC-447, 2009.

[47] San Joaquin River Group Authority [SJRGA]. 2011. 2010 Technical Report: On implementing and monitoring of the San Joaquin River Agreement and the Vernalis Adaptive Management Plan: Prepared by San Joaquin River Group Authority for California Water Resource Control Board. Available at http://www.sjrg.org

5, 1998, and June 3, 2006 (See SJTA Attachment 14, p. 3, Figure 2). Since the proposed flow objective of 40% unimpaired flow will not reach these flood levels, the empirical data do not suggest that the proportion of smolts migrating during June will increase.

These results are reflected in the SalSim model used by the State Water Board. Under the State Water Board's baseline, the juvenile outmigration numbers for the month of June are as follows:

Juveniles Count					
Case: SBBASE					
Year Type	Month	STANISLAUS CONFLUENCE	TUOLUMNE CONFLUENCE	MERCED CONFLUENCE	SJR AT MOSSDALE
W	Jun-1995	725	-	-	766
W	Jun-1996	-	-	8	148,338
W	Jun-1997	-	-	24,544	26,138
W	Jun-1998	-	-	-	99,076
AN	Jun-1999	-	-	437	-
AN	Jun-2000	-	-	6,724	1,260
D	Jun-2001	-	-	-	80,702
D	Jun-2002	2,604	-	-	4,783
BN	Jun-2003	2,215	-	-	4,056
D	Jun-2004	1,046	-	3,662	42,441
W	Jun-2005	6	32	1,066	61,137
W	Jun-2006	-	-	-	-
C	Jun-2007	1,788	-	-	1,337
C	Jun-2008	17	-	-	2
BN	Jun-2009	382	-	3	-
AN	Jun-2010	12	-	46	5,002
	Ave	550	2	2,281	29,690
	Max	2,604	32	24,544	148,338
	Min	-	-	-	-

SJTA Table 4-1: SalSim juvenile count for June under SWB Baseline[48]

Under the State Water Board's 40% unimpaired flow requirement, the June numbers would be as follows:

[48] See SJTA Attachment 3.

Juveniles Count					
Case: SB40					
Year Type	Month	STANISLAUS CONFLUENCE	TUOLUMNE CONFLUENCE	MERCED CONFLUENCE	SJR AT MOSSDALE
W	Jun-1995	-	-	-	-
W	Jun-1996	-	2,441	96,918	147,601
W	Jun-1997	-	-	158,522	337,019
W	Jun-1998	-	-	-	107,516
AN	Jun-1999	-	-	163,843	44,107
AN	Jun-2000	-	-	54,722	121,287
D	Jun-2001	435	-	16,323	52,491
D	Jun-2002	2,052	-	62,347	51,130
BN	Jun-2003	938	-	305,451	94,393
D	Jun-2004	967	-	119,281	40,967
W	Jun-2005	-	-	-	153,016
W	Jun-2006	-	-	-	-
C	Jun-2007	1,780	-	4,299	248
C	Jun-2008	408	-	9,755	638
BN	Jun-2009	-	-	-	1,143
AN	Jun-2010	1,547	-	-	23,293
	Ave	508	153	61,966	73,428
	Max	2,052	2,441	305,451	337,019
	Min	-	-	-	-

SJTA Table 4-2: SalSim juvenile count for June under SWB 40% UIF[49]

Almost all of the June smolt numbers can be explained by the Department of Fish & Wildlife's operations at the Merced River Hatchery. These are not the "natural" fish the objectives are designed to protect. (SED, at Appx. K, p. 18.) Also, in the last four years the Merced Hatchery has begun releasing almost all of their 1,500,000 smolts at Jersey Point, right next to Antioch. The SalSim model confirms the findings by FishBio that little to no Central Valley fall-run Chinook salmon migrate out in June.

[49] See SJTA Attachment 3.

Comparing the SWB's Baseline run to the 40% UIF run, the results for June are as follows:

Increment improvement with respect to SBBASE					
SB40 (-) SBBASE					
Year Type	Month	STANISLAUS CONFLUENCE	TUOLUMNE CONFLUENCE	MERCED CONFLUENCE	SJR AT MOSSDALE
W	Jun-1995	(725)	-	-	(766)
W	Jun-1996	-	2,441	96,910	(737)
W	Jun-1997	-	-	133,978	310,881
W	Jun-1998	-	-	-	8,440
AN	Jun-1999	-	-	163,406	44,107
AN	Jun-2000	-	-	47,998	120,027
D	Jun-2001	435	-	16,323	(28,211)
D	Jun-2002	(552)	-	62,347	46,347
BN	Jun-2003	(1,277)	-	305,451	90,337
D	Jun-2004	(79)	-	115,619	(1,474)
W	Jun-2005	(6)	(32)	(1,066)	91,879
W	Jun-2006	-	-	-	-
C	Jun-2007	(8)	-	4,299	(1,089)
C	Jun-2008	391	-	9,755	636
BN	Jun-2009	(382)	-	(3)	1,143
AN	Jun-2010	1,535	-	(46)	18,291
	Ave	(42)	151	59,686	43,738
	Max	1,535	2,441	305,451	310,881
	Min	(1,277)	(32)	(1,066)	(28,211)

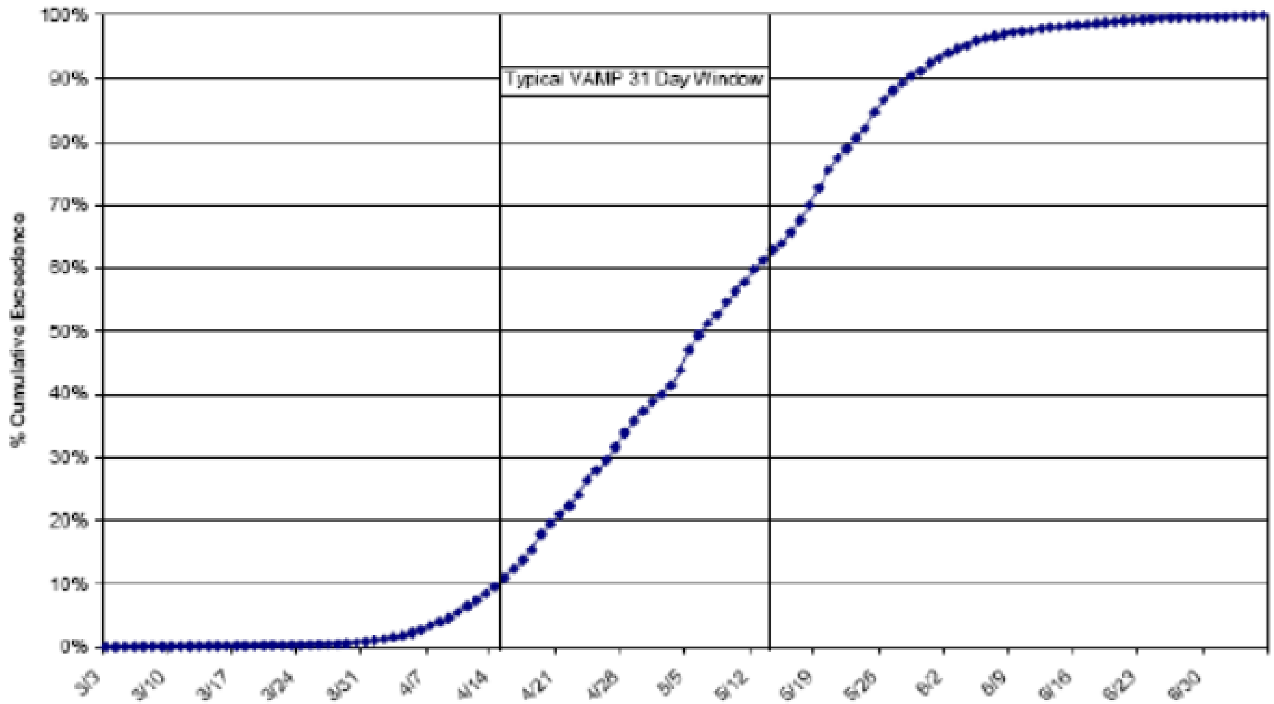
SJTA Table 4-3: Comparison of SWB Baseline and SWB 40% UIF[50]

The numbers on the Stanislaus River go *down.* The numbers on the Tuolumne River essentially remain the same. The Merced River Hatchery accounts for the entire increase. All of the facts point to little or no smolt production on the Stanislaus River and Tuolumne River under Baseline, and the numbers remain the same even with 40% unimpaired flow in June.

State Water Board Staff is well-aware of this information. In the recently released scientific basis report for Phase II of the State Water Board's update to the Bay-Delta Plan, the Board included a figure demonstrating that approximately 90% of *smolt* outmigration on the San Joaquin River occurs by June 1.[51]

[50] See SJTA Attachment 3.

[51] State Water Resources Control Board's Working Draft Scientific Basis Report for New and Revised Flow Requirements on the Sacramento River and Tributaries, Eastside Tributaries to the Delta, Delta Outflow, and Interior



SJTA Figure 4-1: Excerpted Figure 3.4-10 of SWRCB's Draft Working Scientific Basis Report for Phase II of the update to the Bay-Delta Plan

As noted above, these are the fish that remained in the freshwater spawning areas after many *fry* migrants had already left. This data confirms the observations reported by FishBio that June outmigrants account for less than 1% of the overall outmigration on the San Joaquin River and its tributaries. (SJTA Attachment 14.)

Furthermore, a recent article (Lehman et al. 2017) published in the Transactions of the American Fisheries Society provides support for the proposition that environmental and physical conditions in the Lower San Joaquin River for outmigrating salmon are extremely poor during June.[52] This study examined the swimming capabilities of hatchery juvenile Chinook salmon under varying environmental conditions, both in a hatchery and field setting. Juvenile Chinook salmon from the Mokelumne River Hatchery were subjected to swimming trials using experimental swim tunnels and a mobile respirometer. The study found that swimming performance tended to decrease

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Delta Operations, Figure 3.4-10, p. 3-27; available at http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/docs/20161014_ph2_scireport.pdf

[52] SJTA Attachment 15.

with increased water temperature and increased turbidity, specifically at temperatures over 19°C. The authors noted that this temperature threshold is similar to the temperature at which largemouth bass behavior and feeding is highest, and the reduced swimming performance could make Chinook salmon juveniles especially susceptible to predation. Water temperatures in the San Joaquin River and lower reaches of the tributaries during June are largely driven by ambient air temperatures, and regardless of flow, exceed 19°C during the majority of June. By June, the overwhelming majority of Chinook salmon have already migrated. Combined, this evidence supports focusing management actions earlier in the year (i.e., April/May) when environmental conditions can be managed to benefit smolt survival. (Attachment 15.)

In sum, the scientific evidence demonstrates that - by June 1st - all *fry* migrants will have left the tributaries and lower San Joaquin River, and more than 90% of *smolt* migrants will have also left. The limited number of smolt migrants that may remain after June 1 will experience extremely poor environmental and physical conditions that cannot be improved by increased flow, such as warming water temperatures driven by ambient air temperatures and heightened predation activity by largemouth bass. State Water Board Staff is aware of this information and has even reported on it in the draft scientific basis report for the Phase II updates to the Bay-Delta Plan. Given this information, it is both unreasonable and a waste of water to require agricultural users to bypass/release 40% unimpaired flow during the month of June for the supposed protection of migrating Chinook salmon.

5. The Proposed Project is Unlawful Because it Violates the Rules of Water Right Priority

"California operates under a 'dual' or hybrid system of water rights which recognizes both doctrines of riparian rights and appropriative rights." (*United States v. State Water Resources Control Bd.*, *supra*, 182 Cal.App.3d 82, 101.) "[A]ppropriation rights are subordinate to riparian rights so that in times of shortage riparians are entitled to fulfill their needs before appropriators are entitled to any use of the water." (*Id.* at 101-102.) Between appropriators, "the rule of priority is 'first in time, first in right' [where] [t]he senior appropriator is entitled to fulfill his [or her] needs before a junior appropriator is entitled to use any water." (*Id* at 102.) "Every effort . . . must be made to respect and enforce the rule of priority." (*El Dorado Irr. Dist. v. State Water Resources Control Bd.*, (2006) 142 Cal.App.4th 937, 966.) The preservation of water right priority should be the "*first concern*" of the State Water Board in the exercise of its powers . . . (*El Dorado, supra*, 142 Cal.App.4th at 961, quoting *Meridian, Ltd v. San Francisco* (1939) 13 Cal.2d 424, 450.)

To understand the issue of water right priority in the context of the regulation, one must first understand the fundamental difference between what was required in the 1995 WQCP/D-1641 and what is being presented in this proposed objective. In the 1995 WQCP, a flow objective was set at Vernalis. The flow at Vernalis could be met by accretions, bypass of flow, releases from storage, or some combination of all of the above. By contrast, the proposed flow objectives are solely based on bypassing the first 40% of the unimpaired flow at New Melones, New Don Pedro, and Exchequer. The objectives do not consider storage releases, nor accretions. Rather, the objectives are based solely on the unimpaired flow of the three rivers.

Since proposed flow objectives are based on unimpaired flow, the implementation of such begins with riparians, then the most senior appropriators to most junior appropriator. It is a reverse priority objective. An example will make this point.[53] If the UIF on the river in June is 500 cfs, for seven days, then the bypass downstream of the rim reservoir flow is 200 cfs. If the riparian demand exceeds 200 cfs, then the riparians must proportionally reduce their diversion to meet the flow requirement. If the riparian demand is fully met with the 200 cfs of flow, then senior appropriators can divert. While this example does not depict how the WQCP Objective would be implemented, it does show how the normal process of starting with cutting first is no longer applicable.

Furthermore, as explained below, the proposed objectives violate the rule of priority across the entire Delta watershed, and across the three eastside tributaries.

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[53] This example is given with no upstream reservoirs or upstream appropriations.

5.1. The entire Delta watershed must be considered for purposes of water right priority

The area to be protected by the Tributary Flow Objectives, the Vernalis Base Flow Objective, and the Narrative Objective extends across all three tributaries, through the San Joaquin River, and "in a larger area [past Vernalis], including within the Delta." (SED, at Appx. K, p. 28.) Despite the broad geographic area intended to be protected, these objectives (the LSJR flow objectives) only require contributions from the Stanislaus, Tuolumne and Merced Rivers. Specifically, the Tributary Flow Objectives require 30% to 50% unimpaired flow on each of the three tributaries, with compliance points on tributaries themselves. (SED, Appx. K, p. 18.) The Vernalis Base Flow Objective requires flows of 800 to 1,200 cfs, which is to be provided from the Stanislaus, Tuolumne and Merced Rivers at certain percentages whenever the flows from the Tributary Flow Objective are insufficient to meet the base flow. (SED, at Appx. K, p. 29.) The WQCP also states that these objectives will be adaptively implemented to achieve the Narrative Objective. (SED, at Appx. K, p. 30.) Thus, although the objectives are intended to protect beneficial uses across the entire San Joaquin River watershed and through the Delta, the only water users responsible for ensuring those objectives are met are those who divert from the Stanislaus, Tuolumne and Merced Rivers. As demonstrated below, by requiring contributions from water right holders on the Stanislaus, Tuolumne and Merced Rivers, without requiring any contributions from other water right holders within the Delta watershed, the WQCP violates the rule of water right priority.

Both the State Water Board and the courts have long recognized that the rule of water right priority applies to and among all water users within the Delta watershed when flows are required under a water quality control plan for the protection of the Bay Delta. For instance, when the State Water Board adopted Decision 1485, it required CVP and SWP operators to release water from storage or curtail diversions whenever the flow entering the Delta would otherwise be insufficient to meet the water quality standards in the 1978 Delta Plan. (*El Dorado Irrigation Dist. v. State Water Resources Control Bd.* (2006) 142 Cal.App.4th 937, 950, citing Decisions 1485 and 1584.) After the adoption of Decision 1485, USBR and DWR began protesting water right applications in the Delta watershed on the basis that (1) any diversion of water by a new applicant, i.e., a junior appropriator with respect to USBR and DWR, would require USBR and DWR to release more stored water to meet the Delta water quality objectives, and (2) the junior appropriator within the Delta watershed should share in the responsibility for meeting those objectives. (*El Dorado, supra*, 142 Cal.App.4th at 950.) To resolve this issue, the State Water Board adopted standard water right permit Term 91, which prohibits new permittees from diverting water whenever USBR or DWR are releasing water to meet Delta water quality standards. (*Ibid.*) Through Term 91, the Board effectively ensured that the water right priority system was upheld amongst water right holders throughout the Delta by precluding junior appropriators within the Delta watershed from diverting while USBR and DWR (the more senior appropriators) were releasing water to meet Delta water quality objectives. In other words, the Board recognized that water right priority must be analyzed on a Delta-watershed-wide basis whenever a water right holder is releasing or bypassing flows to satisfy Delta water quality objectives.

Similarly, in *El Dorado Irrigation Dist. v. State Water Resources Control Bd.*, the Third District Court of Appeal held that the State Water Board violated the rule of priority by including a Term 91 condition in a water right permit with a priority date of 1927 held by the El Dorado Irrigation District because the Board did not impose Term 91 conditions on other water right holders within the Delta watershed with priorities junior to El Dorado's priority. (*El Dorado, supra*, 142 Cal.App.4th at 964-965, 969.) As relevant here, the court applied the rule of priority across all water users in the Delta watershed.

With respect to the revised WQCP designed to protect beneficial uses in the Bay Delta, the Board's decision to require contributions only from water users on the Stanislaus, Tuolumne and Merced Rivers, without requiring any contributions from other water right holders within the Delta watershed, particularly on the San Joaquin side of the Delta, constitutes a violation of the rule of water right priority.

5.1.1. Water users on the San Joaquin River, upstream of the confluence with the Merced River, are improperly exempted

The WQCP does not call for any contributions from water users on the San Joaquin River, upstream of the confluence with the Merced River. In fact, the upper San Joaquin River is entirely excluded from the Plan Area. (SED, at Figure 2-1b.) As the upper San Joaquin River is part of the Delta watershed, the WQCP violates the rule of water right priority by requiring that senior water right holders on the Stanislaus, Tuolumne or Merced Rivers contribute flows to benefit the Delta before any contributions are made from more junior water right holders on the upper San Joaquin River.

The Friant Dam facilities located on the upper San Joaquin River are operated by USBR. The Friant Division alone comprises more than 30% of the average unimpaired flow in the San Joaquin River basin. (SED, at Table 5-2, p. 5-7 [1,732 TAF/5,665 TAF].) In June, due to the snowmelt run-off characteristic of the upper San Joaquin River, approximately 35% of the average unimpaired flow of the San Joaquin River Basin would come from Friant. (SED, at 5-16, 5-19, 5-24, 5-27.) Apart from the San Joaquin River Exchange Contractors, the water users on the upper San Joaquin River are junior to the direct diversion rights of TID, MID, CCSF, OID and SSJID. In addition, the Kings, Fresno, and Chowchilla Rivers diversions are junior to TID, MID, CCSF, OID and SSJID's direct diversion rights.

The SED acknowledges that USBR settled an 18-year legal dispute involving its operation of Friant Dam on the upper San Joaquin River. (SED, at 2-9.) Pursuant to the settlement agreement, USBR has agreed to release water from Friant Dam for the purpose of restoring flows on the upper San Joaquin River to the confluence with the Merced, a stretch of river which has run dry in many locations due to the operations at Friant. (SED, at 2-9; *NRDC v. Rodgers* (2005) 381 F.Supp.2d 1212, 1216.) Rather than incorporating these flows into its plan, or otherwise establishing a compliance point on the San Joaquin River upstream of the confluence with the Merced, the SED merely notes, "the amount of [water] observed [on the upper San Joaquin River] at the mouth of the Merced River is uncertain." (SED, at 2-9.) While such a statement may have had some persuasive power in 2012 when the SWRCB released its first SED for Phase 1 of its update to the Bay-Delta WQCP, the statement clearly has no such authority now. USBR began releasing flows from Friant Dam for the SJRRP in 2014, and recently petitioned the State Water Board to recapture some of those flows in the lower San Joaquin River. (State Water Board Order WR 2016-0017.) The U.S. Geological Survey operates a sensor on the San Joaquin River, immediately upstream of the confluence with the Merced River (SMN [sensor ID]). The mean daily flow at that location is reported on the California Data Exchange Center ("CDEC") and is readily available. To the extent water is needed in the main stem of San Joaquin River from Merced to Vernalis, contributions could come from Friant and could be easily monitored.[54]

In sum, the failure to require contributions from water users on the upper San Joaquin River constitutes a violation of the rule of priority to the extent that water right holders on the three eastside tributaries hold more senior rights than those on the upper San Joaquin River.

As an aside, it is unclear whether SJRRP flows that happen to reach Vernalis will be counted towards the Vernalis Base Flow Objective under the new WQCP. The plan states that "[w]hen the percentage of *unimpaired flow requirement* is insufficient to meet the minimum base flow requirement [at Vernalis], the Stanislaus River shall provide 29 percent, the Tuolumne River 47 percent and the Merced River 24 percent of the additional total outflow needed to achieve and maintain the required base flow at Vernalis." (SED, at Appx. K, p. 29 [emphasis supplied].) Since the SJRRP flows are not part of the "unimpaired flow requirement," it is unclear whether those flows will be part of the sufficiency calculation for determining whether additional contributions are necessary from the three eastside tributaries. This issue needs clarification.

5.1.2. Westside Diversions along the San Joaquin River downstream of the confluence with the Merced River are improperly exempted

The map depicting the Plan Area excludes diverters on the west side of the lower San Joaquin River downstream of Merced River. (SED, at Figure 2-1a). The failure to include these diverters is problematic for two reasons: (1) the diverters on the west side of the San Joaquin River

[54] For example, the 2017 flow schedule can be found at http://www.restoresjr.net/download/ra-recommendations/rar2017/20170206_RA-Flow-Schedule.pdf.

are junior to the water right holders in the Plan Area, and (2) there is no protection for the flows that are bypassed or released on the three eastside tributaries.

First, the diverters on the west side of the San Joaquin River hold water rights that are junior to those held by TID, MID, CCSF, OID and SSJID. (*Meridian, Ltd. v. San Francisco* (1939) 13 Cal.2d 424.) As junior water right holders, the westside diverters should be required to bypass flows to meet the Vernalis Objective and to achieve the Narrative Objective before any contributions are required from the senior water right holders on the three eastside tributaries. In order to comply with the rule of water right priority, the WQCP must be revised to require contributions from the junior water right holders on the west side of the San Joaquin River before requiring any contributions from the senior water right holders on the eastside tributaries. In addition, the SED should be revised to include an analysis of how those contributions will impact the westside diverters. Currently, there is no analysis in the SED of westside diversion amounts, timing, or water rights. The document should be revised to address these omissions.

Second, the failure to regulate or curtail diversions by junior water right holders on the west side of the San Joaquin River will likely result in upward adjustments to the UIF requirements of the Tributary Flow Objectives. The WQCP calls for adaptive adjustments to the Tributary Flow Objectives in order to "support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta." (SED, at Appx. K, p. 30.) In other words, the Tributary Flow Objectives will be continually adjusted for the ostensible purpose of achieving the Narrative Objective. (SED, at Appx. K, p. 18.) If the flows from the Tributary Flow Objectives are more than sufficient to meet the Vernalis Base Flow Objective, then westside diverters, and any other diverter downstream of the tributary compliance points, will be able to divert the flows bypassed/released by TID, MID, CCSF, OID and SSJID, at least insofar as those diversions will not cause noncompliance with the Vernalis Base Flow Objective.[55] Thus, if achieving the Vernalis Base Flow Objective is not sufficient to achieve the Narrative Objective, and if the Tributary Flow Objectives are supposed to be continually adjusted to achieve the Narrative Objective, then it is highly likely that the unregulated diversions by junior water right holders on the west side of the San Joaquin River will result in the need to increase the unimpaired flow requirements on the tributaries in order to ensure that the Narrative Objective is achieved. This is problematic because the junior water right holders on the west side of the San Joaquin River will be diverting water in such a way that requires even more contributions from senior water right holders on the eastside tributaries, thereby violating the rule of priority.

The program of implementation (POI) suggests that the State Water Board may attempt to regulate these downstream diverters. Specifically, the POI states,

> "The State Water Board will exercise its water right and water quality authority to help ensure that the flows required to meet the Lower San Joaquin River flow objectives are used for their intended purpose and are not diverted for other purposes." (Appx. K Bay-Delta Plan, p. 28)

However, the POI does not specify how the westside diverters will be regulated, nor does it indicate which objective, if any, would be implemented by such regulation, as is required in a WQCP. (Water Code, § 13242.)

Notably, there is an unresolved legal question as to whether flows that are released in compliance with a WQCP objective are automatically protected from diversion by other users, or whether such flows are abandoned and available for diversion by others, such as water users in the Delta, absent protection under Water Code section 1707. This issue was raised in a complaint filed by the State Water Contractors with the SWRCB on June 16, 2015, alleging that diverters in the Delta south of the San Joaquin River are unlawfully diverting releases of SWP stored water. (STJA Attachment 16.) The State Water Board has yet to address this complaint. As the current WQCP

[55] The SJTA is assuming in this example that the Board will prevent west side diverters from diverting water from the lower San Joaquin River if doing so would cause noncompliance with the Vernalis Base Flow Objective. The supposed method for imposing this restriction on west side diversions is the exercise of the Board's water right and water quality authority "to help ensure that the flows required to meet the LSJR flow objectives are used for their intended purpose and are not diverted for other purposes." (SED, at Appx. K, p. 28.)

raises the same issue, resolution is needed. There are several issues embedded in these fact patterns, all of which will require resolution: (1) is meeting a WQCP objective a beneficial use of water, (2) is water considered abandoned after it meets a WQCP objective, (3) if water is deemed abandoned after it satisfies a WQCP objective, how will it be determined whether the Narrative Objective is satisfied, and who will make such a determination, (4) what will prevent a downstream diverter from appropriating the water once it has met the WQCP objective on the tributaries, (5) if the San Joaquin River flow at Vernalis exceeds the minimum base flow objective, is the water released on the tributaries subject to diversion after it reaches the San Joaquin, (5) does the regulated water right holder bear the "burden" of depletions (natural and by diversion) when meeting the objectives. These are the legal issues that the State Water Board needs to address, but continues to ignore in this Bay-Delta Plan.

5.1.3. CVP and SWP Exports in the South Delta are improperly exempted

Exports by the CVP and SWP pose the same water right priority issues as the westside diversions on the San Joaquin River. The State Water Board did no analysis of the fate of the San Joaquin River flow entering the Delta. The DSM2 model is available, but was not used by the SWB. Dr. Paulsen collaborated with Dan Steiner and used the SJTA 40% UIF run to determine San Joaquin River inflow under the proposed Tributary Flow Objective. Her analysis shows the fate of San Joaquin River inflow once it reaches the Delta in a below normal year (1966), a dry year (1968), and a critically dry year (1988). As shown in Table 5-1 below, when Delta inflow from the San Joaquin River increases under 40% unimpaired flow, there is a corresponding increase in exports by the CVP and SWP. (SJTA Attachment 6, p. 7, 17.)

	DELTA INFLOW – SJR (TAF)[a]		EXPORTS - CVP, SWP, Contra Costa Canal (TAF)[b]		SJR CONTRIBUTION TO DELTA OUTFLOW (TAF)[c]	
	Base	**40%**	**Base**	**40%**	**Base**	**40%**
1966 (BN)	884	1491	723	1014	2	19
1968 (Dry)	816	1223	647	837	3	15
1988 (Critical)	456	843	304	462	0.6	7

[a] San Joaquin River water that enters the Delta between February 1 and June 30.
[b] Amount of San Joaquin River water that entered the Delta between February 1 and June 30 and that was exported or diverted from the Delta during the given water year.
[c] Volume of San Joaquin River water that entered the Delta between February 1 and June 30 that left the Delta as Delta outflow.

SJTA Table 5-1: Summary of Delta Inflow, Exports and Outflow derived from SJTA Attachment 6

The SED recognized that Delta exports would increase by an average of 76,000 acre-feet annually under 40% unimpaired flow. (SED, at 5-78.) However, Dr. Paulsen's analysis demonstrates that the increase could be significantly higher than the number reported in the SED when the WSE modeling constraints used by SWB Staff - such as carryover storage, refill criteria and flow shifting - are eliminated. For instance, exports would increase by 275 TAF in a below normal year such as 1996, by 178 TAF in a dry year such as 1968, and by 152 TAF in a critically dry year such as 1988.

USBR and DWR, as operators of the CVP and SWP, are some of the most junior water right holders in the entire Bay-Delta system. It is a violation of water right priority to require senior water right holders on the three eastside tributaries to reduce diversions for the supposed benefit of fish migrating through the Delta, while simultaneously creating a situation that allows for additional diversions by the junior CVP and SWP operators in the Delta. Moreover, as noted above, only 1.3% of San Joaquin River inflow (from February 1 – June 30) contributes to Delta outflow – even under 40% unimpaired flow. (SJTA Table 2-7.)

In sum, water right priorities are once again turned on their head when the most senior water right holders must bypass water while the most junior water right holders in the Basin continue to divert unabated in higher quantities.

5.1.4. Other South Delta diverters are improperly excluded

According to the SWRCB's data from the joint enforcement proceeding commenced against Byron-Bethany Irrigation District and West Side Irrigation District, which culminated in an order of dismissal in ORDER WR 2016-0015, average diversions in the San Joaquin Delta amount to 65,641 acre feet from February through June. (ENF01951 & ENF01949, Exhibit WR-51, Sheet - Delta Sr Combined 2015-06-15 [selected for San Joaquin Delta diverters only].)

In order to adhere to the water right priority system, the State Water Board must consider what contributions, if any, must be made by south Delta diverters to protect San Joaquin River fish migrating through the Delta. Any diverters in the south Delta who have rights junior to those held by water right holders on the three eastside tributaries must contribute flows first. The creation of a plan which does not even contemplate contributions from south Delta diverters runs afoul of the rules of water right priority.

5.1.5. Water right holders on Calaveras, Mokelumne and Cosumnes Rivers are improperly excluded

It is not clear from the WQCP or the SED how water right holders on the Calaveras, Mokelumne, and Cosumnes Rivers will be addressed. As flows from these rivers contribute to the Delta, this omission should be corrected to ensure that water right holders on these rivers contribute in accordance with their water right priority.

5.2. Riparian water right holders are not analyzed

The SED assumes that riparian rights will not be affected by the WQCP. Specifically, the modeling in the SED assumed that "[r]iparian . . . demands are fully met, because these diverters are considered senior to appropriative ones." (SED, at Appx. F1, p. F.1-38.) This assumption is erroneous. The WQCP's requirement of 30% to 50% for instream uses could affect riparian water right holders if the remaining flow, i.e., 70% to 50%, were insufficient to meet all riparian demand.

In such a scenario, riparian diverters would be collectively curtailed. While it may be unlikely that riparians will be curtailed, the likelihood is unknown because the SWB failed to analyze the issue. This error should be corrected.

5.3. The WQCP provides protection to municipal supply without consideration of water right priority

The WQCP states that the Board will "take actions as necessary to ensure that implementation of the flow objectives does not impact supplies of water for minimum health and safety needs, particularly during drought periods." (SED, at Appx. K, p. 28.) To the extent that this provision of the program of implementation will prioritize municipal beneficial uses over other beneficial uses without respect to water right priority, it is unlawful. "[T]here is no legislative or judicial authority in California for the enforced advancing of the priority of an appropriation for one beneficial purpose over that of a prior appropriation for another beneficial purpose, either in time of water shortage or otherwise, without making due compensation." (Hutchins, *California Law of Water Rights*, p. 174.) The only mechanism by which the State Water Board can assign a higher priority to a later appropriation serving a more preferred beneficial use is through the imposition of permit terms and conditions on the earlier appropriation. (see *Racanelli, supra,* 182 Cal.App.3d at 132 [recognizing the very limited authority of the Board to impose permit conditions that give a higher priority to a more preferred beneficial use even though later in time].) Thus, where a water right is not based on a permit issued by the State Water Board or its predecessor agency, the Board has no authority to prioritize one beneficial use over another in violation of water right priority. (*Young v. State Water Resources Control Bd.* (2013) 219 Cal.App.4th 397, 404 ["the Water Board does not have jurisdiction to regulate riparian and pre-1914 appropriative rights"].) The Board's effort to effectuate such a prioritization in the WQCP constitutes a violation of the rule of water right priority.

5.4. The WQCP violates the rule of water right priority amongst water right holders on the Stanislaus, Tuolumne and Merced Rivers

Apart from violating the rule of priority by excluding all diverters on the San Joaquin River, the WQCP also violates the rule of priority by requiring certain percentage contributions from the

Stanislaus, Tuolumne and Merced Rivers whenever the Tributary Flow Objectives are insufficient to satisfy the Vernalis Base Flow Objective. Specifically, the program of implementation states, "[w]hen the percentage of unimpaired flow requirement is insufficient to meet the minimum base flow requirement, the Stanislaus River shall provide 29 percent, the Tuolumne River 47 percent and the Merced River 24 percent of the additional total outflow needed to achieve and maintain the required base flow at Vernalis." (SED, at Appx. K, p. 29.) These contribution percentages violate the rule of priority because they ignore the fact water right holders on the Stanislaus, Tuolumne and Merced Rivers have different priority levels. The Board cannot require contributions in accordance with these percentages because they are not based on water right priority. The Board should decline to adopt the plan in its current form as it violates the rule of priority.

6. The Proposed Objective is Unlawful Because the State Water Board Cannot Regulate Flow in the San Joaquin River Tributaries Through the Basin Plan Covering the San Francisco Bay Delta.

The State Water Board developed the Bay Delta Plan pursuant to its authorities under the Clean Water Act and the Porter Cologne Act. Under these two authorities, the purpose of a basin plan is to protect "water bodies and the beneficial uses of those water bodies." (*City of Arcadia* (2011) 191 Cal.App.4th 156, 178.) Further, Water Code section 13050 describes a water quality control plan as applying to only those beneficial uses "for the waters within a specified area." (Water Code, § 13050[j].) Thus, water quality control plans are developed to protect specific waters within a defined geographic scope.

The Bay Delta Plan specifically regulates the waters within the San Francisco Bay and the Delta Estuary. (SWRCB 1978 Bay Delta Plan, at I-3 [stating the purpose of the plan was to "protect beneficial uses of Delta water supplies"]; SWRCB 2006 Bay Delta Plan, at 1.) This includes the waters of the San Francisco Bay, the San Pablo Bay, the Suisun Bay, the water bodies of the interior Delta, the Sacramento River from the Delta up to the confluence of the American River, and the lower San Joaquin River from the Delta up to Vernalis. (SWRCB 2006 Bay Delta Plan, at Figure 1.) Since its original adoption in 1978, the State Water Board has revised the Bay Delta Plan several times. Through these revisions, however, the geographic scope and the beneficial uses to be protected have remained the same, consistent with guidance provided by Water Code section 13050. (*See* 1978 Bay Delta Plan, at I-3; 1995 Bay Delta Plan, at Figure 1; 2006 Bay Delta Plan, at Figure 1.)

The proposed project seeks to protect beneficial uses outside the geographic scope of the Bay Delta Plan, and also proposes to completely change the geographic scope of the Bay Delta Plan. The proposed geographic changes are unlawful for several reasons. First, the State Water Board did not notice the changes to the geographic scope and regulated waters. The State Water Board noticed its review of the Bay Delta Plan on February 13, 2009 ("2009 NOP"). The 2009 NOP noticed the State Water Board was beginning its review of the San Joaquin River Flow Objective. The 2009 NOP did not provide notice the State Water Board planned to review the geographic scope of the Bay Delta Plan or otherwise regulate waters outside the Bay Delta Plan. The State Water Board revised the 2009 NOP by issuing a revised Notice of Preparation in 2011 ("2011 NOP"). The 2011 NOP did not notice the State Water Board was reviewing or amending the geographic scope of the Bay Delta Plan, nor did it notice that it would be regulating waters not included in the Bay Delta Plan.

Second, the proposed changes to the geographic scope are significant and the Lower San Joaquin River Flow Objective no longer seeks to regulate the waters in the Bay Delta. The waters regulated in the Bay Delta Plan do not include the San Joaquin River upstream of Vernalis, nor the Stanislaus, Tuolumne, or Merced Rivers. Now, the WQCP proposes to regulate the San Joaquin River from its confluence with the Merced River to Vernalis, and the Stanislaus, Tuolumne, and Merced Rivers. Thus, the geographic scope and regulated waters of the existing Bay Delta Plan are entirely different than the geographic scope and waters of the proposed project. Because the Bay Delta Plan only regulates specific waters, the regulation of waters beyond the geographic scope of the Bay Delta Plan cannot – and should not - be performed through a review of the plan. (Water Code, § 13050.)

Third, the proposed LSJR Flow Objective is no longer tied to a Delta benefit. In the 1978, 1995, and 2006 plans, the water quality objectives were directly tied to the protection of beneficial uses in the Delta. (1978 Bay Delta Plan, at III-1 [protecting "beneficial uses in the Delta and Suisan

Marsh"]; 1995 Bay Delta Plan, at [protecting the "multitude of beneficial uses" served by the "waters of the Bay Delta Estuary"]; 2006 Bay Delta Plan, at 5 [developing a plan to protect the waters of "the Delta, Suisun Bay, and Suisun Marsh"].) The WQCP no longer proposes to protect beneficial uses of the Bay or Delta; instead, the revised regulations proposes to protect beneficial uses in "those portions of the San Joaquin River (SJR) Basin that drain to, divert water from, or otherwise obtain beneficial use (e.g., surface water supplies) from the three eastside tributaries." (SED, at 7-1.) The State Water Board attempts to tie the benefits of the proposed Tributary Flow Objective to a downstream Delta benefit, by including the Narrative Objective which mentions protection of San Joaquin River watershed fish migrating through the Delta. However, both the analysis performed in the SED and information provided by the SJTA demonstrate that little, if any, of the proposed releases will benefit the Delta and Bay at all. This is a complete departure from the previous Bay Delta plans; the Tributary Flow Objective will not protect beneficial uses in the Delta and therefore is not truly an amendment to the Bay-Delta Plan or the former Lower San Joaquin River flow objective therein.

Fourth, the reality is that the Tributary Flow Objective is a very focused and localized plan that is entirely contained in the Central Valley region and is the responsibility of the Central Valley Regional Water Quality Control Board. The Regional Water Quality Control Boards are responsible for developing water quality requirements for the water basins within their respective jurisdictions. (Water Code, § 13240 ["Each regional board shall formulate and adopt water quality control plans for all areas within the region"].) The State Water Board may develop statewide water quality regulations or water quality control plans spanning more than one basin. (*County of Los Angeles v. California State Water Resources Control Board* (2006) 143 Cal.App.4th 985, 1000; Water Code, § 13140.) The Bay Delta Plan is a water quality control plan spanning more than one basin. However, unlike the Bay Delta Plan, the Tributary Flow Objective does not span more than one basin. In fact, the proposed regulation is localized in the three tributaries to the San Joaquin River. For this reason, water quality regulation of the tributaries is the duty of the Regional Board, rather than the State Water Board. (Water Code, § 13240.) It is therefore unlawful for the State Water Board to attempt to reach outside the scope of the Bay Delta Plan and regulate tributary flows outside the Bay Delta area.

The proposed plan is neither a Bay-Delta Plan, nor a basin plan. As the SED points out, the Delta will be dealt with later, namely in Phase II. Similarly, it is not a San Joaquin River basin plan, as the entire San Joaquin River watershed south of Merced is excluded, as is everything on the west side of the San Joaquin River. Essentially, the proposed project is a tributary instream flow determination which should have been developed in an entirely different process, as explained below.

Pursuant to the Sacramento-San Joaquin Delta Reform Act of 2009, the Board was to submit to the legislature "a prioritized schedule and estimate of costs to complete instream flow studies for the Delta and for high priority rivers and streams in the Delta watershed . . ." (Water Code, § 85087.) The State Water Board's initial list of high priority streams in 2010 included the Stanislaus, Tuolumne and Merced Rivers. (SWRCB, Instream Flow Studies for the Protection of Public Trust Resources, A Prioritized Schedule and Estimate of Costs; December 2010).[56] After creating the list of high priority streams, the State Water Board decided to abandon its effort to perform Instream flow/Public Trust proceedings on the three tributaries. Instead, the Board shifted to using the Bay-Delta Plan as a vehicle to get additional flows out of the three tributaries. Unfortunately for the State Water Board, this shift from a Public Trust proceeding to a Basin Plan/Water Quality Plan accounts for much that is wrong with the WQCP objectives.

For these reasons, the Board should not adopt the proposed revisions to the Bay-Delta Plan, and should leave the development of water quality control plans for the San Joaquin River basin to the Regional Water Quality Control Board.

7. The Proposed Objective is Unlawful Because Flow is Not a Water Quality Constituent That Can Be Regulated Through a Water Quality Control Plan.

The Porter Cologne Water Quality Control Act establishes a comprehensive program for water quality control. Water quality control plans are developed pursuant to Porter Cologne

[56] Instream Flow Studies report available at http://www.waterboards.ca.gov/publications_forms/publications/legislative/docs/2011/instream_flow2010.pdf.

authority and consist of three parts: (a) designation of beneficial uses, (b) water quality objectives, and (c) a program of implementation. (Water Code, § 13050[j].) The purpose of water quality objectives is to set the level of water quality constituents or characteristics for the reasonable protection of beneficial uses of water. (Water Code, § 13050[h]. Water quality means chemical, physical, biological, bacteriological, radiological, and other properties and characteristics of water which affect its use. (Water Code, § 13050[g].)

Quantity of water is a descriptive term that reflects the amount of water, but it is not a characteristic of the water itself. Thus, flow is not water quality constituent or characteristic. The recent storm water case out of the United States District Court for the Eastern District of Virginia clarifies the distinction between water quality and water flows. (*Virginia Department of Transportation v. United State Environmental Protection Agency* (2013) 2013 U.S. Dist. LEXIS 981 ("*VDot*").) In the *VDot* matter, the Department of Transportation challenged the EPA's regulation of storm water runoff through the Clean Water Act. Specifically, the Department of Transportation claimed that storm water is not a pollutant that can be regulated by the EPA. The Eastern District Court agreed and prohibited the regulation of storm water as a "surrogate" for water quality, rather than regulating pollutants directly. (*VDot*, at 9.) The Court understood the EPA's storm water regulation was attempting to control water quality with flow, but the Court made clear that the EPA was required to regulate pollutants directly and had no authority to regulate the flow of water in an effort to control water quality. (*Id*.)

Thus, applying the holding in *VDot* to the present matter, the State Water Board cannot regulate flow pursuant to the Clean Water Act because flow is not a water quality constituent. Because flow is not a water quality constituent, it cannot be regulated through a water quality control plan. For these reasons, the Tributary Flow Objective is unlawful and must be set aside.

8. The Proposed Amendments to the WQCP Violate Federal Antidegradation Policy

The Clean Water Act requires that a state's water quality standards contain the following elements: (1) designated uses, (2) methods used and analysis conducted to support water quality standards revisions, (3) numeric or narrative water quality criteria sufficient to protect those designated uses, and (4) **an antidegradation policy**. (See 33 USCS § 1313[c][2][A]; Protection of Environment, 40 C.F.R. §§ 131.6; 131.11[a][1]; 131.11[b][1],[2]; 131.12.) With respect to the antidegradation policy, the EPA's regulations require the state to "develop and adopt a statewide antidegradation policy" as well as "methods for implementing the antidegradation policy." (40 C.F.R. § 131.12[a][d]; *Northwest Envtl. Advocates v. United States EPA* (Or. Dist. Ct. 2003), 268 F.Supp.2d 1255, 1264.) The federal policy requires that "existing instream water users and the level of water quality necessary to protect the existing uses . . . be maintained and protected." (40 C.F.R. § 131.12[a][1].)

The State Water Board has adopted Resolution No. 68-16, entitled "Statement of Policy with Respect to Maintaining High Quality Waters in California." (SWRCB Resolution No. 68-16.) The Board has interpreted this resolution as incorporating the federal policy wherever federal policy applies under federal law. (SED, at 23-3.) By its own terms, the resolution "is to be followed in any of its water right or water quality actions." (*Central Delta Water Agency v. State Water Resources Control Bd.*, (2004) 124 Cal.App.4th 245, 265.) Specifically, the resolution states,

> "[w]henever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies." (SWRCB Resolution No. 68-16, ¶ 1.)

As demonstrated below, the State Water Board has failed to perform the necessary analysis to determine whether the proposed amendments to the WQCP will comport with federal antidegradation requirements and Resolution No. 68-16.

Currently, the 2006 Bay-Delta Plan requires the following minimum monthly average flow rate on the San Joaquin River at Vernalis:

Vernalis Base Flow		
Wet, Above Normal	Feb-Apr. 14 & May 16-June	2,130 or 3,420 cfs
Below Normal, Dry	Feb-Apr. 14 & May 16-June	1,420 or 2,280 cfs
Critical	Feb-Apr. 14 & May 16-June	710 or 1,140
Vernalis Pulse Flow		
Wet	Apr. 15 – May 15	7,330 or 8,620 cfs
Above Normal	Apr. 15 – May 15	5,730 or 7,020 cfs
Below Normal	Apr. 15 – May 15	4,620 or 5,480 cfs
Dry	Apr. 15 – May 15	4,020 or 4,880 cfs
Critical	Apr. 15 – May 15	3,110 or 3,540 cfs
All	October	1,000 cfs

SJTA Table 8-1. Vernalis base and pulse flows as reflected in Table 3 of the 2006 Bay-Delta Plan

Under the proposed amendments to the water quality control plan, these flow requirements would no longer be controlling. Instead, the controlling factors would be an unimpaired flow percentage of 30% to 50% from the three eastside tributaries (on a minimum 7-day running average), with a minimum base flow of 800 to 1,200 cfs at Vernalis, from February through June. (SED, Appx. K, p. 18.) Without providing any analysis as to whether the new flow requirements would result in more or less flow at Vernalis, or whether the new flow requirements would provide better water quality in the lower San Joaquin River or in any of the three eastside tributaries, the SED concludes that the proposed plan amendments "will likely result in water quality improvements in the San Joaquin River (SJR) Watershed and the southern Delta ." (SED, at 23-2.) The only basis for this conclusion appears to be the State Water Board's assertion "the flow objectives may be adjusted" as part of an adaptive management program if monitoring and "other best available scientific information indicates that such changes will be sufficient" to meet the narrative objective, i.e., that the changes will "support and maintain the natural production of viable native SJR Watershed fish populations migrating through the Delta . . .." (SED, at 23-4.) In other words, rather than performing the scientific analysis prior to proposing these changes to the WQCP to ensure that the amendments do not result in a degradation of water quality, the State Water Board has taken the position that the scientific analysis will be performed later, and in real-time, as part of implementing the plan. The failure to perform an antidegradation analysis to ensure that the proposed objectives do not result in a degradation of water quality is a dereliction of duty, and a violation of Resolution No. 68-16. `

Furthermore, the State Water Board's adaptive management plan is so far-reaching that it would amount to an amendment of the proposed objectives. Specifically, the SED states that the initial 40% flow requirement set forth in the objectives might be changed (within the 30% to 50% range); that the flows may not be released on a 7-day running average of unimpaired flow, but instead on an "adaptive schedule" that does not coincide with a 7-day running average of unimpaired flow; and that the flow requirements may be "shifted" outside the February through June period for release later in the year, or in a subsequent year. (SED, at 23-4.) The latter two proposals are fundamental changes to the proposed objectives, which clearly and explicitly require the maintenance of a percentage of unimpaired flow on a minimum 7-day running average from February through June, and which do not require any releases outside of the February through June period. (SED, at Appx. K, p. 18.) While the Board has modeled the proposed objectives as if *some* version of these adaptive adjustments was in place (such as one method of flow shifting), it has not analyzed the broad range of flow scenarios that are permissible under the proposed adaptive adjustments to determine whether implementation of these changes would degrade water quality.

As the SED does not demonstrate that the new objectives will not cause a degradation of water quality, the Board should decline to adopt the WQCP. Moreover, as the plan itself must contain an antidegradation policy under the Clean Water Act (See 33 USCS § 1313[c][2][A]), the

State Water Board should decline to adopt the proposed amendments because they fail to comport with federal law and the requirements for EPA approval.

9. The Proposed Project is Unlawful Because it Violates FERC's Exclusive Jurisdiction.

The SJTA incorporates all of the comments submitted by Modesto Irrigation District and Turlock Irrigation District on the issue of FERC's exclusive jurisdiction.

10. The Proposed Objective is Unlawful Because the State Water Board Failed to Fully Implement the 2006 Water Quality Control Plan Objectives

After adopting water quality objectives, the State Water Board is required to fully implement those objectives; failure to fully implement the objectives amounts to a de facto amendment without complying with the procedural requirements for amending a water quality control plan. (*State Water Resources Control Bd. Cases*, *supra*, 136 Cal.App.4th at 734.) To date, the State Water Board has not fully implemented the SWRCB 2006 Bay-Delta Plan. USBR has repeatedly failed to comply with the flow requirements at Vernalis. In addition, the SWRCB 2006 Bay-Delta Plan includes several non-flow measures in its plan of implementation. These measures include installation of screening facilities on diversions, modification of existing commercial and sport fishing regulations, expansion of the illegal harvest program, improvement of hatchery programs, and expansion of gravel replacement and maintenance. (2006 Bay Delta Plan, at 34-37.) The State Water Board did not include these measures as superfluous to the protection of beneficial uses; instead, the State Water Board characterized the non-flow measures as "necessary to achieve the objectives." (SWRCB 2006 Bay Delta Plan, at 22.) Despite the necessity, these actions were never implemented.

The proposed project seeks to create new flow requirements on the three eastside tributaries for the protection of fish and wildlife beneficial uses, without first determining whether the 2006 Bay-Delta Plan is sufficient to protect those same uses. Before the Board takes the drastic step of altering the 2006 Bay-Delta Plan to include geographic area never before included in the plan, the Board should implement the 2006 Bay-Delta Plan as written and determine whether it is sufficient to protect fish and wildlife beneficial uses. Having never fully implemented the 2006 Bay-Delta Plan, the Board simply cannot know whether the plan was sufficient or not.

The State Water Board cannot continue to ask for increased flow and allow the non-flow measures from the 2006 Bay-Delta Plan to continue to be ignored. Before the State Water Board can change the Lower San Joaquin River Flow Objective, it must first implement the existing non-flow actions. (*State Water Resources Control Bd. Cases*, *supra,* 136 Cal.App.4th at 734.) Only after those actions are implemented, may the State Water Board review the existing flow objectives to determine if more flow is needed protect fish and wildlife.

11. The Proposed Revisions to the Bay-Delta Plan Violate the Clean Water Act.

Section 303 of the Clean Water Act requires each state, subject to approval by the Environmental Protection Agency (EPA), to "institute comprehensive water quality standards" in order "to prevent water quality from falling below acceptable levels." (*Pud No. 1 v. Wash. Dep't of Ecology* (1994) 511 U.S. 700, 704, quoting *EPA v. California ex rel. State Water Resources Control Bd.* (1976) 426 U.S. 200, 205, n. 12; see 33 U.S.C. § 1313.) In establishing water quality standards, the states must consider the "use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other purposes, and [navigation]." (33 U.S.C. § 1313[c][2].)

The State Water Board has taken the position that regulation of water *quantity*, including the regulation of instream flow, is not a water quality standard under the Clean Water Act that is subject to EPA approval or enforcement. (SED, at Appx. K, p. 5; SJTA Attachment 12.) In the event the State Water Board changes its position, or in the event it is determined by a court that the State Water Board's position is incorrect, it is the SJTA's position that, for the various reasons stated above in Sections 2 and 3, the information in the SED is insufficient for the Board to conduct the necessary balancing required under the Clean Water Act for the setting of water quality standards.

12. The Proposed Objectives are Unlawful because they Amount to an Adjudicatory Action without Due Process of Law

The State Water Board is empowered to undertake both adjudicatory and regulatory functions in allocating water rights and protecting water quality. (Water Code, § 174.) Although the State Water Board possesses this dual authority, the two functions have "distinct attributes." (*Racanelli*, *supra*, 182 Cal.App.3d at 112.)

The development of a water quality control plan is a regulatory function in which the State Water Board acts in a quasi-legislative capacity. (*State Water Resources Control Bd. v. Office of Admin. Law* (1993) 12 Cal.App.4th 697, 701-702 [amendments to the regional water quality control plan were "regulatory"]; (*Ibid.*) The State Water Board's review of the water quality objectives in the Bay Delta Plan is also a quasi-legislative act. (*Ibid.*) ["In performing its regulatory function of ensuring water quality by establishing water quality objectives, the Board acts in a legislative capacity."])

Water quality objectives are not self-effectuating; instead, the State Water Board must act separately to implement the actions delineated in the program of implementation. (Water Code, § 13242 [requiring a program of implementation to achieve the objectives].) Usually, the State Water Board implements the objectives by amending water rights. In contrast to developing water quality objectives, the State Water Board's amendment of water rights is an adjudicatory function. (*Racanelli*, *supra*, 182 Cal.App.3d at 113 ["in undertaking to allocate water rights, the Board performs an adjudicatory function"], citing *Temescal Water Co. v. Dept. of Public Works* (1995) 44 Cal.2d 90, 100-06.) Because property rights are at issue in an adjudicative water-right proceeding, the State Water Board is required to comply with Government Code section 11425.10, which provides due process protections such as directed notice, an opportunity to be heard, the ability to present and rebut evidence, and the right to cross examine. (Cal. Code Regs., tit. 23, § 648[b].) The same due process requirements are <u>not</u> required when the State Water Board acts in a legislative capacity, such as when the Board develops water quality objectives and amends a water quality control plan. (Gov. Code, § 11353.)

As demonstrated below, the State Water Board's proposals for the Tributary Flow Objective and the Vernalis Flow Objective are framed so narrowly that they amount to an adjudication of the rights of OID, SSJID, TID, MID, and CCSF. Oakdale Irrigation District, South San Joaquin Irrigation District, Turlock Irrigation District, Modesto Irrigation District, and the City and County of San Francisco. By conducting this adjudication through the guise of a quasi-legislative action, i.e., an amendment to the water quality control plan, the State Water Board is violating the due process rights of the SJTA members.

When developing water quality objectives, "the Board is directed to consider not only the availability of unappropriated water (Water Code, § 174) but also *all* competing demands for water in determining what is a reasonable level of water quality protection (Water Code, § 13000)." (*Racanelli*, *supra*, 182 Cal.App.3d at 118 [emphasis in original].) Similarly, the State Water Board must consider "[w]ater quality conditions that could reasonably be achieved through the *coordinated control of all factors which affect water quality in the area*." (Water Code, § 13241[c][emphasis supplied].) In *Racanelli*, the First District Court of Appeal held that the Board's decision to establish water quality objectives for the Delta based on the amount of water available prior to the construction and operation of the CVP and SWP and facilities (collectively the "Projects"), known as the "without project" standard, violated these rules because the "Board considered only the water use of the Delta parties . . . and the needs of the customers served by the [P]rojects . . . [while] [n]o attention was given to water use by the upstream users." (*Ibid.*) In other words, the standard was set "only at a level which could be enforced against the projects." (*Id.* at 119.) The *Racanelli* Court stated that a "global perspective" of the available water resources was necessary. (*Ibid.* at 119.) The Court observed that the imposition of a "without project" standard upon the Projects themselves "represents one reasonable method" of achieving water quality control in the Delta, but the Court explained that the Board cannot satisfy its water quality planning obligations if it does not consider "other actions which could be taken to achieve Delta water quality, such as remedial actions to curtail excess diversions and pollution by other water users." (*Ibi.d* at 120.)

The State Water Board's Tributary Flow Objective and Vernalis Flow Objective are unlawful for the same reasons that the "without project" standard in *Racanelli* was unlawful, namely, they target a select group of water users and ignore the possible contributions or actions of other water users. The State Water Board's new flow proposal has a narrative objective and two numeric flow objectives. (SED, at ES-4; Appx. K, p. 18.) Both the narrative and numeric objectives purport to cover a broad geographic area that extends far beyond the locale of the three eastside tributaries that are identified as being the contributing resources for achieving those objectives. Specifically, the Narrative Objective states that inflow conditions from the "San Joaquin River watershed to the Delta" should be maintained at sufficient levels to support and maintain the natural production of viable native San Joaquin River watershed fish populations "migrating through the Delta." (SED, at Appx. K, p. 18.) Similarly, the program of implementation states, "[a]lthough the lowest downstream compliance location from the Lower San Joaquin River flow objective is at Vernalis, the objectives are intended to protect migratory Lower San Joaquin River fish in a larger area, including within the Delta . . .." (SED, at Appx. K, p. 28.) Despite the broad geographic scope of the objectives, which covers the entire San Joaquin River watershed through the Delta, the Tributary Flow Objective only requires the maintenance of an unimpaired flow percentage below the rim dams on each of the Stanislaus, Tuolumne and Merced Rivers. (SED, at ES-5; 1-1 – 1-2; Appx. K, p. 18.)[57] Likewise, the SED states that the Vernalis Flow Objective will be satisfied by releases from the Stanislaus, Tuolumne and Merced Rivers: "When the percentage of unimpaired flow requirement is insufficient to meet the minimum base flow requirement, the Stanislaus River shall provide 29 percent, the Tuolumne River 47 percent and the Merced River 24 percent of the additional total outflow to achieve and maintain the required base flow at Vernalis." (SED, at Appx. K, p. 29.)

[57] The "plan area" in the SED is described as the Stanislaus River watershed from New Melones to the confluence of the San Joaquin River, the Tuolumne River watershed from New Don Pedro Reservoir to the confluence of the San Joaquin River, and the Merced River watershed from the Lake McClure to the confluence of the San Joaquin River, as well as the mainstem of the San Joaquin River between its confluence with the Merced River downstream to Vernalis. (SED, at 1-2.)

By only requiring the maintenance of unimpaired flow below the rim dams on each of the three eastside tributaries, and by only requiring contributions from the three eastside tributaries to meet the Vernalis Flow Objective, and by proposing to meet the Narrative Objective by adaptively adjusting the Tributary Flow Objective (SED, at Appx. K, p. 30), the State Water Board's proposed objectives are designed in such a way that they can only be enforced against water users who divert from the Stanislaus, Tuolumne and Merced Rivers, upstream of the compliance points on each of those rivers. The major water users on those rivers include the SJTA member agencies SSJID, OID, TID, MID, and the City and County of San Francisco. (SED, at 2-7, 2-18.) All of the water users upstream of the confluence of the Merced River with the San Joaquin River are notably exempt from this regulation, as are the water users on the westside of the San Joaquin River, and the water users on the Calaveras, Mokelumne and Cosumnes Rivers (SED, at Figure ES-1 [showing the Calaveras, Mokelumne and Cosumnes Rivers in the San Joaquin River Basin]). By exempting these water users and the resources available to them, the State Water Board has improperly ignored numerous water resources that should have been included in developing the objectives designed to protect "the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta." (SED, at Appx. K, p. 18.)

Specifically, on the Upper San Joaquin River, the State Water Board has ignored Eastman Lake behind Buchanan Dam on the Chowchilla River (Storage Capacity: 150,000 acre feet[58]), Hensley Lake behind Hidden Dam on the Fresno River (Storage Capacity: 90,000 acre feet[59]), and Millerton Lake behind Friant Dam on the Upper San Joaquin River (Storage Capacity: 520,500 acre feet[60]). (SED, at Figure 2-3.) The average annual unimpaired flow for the Upper San Joaquin River at Friant Dam is 1,702,000 acre feet, which, standing alone, "represents approximately 28 percent of the unimpaired flow on the SJR at Vernalis." (SED, at 2-9.) That figure of 28 percent does not include the resources on the tributaries further upstream on the Chowchilla and Fresno Rivers. The

[58] Eastman Lake storage: http://cdec.water.ca.gov/cgi-progs/profile?s=BUC&type=res
[59] Hensley storage: http://cdec.water.ca.gov/cgi-progs/profile?s=HID&type=res
[60] Millerton Lake storage: http://cdec.water.ca.gov/cgi-progs/profile?s=MIL&type=res

State Water Board did not consider, nor incorporate these resources, when setting the numeric requirements in the Tributary Flow Objective and the Vernalis Flow Objective.

The State Water Board has also ignored the water users on the lower San Joaquin River that are downstream of the compliance points on each of the three eastside tributaries. These water users include, but are not limited to, the following:

Water User	**Average Annual Demand in Acre Feet**
Westside Irrigation District	19,437
Stevinson Water District	17,533
Patterson Irrigation District	62,932
West Stanislaus Irrigation District	61,617
El Solyo Water District	60,252
Banta-Carbona Irrigation District	14,686
Recl. Dist. 2075 (McMullin)	5,906
Recl. Dist. 2064 (River Junction)	2,610
Byron-Bethany Irrigation Dist.	1,743

SJTA Table 13-1[61]

Due to the location of these water users downstream of the compliance points, none can contribute to meeting the Tributary Flow Objective, and none are directed to contribute to the Vernalis Flow Objective, the latter of which is to be satisfied with flows from the Stanislaus, Tuolumne and Merced Rivers. (SED, at Appx. K, p. 29.) Although the SED indicates that these water users may be subject to conditions requiring them to curtail or cease diversions "when flows

[61] Demand data derived from SWRCB's submissions in ENF01951 & ENF01949, Exhibit WR-51

are required to meet the proposed flow objective," the WQCP does not identify these contributions as objectives, and fails to indicate how such a contribution might be achieved or implemented in the absence of an objective. (SED, at ES-23.)

Similarly, the Plan Area also includes the Southern Delta, and rightfully so, because the San Joaquin River enters and supplies water to the Southern Delta. The WQCP only addresses salinity impacts to lands in the South Delta. There is no requirement that South Delta water users contribute to the flow objectives by curtailing diversions, or taking any other action, in order to achieve the objectives for fish and wildlife beneficial uses, despite the fact that the WQCP explicity states that "the objectives are intended to protect migratory LSJR fish in a larger area, including within the Delta." (SED, at Appx. K, p. 28.)

In summary, the Plan Area includes 806,547 total acres. (SED, at 11-11.) The amount of land in the entire San Joaquin River Hydrologic Region is approximately 3.73 million acres (SED, at 2-5), which leaves approximately 2.92 million acres of land that are not included, but which still fall within the San Joaquin River basin.[62] When the hydrologically connected Kings River basin is added, the amount of land that is within the San Joaquin River basin that is not included in the plan increases even more. In addition, while the WQCP focuses on the seven water right holders identified in the table above, it excludes approximately 4,500 water right holders in the San Joaquin River Basin.

By developing objectives that can only be achieved through the imposition of restrictions on a select group of water users and water right holders, the State Water Board has unlawfully "ignore[d] other actions which could be taken to achieve Delta water quality, such as remedial actions to curtail excess diversions . . . by other water users" and/or flow contributions from other water users within the system. (*Racanelli, supra,* 182 Ca.App.3d at 120.) The necessary "global perspective" which considers all available water resources is severely lacking here. (*Racanelli*,

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[62] The map in figure ES-1 does not accurately depict the San Joaquin River Basin. The San Joaquin River Basin also includes the Kings River Basin. (See Comprehensive Study of Sacramento and San Joaquin River Basins by U.S. Army Corps of Eng'rs, 2002, Appx. B, at 11-4,11-5; *Turner v. James Canal Co.*, 155 Cal. 82, 91 [explaining that the Kings River and San Joaquin River are hydrologically connected through the Fresno Slough].)

supra, 182 Cal.App.3d at 119.) The beneficial uses to be served must drive the objectives (Water Code, § 13241), not the ability of the State Water Board to obtain/regulate water right holders. (*Racanelli, supra,* 182 Cal.App.3d at 120 ["the Board compromised its important water quality role by defining its scope too narrowly in terms of enforceable water rights"].) As the objectives do not consider "[w]ater quality conditions that could reasonably be achieved through the **coordinated control of all factors** which affect water quality in the area," the State Water Board's proposed amendments to the water quality control plan are in violation of Water Code section 13241[c]. ([emphasis supplied].)

Moreover, because the objectives area are so geographically limited and can only be implemented against a select number of water right holders, namely the SJTA member agencies who account for nearly all of the water directly diverted or stored from the Stanislaus and Tuolumne Rivers, it amounts to a *de facto* adjudication of the water rights of the SJTA member agencies. The water rights held by the SJTA member agencies are vested property rights that cannot be infringed upon or otherwise taken by governmental action without due process. (*Racanelli*, *supra*, 182 Cal.App.3d at 101; *Ivanhoe Irrigation Dist. v. All Parties* (1957) 47 Cal.2d 597, 623; *U.S. v. Gerlach Live Stock Co.* 339 U.S. 725, 752-54.) The *Racenelli* Court clearly explained that the regulatory function of adjudicating water rights is distinct from the quasi-legislative function of adopting water quality control objectives. (*Racanelli, supra*, 182 Cal.App.3d at 112.) By developing an objective which can only be achieved by imposing restrictions on a select group of water users, as was done against the SJTA members here and against the Projects in *Racanelli*, the Board has effectively exercised its adjudicatory authority over water rights. Having done so in the context of a quasi-legislative process, namely the development of a water quality control plan, the State Water Board has subverted numerous due process protections, including the requirements of providing directed notice, the opportunity to be heard, the ability to present and rebut evidence, and the right to cross examine. (Cal. Code Regs., tit. 23, § 648[b].)

For these reasons, the State Water Board should decline to adopt the proposed amendments to the water quality control plan.

13. The Salinity Standard is Flawed Because it Improperly Allocates All Responsibility for Salinity Control at Vernalis to Senior Right Holders on the Stanislaus, Tuolumne and Merced Rivers, Contrary to the Express Findings of D-1641

Appendix K of the Draft 2016 SED states that increased flow from the Stanislaus, Tuolumne and Merced Rivers will assist in achieving the southern Delta salinity objective:

> In addition to the above requirements, the salinity water quality objective for the southern Delta will be implemented through the Lower San Joaquin River flow objectives, which will increase inflow of low salinity water into the southern Delta during February through June and thereafter under adaptive implementation to prevent adverse effects to fisheries. This will assist in achieving the southern Delta water quality objective.
>
> (Draft 2016 SED, Appx. K, at 45.)

San Francisco collected decades of salinity data in the 1930s, 1940s and 1950s on the Tuolumne and lower San Joaquin Rivers in anticipation that increasing diversions and application of irrigation water would result in increased salinity in the San Joaquin River. The Department of Water Resources took over this monitoring effort in the early 1960s. State Water Board Decision 1641 ("D-1641")[63] contains findings regarding the source of salinity in the San Joaquin River that are consistent with this historic data:

> 10.2.1.1 EFFECTS OF UPSTREAM WATER DIVERSION AND USE
>
> The largest diversions of water from the San Joaquin River and its tributaries are by (1) [United States Bureau of Reclamation ("USBR")] at New Melones Reservoir and Millerton Lake; (2) MID and TID at New Don Pedro Reservoir; and (3) [Merced Irrigation District ("Merced ID")] at Lake McClure. Additionally, the diversions into pipelines by the City and County of San Francisco from the Tuolumne River upstream of the Delta deplete Vernalis flows by 240 [TAF]. Taken together, these diversions have significantly reduced the flows in the San Joaquin River. Because of [Central Valley Project ("CVP")] diversions, alone, the flow of the San Joaquin River at Vernalis has decreased by 550 [TAF] per year on average with 345 [TAF] of this decrease occurring from April through September. The water diverted from the upstream tributaries to the lower San Joaquin

[63] *Revised Water Right Decision 1641, In the Matter of: Implementation of Water Quality Objectives for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary; A Petition to Change Points of Diversion of the Central Valley Project and the State Water Project in the Southern Delta; and A Petition to Change Places of Use and Purposes of Use of the Central Valley Project*, December 29, 1999, *Revised in Accordance with Order WR 2000-02*, March 15, 2000, State Water Resources Control Board, *available at* http://www.waterboards.ca.gov/waterrights/board_decisions/adopted_orders/decisions/d1600_d1649/wrd1641_1999dec29.pdf.

River is of high quality. Thus, these diversions result in a substantial reduction in the assimilative capacity of the San Joaquin River.

Despite the reduction in the assimilative capacity of the San Joaquin River that results from upstream diversions, water users in the San Joaquin basin upstream of the Delta are not necessarily responsible for implementation of the southern Delta salinity objectives by virtue of their depletions. Water diverted by the upstream parties is put to beneficial use for purposes such as irrigation, hydropower generation, recreation, and fish and wildlife enhancement. These are reasonable and beneficial uses that contribute to ensuring that the State's water resources are put to beneficial use to the fullest extent of which they are capable. (*See* Cal. Const., art. X, § 2.) It has long been recognized that it is reasonable to expect that upstream development will eventually reduce the amounts of water available downstream. (*Town of Antioch v. Williams Irrig. Dist*. (1922) 188 Cal. 451.) In *Antioch*, the California Supreme Court held that it would not be reasonable for an appropriator to enjoin upstream diversions so that sufficient flow would remain to hold back salt water from the ocean. *The current situation is similar to the Antioch case with respect to the depletion of water, since Antioch indicates that it may not be reasonable to require junior water right holders, solely because of their depletions, to release or bypass extra water to dilute downstream salinity.* In appropriate circumstances, of course, the SWRCB has authority to restrict diversions or require releases to protect water quality from seawater intrusion or loss of assimilative capacity. (*United States v. State Water Resources Control Board* (1986) 182 Cal.App.3d 82, 117 ("Whatever final conclusion is to be drawn from Antioch regarding the nature and extent of common law . . . rights to salinity control, existing constitutional and legislative authorities encompass the [SWRCB's] obligation to protect the quality of Delta waters.").) *In this case, however, it is not necessary, and would not be reasonable, to require that depletions be reduced, since the water quality objectives can and should be attained through regulation of other controllable factors*.

In this case, the depletions in the tributaries and the water right holders incurring the depletions are not the primary cause of salinity problems. Return flow from upstream diversions of water does not contribute significantly to the salt loading in the San Joaquin River. From 1977 through 1997, return flows from the Merced, Tuolumne and Stanislaus rivers contributed four, nine, and six percent, respectively, of the annual salt load of the river. Return flows from the upstream segment of the San Joaquin River also contribute little to the salt in the lower river. ***As discussed below, other factors contribute far more to the salinity concentrations in the southern Delta.***

10.2.1.2 THE EFFECT OF DISCHARGES IN THE CVP SERVICE AREA ON VERNALIS SALINITY

Although water quality problems on the San Joaquin River began with the reduction of flows due to upstream development and the advent of irrigated agriculture, they were exacerbated with construction of the CVP. The CVP consists of 18 federally operated reservoirs and four reservoirs operated jointly with the DWR. The Delta-Mendota Canal and pumping plant first began operating in 1951. The San Luis Dam and the California Aqueduct were completed in 1967. [South Delta Water Agency's] *witness testified that between 1930 and 1950 the average salt load at Vernalis was 750,000 tons*

> *per year. Between 1951 and 1997, the salt load has averaged more than 950,000 tons per year. Peak loads have exceeded 1.5 million tons per year following extended droughts.* [Central Valley Regional Water Quality Control Board ("Central Valley RWQCB staff")] *testified that from the 1960s onward there has been an increase in salt load and concentrations. The April through August salt load in the 1980s was 62 percent higher than the load in the 1960s and the corresponding annual load increase was 38 percent.*
>
> Central Valley RWQCB staff described geographic sources of salinity based on historical data from 1977 through 1997. The Central Valley RWQCB staff concluded that high salinity at Vernalis is caused by surface and subsurface discharges to the river of highly saline water. *The sources of the discharges are agricultural lands and wetlands. Approximately 35 percent of the salt load comes from the northwest side of the San Joaquin River, and approximately 37 percent of the salt load comes from the Grasslands area. These areas receive approximately 70 percent of their water supply from the CVP, 20 percent from precipitation and 10 percent from groundwater. The* [total dissolved solids ("TDS")] *concentration of agricultural drainage water from the Grasslands area that discharges to the river through Mud Slough is approximately 4,000* [milligrams per liter ("mg/l")]. *In some cases, drainage water is more than ten times the concentration of the Vernalis salinity standard. . . .*
>
> ***Based on the above discussion, the SWRCB finds that the actions of the CVP are the principal cause of the salinity concentrations exceeding the objectives at Vernalis.*** *The salinity problem at Vernalis is the result of saline discharges to the river, principally from irrigated agriculture, combined with low flows in the river due to upstream water development. The source of much of the saline discharge to the San Joaquin River is from lands on the west side of the San Joaquin Valley which are irrigated with water provided from the Delta by the CVP, primarily through the Delta-Mendota Canal and the San Luis Unit. The capacity of the lower San Joaquin River to assimilate the agricultural drainage has been significantly reduced through the diversion of high quality flows from the upper San Joaquin River by the CVP at Friant. The USBR, through its activities associated with operating the CVP in the San Joaquin River basin, is responsible for significant deterioration of water quality in the southern Delta…*

(D-1641, at 80-82 [emphasis added] [citations omitted].)

In response to these findings, D-1641 appropriately allocated responsibility to the CVP for meeting the Vernalis salinity standard:

> The USBR's actions have caused reduced water quality of the San Joaquin River at Vernalis. Therefore, this order amends the CVP permits under which the USBR delivers water to the San Joaquin basin to require that the USBR meet the 1995 Bay-Delta Plan salinity objectives at Vernalis.

(*Id*. at 86.)

The contribution of west side lands to San Joaquin River salinity is thus well known to the State Water Board, yet the Draft 2016 SED simply defers action with regard to reducing these discharges, contrary to the conclusion in D-1641 that salinity control "*can and should be attained through regulation of other controllable factors*," *i.e*. prevention of the discharges in the first place. (D-1641, at 81 [emphasis added].) While Appendix K acknowledges ongoing drainage reduction processes such as the San Luis Unit Feature Reevaluation Project and the San Joaquin River Real-time Salinity Management Program, (*see* Draft 2016 SED, Appx. K, at 49-50), there is no acknowledgement that these programs have failed to significantly reduce salinity loading by west side agriculture into the San Joaquin River. Given the considerable resources that have been spent over the years on these programs, it makes no sense to disregard these efforts. The SWB even concludes that if these programs are successful, then additional regulatory measures would be unnecessary

Instead, the Draft 2016 SED effectively shifts the economic burden of salinity reduction to senior rights holders on the three San Joaquin River tributaries by taking their water to solve the problem. The "main objective" of the San Joaquin River Real-time Salinity Management Program is to "control and time the releases of wetland and agricultural drainage to coincide with periods when dilution flow is sufficient to meet the Vernalis salinity objectives." (Draft 2016 SED, Appx. K, at 50.) The implication here is that "the solution to pollution is dilution," *i.e*. increased flows from the three tributaries will be used to avoid solving the drainage problem because higher flows will allow greater discharge of high salinity drain water from wildlife refuges and from west side agricultural land, without answering the basic question of whether it is reasonable to conduct irrigated agriculture on lands that are responsible for over 70-percent of the salt loading in the San Joaquin River without a feasible disposal option. The bottom line is that the State Water Board is not following the process described in D-1641:

> In the absence of an agreement, the SWRCB's approach to allocating responsibility would be to fashion an allocation that it believes mitigates the water right holders' impacts on salinity and flow related impacts on the Bay-Delta Estuary. Such an approach would include consideration of the factors discussed in California Constitution, Article X, section 2, the public trust doctrine, and applicable statutes, in addition to providing a reasonable method of calculating the responsibilities of the water right holders.

(D-1641, at 12-13, fn. 13.)

By not including the west side tributaries of the San Joaquin River in the Draft 2016 SED, the State Water Board cannot accomplish the approach set forth in D-1641 for allocation of responsibility based on relative contributions toward the problem of San Joaquin River salinity.

14. THE SED FAILS TO COMPLY WITH THE REQUIREMENTS OF CEQA AND THE BOARD SHOULD NOT ADOPT IT.

The proposed amendments to the WQCP are a discretionary action of a state agency and therefore subject to environmental review pursuant to the California Environmental Quality Act (CEQA). The Board acknowledges the Proposed Project is required to comply with CEQA. (SED, at ES-1.) The water quality control planning program is a certified regulatory program under which CEQA allows the State Water Board to prepare an SED in place of an environmental impact report. (Cal. Code Regs., tit. 14, § 15251; Cal. Code Regs., tit. 23, § 3775.) Although the environmental review is being performed pursuant to an SED, the review remains "subject to the broad policy goals and substantive standards of CEQA." (*City of Arcadia v. State Water Resources Control Board* (2006) 135 Cal.App.4th 1392, 1422 ("*City of Arcadia*").)

The draft Staff SED is fundamentally flawed and does not comply with CEQA. The following comments set forth the flaws of the SED.

14.1. Standard of Review

The California Environmental Quality Act, Pub. Res. Code, § 21000 *et seq*. ("CEQA"), requires a governmental agency to evaluate the environmental impacts whenever it considers approval of a discretionary project. (*California Sportfishing Protection Alliance v. State Water Resources Control Bd*.) (2008) 160 Cal.App.4th 1625, 1642). The purpose of environmental review is to inform the public and its responsible officials of the environmental consequences of their decisions before they are made. Thus, environmental review protects not only the environment but also informed self-government. (*Napa Citizens for Honest Government v. Napa County Bd. of Supervisors* (2001) 91 Cal.App.4th 342, 355.) An accurate, stable and finite project description is essential for an informative and legally sufficient environmental review. (*County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185, 193.) "[O]nly through an accurate view of the project may the public and interested parties and public agencies balance the proposed project's benefits against its environmental cost, consider appropriate mitigation measures, assess the advantages of terminating the proposal and properly weigh other alternatives." (*City of Santee v. County of San Diego* (1989) 214 Cal.App.3d 1438, 1454.)

Judicial review of CEQA analyses of non-adjudicative decisions extends only to whether there was a prejudicial abuse of discretion: "an agency may abuse its discretion under CEQA either by failing to proceed in the manner CEQA provides or by reaching factual conclusions unsupported by substantial evidence." (*Save Tara v. City of West Hollywood* (2008) 45 Cal.4th 116, 131, *as modified* (Dec. 10, 2008) [*citing* Pub. Res. Code, § 21168.5].)

"[T]he ultimate decision of whether to approve a project, be that decision right or wrong, is a nullity if based upon an EIR [environmental impact report] that does not provide the decision-makers, and the public, with the information about the project that is required by CEQA. The error is prejudicial if the failure to include relevant information precludes informed decision making and informed public participation, thereby thwarting the statutory goals of the EIR process." (*Napa Citizens for Honest Government*, 91 Cal.App.4th at 355–356 (citation omitted) (internal quotation omitted); see also *California Oak Foundation v. City of Santa Clarita* (2005) 133 Cal.App.4th 1219, 1237 [citing *Concerned Citizens of Costa Mesa, Inc. v. 32nd Dist. Agricultural Assn.* (1986) 42 Cal.3d 929, 935].) Similarly, CEQA's purpose to facilitate informed decision making and public participation is contravened when important information is "scattered here and there in EIR appendices," or significant analyses are "buried in an appendix." (*California Oak Foundation*, 133 Cal.App.4th at 1239 (citing Santa *Clarita Organization for Planning the Environment v. County of Los Angeles* (2003) 106 Cal.App.4th 715, 723.) Information that cannot be found or is not readily accessible is not a substitute for a good faith reasoned analysis. (*Id*.)

For purposes of CEQA, "[s]ubstantial evidence shall include facts, reasonable assumptions predicated upon facts, and expert opinion supported by facts." (Cal. Code Regs., tit. 14, § 15384[b].) "Argument, speculation, unsubstantiated opinion or narrative, evidence which is clearly erroneous or inaccurate, or evidence of social or economic impacts which do not contribute to or are not caused by physical impacts on the environment does not constitute substantial evidence." (Cal. Code Regs., tit. 14, § 15384[a].)

"In lieu of the requirement for preparing an EIR or negative declaration, CEQA provides a mechanism for the exemption of certain regulatory programs which themselves require a plan or other written documentation containing environmental information." (*City of Sacramento v. State Water Resources Control Bd*. (1992) 2 Cal.App.4th 960, 973–74, *as modified* (Feb. 14, 1992) (*citing* Pub. Res. Code, § 21080.5(a); *Wildlife Alive v. Chickering* (1976) 18 Cal.3d 190, 196.) The State Water Board's water quality control planning program is a certified regulatory program and thus a substitute environmental document, or "SED," may be prepared in lieu of an EIR. (Draft 2016 SED, at 1-3 (*citing* Pub. Res. Code, § 21080.5(c); Cal. Code Regs., tit. 14, § 15251[g].) An SED, like an EIR, must still comply with CEQA requirements. Specifically, all conclusions must be supported with substantial evidence in the administrative record. (Cal. Code Regs., tit. 23, § 3777[a].) An SED must include: "identification of any significant or potentially significant adverse environmental impacts of the proposed project;" "analysis of reasonable alternatives to the project and mitigation measures to avoid or reduce any significant or potentially significant adverse environmental impacts;" and "environmental analysis of the reasonably foreseeable methods of compliance." (Cal. Code Regs., tit. 23, § 3777[b][2-4]; Cal. Code Regs., tit. 14, § 15187[b]-[c].) The environmental analysis of the reasonably foreseeable methods of compliance "shall take into account a reasonable range of environmental, economic, and technical factors, population and geographic areas, and specific sites" at a program level. (Cal. Code Regs., tit. 23, § 3777[c].)

The SED is also required to comply with the requirements of Public Resources Code Section 21159, that provides an agency "shall perform, at the time of the adoption of a rule or regulation requiring . . . a performance standard . . . an environmental analysis of the reasonably foreseeable methods of compliance." (Pub. Res. Code, § 21159(a).) The required environmental analysis must, at a minimum, include: "[a]n analysis of the reasonably foreseeable environmental impacts of the methods of compliance;" "[a]n analysis of reasonably foreseeable feasible mitigation measures;" and, "[a]n analysis of reasonably foreseeable alternative means of compliance with the rule or regulation." (Pub. Res. Code, § 21159(a)(1-3).) Similar to the requirements prescribed by California Code of Regulations, Title 23, Section 3777 identified above, the environmental analysis of the reasonably foreseeable methods of compliance required by the statute must "take into account a reasonable range of environmental, economic, and technical factors, population and geographic areas, and specific sites" at a program level. (Pub. Res. Code, § 21159(c-d).)

15. ADOPTION OF THE STAFF SED WOULD RESULT IN THE STATE WATER BOARD NOT PROCEEDING IN A MANNER REQUIRED BY LAW.

CEQA requires environmental review of discretionary state actions, including the Proposed Project. In drafting the SED, Staff failed to comply with several of the legal requirements, rendering the SED unlawful and preventing the State Water Board from being able to adopt the Staff draft without proceeding in a manner that would violate the law. The legal deficiencies are set forth in this section below.

15.1. The Notice(s) of Preparation Are Not Lawful

When a lead agency for a project determines that an environmental impact report is required, the agency must send a "notice of preparation" (NOP) to the Office of Planning and Research, and to each responsible and trustee agency, stating that an EIR will be prepared. (Cal. Code Regs., tit.

14, § 15082[a].) The purpose of the NOP is to provide the public and regulated community with notice of the action the State Water Board intends to take. The NOP must include, at a minimum, a description of the project, the location of the project, and the probable environmental effects of the project. (Cal. Code Regs., tit. 14, § 15082[a][1].)

The Board issued two NOPs for the update and implementation of the Water Quality Control Plan, one in 2009 and another in 2011. Neither provides a description of the currently Proposed Project. The NOP dated February 13, 2009 (2009 NOP), described the Proposed Project as a review and update of the flow objectives **on the San Joaquin River**. Critically, the 2009 NOP did not provide notice for a project that would create entirely new numeric flow objectives on **the three eastside tributaries** to the San Joaquin River.

On April 1, 2011, the Board circulated a revised NOP (2011 NOP) in order to "clarify the scope of the State Water Board's current review of the Southern Delta salinity and San Joaquin River flow objectives and the program of implementation for those objectives . . .." (Exh. [2011 NOP], at 3.) The 2011 NOP continued to describe the project as a "review of and potential amendments to . . . the San Joaquin River flow objectives for the protection of fish and wildlife beneficial uses." (Exh. [2011 NOP], at 4 [emphasis supplied].) The 2011 NOP also included a notice of potential new "narrative" objective at the confluence of each of the three eastside tributaries with the San Joaquin River. (2011 NOP, Attachment 2, at 1.) The 2011 NOP did not provide notice the State Water Board planned to create new numeric flow objectives on the three eastside tributaries, which is now being proposed by Staff. (SED, Appx. K.) The 2011 NOP explicitly stated that "the State Water Board is not currently considering any other changes to the Bay-Delta Plan or any specific changes to water rights and other requirements implementing the Bay-Delta Plan." (2011 NOP, Attachment 2, at 3.) The Board also stated that it would "provide **additional notice** regarding review of other aspects of the Bay-Delta Plan and its implementation in the future." (2011 NOP, Attachment 2, at 3 [emphasis supplied].)

The State Water Board is required to circulate a NOP with an accurate description of the project. (Cal. Code Regs., tit. 14, § 15082[a][1].) In violation of this requirement, Staff has now released the Proposed Project which proposes an entirely new project containing, among other things, numeric flow objectives on the three eastside tributaries (SED, Appx. K, at 18), a new narrative flow objective that is different than the narrative flow objective proposed in the NOP (SED, Appx. K, at 18), minimum reservoir carryover storage targets (SED, Appx. K, p. 28), and end-of-drought storage refill requirements. (SED, Appx. F.1, at F.1-32.) The Board never circulated a new or revised NOP with a project description fitting the current proposal in the SED. The failure to issue a new or revised NOP describing the project in its current proposed form is a violation of Section 15082(a)(1) of the California Code of Regulations.

Moreover, the 2012 SED is not a substitute for a proper NOP. The CEQA Guidelines do not allow for a recirculated EIR, or in this case a recirculated SED, to serve as a substitute for a NOP. (See Cal. Code Regs., tit. 14, § 15082[a][1].) The NOP violation is a problem for several reasons. First, it fails to provide proper notice to the regulated community, which is the purpose of the notice requirements. Second, it fails to provide trustee and responsible agencies with the opportunity to comply with their requirements under CEQA. For example, there is a distinct process requiring responsible and trustee agencies to respond to NOPs which is different from the process for responding to draft EIRs or SEDs. (Cal. Code Regs., tit. 14, § 15082[b].) Specifically, after a NOP is circulated, the responsible and trustee agencies have 30 days to provide the lead agency with a response that identifies significant environmental issues and reasonable alternatives and mitigation measures that those agencies "will need to have explored in the draft EIR." (Cal. Code Regs., tit. 14, § 15082[b][1][a].) After the responses are received, the draft EIR or SED that is in preparation "may need to be revised or expanded to conform to [those] responses . . .." (Cal. Code Regs. tit., 14, § 15082[a][4].) In other words, the purpose of the NOP is to allow for input **prior** to the circulation of any Draft EIR or SED. Indeed, a lead agency cannot circulate a draft SED for public review "before the time period for responses to the notice of preparation has expired." (Cal. Code Regs. tit., 14, § 15082[a][4].) By failing to provide a NOP with an accurate project description, the Board unlawfully divested the responsible and trustee agencies of the opportunity to provide input prior to preparation of the SED.

The failure to issue a new or revised NOP has also distorted the impact analysis in the SED, compromising its value as an informative CEQA document. An SED, "must include a description of the physical environmental conditions in the vicinity of the project, **as they exist at the time the notice of preparation [NOP] is published** . . ..” (Cal. Code Regs., tit. 14, § 15125[a] [emphasis supplied].) The environmental setting at the time the NOP is published serves as the “baseline” against which the lead agency compares the project to determine whether an impact is significant. (Cal. Code Regs., tit. 14, § 15125[a].) Since the issuance of the 2011 NOP, numerous conditions have changed in the vicinity of the project. For example, at the time the NOP was circulated, the flow requirements at the Vernalis compliance point on the San Joaquin River were set in accordance with the Vernalis Adaptive Manage Program (VAMP), an experimental flow regime that concluded in 2011. (SED, at 3-13.) Accordingly, the VAMP flows are included as part of the baseline in the SED. (SED, at 3-13.) As the VAMP flows were “generally lower than the Table 3 flows in the 2006 Bay-Delta Plan” which is now in place, the impact of the project as compared to the baseline does not accurately reflect the impact of the project on current conditions.

For the above reasons, Staff failed to properly issue an NOP for the recirculated SED, which means the State Water Board cannot adopt the Staff draft and also proceed in a manner required by law.

15.2. The SED Project Description Is Not Lawful.

An accurate description of the project is a necessary element of environmental review. (*County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185, 192.) The purpose of environmental review is to provide the public with detailed information about the effects a proposed project is likely to have on the environment. (*Laurel Heights Imp. Ass’n of San Francisco, Inc. v. Regents of University of California* (1988) 47 Cal.3d *37*, 391 (“*Laurel Heights*”); Pub. Resources Code, § 21061; Cal. Code Regs., tit. 14, § 15003[b].) CEQA requires a project description sufficient to permit preparation of a meaningful and accurate report of the impacts of the proposed project. (*Laurel Heights*, at 396.)

Most environmental documents dedicate an entire chapter to describing the project purpose and goals. The SED does not include such a chapter. The SED includes a short section in which the proposed project is described in less than a page. Section 1.1 states the proposed project would create a new LSJR Flow Objective for the protection of fish and wildlife beneficial uses and an associated program of implementation. (SED, at 1-1.) Given the complexity of the Proposed Project, this simplified description is not sufficient and fails to properly reflect what Staff is proposing.

Specifically, the project description fails to identify a project horizon. Therefore it is unclear whether the Proposed Project will be in effect for a few months or eternity. This fundamental attribute of the Proposed Project appears to be up in the air. Staff has made several confusing and contradictory comments regarding Project horizon. At one point Staff commented that the Project horizon is likely between 10-20 years. (12/12/16 Workshop, Les Grober, at 60:17-18; 61:7-8.) At a different time, Staff stated that the Project did not have a specific time horizon. (Staff Technical Meeting, 11/18/2016 at 29:24-26.) These responses are both contrary to the statutory requirement to review and amend the Water Quality Control Plan every three years. (Water Code, § 13241.) Thus, it is not clear how long the Propose Project will be in place, which makes environmental review increasingly difficult.

Another example of lacking project description is that no preferred alternative is identified. The Staff SED discloses that Tributary Flow Objective will require a range between 30 to 50 percent of unimpaired flow. However, the SED fails to identify that the Staff preferred alternative is 40 percent of unimpaired flow. Appendix K states that 40 percent unimpaired flow will be implemented unless another percent is selected by the adaptive management teams and/or Executive Director. (SED, at Appx. K, p. 29.) This default language is unclear and does not constitute the identification of a preferred alternative. The identification of a preferred alternative is a key component of environmental review. (CEQA Guidelines, at 15126.6(a)(c)(2).) The SED has not correctly identified a preferred alternative and for that reason is unlawful.

Most critically, the project description fails to disclose several fundamental portions of the Proposed Project that are hidden in the program of implementation. For example, the project description does not disclose that the program of implementation states the State Water Board will require minimum reservoir levels. The project description fails to disclose that the Proposed Project will require the participation in working groups to manage flows on an annual basis and develop biological objectives. Staff does not disclose these components in the project description. Instead, the SED states the program of implementation will be developed by stakeholders in the future. (SED, Appx. K, at 4.) Because the program of implementation is part of the Proposed Project and the SED does not describe the program of implementation sufficiently to allow meaningful environmental review, the project description is deficient. Because the SED does not include a sufficient project description and program of implementation the State Water Board failed to proceed in the manner required by law.

15.3 The SED Employs an Incorrect Baseline.

CEQA requires the SED to designate a proper baseline as the foundation for its environmental analysis. (Cal. Code Regs., tit. 14, § 15125.) A proper baseline must reflect the existing physical conditions and enable the environmental analysis to evaluate the impacts of the proposed project. (*Cherry Valley Pass Acres v. City of Beaumont* (2010) 190 Cal.App.4th 316 ("*Cherry Valley*"); *Neighbors for Smart Rail v. Exposition Metro Line Construction* (2012) 205 Cal.App.4th 552.) The general baseline rule provides that the baseline is usually set at the time the notice of preparation is published or at the time the environmental analysis is commenced. (Cal. Code Regs., tit. 14, § 15125.) The general rule is not rigid; rather, the State Water Board has flexibility is necessary to accommodate and account for changing conditions. (*Cherry Valley*, at 336.)

Selection of a proper baseline is important; without an appropriate baseline, an adequate analysis of an environmental impact cannot be measured. (*Cherry Valley*, at 337.) Further, selecting an improper baseline will skew the environmental analysis. Setting a baseline too late may incorporate some early project impacts into the baseline without sufficiently analyzing these impacts, while setting a baseline too early may attribute non-project-related impacts to the proposed project. (*Id.*) As discussed in greater detail below, the State Water Board failed to set the baseline in a manner required by law. This failure renders the SED's evaluation of environmental impacts arbitrary and capricious.

15.3.1 Baseline is Outdated

Staff selected 2009 as the baseline to which it will compare the impacts of the Proposed Project. Staff's position is that it is required to use the 2009 baseline because the original NOP was released at that time. (12/15/2016 Workshop, at 47:23-48:5.) However, the Proposed Project has changed fundamentally since the 2009 NOP. For example, the compliance points are now on different rivers compared to the 2009 Draft SED, the Proposed Project now includes reservoir operation constraints that were not in the 2009 version, and the Proposed Project also includes participation in groups that will develop annual operations and biological objectives that were not previously included in the 2009 version. Because the Proposed Project differs so fundamentally from the previously proposed project, Staff is required to issue a revised NOP. If Staff had complied with issued an updated NOP it would not be able to claim that its hands are tied and it would be able to appropriately update the baseline as well. Due to both the changes in the Proposed Project, the fact that 2009 is now 8 years ago, and there have been several substantial changes to the physical environment in that time, Staff must also revise the baseline to include a proper, current baseline that is reflective of the existing environment. Without such an adjustment, the baseline includes flows that are no longer required and excludes other requirements that are in place, but not part of the Proposed Project.

15.3.2 VAMP Flows

The SED baseline is incorrect because it includes the Vernalis Adaptive Management Program ("VAMP") flows. The inclusion of VAMP flows misrepresents the allocation of responsibility for San Joaquin River flows, mischaracterizes the existing physical environment, and underestimates the environmental impacts of the proposed alternative.

Under D-1641, the State Water Board allocated responsibility for meeting the San Joaquin River flows to the United States Bureau of Reclamation ("USBR") out of New Melones. The SJTA members have never been responsible for meeting previous flow objectives on the San Joaquin River. Pursuant to the San Joaquin River Agreement ("SJRA"), the SJTA members agreed to release flows through VAMP. During VAMP, the SJTA members were able to provide flow because SJRA revenue funded conservation programs and efficiencies not otherwise funded. The term of the SJRA expired in 2010. D-1641 recognized VAMP flows would expire and recognized this expiration could occur before new objectives were in place. (Decision No. 1641, at 132, 162.) By including VAMP flows in the baseline the SED misrepresents the existing responsibilities of the USBR and SJTA members.

The inclusion of VAMP flows in the baseline also mischaracterizes the existing physical environment. VAMP flows are no longer in place. Although D-1641 controls since VAMP ended, the USBR, which is responsible for satisfying the San Joaquin River Flow Objectives, has been operating under a series of temporary urgency change permits (TUCP) and is operating pursuant to the TUCP mandated flow release schedule. Further, as the February 15, 2017 letter from USBR makes clear, USBR does not plan to comply with D-1641 requirements.

The inclusion of VAMP flows in the baseline results in the SED underestimating environmental impacts of the Proposed Project. First, the SED underestimates the impact of the proposed project's reduction to water delivery. Because the baseline includes VAMP flows, the SED only analyzes the environmental impact of releasing flows in excess of VAMP flow levels. The Irrigation Districts are not currently providing VAMP flows. Therefore, the SED underestimates the impact of the proposed regulation.

Second, the inclusion of VAMP flows in the baseline falsifies operations at New Melones. By including VAMP flows, the SED makes water available from the Merced, Tuolumne and Stanislaus Rivers, masking the impacts of USBR operating New Melones to meet D-1641 requirements. In order to meet D-1641 requirements, New Melones operators would often need to draw down the reservoir to near empty. The SED fails to evaluate the impacts to this extreme operation scenario and analyze whether the proposed regulation would further adversely impact the operation of New Melones under existing conditions.

15.3.3 San Joaquin River Restoration Program

The SED baseline does not include any flows from the San Joaquin River Restoration Program ("SJRRP"). Currently, the SJRRP affects flows, seepage and drainage in the San Joaquin River system. The SJRRP is part of the existing physical environment and therefore should be reflected as part of the baseline.

15.4 The SED Fails to Evaluate Dry Year Impacts.

The Mediterranean climate of California is defined by periods of wet and dry years; the system is boom and bust. Dry year and drought periods are not just likely to occur – they are guaranteed to happen. In dry years, water delivery is often reduced, groundwater use is increased, fields may be fallowed, hydropower generation is reduced, and the economy is adversely impacted. Staff is proposing to reduce water deliveries. These reductions will affect the environment differently depending on the existing hydrology. Staff recognizes the extreme variation in impacts between wet and dry years. In wet years, the Proposed Project would have almost no impact, while in dry years, the same objective would have dramatic and devastating impacts.

The State Water Board is required to analyze the environmental impacts of the Proposed Project. (Cal. Code Regs., tit. 3, § 3777[a][1].) Because the environmental impacts of the Proposed Project vary greatly depending on the hydrologic year type, Staff is required to analyze the impacts of the proposed project in various water year types. It is not sufficient for the State Water Board to average the results and only evaluate the environmental impacts of the averages. This is unlawful because the average does not reflect the widely variable potential impacts. (*San Joaquin Raptor Rescue Center v. County of Merced*, (2007) 149 Ca.App.4th 645, at 665-666 [finding the environmental review of a project with widely variable potential impacts deficient for failing to analyze peak impacts.) In *San Joaquin Raptor*, a mining project disclosed peak project levels, but only analyzed the environmental impacts of the average production. The Court determined this was inadequate because it was reasonably foreseeable that the peak operation may occur and thus the environmental impacts of the peak production must be analyzed.

In fact, CEQA statute prohibits the reliance of averages where more specific data is available. (Cal. Code Regs., tit. 23, § 3777[c].) The data on dry years is readily available to Staff. Staff actually discloses the dry year data in the SED, but fails to analyze impacts in such dry years. (SED, at Appx. F.1, p. 64.)

The lack of dry year analysis is a significant failure. Because the Proposed Project will result in only very minimal or very significant impacts, "average" impacts will very rarely occur. Yet these rarely occurring "average" impacts are the only impacts for which the environmental analysis is performed. Therefore, averaging the impacts does not properly disclose the reasonably foreseeable impacts of the Proposed Project. Because the impacts of the Proposed Project vary so widely between average and dry years and because the dry year data is readily available, it is not adequate to analyze only the average water year type.

Because the law requires Staff analyze dry year impacts, and it failed to do so, the State Water Board cannot adopt the Staff draft and proceed in a manner required by law.

15.5 The SED Fails to Disclose Project Impacts Prior to Mitigation

CEQA requires the lead agency to identify the environmental impacts of the Proposed Project. To the extent these impacts are found to be significant, Staff must consider mitigation. However, CEQA is clear that prior to mitigation, the full impacts of the Proposed Project must be disclosed. Staff fails to identify all Proposed Project impacts prior to incorporating mitigation. (*San Joaquin Raptor Rescue Center v. County of Merced*, (2007) 149 Ca.App.4th 645, at 665-666)

For example, the minimum reservoir levels were developed by Staff to mitigate for temperature impacts from the Proposed Project. When explaining the development of reservoir minimums, Staff explains:

> "[W]ith the increased drawdowns that would occur to meet the flow requirements, that was found to have temperature effects. So this was done to not have those effects by increasing the carryover storage." (12/5/2016 Workshop, Less Grober, at 73:6-9.)

In this situation, where the Proposed Project results in temperature impacts, CEQA requires Staff to first disclose the impacts from the Proposed Project. Staff never disclosed the impacts. Instead, Staff developed mitigation in the form of reservoir minimum requirements and ONLY disclosed the impacts of the Proposed Project with the included mitigation. This is violation of CEQA and causes several fundamental disclosure issues. First, it fails to disclose the full impacts of the Proposed Project to the public. Second, it asks the public or regulated community to believe that the Staff developed the reservoir minimums to mitigate for temperature impacts that were never disclosed without getting to review or analyze the temperature impacts. Third, it further asks the public to have faith that the reservoir minimums actually mitigate the temperature conditions that were allegedly occurring. Fourth, it fails to provide State Water Board members with the information that would provide them with the ability to weigh and balance the benefit of the reservoir minimums against the alleged temperature impacts.

Staff also fails to disclose the agriculture impacts of the Proposed Project without mitigation. Specifically, Staff assumes that an average quantity of 105,000 acre feet of groundwater will be pumped to mitigate the Proposed Project's reduced water deliveries to agriculture. (SED, at Appx. G, p. 15.) Staff explains how it off-set agriculture impacts by mitigating with groundwater:

> "For the purposes of agricultural resources, the full reduction on surface water supply would occur to all agricultural crops. For the purposes of groundwater resources, we link this to the agricultural analysis and that the shortfall expected to occur in the agricultural analysis would result in an increasing groundwater pumping over a subbase scenario and a reduction in groundwater recharge." (12/12/16 Workshop, at 26:4-11.)

This means that Staff includes groundwater mitigation before disclosing the loss to agriculture. Staff failed to evaluate the potential impacts to agriculture without groundwater mitigation. Again, this causes several problems. First, it fails to disclose the full impacts of the Proposed Project to the public. Second, it requires the public to trust that Staff correctly identified the amount of groundwater that will be pumped and that this amount of groundwater would off-set a specific quantity of agriculture impacts. This trust is required because Staff fails to disclose the agriculture impacts without groundwater mitigation, requiring stakeholders to trust that pre-mitigation impacts existed and that mitigation resolved a portion of those impacts. Third, it fails to provide State Water Board members with the information necessary to weigh and balance the benefit of groundwater pumping against the agriculture impacts.

15.6 The SED No-Project Alternative is Unlawful.

The SED analysis of the no-project alternative does not proceed in a manner required by law for several reasons. First, the environmental analysis of the no-project alternative includes operational requirements which would not exist if the State Water Board took no action. Specifically, the no-project alternative assumes Oakdale Irrigation District ("OID") and South San Joaquin Irrigation District ("SSJID") would share the responsibility of the USBR to comply with D-1641. This assumption is unfounded and unsupported; neither OID nor SSJID are responsible for existing D-1641 flows and in addition, both OID and SSJID have water rights that are senior to those of the USBR. Thus, if the State Water Board took no action, OID/SSJID would not experience delivery reductions. If the State Water Board took no action, OID and SSJID would continue delivering water to their respective service areas and the USBR would meet the existing requirements by drawing down New Melones. Therefore, the environmental analysis of the no-project alternative is based on flawed operational assumptions. These flaws prevent Staff from properly analyzing the environmental impacts of deciding not to adopt the Proposed Project.

Third, Staff evaluates the impacts of the no-project alternative by using the WSE Model. The WSE Model makes several assumptions that do not exist and would not exist if the State Water Board took no action. For this reason, the WSE Model skews the no-project analysis and misrepresents the environmental impacts.

Fourth, the environmental analysis of the no-project alternative does not reflect the reality that the no-project alternative is not viable and will result in New Melones Reservoir emptying in dry years. Staff does not understand how New Melones Reservoir is operated. This lack of understanding is demonstrated in Staff' description of the no-project alternative on the Stanislaus River and lack of accounting for the water right priority of OID and SSJID. Staff must understand the operation of the reservoirs it is proposing to regulate. The failure to demonstrate this understanding is a fundamental defect. Had Staff understood New Melones operations, the environmental analysis would reflect that compliance with the existing regulations is not operationally possible, as these requirements would often require New Melones to be emptied. Therefore, Staff's no-project alternative, which assumes OID and SSJID allocate water to meet the existing requirements is faulty and misrepresents environmental impacts.

Fifth, Staff fails to recognize that for the past several years, flows at Vernalis have been controlled by several temporary urgency change permits (TUCP). The no-project alternative should consider whether such TUCP relief will continue to control the flows on the San Joaquin River in the future.

15.7 The SED Phasing Approach is Unlawful.

Historically, the State Water Board has performed its review of the Bay Delta Plan in one comprehensive process. (*See* 2006 Bay Delta Plan; *See* 1995 Bay Delta Plan; *See* 1991 Bay Delta Plan; *See* 1978 Bay Delta Plan.) Although the objectives are complex and multi-faceted, the Bay Delta Plan is a single basin plan that includes water quality objectives whose purpose is to protect the beneficial uses in the Bay Delta Estuary. (*See* 1995 Bay Delta Plan, at 3.) Because the purpose of the water quality objectives is to benefit a Bay Delta watershed, many of the objectives are inextricably interrelated. For example, the San Joaquin River Objectives are affected by and affect the objectives which set reverse flows, export/inflow ratios, and Delta outflows.

The State Water Board split its review of the Bay Delta Plan into phases by reviewing south Delta salinity and San Joaquin River Flow Objectives in a process that is prior to and separate from the remainder of the "comprehensive" review. (SED, Appx. KI, Executive Summary.) This separation is unlawful for several reasons.

First, the Bay Delta Plan is a basin plan covering a single designated area. Separating south Delta and San Joaquin River flows from the remainder of the basin plan review results in a piece-mealed analysis that is non-comprehensive. The San Joaquin River is one of the two main rivers whose confluence makes up the Delta. Separating the flow objectives on the San Joaquin River from the larger "comprehensive" review of the remainder of the Bay Delta Plan makes little sense. The quantity of San Joaquin River flows that will reasonably be required to protect the beneficial uses in the Delta is affected by reverse flows, exports, and other factors being reviewed in the "comprehensive" review. For this reason, evaluating San Joaquin River flows in isolation, without considering the other basin-wide mechanisms that are interrelated, results in a non-comprehensive piecemealed review.

Second, separating the processes will require water users on the San Joaquin River to expend twice the resources to achieve the same result. Because SJTA interests will be subject to all "phases" of the Bay Delta Plan review, it will be required to participate in two different review processes in front of the State Water Board, review at least two different environmental documents, and to the extent the adoption and/or implementation of any revised objectives do not comply with law, the SJTA will have to challenge two different actions adopting objectives and two different implementation plans. This unfairly prejudices the regulated parties in Phase 1.

Third, the piecemealed process is not conducive to properly evaluating the cumulative impacts of the Proposed Project. Staff does not take into consideration the impact of the potential subsequent amendment of objectives in the later "comprehensive" review. As noted above, these subsequent objectives may require different flows from San Joaquin River water users or impact the efficacy of the flows required by amended south Delta salinity and San Joaquin River Flow Objectives. Staff must consider the cumulative environmental impacts from Phase 1 and Phase 2.

Fourth, the California Code of Regulations, title 23, section 3777, requires a single SED be performed for each basin plan amendment. (Cal. Code Regs., tit. 23, § 3777.) Section 3777 specifically states that "Any water quality control plan . . . proposed for [State Water] Board approval or adoption must be accompanied by an SED." (*Id.*) This code provision does not provide or otherwise allow for multiple SED's for a single basin plan amendment. For these reasons, the phasing approach to a single basin plan results in the failure of the State Water Board to proceed in a manner required by law.

15.8 The SED Unlawfully Segments Environmental Analysis.

The State Water Board divided its review and update of the Bay-Delta Plan into two phases. Phase 1 of the process consists of "proposed amendment to the Bay-Delta Plan involving the LSJR flow objectives and the southern Delta salinity objectives." (SED, at ES-2.) Phase II consists of "reviewing and considering updates to other elements of the Bay-Delta Plan, including Delta outflows, Sacramento and tributary inflows (other than the SJR inflows), and ecosystem regime shift." (SED, at ES-2.) Along with this phasing approach, the State Water Board divided its environmental analysis by phases as well. Therefore, the SED for Phase I and evaluation of Phase I impacts is separate from the evaluation of impacts for later phases. This amounts to impermissible segmentation for several reasons.

First, CEQA prohibits the division of a single project into several projects, as the review of the environmental impacts of a single project must be considered together. (*Laurel Heights,* at

396.) The review of the Bay Delta Plan is one project. Previously the State Water Board has reviewed and revised the Bay Delta Plan as a single project. To split up a single project into several pieces for the purpose of environmental review violates CEQA requirements.

Second, the Bay Delta is system that is interconnected, works together and cannot be separated out into different phases. "Past experience has shown that piecemeal efforts to address the Bay-Delta's problems have failed because those problems are interrelated and because conflicting interest groups and stakeholders can block actions that promote some interests at the expense of others" (In re Bay-Delta, supra, 43 Cal.4th at 1165 [acknowledging that CALFED properly "determined that the four primary project objectives had to be addressed concurrently"].) The regulation of flows in one area affects the Bay Delta system; all changes to the Bay Delta Plan must be considered concurrently to have an accurate understanding of these changes and how they function in the system at the same time.

Third, because the SED analyzes the Proposed Project separately from the other objectives in later phases that the State Water Board intends to propose for the rest of the Bay-Delta Plan, it necessarily limits the number of alternatives and mitigation measures that are available for consideration. Staff confines its analysis to an area characterized (albeit incorrectly) as the "SJR Basin." (SED, ES-5; Figure ES-1.) As such, any alternatives that would have allowed for lesser flow objectives on the San Joaquin River or three eastside tributaries due to flow contributions from the Sacramento River basin to the Bay-Delta Estuary were not considered. Likewise, any mitigation measures that might have called for greater contributions from the Sacramento River basin in order to limit or reduce impacts in the San Joaquin River basin were also not considered, and indeed could not have been considered due to the segmented environmental analysis. Given that the stated purpose of the Proposed Project is to protect "fish populations migrating through the Delta," the significant flow contributions of the Sacramento River to the Bay-Delta should not have been ignored when determining and/or analyzing the possible alternatives for the flow objectives on the San Joaquin River, and the potential mitigations measures for impacts within the San Joaquin River basin. On an even more limited geographic scale, the SED also fails to analyze any alternatives or mitigation measures that would incorporate flows or other contributions from the Upper San

Joaquin River (upstream of Merced), the Mokelumne River and the Consumnes River, all of which are part of the "SJR Basin" identified in the document. (SED, Figure ES-1.) The potential contributions from these areas of the plan should also not have been ignored.

"The purpose of an EIR is to give the public and the government agencies the information needed to make informed decisions, thus protecting 'not only the environment but also informed self-government.'" (*In re Bay-Delta* etc. (2008) 43 Cal.4th at 1162 [*quoting Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal.3d 553, at 564].) "The EIR is the heart of CEQA, and the mitigation and alternatives discussion forms the core of the EIR." (In re Bay-Delta, supra, 43 Cal.4th at 1162.) By ignoring the impacts and contributions of the Sacramento River Basin to the Bay-Delta when setting the Proposed Project, the program SED failed to describe "a range of reasonable alternatives to the project" (CEQA Guidelines, § 15126.6[a]), or "feasible measures which could minimize significant adverse impacts" (CEQA Guidelines, § 15126.4[a][1].) A "single program EIR," or in this case a single program SED, was required for the entire Bay-Delta Plan. (CEQA Guidelines, § 15168.)

15.9 The SED's Programmatic Approach is Unlawful.

Staff states that the environmental effects of the Proposed Project were evaluated on a "programmatic level, which is a broader level than a project-specific analysis." (SED, at 4-11.) The CEQA roadmap outlined in the SED indicates that subsequent "project-specific environmental review" will occur at later date. (SED, at 4-11.) As demonstrated below, the decision to prepare a programmatic level SED on a project that makes specific amendments to two objectives in the Bay-Delta Plan, as opposed to comprehensive review of the entire Bay-Delta Plan, constitutes unlawful segmentation of the environmental review.

The CEQA Guidelines allow for the preparation of a "Programmatic" document when the project is "a series of actions that can be characterized as one large project" and where the actions are related, either (1) geographically, (2) as "logical parts in the chain of contemplated actions," (3) "[i]n connection with issuance of rules, regulations, plans, or other general criteria to govern the conduct of a continuing program," or (4) "[a]s individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects which can be mitigated in similar ways." (Cal. Code Regs., tit. 14 [CEQA Guidelines], § 15168[a] [emphasis supplied].) A "Program EIR" is required whenever a "phased project" is "to be undertaken and where the total undertaking comprises a project with significant environmental effect . . .." (CEQA Guidelines, § 15165.) In such circumstances, the lead agency must prepare "a single program EIR for the ultimate project." (CEQA Guidelines, § 15165.) As relevant here, the entire Bay-Delta Plan constitutes the "one large project" that will be undertaken in phases, and for which "a single program EIR" was required to be prepared. (CEQA Guidelines, §§ 15165, 15168.) Applying these rules to the Proposed Project, if Staff wished to perform a programmatic level environmental review, it could have done so by performing a programmatic review of the State Water Board's entire Bay-Delta Plan review, prior to the evaluation of the specific phases. The review of Phase 1, which consists of specific revisions to two specific water quality objectives is not a "series of actions" that can be characterized as a larger project. Rather, it is one of the specific actions for which a project level analysis is required.

In addition to the fact that the Proposed Project is too specific for Staff to perform a programmatic document, it also lacks the necessary detail and analysis necessary even for a programmatic document. As noted above, Staff purports to analyze the environmental impacts associated with the Proposed Project at a "programmatic level." (SED, at 4-11.) Programmatic documents are used "in conjunction with the process of tiering." (In re Bay-Delta etc. (2008) 43 Cal.4th 1143, 1170.) The "tiering" of environmental review is a one-directional process: from "general matters in broader EIRs (such as on general plans or policy statements)" to "narrower EIRs or ultimately site-specific EIRs" that incorporate the general discussions by reference. (CEQA Guidelines, § 15385.) Tiering can also be used to stage environmental review, but only where certain issues are "not yet ripe." (CEQA Guidelines, § 15385.) A lead agency may defer analysis where accessing "site-specific information may not be feasible" such deferral is allowed "until such time as the lead agency prepares a future environmental document" on a project level. (*In re Bay-Delta*, at 1170.) Thus, the analysis of a potential environmental impact may not be deferred "when it is 'a reasonably foreseeable consequence' of the plan and the agency preparing the plan has 'sufficient reliable data to permit preparation of a meaningful and accurate report on the impact' of the factor in question." (*Los Angeles Unified School Dist. v. City of Los Angeles* (1997) 58 Cal.App. 4th 1019, 1028.)

In violation of the rules requiring analysis of all reasonably foreseeable consequences, Staff fails to consider several foreseeable impact. For example, Staff does not consider the impacts that will result to junior water right diverters on the west side of the San Joaquin River, downstream of the rim dams. Staff recognizes the "reduction in availability of surface water could affect water users who obtain their water from diversions anywhere within the plan area and extended plan area – anywhere within the Stanislaus, Tuolumne, and Merced River Watersheds." (SED, at ES-23.) Staff further states, "implementation would generally follow the water right priority system [and] [t]his could result in adding conditions to existing water rights or taking other water right actions that would require some water right holders to not divert water when flows are required to meet the proposed flow objective." (SED, at ES-23.) Despite acknowledging this impact, Staff fails to analyze the environmental results.

"A program EIR should contain a sufficient degree of analysis, in the light of what is reasonably feasible, to provide decision makers with information that enables them to make a decision which intelligently takes account of environmental consequences." (*North Coast Rivers Alliance v. Kawamura* (2015) 243 Cal.App.4th 647.) The failure to consider the impact to downstream diverters renders the SED deficient, even from a programmatic level.

15.10 The Failure to Consider a Range of Reasonable Alternatives is Unlawful.

Staff must consider a reasonable range of alternatives which could feasibly attain the basic objectives of the Proposed Project. (Pub. Resources Code, § 15126(d); *Friends of the Eel River v. Sonoma County Water Agency* (2003) 108 Cal.App.4th 859, 873 ("*Friends of Eel River*").) It is well-established that environmental review is not required to analyze every conceivable alternative. (*Preservation Action Counsel v. City of San Jose* (2006) 141 Cal.App.4th 1336.) However, Staff is required to analyze a reasonable range of potentially feasible alternatives that will foster informed decision making and public participation. (*Id*.) Further, Staff is required to provide sufficient information "from which one could reach an intelligent decision as to the environmental consequences and relative merits of the available alternatives." (*San Joaquin Raptor*, at 738; [*quoting Friends of Eel River*, at 873]; *Wildlife Reserve Center v. County of Stanislaus*, (1994 27 Cal.App.4th 713.)

Staff failed to properly consider a reasonable range of alternatives in compliance with CEQA. Instead, Staff considered only unimpaired flow regulations. Because Staff failed to consider other flow and non-flow alternatives that could feasibly attain the basic objectives of the Proposed Project, the discussion of alternatives does not foster informed decision-making and if the State Water Board adopts the Staff draft it will not proceed in the manner required by law. (*Friends of Eel River*, at 874.)

15.10.1 The Staff Alternative Is Unlawfully Narrow

The purpose of the Proposed Project is to provide reasonable protection to fish and wildlife. There are a number of factors or stressors that affect native fish, including, but not limited to, ocean harvest, ocean conditions, hatchery practices, predation, temperature, dissolved oxygen, nutrients, toxics, turbidity, availability of food, and habitat. Taking these factors into account, there are literally hundreds of actions Staff could have considered as feasible alternative actions. For example, Staff could have considered pulse flows to create fish habitat, limitations to ocean harvest, optimization of hatchery practices, or other functional flow regimes.

Staff failed to consider any of these alternatives. Instead, Staff evaluated only a single alternative: regulation of unimpaired flow. Staff claims that by considering varying percentages of unimpaired flow it satisfied the requirement to evaluate a range of reasonable alternatives. This is not the case; the varying unimpaired flows ranges are simply gradations of the same alternative, they are not separate alternatives.

15.10.2 Staff Failed to Consider Other Reasonable Flow Alternatives.

Staff failed to evaluate other reasonable flow alternatives. For example, Staff could have analyzed an objective based on unimpaired flow in months different than the February to June period. The SJTA provided the Staff with significant information regarding the lack of fish benefit and disproportionate cost burden related to increasing flows in June. This information makes the alternative of flow requirements for February through May a reasonable alternative that should have been analyzed in the SED. Instead of analyzing the non-June alternative, Staff developed a post-hoc rationalized position that it did not need to consider a non-June flow alternative. Specifically, Staff created and presented slides in the Phase 1 workshops that attempted to combat the high cost and low return issues with June flows. (1/3/2017 Staff Presentation, at Slide 14.)

This slide selects a single year to support the assertion that salmon remain in the Tributaries until June. Staff's cherry picking data is not effective; as small passage in a single year does not combat more comprehensive data that reflects there are only small remnant populations that remain in the Tributaries in June. Further, this single data point does not replace the need to evaluate a non-June flow alternative to better understand the costs/benefits of other alternatives. Staff did not analyze a February through May alternative. Therefore, it is not known whether this alternative would provide similar fish benefits for a significantly reduced cost. For this reason, the SED did not consider a range of reasonable alternatives.

Similar to June, February is a month that has low fish benefit and higher water costs. Staff failed to consider an alternative that did not include February.

Staff also failed to consider flow alternatives other than percentages of unimpaired instream flow. For example, several stakeholders suggested pulse flows may provide more benefit to fish and wildlife as compared to a constant level of unimpaired flow because such pulse flows may provide floodplain habitat, assistance in outmigration, and/or increased turbidity. (SED, at 3-22 to 3-24.) Based on this information, Staff should have analyzed a regulation that would require pulse flows for floodplain habitat, outmigration, or other benefits. This would have provided the water cost and fishery benefits analysis required by CEQA. The SED did not analyze the environmental impacts of a pulse flow objective or a tributary-specific flow objective. For this reason, the SED did not consider a range of reasonable alternatives, and the State Water Board did not proceed in the manner required by law.

Staff also could have considered an alternative that tailored specific flow regimes for each tributary based upon different flow functionality goals. For example, specific functions such as spawning, outmigration, and cold-water habitat could be matched up with specific tributaries and a flow regime on each tributary could have been developed implementing a specific functional flow goal. This type of functional flow regime is reasonable and should have been considered in the range of reasonable alternatives. Because it does not analyze reasonable alternatives, the State Water Board cannot adopt the Staff draft and proceed in a manner required by law.

15.10.3 The SED Failed to Consider Reasonable Non-Flow Alternatives.

The purpose of the Proposed Project is to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta. (SED, Appx. K, p. 18.) Because it is feasible that the support and maintenance of fish could be achieved through a variety of non-flow actions, Staff should have analyzed some non-flow measures.

For example, studies indicate predation is the dominant stressor to salmon smolts in the San Joaquin River tributary systems – allowing less than five percent salmon smolt survival to the main stem of the San Joaquin River. (VAMP 2011 Report; 2013 FERC Tuolumne River Predation Report.) An alternative that addresses the stressor causing approximately 95 percent mortality is not only reasonable, but necessary. Predation rates are so high, it is likely that no flow regime could be crafted to support and maintain salmon. (SED, Appx. C, at 3-28.) In this situation, flow alternatives may be rendered "infeasible" because without addressing predation, a flow-only alternative will not achieve the basic objectives of the Proposed Project.

Further, predation programs have minimal water costs and provide a substantial and measurable benefit to native fish species, which would result in less significant environmental impacts compared with any of the flow alternatives evaluated by Staff. Thus, the omission of a predation alternative amounts to an omission of relevant, feasible alternative. Because Staff failed to include a predation alternative, the SED has subverted the purposes of CEQA and is legally inadequate. (*Friends of Eel River*, at 783.)

Staff failed to analyze objectives which amend ocean harvest, increase floodplain habitat, develop spawning habitat, and other non-flow measures. Because the SED does not include this analysis, the State Water Board cannot adopt the Staff draft and proceed in the manner required by law.

An alternative considering hatchery practices is also a feasible alternative that Staff failed to consider. The overwhelming majority of salmon are not natural, but hatchery fish. Therefore, changes to hatchery practices is the most effective way to influence salmon populations. This is reflected by the recent changes to hatchery practices by moving the location of hatchery releases past Chipps Island, the survival and salmon returns have increased significantly. (www.rmpc.org.)

15.10.4 Staff Failed to Explain the Infeasibility of Alternatives it Decided Not to Consider.

Staff acknowledges the SED must identify all alternatives the State Water Board considered but did not analyze due to infeasibility. (SED, at 3-8 to 3-10; CEQA Guidelines § 15126.6, § 21002.1.) Further, Staff is required to explain the reasons it determined analysis of the alternatives was infeasible. (*City of Del Mar v. City of San Diego,* (1982) 133 Cal.App.3d 401; *California Native Plant Society v. City of Santa Cruz,* (2009) 177 Cal.App.4th 957.) Pursuant to these requirements, Staff includes Section 3.3.9 which discloses approximately fifteen alternatives that stakeholders suggested the State Water Board analyze. Although these alternatives are disclosed, Staff fails to explain the basis for its determination that they are not feasible.

For example, Staff concedes that stakeholders suggested the State Water Board consider an alternative that would measure the protection of fish and wildlife based on environmental condition metrics. (*Id*., at 3-9.) Staff did not explain why this alternative was not feasible. In fact, Staff stated it "anticipated that environmental condition metrics will be considered during the development of monitoring or special studies programs." (*Id*.) Staff's anticipation that an alternative will be otherwise "considered" is not a reason that it is infeasible to fully analyze in the SED. Further, Staff's anticipation that an alternative will be "considered" when developing monitoring programs does not replace or otherwise satisfy analysis that would be performed if environmental condition metrics were an alternative in the SED. For these reasons, Staff fails to properly disclose and analyze reasonable alternatives.

Staff did not adequately explain its refusal to consider the "upstream inclusion" alternative. (SED, at 3-34.) The suggested alternative would require Staff evaluate the impacts of requiring San Joaquin River water users upstream of the Merced River to contribute flows to comply with the Proposed Project. Staff does not state it is infeasible for the State Water Board to consider the "upstream inclusion" alternative. Instead, Staff stated that it would be considering the "need" for "additional flows" from the upper San Joaquin River Basin to "contribute to the narrative LSJR flow objective" "during the next review of the Bay Delta Plan." (*Id*.) Therefore, in this circumstance, Staff admitted it plans to evaluate the proposed alternative at a later date. Staff does not provide a reason or other defense as to why the analysis is not included in the current SED. For this reason, Staff failed to properly explain why it is not legally obligated to consider the "upstream inclusion" alternative.

Staff did not adequately explain its refusal to consider the "south Delta and lower San Joaquin River" alternative. (SED, at 3-24.) The suggested alternative would require Staff evaluate the impacts of ensuring flows are not rediverted by south Delta and downstream San Joaquin River diversions. Staff states this alternative is addressed through the following language: "The State Water Board will exercise its water right and water quality authority to help ensure that the flows required to meet the LSJR flow objectives are sued for their intended purpose and are not diverted for other purposes." (SED, at 3-34.) This language is vague and unclear. If this language represents Staff's intent to implement the Tributary Flow Objective by amending the water right holders between the Tributary compliance point and the Delta to ensure that such water right holders do not divert flow released to meet the water quality objective, Staff must consider the impacts of such an approach. It has not identified or evaluated such impacts. Staff must either consider this approach as an alternative or include it as part of the proposed objective; either way Staff has failed to identify and evaluate the impacts as required by law.

15.11 Staff Failed to Consider Reasonably Foreseeable Methods of Compliance is Unlawful.

Section 3777 requires the SED analyze the reasonably foreseeable methods of compliance. (Cal. Code Regs., tit. 23, § 3777[b][(4].) Specifically, this section requires the methods of compliance analysis include "***at a minimum all***" of the following:

> (A) An identification of the reasonably foreseeable methods of compliance with the project;
>
> (B) An analysis of any reasonably foreseeable significant adverse environmental impacts associated with those methods of compliance;

(C) An analysis of reasonably foreseeable alternative methods of compliance that would have less significant adverse environmental impacts; and

(D) An analysis of reasonably foreseeable mitigation measures that would minimize any unavoidable significant adverse environmental impacts of the reasonably foreseeable methods of compliance.

(Cal. Code Regs., tit. 23, § 3777[b][4].)

Staff does not comply with the requirements of section 3777. Instead, Staff assumes a single method of compliance and analyzes only this single method. This single method includes specific WSE Model parameters, such as minimum reservoir storage, flow shifting, and reservoir refill requirements. Staff did not analyze compliance with the Proposed Project without the WSE Model parameters. Because compliance with the required percent of unimpaired flow without including all of the WSE Model parameters is a reasonable foreseeable method of compliance, Staff was required to analyze this method of compliance.

15.11.1 Staff Fails to Disclose the Method of Compliance Upon Which the Environmental Analysis is Based.

Staff's discussion regarding the assumptions that drive the WSE Model is deficient. For example, Staff includes a section in which it purports to disclose the WSE Parameters and explain the approach to the WSE Model. (SED, at F.1-13-40.) However, this section is incomplete as Staff fails to include several WSE Model parameters in its discussion of the modeling. For example, flow shifting and minimum allocation fractions are both WSE Model parameters that were not disclosed, but were discovered by reverse engineering the WSE Model. This violates the most fundamental requirements of CEQA, which require Staff disclose sufficient information to facilitate environmental analysis. Staff must revise the SED and identify the method of compliance assumed for the purpose of its environmental analysis.

15.11.2 The SED Analysis is Based on a Single Method of Compliance which is Unreasonable and Unenforceable.

All of Staff's environmental analysis of the Proposed Project is based on the WSE Model. Although Staff has taken the position that the Proposed Project could be implemented in various ways, and the WSE parameters represent only one way to implement, Staff only analyzed the environmental impacts of implementing the Proposed Project with WSE Model parameters. As fully described earlier, the WSE Model is based on a series of parameters. Not only did Staff fail to explain these parameters, but, in violation of CEQA, many of these assumptions are not reasonable and/or not within the authority of the State Water Board to implement. For example, it is not reasonable to assume water delivery would be sacrificed in order to maintain reservoir levels. Reservoirs are water storage tools. Staff assumes that in response to water shortages, reservoir levels will be held static. This is not a reasonable assumption. Instead, it is reasonable to assume that in times of shortage reservoir operations would be used more aggressively, i.e. empty and fill more often. It is not reasonable to assume that in times of shortage (or in response to regulatory shortages) reservoirs would not be exercised aggressively, but instead water delivery would be decreased in order to avoid reservoir fluctuation or to maintain reservoir levels.

Staff assumes the Proposed Project will reduce water deliveries evenly throughout the region. (See SED, Appx. F.1.) It is not reasonable to assume water delivery would be reduced evenly across the region regardless of water right priority. The rules of water right priority require junior water users be curtailed completely before senior water right holders are affected. (*El Dorado Irr. Dist. v. State Water Resources Control Bd.* (2006) 142 Cal.App.4th 937, 963-964.) Therefore, the assumption that the proposed reductions would affect all water right holders similarly is unreasonable. It is reasonable to assume that the rule of water right priority would apply and result in the proposed regulations having greatly different impact on junior water right holders compared to senior water right holders.

15.12 Staff Failed to Obtain Information in a Manner Required By Law.

The State Water Board is required to include all information, comments, or proposed findings relevant to the proposed project or the State Water Board's compliance with CEQA. (Pub. Resources Code, § 21167.6.) Staff originally noticed it planned to prepare an environmental document to review of the San Joaquin River flow and south Delta salinity requirements on February 13, 2009. In this 2009 NOP, Staff set up a schedule to hold several workshops for the purpose of collecting information required to perform the environmental review. These workshops were subsequently cancelled; Staff did not provide a reason for the cancellation. Despite repeated requests and recommendations from stakeholders, Staff failed to hold a single informational workshop or otherwise provide a forum to collect sufficient information upon which a defensible environmental analysis could be conducted.

In addition, Staff did not hold a single scoping meeting in the area affected by the proposed project. Nor did the State Water Board work with local public agencies and water districts prior to the release of the recirculated Staff SED.

The SJTA members provided the State Water Board with information in response to the 2012 SED Draft. Staff did not include information submitted by stakeholders in the Phase 1 process. Staff did not address the information in any fashion. Staff never acknowledged the information and did not reject it as prejudicial or incorrect. Nor did Staff incorporate the information into its analysis. Instead, Staff completely ignored the information provided by the regulated community.

Staff developed a scientific basis report for Phase 1 which considered the basis for setting flows at Vernalis. Staff included this report as an appendix to the SED. The report was not revised or otherwise recalibrated to address the fundamental change to the Proposed Project which moved the Vernalis compliance points to the Tributaries.

In contrast to the Phase 1 process, the Phase 2 process has developed information and science in a deliberate and appropriate manner. On or about January 24, 2012, Staff provided the public with notice that it planned to develop an environmental document to analyze the impacts of the remaining objectives in the Bay Delta Plan. In order to collect sufficient information to conduct that environmental review, Staff set up a series of workshops. Staff hired an independent facilitator and held workshops over a period of three months. The independent facilitator then drafted a report summarizing the workshops. In 2013, Staff developed a draft scientific basis report and released the report for public comment. In 2014, the Delta Science Program held a series of workshops on flows and stressors. In 2016, the State Water Board held workshops on the modeling tools it was using for phase 2. Also in 2016, the State Water Board released the scientific report, which it had peer reviewed by the Independent Science Board. The peer reviewed report was released on [Dated} xx, 2016.

Due to the lack of process and the SED's failure to analyze information in the administrative record, if the State Water Board were to adopt the Staff draft it would not proceed in a manner required by law.

15.13 The Failure to Identify and Consult with Local Agencies as Responsible Agencies is Unlawful.

CEQA defines a "responsible agency" as "a public agency, other than the lead agency, which has responsibility for carrying out or approving a project." (Pub. Resources Code, § 21069; *See also* Cal. Code Regs., tit. 14, § 15381.) Pursuant to this definition, the Irrigation Districts qualify as responsible agencies because they will be primarily responsible for carrying out the Proposed Project. (*See* SED, Appx. K, at 2-3 [noting that each LSJR tributary will be responsible for 35 percent unimpaired flow].)

As the lead agency, the State Water Board is required to consult with responsible agencies prior to determining whether the lead agency may perform a negative declaration or will be required to perform a more rigorous environmental review. (Pub. Resources Code, § 21080.3(a).) The lead agency must also solicit comments from responsible agencies regarding the choice and content of environmental documents. (Pub. Resources Code, §§ 21080.4(a) [requiring solicitation of comments on "the scope and content of the environmental information that is germane to the statutory responsibilities of that responsible agency" when the lead agency determines an environmental impact report is required for the proposed project]; 21104(a) [requiring consultation with, and solicitation of comments from, responsible agencies prior to completing an environmental document]; *See also* Cal. Code Regs., tit. 14, §§ 15082[a], 15086.)

Staff did not comply with these consultation requirements. Staff failed to consult with the Irrigation Districts prior to the release of the Phase 1 SED regarding the extent or content of environmental review. Quite the opposite, Staff put all communication and information provided by the Irrigation Districts into a folder titled "Unsolicited Comments." (www.waterboards.ca.gov/waterrights/water-issues/programs/bay-delta/bay-delta-plan/waterquality-control-planning/index.shtml.) Thus, Staff openly concedes it did not solicit the participation and comments of responsible agencies. Staff failed to proceed in the manner required by law; the lack of consultation and communication with responsible agencies is a blatant violation of CEQA requirements.

15.14 The SED Failure to Properly Consider Mitigation Measures is Unlawful.

The State Water Board is precluded from approving a proposed project with significant environmental effects if "there are feasible alternatives or mitigation measures" that could substantially lessen or avoid those effects. (Cal. Code Regs., tit. 23, § 3777[b][3]; Pub. Resources Code, § 21002; *Citizens for Quality Growth v. City of Mount Shasta* (1988) 198 Cal.App.3d 433, 439 ("*Mount Shasta*"); *Mountain Lion Foundation v. Fish & Game Commission* (1997) 16 Cal.4th 105, 134.) For each significant impact, Staff is required to identify specific mitigation measures. Where several potential mitigation measures are available, each should be discussed separately, and the reasons for choosing one over the other should be stated. (*Id*.) If the inclusion of a mitigation measure would itself create new significant effects, these too, must be discussed, though in less detail than that required for those caused by the project itself. (*Sacramento Old City Assn. v. City Council* (1991) 229 Cal.App.3d 1011, 1027 ("*SOCA*"); *Mount Shasta*, at 439; Cal. Code Regs., tit. 23, § 3777[b][3]; Pub. Resources Code, § 21002.) Staff has not provided the requisite mitigation analysis.

15.14.1 The SED Summarily Dismisses Feasible Flow Mitigation.

In considering mitigation measures, Staff summarily dismisses the consideration of flow as a mitigation measure. (SED, 5-93.) Specifically, Staff states that because other alternatives consider various percentages of unimpaired flow, Staff cannot "independently apply" additional flow as mitigation because it would be "inconsistent with the terms" of the alternative. (*Id.*) This rationale is unsupported.

First, Staff does not state that it is not feasible to consider additional flow, only that it would be inconsistent with the alternative. This is not a sufficient reason for failing to consider additional flow. Second, the statement that other alternatives consider additional flow is only true in terms of percentages of unimpaired flow. There are several flow measures that Staff did not consider including, but not limited to, pulse flows, highly variable flow regimes, outmigration flows, and flow regimes by water year type. Because Staff fails to properly evaluate different flows as mitigation measures, if the State Water Board adopts the Staff draft, it will not proceed in a manner required by law.

15.14.2 Staff Fails to Consider Feasible Non-Flow Mitigation Measures.

Staff does not properly consider non-flow mitigation measures. Staff fails to properly analyze potential mitigation measures for increased prey vulnerability. For instance, Staff fails to evaluate a predator suppression program as a mitigation measure. By failing to consider predator suppression, the State Water Board cannot adopt the Staff draft and proceed in a manner required by law.

15.14.3 Staff Fails to Properly Mitigate Temperature Impacts.

During the December 5, 2016 Workshop, Staff acknowledge that the Proposed Project results in temperature impacts. Staff fails to disclose the temperature impacts in the SED. Instead, Staff attempts to mitigate the temperature impacts by building in constraints into the Proposed Project, such as minimum storage requirements. As noted earlier, this is a violation of CEQA. Staff was required to disclose any temperature impacts from the Proposed Project. Only after this disclosure is Staff allowed to consider mitigation for such impacts. Because Staff failed to disclose the temperature impacts, Staff also failed to appropriately develop mitigation for such impacts. Due to this failure to comply with CEQA, the State Water Board cannot adopt the Staff draft and proceed in a manner required by law.

15.15 The Failure to Adequately Analyze the Environmental Impacts of Climate Change is Unlawful.

Staff fails to analyze how climate change will affect the Proposed Project and the environment. Staff includes a section that generally describes the anticipated impacts of climate change. In this section, Staff describes that higher, warmer flows are likely, flood events will increase, and snow pack will be reduced. (SED, at 14-52.) However, when it comes time to analyze how these changes will affect the Proposed Project or the environment, Staff provides no analysis. Staff simply states that the adaptive management process will appropriately respond and address climate change impacts. This lack of analysis is a problem for several reasons. First, it fails to identify the impacts of climate change of the Proposed Project; so it is unclear whether climate change will require more or less flow under the Proposed Project. For instance, Staff does not consider whether flooding will become more frequent or severe as a result of the increased flow from the proposed project, combined with rising sea levels and earlier snowmelts caused by climate change. Nor does Staff analyze impacts of the proposed project and climate change to reservoir storage or aquatic resources. Second, the failure to identify impacts also gives rise to the failure to determine whether significant impacts will occur and whether mitigation is necessary. Third, the analysis simply assumes any impacts that arise will be taken care of by adaptive management. The failure to identify, disclose and analyze the impacts is a fundamental violation of CEQA requirements. CEQA does not allow lead agencies to simply promise to address problems if they arise; rather the entire point of CEQA is to identify and evaluate potential future impacts. Staff's failure to properly disclose and analyze climate change is particularly egregious because of the State Water Board's recent adoption of its Climate Change Resolution, which commits the State Water Board to properly analyzing climate change impacts for any project it undertakes. Because Staff does not analyze climate change impacts of the proposed project, the State Water Board cannot adopt the Staff draft and proceed in the manner required by law.

15.16 Failure to Evaluate Impacts Outside the Plan Area is Unlawful

Staff failed to consider environmental impacts outside the Plan Area. Specifically, Staff failed to consider both impacts to upstream water right holders and facilities and downstream water right holders and facilities. Staff defines the area outside the Plan Area that may be affected by the Proposed Project as the "extended plan area." Staff's explains "impacts in the extended plan area are addressed in the SED as appropriate." (SED, at 4-7.) This approach results in a significantly deficient analysis. Staff simply takes the position that impacts in the extended plan area are not worth environmental analysis. For example, Staff states "given the small volume of water held in non-hydropower post-1914 rights for consumptive use in the extended plan area compared to the volume held in non-hydropower post-1914 water rights used below the rim dams, most of the effect of implementing LSJR alternatives would occur at, or downstream of, the major rim dams in the three tributaries stream water users and downstream water users from the Plan Area." (SED, at 4-7.)

Staff's failure to analyze impacts in the extended plan area is incorrect and unlawful for several reasons.

First, Staff's premise that the projected size of impacts is not worth evaluating the impacts is unsupported and puts the cart before the horse. Only after Staff has evaluated the impacts of the Proposed Project on the extended plan area should it provide comment or conclusion regarding such impacts. Staff failed to evaluate the impacts to the extended plan area and cannot hide behind its unsupported conclusion that such impacts are not worth evaluating.

Second, the assumption that the impacts will be small is not true. There are junior water right holders and water facilities upstream of the Plan Area that will be devastated by the Proposed Project. For example, on both the Tuolumne and Stanislaus Rivers there are reservoir facilities and water right holders that are junior to downstream senior water right holders. The Proposed Project will require these junior water right holders to cease all diversions before senior water right holders begin to contribute flows to the Proposed Project. This means that an impact of the Proposed Project may result in facilities like New Spicer Reservoir being emptied and all water use in the region served by that facility would be reduced to extreme near-zero delivery levels. Certainly the volume of water from this impact would be less than emptying New Melones Reservoir. However, the devastation to the facility and the community dependent on that water supply is significant and must be analyzed in the SED.

Third, Staff's assumption that upstream impacts will be small is contradicted by the fact that Hetch Hetchy and the CCSF system is in the extended plan area. Staff recognizes that it cannot simply ignore the Hetch Hetchy system as an upstream facility with minor impacts and performs a special analyses of potential impacts. (See SED, Appx. L.) However, there are fundamental flaws in this analysis. Primarily, Staff incorrectly assumed that CCSF water supply would be augmented by transfers from Turlock and Modesto Irrigation Districts. (12/12/17 Workshop, at 194.) This assumption was made despite CCSF informing Staff that is not a viable assumption and not how the system would operate. In addition, addition, Staff's analysis did not actually consider impacts to CCSF. Instead, the assumption of transfer allowed Staff to largely avoid analyzing any impacts to CCSF, but rather just assumed those impacts would be shouldered by Turlock and Modesto Irrigation Districts shorting agriculture. (12/12/17 Workshop, at 216 [explaining that the analysis assigned the full shortage to agriculture and that was how Staff accounted for CCSF impacts.].) Because the entire CCSF analysis is premised on not analyzing impacts to CCSF, but incorrectly assigning them to the irrigation districts, this analysis is unsupported and unlawful.

Fourth, Staff's treatment of the extended plan area as one geographic unit is not supported. The areas upstream of the Plan Area and downstream of the Plan Area are different and the Projected Project would impacts these areas differently. The Proposed Project's potential impacts to upstream water users is discussed above. However, downstream water users may also be impacted by the Proposed Project. Staff recognizes that in order to protect released flow from the diversion by junior water users downstream that some action must be taken. (SED, at ES-23.) Staff failed to analyze the impacts of cutting off junior water users during times when senior water right holders were releasing water required by the Proposed Project. This lack of analysis is a significant and unlawful omission.

Fifth, the SED includes a chart of summarized significance determinations for the extended plan area. (SED, at 18-6.) This chart indicates that Staff has made determinations of impact in each chapter of the SED. This chart is misleading because it indicates that Staff performed analyses and made a determination. Staff did not perform the requisite analysis and these determinations are not based on supported analyses. To the contrary, these determinations are based on unsupported conclusions, no analysis, and bold and dismissive statements. Staff must evaluate the impacts of the Proposed Project on the extended plan area.

15.17 Statements of Overriding Consideration Are Unlawful.

If the State Water Board is to approve a project that has significant and unavoidable impacts, it must first adopt a statement of overriding considerations. CEQA requires a statement of overriding considerations to be supported with substantial evidence that a project will confer benefits. (*Woodward Park Homeowners Ass'n, Inc. v. City of Fresno* (2007) 150 Cal.App.4th 683, 718.) General benefits are not sufficient; the State Water Board is required to perform a good-faith balancing and find the proposed project outweighs significant and unavoidable impacts. (*Id.*) In other words, the State Water Board must explicitly find the fish and wildlife benefit outweighs the significant impacts to groundwater, agriculture, water supply, service providers, and the economy. Because Staff has not identified the Proposed Project's benefits to fish and wildlife, the State Water Board cannot support such a determination. Without information to support a statement of overriding consideration, the State Water Board will not be able to proceed in a manner required by law.

15.18 The Failure to Evaluate the Proposed Changes to the October Flow Requirements is Unlawful.

The program of implementation suggests Staff intends the Proposed Project to change the responsibility for meeting the October flow objective. (SED, Appx. K, at 34.) However, Staff makes no mention of this reallocation in the environmental analysis. Changing the allocation of responsibility for meeting the October flow objective is not without consequence; it has the potential to impact water supply effects, aesthetics, hydrology, groundwater pumping, and fish and wildlife. A CEQA document "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." (*Laurel Heights*, at 404-405.) Without analyzing the environmental effects of changing the responsibility to meet the October flow objective, the SED is deficient. If the State Water Board adopts the Staff draft it will not proceed in the manner required by law.

16.0 THE SED IS NOT SUPPORTED BY SUBSTANTIAL EVIDENCE.

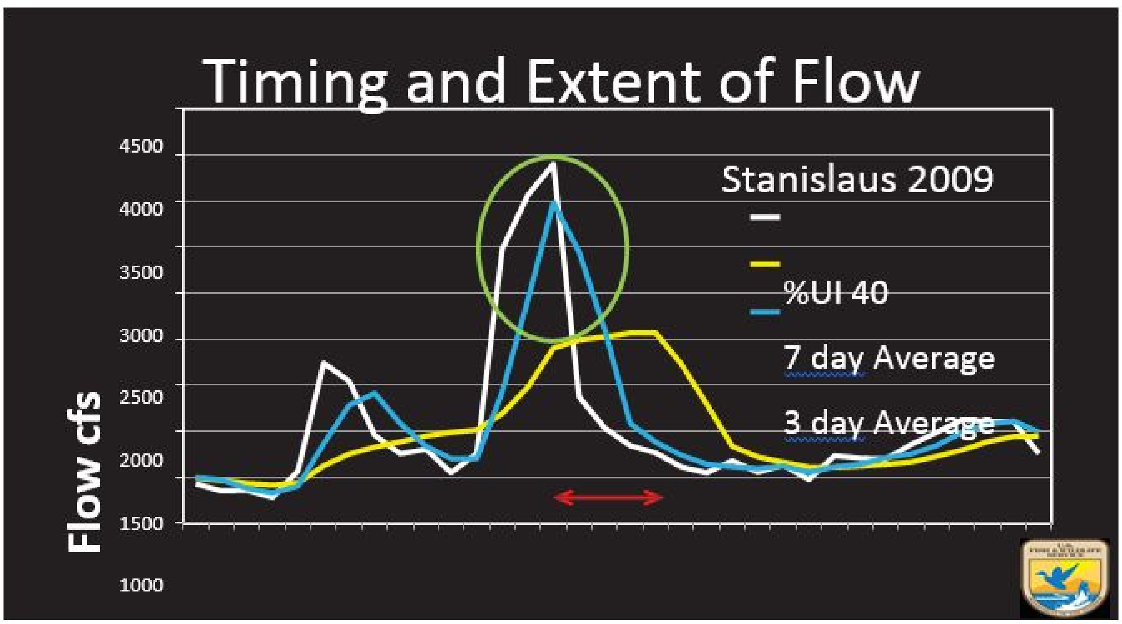
Staff must support its conclusions, findings, or determinations with substantial evidence. (*Uphold Our Heritage v. Town of Woodside* (2007) 147 Cal.App.4th 587, 595-596; *See* Pub. Resources Code, § 21168.) Substantial evidence requires "enough relevant information and reasonable inferences from [the information in the administrative record] that a fair argument can be made to support a conclusion." (*Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) 124 Cal.App.4th 1184, 1198 [*quoting Association of Irritated Residents v. County of Madera* (2003) 107 Cal.App.4th 1383, 139]).) Substantial evidence shall include facts, reasonable assumptions predicated upon facts, and expert opinions supported by facts. In contrast, argument, speculation, unsubstantiated opinion or narrative, or evidence which is clearly inaccurate or erroneous does not amount to substantial evidence. (Pub. Resources Code, § 21082.2(c).) Staff fails to support much of the analysis in the SED with by substantial evidence, including the sections described below.

16.1 The Water Supply Effects Model is Not Supported by Substantial Evidence.

The WSE Model is the model that is supposed to estimate the water supply impacts from the proposed project objective. However, the WSE Model does not model the Proposed Project, but, rather, models a specific set of constraints that are not included in the Proposed Project. The Proposed Project is comprised of the Tributary Flow Objective, which requires a range (30-50 percent) of unimpaired flow at the compliance points on each of the Stanislaus, Tuolumne, and Merced Rivers. The WSE Model makes several significant operational assumptions that are not part of the Proposed Project. These assumptions or "parameters" control the WSE Model and its results. Each of the WSE Model parameters includes fundamental flaws.

16.1.1 Monthly Average Parameter

The WSE Model uses a 30-day average to model the impacts of the proposed unimpaired flow objective. The use of the 30-day average does not reflect the Proposed Project because the Tributary Flow Objective requires implementation on a 7-day running average. (SED, Appx. K, at 18.) Running the model on a 30-day average smooths variances in hydrology that would occur on a 7-day average. In other words, the thirty day run would not reflect the hydrology and impacts of the Proposed Project's highs and lows that would occur in sending down unimpaired flow on a weekly average. This smoothing effect is reflected in the slide presented by the United States Fish and Wildlife Service (USFWS) at the January 3, 2017 hearing for Phase 1:



The above slide shows the impact of using different time period over which to average the unimpaired flow. The slide above shows the daily unimpaired flow, the 3-day average and the 7-day average. The 7-day average reflects some hydrologic variation, but smooths the impacts of the hydrological event. The 30-day average is not shown on this graph, but is even more extreme and creates a flat line that only minimally reflects specific hydrologic events. This is because 30-day average would only reflect the average of all flow events and daily flows over the 30-day period, without reflecting the varied nature of actual unimpaired flows. This kind of smoothing has significant impacts when estimating environmental impacts. As the USFWS service presenter noted, using a longer running average fundamentally changes the hydrology and often "decouples" the benefits of unimpaired flow from the potential fish benefits such as higher flows, turbidity, cued migration and others. (January 3, 2017 Phase 1 Hearing, at 2:36:30.) This slide resonated with the State Water Board members, specifically member Steve Moore. In response to the issue of averaging flows and in response to the slide above, Mr. Moore stated: "I appreciate this, this gets to the heart and soul of why I am doing this job . . . to better engineer biology . . . and this is a key point. Not only are you missing benefits when the natural cues are happening . . . but there is a bunch of water that will not get the benefit because we have averaged based on an operational constraint that we are imagining . . .we are imagining that we have to stay with a 7 day approach. We can do better." (January 3, 2017 Phase 1 Hearing, at 2:37:15.)

This comment and concern were not reflected by Staff. In direct contradiction to Mr. Moore's statements and concerns, Staff used a 30 day running average to evaluate the impact of the Proposed Project, despite the availability of models that could run daily averages. When questioned regarding the use of the 30 day average, Staff affirmed its approach:

> Bill Paris: Did I understand you guys right, you haven't modeled the proposal? Is that correct? The proposal is not based on monthly and you are presenting monthly. Have you modeled it in a less than monthly time-step? And if so can we see that data and information?
>
> Les Grober: No we only modeled it at the monthly time-step. Because this intended to be a, uh, budget of water, if you will. Really this is getting back to the adaptive implementation, but, it's not, we didn't do a daily model for showing this.
>
> Bill Paris: Is there a daily model available?
>
> Les Grober: Not that we have run. Except what we have run for temperature modeling.
>
> Will Anderson: The temperature model takes the monthly and it runs it on a daily time-step. So there is some smoothing there, but it is essentially the monthly averages.

Les Grober: So, again, this is speaks to that this is not intended to optimizing, it shows what it could be if you look at it very broadly, programmatically. So, for the temperature, of course you would see some other variation potentially depending on how this is operated. If you had rigid adherence with the 7-day running average, you would expect to see somewhat different results. But we have looked at the monthly, a very course monthly and then the course dis-aggregation of monthly into daily for the temperature effects.

Bill Paris: Sure, but uh, I guess I would flip that around and say from the impact perspective, modeling what you are going to require the regulated community to comply with would be a more accurate depiction of what those impacts might be.

Les Grober: Are you suggesting that it would result in a different quantity of water at a 7-day average than on a monthly?

Bill Paris: Yeah.

Les Grober: Ok. You can provide that comment.

Chris Shutes: Chris Shutes in response to Mr. Paris. For the, uh, Don Pedro relicensing, Dan Steiner built a dandy daily model . . .

Les Grober: Again, and I would, we are happy to receive comments on this as part of the hearing, and the written comments, so I appreciate all of the comments, but bringing it back to this is a programmatic analysis and any such comments would have to demonstrate what, what different result one would be expecting to achieve and how it would be . .. I can imagine it would be in the details it would be different but, why, what, why running this on a monthly time-step is insufficient to demonstrate what can be achieved broadly in terms of temperature improvements and broadly in terms of uh the water supply effects.

(12/5/2016 Workshop, at 3:31:30.)

This dialogue above differs so drastically from the dialogue between Mr. Moore and USFWS. State Water Board members are on record dedicated to understanding the impacts of the

Proposed Project on a daily average. In stark contrast, Staff takes the position that precision is not only not necessary, but that stakeholders would need to prove to Staff why the imprecise approach Staff is us using is not sufficient before a more precise analysis would be implemented. It is clear that Staff and the State Water Board members are not on the same page with regard to the WSE Model 30-day running average. The State Water Board members are correct to be concerned about the averaging of hydrologic events; the stated purpose of the unimpaired flow approach is based on mimicking the natural hydrograph. The WSE Model run of a 30-day average does not evaluate the Proposed Project and does not reflect the impacts of the unimpaired flow objective. For this reason, the WSE Model is not supported by substantial evidence.

16.1.2 Reservoir Minimum Carryover Parameter

The WSE Model assumes the minimum reservoir carryover storage parameters of New Exchequer at 300,000 and New Melones at 700,000, and New Don Pedro Reservoir at 800,000. (SED, at F.1-34-38.) There are several problems with this parameter. First, the parameter is not part of the Proposed Project. Minimum reservoir levels are not listed as objectives. And although minimum reservoir levels are referenced in the plan of implementation, the reference only states that the State Water Board will implement some mitigation measure to reduce temperature impacts and reservoir minimums is one such tool. For these reasons, minimum reservoir storage is an implementation option, but is not part of the Proposed Project.

Second, it is not clear how Staff developed the minimum reservoir storage levels. When asked about the development of the minimum reservoir levels, Staff provided several reasons the minimum levels were developed. For example, Staff stated, "The reason for selecting the carryover storage that we did was to minimize those temperature effects that were incurred by drawing the reservoir down further." (12/5/16 Workshop, Les Grober, at 2:23:56- 2:24:08.) Staff also stated that reservoir storage is in place to increase reliability of water supplies. (12/5/16 Workshop, Dan Worth, at 2:28:00- 2:29:09 ["There is reliability to having carryover storage, to where if you draw it all the way down and then have increased requirements in a successive year then that would be . . uh . . have less available for consumptive use in the following year as well."].) Staff also stated that reservoir minimum requirements were necessary to prevent reservoirs from going dry. Specifically, Staff stated if the Proposed Project were implemented without a minimum reservoir requirement, "the first thing that you see is that if you keep everything else the same, the reservoir runs dry. So we had to make assumptions that we have described and disclosed about reservoir operations that prevent those things like running reservoirs dry or temperature impacts . . . it prevents those from occurring. "(12/5/16 Workshop, Les Grober, at 3:02:05 – 3:02:27.) However, providing the general reasons for developing minimum reservoir requirements does not actually disclose how Staff developed the specific numeric minimum storage levels. When pressed further on the development of reservoir levels, Staff backed away from the minimum reservoir levels, stating: "The reason for not including it as an explicit amount or explicit requirement is . . . because we haven't optimized it, so we don't want to presume and establish any fixed number that wouldn't be a better number." (12/5/16 Workshop Les Grober, at 2:31:50-2:32:10.) This explanation makes no sense, because, of course, Staff did select "explicit amounts" and the inclusion of "explicit amounts" in the modeling control much of the analysis in the SED. Thus, the lack of disclosure in the SED and Staff's inability to explain the development of minimum reservoir levels reflects that Staff did not have a specific method for developing the minimum reservoir storage requirements, but rather, based the requirements on general estimates vaguely related to avoiding temperature and water supply impacts. The SED is required to be supported by substantial evidence. The development and reliance upon minimum reservoir levels is not supported by substantial evidence.

Third, it is not clear whether the minimum reservoir requirements are required or whether they are non-binding targets. Some Staff members suggest that the minimum reservoir levels are guidelines or targets. (12/5/16 Workshop, Will Anderson, at 2:07:40 – ["End of September storage guideline, which is not a hard and firm . . . requirement, it is a guideline."].) However, other Staff state more definitively that the reservoir levels are requirements. For example, Staff stated that the program of implementation includes carryover storage requirements. (12/5/16 Workshop, Les Grober, at 2:31:35 – 2:31:46 ["We do have in the program of implementation that there would be some carryover requirements included."].) Regardless of the inconsistent characterization by Staff, the WSE Model assumes the minimum reservoir levels are met. Fourth, it is not clear how Staff plans to implement the minimum reservoir level requirement. The Tributary Flow Objective does not include minimum reservoir levels. (SED, Appx. K.) The method through which Staff assumes that such minimum level requirements will be implemented is not clear. Staff states that it will implement minimum reservoir requirements through a "water rights proceeding." (SED, at 5-64.) However, Staff does not identify the authority through which Staff will rely upon to implement the minimum reservoir requirements. The Irrigation Districts take the position that no such authority exists. Without disclosure of the authority under which the State Water Board is able to implement the proposed minimum reservoir requirements, it appears that the WSE Model relies on an unenforceable assumption that minimum reservoir levels will be achieved.

Fifth, the WSE Model relies upon the minimum storage requirements, which are "necessary for the analysis" to work. (12/5/16 Workshop, Will Anderson, at 2:24:45 – 2:25:10.) As Staff explained, there is "a need for storage rules or targets to keep the reservoirs spilling cold water in particularly the summer time period and the fall." (2:51:05 – 2:51:22.) Without the rules, the temperature impacts of the Proposed Project would increase the number of days that temperature targets are not met. Such a result would not provide the alleged protection to fish and wildlife, which is the purpose of the Proposed Project.

Sixth, Staff never analyzed the results of the Proposed Project without the minimum reservoir requirements. Because the minimums are not part of the objectives, but rather are just a WSE Model parameter, and Staff did not run the model without that parameter, this means that Staff has not analyzed the impacts of the Proposed Project. Further, Staff has struggled with the transparency and disclosure of the results of running the WSE Model without the assumed minimum reservoir requirements. At the same workshop, one Staff member stated Staff has run a no-reservoir-minimum, stating, "The work that was done there pre-dates me a little bit and we just went back since last Tuesday and we have seen the interest in that and we have a re-run that . . . so yes, it was done." (12/5/16 Workshop, Will Anderson 2:33:30 - .) While other Staff, at a later Workshop, stated the opposite, that the Staff has not yet run a no-reservoir-minimum. In responding to a question on modeling without reservoir restraints: "We were unable to get those sensitivity runs, so we are not going to be presenting them today." (12/12/2016 Workshop, 80:13-.)

Seventh, the proposed reservoir minimums are year round and thus appear to attempt to regulate outside the February through June regulatory period. Regulation of flows or reservoir operations outside this time period has not been noticed by the State Water Board. In order to properly effectuate a regulation outside the regulatory period, the State Water Board would need to re-notice the process and include the reservoir storage regulation in such a notice.

16.1.3 Restricted Storage Release Parameter

The WSE Model also limits the amount of water that can be drawn from storage that is more restrictive than the minimum storage level requirement. This parameter controls the amount of water released from storage and limits water right holders' release, limiting releases to only 50 percent of the water available for release, i.e. the amount above the minimum reservoir requirement. For example, if reservoir storage is at 1,200,000 in New Don Pedro, the storage release parameter would prohibit Turlock and Modesto Irrigation Districts from releasing the 400,000 acre feet available from storage. Instead, the storage release parameter would restrict the Irrigation Districts to releasing 200,000 from storage, leaving year end storage at 1,000,000, which is 200,000 over the minimum storage level. Staff explains:

"The model constrains the percentage of the available storage (after holding back for minimum end-of-September storage) that is available for diversion over the irrigation season. This limits the amount of storage that can be withdrawn to reduce potential effects on river temperatures by protecting carryover storage and the coldwater pool in the reservoirs leading into a drought sequence." (SED, at F.-31-32.)

There are several problems with the restricted storage release parameter. First, the restricted storage release parameter is not part of the Proposed Project. As previously noted, reservoir constraints are not a proposed objective. Further, unlike the minimum reservoir storage that is mentioned in the plan of implementation, the restricted storage release parameter is not found anywhere in the program of implementation. This operational restriction is simply not mentioned in Appendix K at all and it is only briefly explained as a model parameter in the SED.

Second, similar to the minimum reservoir requirement, it is unclear whether the State Water Board has the authority to implement the restricted storage release parameter. The State Water

Board has not demonstrated how it will restrict water right holders and dam operators from releasing water above that allowed by the storage release parameter.

Third, the restricted storage release parameter controls the release of water from storage outside the period of noticed regulation. This parameter appears to control reservoir storage all year. Regulation of flows or reservoir operations outside this the noticed February through June time period has not been noticed by the State Water Board. In order to properly effectuate a regulation outside the regulatory period, the State Water Board would need to re-notice the process and include the reservoir storage regulation in such a notice. For the numerous reasons noted above, the storage release parameter is not supported by substantial evidence.

16.1.4 Reservoir Refill Parameter

The reservoir refill parameter limits the delivery of water in above normal and wet years. During these years, the WSE Model requires increased diversion of water to storage. The SED explains the refill limitations as follows:

> When reservoir levels are very low (typically after a drought sequence), the model limits the amount of inflow that can be allocated for diversion in a subsequent wet year(s). By reducing the amount of inflow that can be diverted in such years, reservoirs and associated coldwater pools recover more quickly after a drought. Without such a requirement, reservoirs otherwise would remain lower for longer after a drought, causing associated temperature impacts. (SED, at F.1-31.)

Staff further explained the refill limitations as a tool that will "also constrain diversions in order to give a boost to the reservoir level so that it can meet carryover guidelines in the future, that comes into play when there is a very low reservoir level and there is a lot of inflow, it will then um be a constraint a maximum allocation for that year." (12/5/16 Workshop, Will Anderson, at 2:08:24.)

Staff discloses the refill requirement is a "user specified parameter between 0 and 1 that reduces diversion in an effort to help refill the major reservoirs at the end of a drought. This parameter is activated if: 1) storage in the major reservoir at the end of the previous October was less than minimum reservoir requirement plus 10 percent and 2) inflow to the major reservoir over the growing season will be greater than an inflow trigger set by the user. This diversion cut will continue over the entire irrigation year (March–February) unless the reservoir reaches the flood curve at which point the cut will end for the rest of the year." (SED, at F.1-39.) Similar to the minimum reservoir level requirements, the refill limitations cause several problems.

First, the refill limitations are not proposed as water quality objectives in Appendix K. Nor are the refill limitations discussed in the program of implementation. Thus, the refill limitation does not appear to be a part of the Proposed Project. Even though it is not part of the Proposed Project, Staff only analyzed the environmental impacts of the Proposed Project with the inclusion of the refill limitation. Therefore, Staff does not know or did not disclose the impacts without the limitation.

Second, neither the SED nor Staff disclosed the actual refill limitations. The SED explains the concept of refill requirements. However, the actual calculation or quantity that the WSE Model requires or assumes is not disclosed. This lack of transparency is common in the SED and it requires the regulated community to reverse engineer the WSE Model to understand how Staff ran the model.

Third, neither the SED nor Staff explained how the refill limitations were developed. These explanations fail to identify the "user specified parameter" employed by the WSE Model. Further, the explanations fail to identify the "inflow target" used by Staff. However, generally, from viewing WSE Model results, it seems that the refill requirement usually applies to require diversion to storage in wetter years that follow drought or dry year periods.

Fourth, the refill parameter regulates diversions outside February through June period. Regulation of flows or reservoir operations outside this the noticed February through June time period has not been noticed by the State Water Board. In order to properly effectuate a regulation outside the regulatory period, the State Water Board would need to re-notice the process and include the reservoir storage regulation in such a notice. For these reasons, the refill parameter is not supported by substantial evidence.

16.1.5 Flow Shifting Parameter

The WSE Model assumes that some of the unimpaired flow required during the February to June period will be placed in storage and released in later fall months. Staff assumes that "some" flow shifting will occur, but does not disclose exactly how much or the extent to which flow shifting exists. The flow shifting parameter that is built into the WSE Model is a significantly flawed for several reasons. First, it does not reflect the Proposed Project. The Tributary Flow Objective requires 30 to 50 percent of unimpaired flow to be met at the Tributary compliance points flows from February through June. The Tributary Flow Objective does not include required storage, delays in release of stored water, or otherwise shifting flows from the Proposed Project.

Second, it requires flows outside the February – June period. Flows outside the February to June period have not been noticed in the present matter. To include flows that are required outside the regulated period of February to June violates the notice requirements.

Third, Staff has failed to disclose how it developed the parameters for flow shifting. Staff discloses that the WSE Model includes flow shifting in the model runs for proposed flow requirements of 35 percent unimpaired flow and any other higher proposed flows. However, Staff does not explain how much flow is shifted, when the flow is shifted, and/or any other information regarding how the determination to shift flow was developed. Staff was asked to explain how the flow shifting parameter was developed. Staff failed to provide an explanation. (12/5/16 Workshop, Will Anderson, at 2:57:20 – 2:58:00 "Um, I am not able to, um, step through, ugh, I don't believe it's going to be satisfying and I can't step through the development of that, um, simply to say that these are parameters are inherent and important and critical for, uh, describing for our description of the system operation.") When pressed further regarding the flow shifting parameters, Staff disclosed that the flow shifting was derived through "trial and error to find a certain . . . flow target . . .that essentially would reduce the amount of time that the temperature criteria would be not met and reduce that so that the project effects would not cause a negative impact." (12/5/16 Workshop, Will Anderson, at 5:31:20 – 5:32:30.) Staff did not provide evidence or explanation of the "trial and error" process to the public. Further, in the SED, the WSE Model is explained and "all" the WSE Parameters are allegedly disclosed. However, Staff failed to disclose that flow shifting is part of the WSE Model runs for all runs over 35 percent of unimpaired flow. Thus, Staff failed to disclose how flow shifting is included in the WSE Model.

Fourth, Staff failed to evaluate the impacts of the Proposed Project without flow shifting. Staff conceded that for proposed regulations of flow that were 35 percent unimpaired flow or higher, Staff did not run the WSE Model without flow shifting. In other words, Staff only analyzed the impacts of a project that required flow releases outside the regulatory period. Staff failed to perform or disclose any analysis of impacts for flows that were limited to the February through June period. (12/5/16 Workshop, Les Grober, at 3:35:05 ["There was no run done with no flow shifting."].)

Fifth, the flow shifting parameter assumes that flow shifting will always be possible and fails to consider the limitation of flood release requirements. The flow shifting parameter assumes that unimpaired flows during the February through June period can be held in storage and released in the River during fall months. In the WSE Model, the flow shifting parameter shifts flows in every wet and above normal year. (12/5/2016 Workshop, at 151-152.) However, the flow shifting parameter does not consider that during required flood control release periods, flows are required to be released and cannot be held to be released at a later date. Staff did not consider that flood release limitations; such limitations never constrained flow shifting. Further, in response to a question asking Staff whether the flood release constraints were considered, Staff responded, "that is an interesting. . uh, please make that comment, because if I am hearing correctly there is a concern with that . . .and you're saying there would be limited opportunity to flow shift." (12/5/16 Workshop, Les Grober, at 5:41:05 – 5:44:00.) The failure to consider flood release limitations results in additional water supply impacts that were not evaluated. The effect of assuming shifted water remained in the reservoir even though the water had to be released due to flood control requirements, would double the required instream flow requirement. Water would be released for flood flows and then released again in the fall due to flow shifting.

Sixth, it is unclear how the shifting of flows into the fall period affects the existing October flow requirements. The existing Bay Delta Plan includes fall pulse flows, which Phase 1 does not officially propose to amend. (SED, Appx. K.) The flow shifting parameter built into the WSE Model pushes flows from the spring into the late summer and fall periods. When asked whether the flow shifted into the fall period is assumed to contribute to meeting the fall flow objectives, Staff responded “Um, lets, um I want to get back to you on that just to give you the correct, make sure we are on the same page on that. So the flow shifting meets a minimum flow target which, in the case of the base case um, well the flow shifting in uh, lets get back to you on that.”) (12/5/16 Workshop, Will Anderson, at 5:09:23 – 5:11:00.) Clearly Staff had not considered the impact of shifting flow into fall on the fall flow objectives.

Seventh, Staff assumes the State Water Board has the authority to implement the flow shifting parameter. This is an assumption that is not supported and is incorrect. In order to implement the flow shifting parameter, the State Water Board would need to require that water be diverted to storage, require the water be held in storage, and then require the later release of the water in late summer or fall months. In order to accomplish these operational controls, the State Water Board would basically need to take over the reservoirs and run them according to the WSE Model. The State Water Board has no such authority.

16.1.6 Base Flow Parameter

The Proposed Project requires a base flow of 800-1200 cubic feet per second at Vernalis. (SED, Appx. K, at 18.) However, the WSE Model does not include the base flow when modeling the Proposed Project. Rather, the minimum flows used by the WSE Model are the existing FERC flows on the Merced and Tuolumne Rivers and the Appendix 2E flows on the Stanislaus River. This is a problem for several reasons. First, the base flows are the one parameter that is included in the Proposed Project and disclosed by Staff. For this reason, the failure to include the base flows in the modeling is both ironic and not supported by substantial evidence. Second, the base flows are the only remaining Vernalis compliance point requirement. Without including the base flows in the modeling, there is no longer any Vernalis compliance point requirement. This is a significant problem, as the Flow Criteria Report bases it science on Vernalis flows, not Tributary flows. In addition, without the Vernalis flow requirement, the Proposed Project is no longer directly with the Bay Delta and becomes a regional basin planning effort. Third, in place of the base flows in the Proposed Project, Staff includes the existing flow requirements on the three Tributaries. The use of these existing flows is not supported by substantial evidence because (a) the flows are not part of the Proposed Project; (b) the State Water Board has no authority over these flows; (c) all of these existing flows are currently being reviewed through reconsultation or the FERC relicensing process; (d) the flow requirements do not require the release of unimpaired flow, but often require the release of water from reservoirs; and (e) the flow requirements on located on the Tributaries, rather than Vernalis.

16.1.7 Minimum Allocation Fraction Parameter

The WSE Model includes a minimum delivery amount that prevents the allocation of water from hitting zero. The Proposed Project would never reduce the delivery of water to the Irrigation Districts to zero, because even if the requirement were 40 percent of the unimpaired flow, sixty percent of even a small amount of water is a small quantity of water that would be allocated to water right holders. However, the WSE Model includes several other components, including flow shifting, minimum reservoir requirements, and refill restrictions, which further reduce water deliveries and make it possible that allocation may hit zero in certain dry years. In order to avoid the impact of zero water deliveries, Staff developed the minimum allocation fraction, which provides the delivery of a minimum quantity of water in years which a zero allocation would occur. Staff explains the minimum allocation fraction in terms of relaxing the reservoir carryover requirements:

> "Minimum Diversion Level (Minimum End-of-September Relaxation): Diversions can override the end-of September storage guideline and draw additional water from storage in the event the available surface water for diversion is less than a specified minimum level. This in effect is a relaxation in certain years to the end-of-September storage guideline. The minimum level constraint was set after trial and error to ensure there were no significant temperature impacts." (SED, at F.1-31.)

The minimum allocation fraction parameter has several fundamental flaws. First, it is not part of the Proposed Project. The Proposed Project includes minimum Vernalis flows, but does nto include a minimum delivery allocation. Rather, the Proposed Project would have a built-in minimum delivery at 60 percent of the unimpaired flow.

Second, it is unclear how the minimum allocation fraction was developed. Staff explained that the minimum allocation fractions were developed "empirically." (12/5/16 Workshop, Will Anderson, at 2:08:20.) Neither the SED nor Staff disclose the "minimum level" of diversion for each Tributary that triggers the minimum allocation fraction. Further, other than describing the process as “empirical” or “trial and error”, Staff fails to explain how it developed the minimum level of diversions. Without this information, the regulated community is not able to understand the considerations or determinations made by Staff. The failure to disclose any supporting evidence results in the lack of substantial supporting evidence for the minimum allocation fraction.

Third, the minimum allocation fraction parameter is not disclosed by Staff. Staff did not disclose the parameter in the SED when explaining the WSE Model parameters. In order to find the minimum allocation fraction, it was necessary to deconstruct the WSE Model and find that Staff included floors or minimum allocations in years that would otherwise delivery little to no water. This failure to identify and disclose the parameter violates CEQA and the spirit of transparency that CEQA is in place to promote.

16.1.8 WSE Model Parameters Are Not Supported by Substantial Evidence.

As described above, the modeling assumptions that form the basis of the WSE Model are not supported by substantial evidence and do not reflect the Proposed Project. This is a fundamental defect with regard to CEQA. CEQA requires the lead agency to identify and evaluate the environmental impacts of the Proposed Project. The WSE Model does not identify impacts of the proposed project, but rather includes several mitigating factors or assumptions that are built into the WSE Model. For this reason, if the State Water Board adopts the Staff draft it would not proceed in a manner required by law. The fundamental flaws with the parameters in the WSE Model result Staff’s analysis not being supported by substantial evidence.

16.2 Evaluation of the Impacts to Agriculture Are Not Supported by Substantial Evidence.

Staff uses the SWAP Model to evaluate the impacts of the Proposed Project on the agricultural sector. There are several problems with the SWAP Model which result in the agriculture analysis not being supported by substantial evidence. In addition, there are problems with the Staff’s analysis of the data coming out of the SWAP Model which make the evaluation of the agriculture impacts not supportable.

16.2.1 The SWAP Model is Fundamentally Flawed and Not Supported by Substantial Evidence

Staff describes the SWAP Model generally as follows:

SWAP model is an agricultural production model that simulates the decisions of farmers at a regional level based on principles of economic optimization. The model assumes that farmers maximize profit (revenue minus costs) subject to resource, technical, and market constraints. The model selects those crops, water supplies, and irrigation technology that maximize profit subject to these equations and constraints. The model accounts for land and water availability constraints given a set of factors for production prices, and calibrates to observed yearly values of land, labor, water and supplies use for each region.

(SED, at G-42.) In general, the SWAP model takes the water supply deficits projected by the WSE Model and estimates how many acres of certain crops may be taken out of production. There are several fundamental problems with the SWAP Model which result in the analysis not being supported by substantial evidence.

First, the SWAP Model is driven by results from the WSE Model. (SED, at 4-5.) Therefore the defects of the WSE Model infect the SWAP model. These defects alone result in the SWAP model failing to be supported by substantial evidence.

Second, the SWAP Model is limited to only two outcomes – cropping or no cropping. The SWAP Model assumes that cropping decisions will be based entirely on commodity pricing and nothing else. In other words, the SWAP Model assumes that farmers will either plant a crop or fallow fields. The SWAP Model does not consider the options of conserving water, altering cropping but continue farming, or continuing to farm fewer acres of the same crop. Staff specifically states that it is too speculative to try to guess what actions farmers may take in response to the Proposed Project. However, the SWAP Model is exactly such speculation; it simply assumes farmers will make one of the two limited decisions. This assumption is not reasonable because it is so simplified and overly strict. It would have been more reasonable to assume that some fallowing by lower crops would occur, but that some conservation, some crop rotation and some other actions may also occur.

Third, the SWAP Model's assumption that all decisions will be market based fails to include all market factors, but rather only looks at commodity pricing. For example, the SWAP Model assumes that pasture and alfalfa would be completely fallowed prior to the fallowing of a crop with a higher commodity value. However, this analysis is based only on commodity pricing; i.e. how much pasture and alfalfa will sell for in the market. However, the SWAP Model only considers the commodity price of alfalfa and pasture, the SWAP Model fails to take into consideration that the alfalfa and pasture crops support a secondary and very lucrative cattle and dairy sectors. This failure is despite the fact that Staff acknowledges that pasture and alfalfa may be grown to support the dairy and cattle industries. (SED, at 11-59.) In addition, the Staff also concedes that the dairy and cattle industries values far exceed those of even the most expensive farming crops. The failure to consider the support of this secondary commodity is a failure of the market comparison, especially since the SWAP Model does not evaluate or distinguish how much of the pasture and alfalfa crops are sold in the market as opposed to grown by dairy and cattle operations. The fact that alfalfa and pasture support the lucrative diary and cattle operations makes it much more likely that these crops will continue to be grown. The SWAP Model is literally built on the presumption that alfalfa and pasture will no longer be grown. Thus, the SWAP Model's refusal to recognize any other information besides commodity pricing is the reason it fails to correctly estimate environmental impacts and is not supported by substantial evidence.

Staff recognizes that the SWAP Model is flawed. Staff states that "SWAP could be over predicting fallowing from feed crops in particular alfalfa and pasture." (SED, at 11-58.) Staff states that because of the powerful commodity pricing of the dairy sector, if dairies need more water in dry years, other crops "such as field and grain and even higher net value crops in the spectrum may decrease in production." (SED, at 11-59.) Staff also acknowledges that because the cattle sector relies directly on pasture and because pasture often is gown on "land with soils, slopes, or other characteristics" that may not support other crops, "it is likely these areas would be maintained as pasture." (SED, at 11-59.) Therefore, even the qualitative analysis included in the SED recognizes that the SWAP Model's assumption that all pasture and alfalfa will be fallowed in favor of maintaining higher commodity crops is not supported by substantial evidence. The fact that Staff and the SED are so directly internally inconsistent prevents the opposite conclusions from being supported by substantial evidence.

Fourth, the SWAP Model assumption that all low value crops will be fallowed incorrectly assumes that intra-district water transfers are allowed and can be facilitated. In each of the six DAU's used by the SWAP model, the Irrigation Districts are the primary water right holders. Individual farmers rarely hold water rights separate and apart from the Irrigation Districts. Therefore, water deliveries are managed and controlled by the Irrigation Districts that hold the water rights, own, manage, maintain, and operate the water conveyance facilities. There are several districts that do not allow intra-district water transfers. Other districts do not prohibit transfers, but there is no system in place to facilitate the transfer or trading of water. Irrigation Districts deliver water to customers based on inches of water allocation per acre. When water shortages are required, the Irrigation Districts reduce the quantity of water delivered equally to each acre of land served. The SWAP Model is premised on the assumption that water can be easily transferred between farmers. This assumption is not supported and often not correct.

Fifth, the SWAP Model assumes that the transfer of water between farmers growing low and high value crops will occur automatically, without any cost, administration, or time for such transfers to be put in place. As noted above, the Irrigation Districts are not set up to facilitate intra-district water transfers. Even if the transfer of water were not prohibited, there would be significant costs and administration of such a transfer. For example, in order to facilitate the transfer, the high value crop farmers would need to (1) identify other farmers that were willing to sell their allocation of water; (2) negotiate the price of purchasing the allocation; (3) draft a contract regarding the sale of the allocation; (4) negotiate terms of the transfer of the allocation; (5) provide contract to Irrigation District and request change of delivery based on the contract. In response to this, the Irrigation District must assess whether the existing facilities are able to accommodate the request. For example, if all lands served by lateral A transfer water to lands served by lateral B, lateral B may not have the capacity to serve the additional water that would have otherwise been delivered by both lateral A and B. In addition, if lateral A no longer carries water during the irrigation season, the Irrigation District may need to perform certain maintenance and upkeep of an empty lateral that would not be required of a lateral that was carrying water. Thus, there are significant administrative costs, negotiations, and evaluations that are required prior to transferring intra-district water. The SWAP Model does not consider these costs in determining whether a transfer would occur; for example, the SWAP Model does not off-set any potential profit by accounting for these administrative costs. Further, the SWAP Model does not consider these challenges as potential factors that would question or reduce the assumption that all low-value crop farmers would fallow in favor of high value crops. In reality, the significant administrative factors, including cost and time to facilitate such a transfer would likely prohibit the movement of water.

Sixth, Staff fails to provide much of the data and inputs that drive the SWAP Model. For example, the commodity pricing and yield production that are fundamental parts of the SWAP Model are not provided. (12/12/2016 Workshop, 112:16-23 to 113:1.)

[“UNIDENTIFIED SPEAKER: And also, while I have the microphone, where in the SED or in the spreadsheets that you have attached can I find the information on the SWAP input specifically yielded and the prices that were used for the various crops?

TIM NELSON: I don't believe -- those are parameters that are part of SWAP itself and not part of the input spreadsheets.

UNIDENTIFIED SPEAKER: Right. Is it possible to get those? LES GROBER: It seems that it should be, yes.”].)

For example, without understanding and evaluating the pricing and yield data, it is not possible to assess whether the model correctly values crops and correctly determines which crops will be fallowed, the quantity of acres fallowed, or any other output of the SWAP Model. In response to a request for the public disclosure of this fundamental information, Staff promised to provide the information, but never fulfilled that promise. Without disclosing this information to the public and including the information in the record, the SWAP Model cannot be supported by substantial evidence.

Seventh, the SWAP Model fails to account for the impacts of multi-year fallowing. Rather, the SWAP Model looks at each year in isolation, as if it is the first and only year that the crop would be fallowed. This causes a significant problem when it comes to the evaluation of permanent crops. The SWAP Model estimates that approximately 731 acres of permanent tree crops will be fallowed in average years. (SED, at G-49 to G-54.) Staff does not estimate the fallowing of permanent tree crops in dry years. However, because the results of the Proposed Project do not affect crops in wet and above normal years, it can be generally assumed that dry year impacts are at least double the average impact disclosed by Staff. Thus, in dry years, the acreage of fallowed permanent crops is likely to be approximately 1500 acres. The SWAP Model fails to evaluate the impacts of fallowing permanent crops for an extended period of time. However, the reality is that after a few years of not applying water, permanent crops die. The SWAP Model does not consider the impact of fallowing permanent crops over several years; the SWAP Model does not consider that a crop may die and not be able to come back into production. Instead, the SWAP Model only considers whether a crop is taken out of production and assumes the crop will be back in production when water is available. The failure to consider loss of permanent crops is a significant flaw in the SWAP Model. The capital investment in permanent crops is a significant cost factor in the agriculture industry. At approximately $25,000 per acre, capital losses will be approximately $37.5 million, (capital cost per acre x 1500 acres) in losses from permanent crops in consecutive below normal, dry and/or critical water years. The failure to consider this cost, and/or estimate when this cost would be incurred (i.e. when the permanent crop would be lost from required fallowing) is a significant flaw in a model whose purpose is to determine cropping patterns from water shortage.

16.2.2 Average Year Analysis is Not Supported by Substantial Evidence

Staff's analysis of agriculture impacts only considers the impacts of average years. This is significantly misleading because the impacts of the Proposed Project are rarely, if ever, average. Instead, the Proposed Project has little, if any, impacts in wet years and devastating impacts in dry and below normal water years. Thus, the true environmental impact is extreme, periods of no change are followed by periods of wreckage. For example, the SED contains several exceedance graphs which provide the picture of how the Proposed Project will affect agriculture. Figure 11-15b shows the Proposed Project projected impact on pasture. In about 60 percent of the years pasture is not reduced at all. Then there are two years that indicate pasture will be reduced about 10 to 20 percent. After the short minimum reduction, pasture is reduced to zero for the remaining years. Thus, the visual of the Figure 11-15b exceedance plot reflects that the Proposed Project is extreme and there is no "average" year; it is either no impact or complete devastation. For this reason, evaluating the averages of the two extreme impacts does not reflect the actual environmental impact of the Proposed Project and is not supported by substantial evidence. Instead, Staff must evaluate the dry year impacts of the Tributary Flow Objective, while disclosing that these impacts occur in only 30 to 50 percent of years.

16.2.3 Failure to Evaluate the Secondary Dairy Impact

The Staff fails to evaluate the impact to the cattle and dairy sector of the agriculture industry. This is not a small error. The dairy and cattle sectors are the largest agriculture commodities. The dairy sector alone is significantly higher than most other agriculture commodities, even the lucrative nut crops. For example, Staff discloses that the gross revenue of dairy is $2.21 billion dollars per year. (SED, at 11-59.) Compared to almonds at $884 million, alfalfa at $50 million, and oranges at $8 million, the dairy and cattle sectors are clearly a large piece of the agriculture portfolio. Staff provides several anecdotal comments recognizing the relationship between alfalfa and pasture crops and the cattle and dairy sector. (SED, at 11-58 to 11-59.) Further, Staff discusses generally how the cattle and dairy sectors may be affected. (SED, at 11-58 to 11-59.) However, Staff never analyzes how the Proposed Project will affect the cattle and dairy sectors. Staff fails to evaluate water demand for the cattle and dairy sectors and does not analyze how the reduced water supply would affect cattle and dairy operations. This analysis may not fit perfectly into the SWAP Model, however, the failure to evaluate the impacts on two of the largest agriculture sectors renders the impacts analysis deficient and unsupported by substantial evidence. Staff must revise the SED to properly identify impacts to the cattle and dairy sectors, analyze how these impacts will change the cattle and dairy operations and environments, disclose whether such impacts are significant, and develop mitigation to the extent significant impacts exist.

16.2.4 Groundwater Mitigation is Not Supported By Substantial Evidence

Staff's evaluation of agriculture impacts is premised on the assumption that groundwater pumping will remain at 2009 pumping levels. (SED, at 11-37.) Specifically, Staff assumes that, on average, 105,000 acre feet of groundwater will continue to be pumped. Thus, the analysis of impacts to agriculture is off-set or reduced by the amount of groundwater pumping that occurred in 2009. Staff does not explain why 2009 groundwater pumping levels are used. Although 2009 may represent the baseline that Staff has chosen, using the baseline number for groundwater pumping is not appropriate. It is not appropriate because the purpose of the SED is to evaluate how the Proposed Project affects the baseline. Using the baseline groundwater pumping does not attempt to evaluate how the Proposed Project affects groundwater pumping. To the contrary, using the baseline seems to reflect Staff's assumption the Proposed Project will have no impact on groundwater pumping.

Staff's use of the 2009 pumping data fails to recognize the Sustainable Groundwater Management Act (SGMA) is now in place. Thus, Staff's use of the 2009 baseline groundwater pumping quantities ignores the impact of both the Proposed Project and SGMA. This is not reasonable; just using a baseline number defeats the purpose of projecting potential future impacts.

16.2.5 Staff's Overestimation of Low Value Crops is Not Supported by Substantial Evidence

Staff and the SWAP Model overestimate the quantity of low-value crops. The data Staff uses to determine the number of low-value crops is approximately 8 years old. In the past 8 years there has been a significant change from lower value crops to higher value permanent crops. (12/12/2016 Workshop, at 109-110.) Therefore, the quantity of low value crops that Staff and the SWAP Model assume can be fallowed prior to impacting higher-value crops may no longer be in production. Using data that is almost a decade old in such a dynamic system is not reasonable and does not reflect the reality of the changes on the ground.

16.2.6 The Thresholds of Significance Are Not Supported by Substantial Evidence

Staff's thresholds of significance selected to evaluate the impacts to agriculture are deficient. The SED includes four thresholds of significance to measure and evaluate the impacts of the Tributary Flow Objective on agriculture:

- AG1: Conversion of designated farmland to non-agricultural use
- AG2: Other changes that convert farmland to non-agricultural use
- AG3: Conflicts with existing zoning or Williamson Act contract
- AG4: Conflicts with existing land use plans or policies

Staff spends the vast majority of time and effort analyzing AG1. There are several fundamental flaws with AG1 that result in this analysis inadequately evaluating Project impacts to agriculture. First, AG1 limits its evaluation of impacts to certain specialized classes of agriculture. AG1 only considers the conversion of prime, unique and farmland of statewide importance. Not all agricultural land falls into these specialized categories. In fact, Staff discloses that the total acreage of designated farmland is 527,793 acres, while non-designated farmland amounts to 107,490. (SED, at Table 11-2.) Therefore, non-designated farmland is approximately 17 percent of the Plan Area's total farming acreage. This acreage is not considered by AG1 or in any other portion of the SED. It is unclear whether Staff assumes this 17 percent of agriculture is completely fallowed or whether this 17 percent is impacted similarly to the designated categories of agriculture. Either way, Staff simply fails to analyze 17 percent of the agriculture in the region. This exclusion of 17 percent of agriculture lands is in addition to Staff's failure to evaluate the impact of the Proposed Project on cattle and dairy sectors. Together, these carve outs result in Staff analyzing only a portion of the agriculture portfolio; Staff does not evaluate the full agriculture picture. This failure to identify and evaluate the impacts of the Proposed Project on 17 percent of the agriculture industry is not acceptable and prevents the analysis from being supported by substantial evidence.

Second, AG1 analyzes the "conversion" of agriculture to non-agriculture uses. Staff does not fully explain how it determines when agriculture would convert to non-agriculture uses. Staff generally explains that the "reduction in water supply is used as a proxy for the conversion of irrigated land to nonagricultural lands." (SED, at 11-47.) This statement seems to indicate that Staff assumes that when water is not available, conversion would result. However, later Staff concedes that "it is unknown whether the reduction in irrigation water would result in direct conversion." (SED, at 11-52.) Thus, Staff's threshold of significance based on conversion is confusing, unclear, and not supported by substantial evidence.

Third, AG1 fails to consider the water supply demand of the non-agriculture use. Staff appears to assume that after the conversion from agriculture use to non-agriculture use will extinguish any water demand for the land. The failure to analyze potential new land uses after conversion is a fundamental short-fall of the analysis, whose purpose is to identify and evaluate the changes to the environment. Simply stating agriculture lands will be converted and not evaluating what environmental impact that conversion will entail is deficient and not supported by substantial evidence.

AG2 also has significant deficiencies. First, it is unclear what the threshold of significance is measuring. The actual threshold reads as follows: "Involve other changes in the existing environment which, due to their location or nature, could result in a conversion of farmland to nonagricultural uses." This description is not clear. The analysis in this section discusses two issues: seepage impacts and impacts of importing feed for cattle and dairy. The seepage discussion is a few sentences that summarily conclude that on one river (Stanislaus) flows are already so high that the Proposed Project would not increase flood impacts. From this, Staff concludes: "Therefore, it is reasonable to assume that a substantial reduction in agricultural production, and thus acreage, would not occur in the LSJR area of potential effects as a result of seepage when compared to baseline." (SED, at 11-58.) This conclusion is unsupported. Staff seems to be translating conclusions regarding flood impacts into evidence of the existence of seepage. This translation is not supported. No baseline seepage information is disclosed, despite the reference thereto. (*Id.*) This kind of unsupported conclusion is not allowed by CEQA and it is not supported by any evidence.

The section on importing feed is longer, but similarly conclusory and frustrating. Staff concedes that the fallowing of pasture and alfalfa may impact the cattle and dairy sectors. (SED, at

11-58.) Staff then dismisses its own concern by stating (1) these sectors will be able to import feed and (2) some local feed is likely to be available because the SWAP Model likely overestimated the amount of pasture and alfalfa that will be fallowed. (SED, at 11-58 to 11-60.) This section is filled with conclusory statements that fail to provide any analysis. For example, in this section, Staff makes a half-hearted attempt to explore the increased cost of importing feed, by stating: “Due to additional transportation costs, feed costs could go up; however, the increase in the cost of feed is not known because it depends on where dairies source feed from and the competition for the feed from other users.” (SED, at 11-58.) This type of analysis is not helpful and not supported by substantial evidence.

AG3 considers whether the Proposed Project would result in lands conflicting with Williamson Act contracts. Williamson Act contracts restrict enrolled parcels of land to agricultural or related open space use. The minimum term for Williamson Act contracts is ten years. However, since the contract term automatically renews on each anniversary date of the contract, the actual term is essentially indefinite. Staff does not identify the baseline quantity of acreage that is under Williamson Act contract. (SED, at 11-61.) Despite the lack of knowledge regarding Williamson Act contracts, Staff concludes that the Proposed Project would not result in any conflict with Williamson Act requirements because “there is enough annual crop acreage for rotation if the plantings of annual crops such as corn and gran were rotated in years with reduced irrigation supply such that all the lands would be irrigated at least once every other year or fallowed in other years.” (SED, at 11-61.) The conclusion and the sentence make no sense. The conclusion that no agricultural land will be taken out of production contradicts the conclusions from AG1, which confirm that there will be thousands of acres taken out of agricultural production.   The conclusion is not supported by evidence; there is no evidence of what “enough annual crop acreage” means, there is no evidence of what is meant by “reduced irrigation supply”, there is no evidence of what is meant by “all lands.” The analysis in AG3 is incorrect, contradictory, and supported by no evidence.

AG4 considers whether the Proposed Project conflicts with any land use policy related to agriculture. The analysis for all this section is located in a single paragraph, analyzing all Project alternatives at the same time. In that paragraph, Staff fails to identify any land use policy related to agriculture. Not one policy, protection, or substantive reference to any agriculture land use guidance is provided. Without first identifying the applicable policies, Staff cannot support the conclusion that the Proposed Project is consistent with such policies. For this reason, the analysis is not supported by substantial evidence.

16.3 The Evaluation of the Impacts to Aquatic Resources is Not Supported by Substantial Evidence.

16.3.1 Fish Species Evaluated and Indicator Species

Staff is required to evaluate how the Proposed Project will impact the environment, which includes aquatic resources and fish species. Although the Proposed Project claims only to protect native fish species, the SED requires Staff evaluate how the Proposed Project will affect all species. Staff fails to provide such analysis. Staff identifies 17 fish species in the Plan Area and briefly discusses the existing status of each of these 17 species. (SED, at 7-9 to 7-29.) The discussion of each of these species generally discloses whether they are a special-status species (or not), whether the species is native or non-native, and identifies the typical habitat for each species. (Id.)

However, after the general description of each species, Staff fails to analyze how the Proposed Project will affect each of the species. Instead, Staff selects “indicator species” and limits the analysis of impacts from the Proposed Project to these representative species. Staff identifies the Central Valley Fall-Run Chinook Salmon and Central Valley Steelhead as indicator species to represent anadromous fish, rainbow trout to represent coldwater reservoir fish, and largemouth bass to represent warmwater reservoir fish. (SED, at 7-3.) Staff explains that “Indicator species were selected based on their sensitivity to expected changes in environmental conditions in the plan area and their utility in evaluating broader ecosystem and community-level responses to environmental change.” (Id.) However, Staff fails to support this conclusion with any citation or scientific information that would support the concept that selecting an indicator species is appropriate and would appropriately reflect the impacts from the Proposed Project on a broader level.

In fact, Staff does not actually analyze the impacts of the Proposed Project on the named indicator species. Instead, Staff focuses almost exclusively on Central Valley Fall-Run Chinook

Salmon and Central Valley Steelhead. For example, for eight of the twelve thresholds of significance, the Staff analyses considered only impacts to Chinook Salmon and Steelhead. Further, the analyses of these two species were often collapsed and the analysis relied only on an analyses of Chinook Salmon. (SED, at 7-102 ["Where appropriate, the Chinook salmon and steelhead analyses are combined."].) The analysis of the Proposed Project impacts on only one or two of the seventeen fish species does not comply with CEQA requirements. CEQA requires Staff analyze how the Proposed Project will impact aquatic resources; evaluating only one or two fish species fails to analyze how the Proposed Project will impact fish species. Without this information the public cannot be aware of the potential impacts and decision-makers cannot make an informed decision with regard to approving the Project.

16.3.2 Thresholds of Significance

Staff selected twelve thresholds of significance upon which to analyze the environmental impacts of the Proposed Project. The twelve categories only analyze three different environmental impacts: (1) changes from reservoir levels (thresholds 1, 2, 4); (2) changes from floodplain habitat (thresholds 3, 8, 9); and (3) changes from temperature (thresholds 10, 11, 5). Thus, although it appears that Staff analyzed twelve separate impacts, the analysis is repetitive and only reflects the above three impacts. Further, each of these categories is compromised and fails to comply with CEQA's requirement to identify and analyze the environmental impacts of the Proposed Project.

16.3.2.1 Impacts from Reservoir Level Change

Based on the thresholds of significance that measure impacts based on changes to reservoir levels, the Staff concludes that no significant impacts will result from the Proposed Project. This conclusion is based on Staff's assumption that the Proposed Project will not change reservoir levels. These conclusions are a problem for several reasons. First, if reservoir stability is required by the Proposed Project, it seems disingenuous to dedicate three thresholds of significance to evaluate the impacts from changing reservoir levels. Pretending to evaluate impacts when Staff knows no such impacts will occur due to the way Staff defined the Proposed Project cannot seriously be considered as legitimate environmental analysis.

Second, the assumption that reservoir levels will not fluctuate, despite the proposed increased flow requirements, is not a supported assumption. As previously discussed above, the minimum reservoir requirements are not proposed as part of the Proposed Project. Rather, the minimum reservoir requirements are imbedded in the WSE Modeling. Staff did not perform any analyses based on modeling that did not include minimum reservoir levels. Thus, the environmental analysis assumes that minimum reservoir levels will be met and are part of the Proposed Project. However, it is not clear how Staff proposes to implement such requirements will be imposed on reservoir operators. Staff fails to disclose either the mechanism or the authority under which such requirements will be imposed. Therefore, the assumption that such requirements will be imposed is unsupported. For this reason it is not reasonable to assume that reservoir levels will remain unchanged by the Proposed Project.

16.3.2.2 Impacts from Floodplain Habitat

The thresholds of significance that stem from floodplain habitat are also flawed. First, Staff's estimate of the amount of improved floodplain habitat is deficient and incorrect. Staff estimates improved floodplain differently for each of the Stanislaus, Tuolumne, Merced, and San Joaquin Rivers. For the Stanislaus, Staff relies on the USFWS model, which estimates initiation of floodplain by reach of the River. Each reach of the River has a different floodplain inundation threshold, ranging between 1,000 and 1,500 cubic feet per second (cfs). Staff makes the general assumption that floodplain inundation for the Stanislaus initiates at 1,000 cfs, which falsely increases the quantity of improved floodplain habitat from the Proposed Project. By setting the floodplain inundation threshold at the lowest point (1,000 cfs) Staff shows there are 43 instances of inundation improvements of 10 percent or greater. (SED, at 19-63.) However, setting the inundation threshold at the more common and higher inundation threshold of 1,500 cfs, the instances of inundation improvements greater than 10 percent are reduced to only 19.

On the Tuolumne, Staff relies on a version of floodplain modeling developed by USFWS in the FERC process. This model looks at only a specific reach of the River, from River mile 52 to River mile 21.5. Unfortunately, this evaluation omits the lower 20 miles of the River. This omission is curious because the modeling for this section of the River was completed and is part of the public

FERC package available to the public and Staff. The lower 20 miles includes different, often higher, floodplain thresholds and may have reduced the amount of improved floodplain from the Proposed Project.

On the Merced no floodplain model or relationship has been developed. For this reason, Staff estimated floodplain inundation by calculating water surface area and comparing the estimated surface area with flows. Staff estimated the floodplain inundation threshold on the Merced above River mile 27 would be 1,000 cfs. Staff did not consider inundation levels on the lower portion of the River. Staff did not provide a reason for such omission. The estimate on the Merced River is fairly crude and limited to only a portion of the River; the actual floodplain inundation that will result from the Proposed Project is not clear and cannot be determined from the information provided by Staff.

Second, Staff's floodplain analysis is deficient because it does not consider the reality of floodplain limitations in the Plan Area. Most of the citations are from floodplain studies in the lowland bypass areas. (SED, at 19-89 - 19-99.) The Plan Area consists of incised channels at the bottom of steep mountainous terrain, leveed waterways, and urban development close to natural channels. Staff failed to consider these types of on-the-ground limitations. Instead, Staff's floodplain analysis considered any and all out of bank flows as usable floodplain habitat. This assumption is unsupported and contradicted by site-specific floodplain analyses. On the Tuolumne, a recent floodplain hydraulic study evaluated usable habitat and determined that the fraction of usable – compared to total- floodplain habitat can be as low as 30 percent. (HDR and Stillwater Sciences, 2016.) This same study also found that increases in floodplain inundation are off-set by losses in habitat associated with increased channel velocities and depths. Because Staff failed to consider the limitations and off-setting of floodplain habitat, Staff's estimates are based on calculations, but are not helpful in understanding the environmental impact of the Proposed Project on the ground. The simplified assumption that more flow equals more floodplain does not support the conclusion that the Proposed Project will result in improved floodplain habitat.

Third, Staff's evaluation of floodplain analysis is deficient because it fails to evaluate the most important attributes of floodplain habitat – duration, depth, velocity, cover, connectivity, and water temperature. Without evaluating these factors, it is impossible to know whether usable floodplain habitat is created or not. Staff assumes that any water outside the capacity of the channel results in floodplain habitat. This grossly overstates the Proposed Project's actual improvement to floodplain habitat. Without understanding the attributes above, it is unclear whether the Proposed Project's out of channel flows create usable floodplain habitat or result in stranding or mass killing of fish due to lack of connectivity, temperature, depth, and/or other factors.

Fourth, Staff's estimate of floodplain is not consistent with the Proposed Project. The Proposed Project requires the release of flows on a 7-day running average. The Staff estimated floodplain improvement based on a 30-day average. Staff's approach results in only twelve floodplain inundation estimates per year and all daily inputs for each month to be the same. In contrast, the Proposed Project's 7-day average will result in 52 different floodplain inundation estimates per year. The difference between twelve and fifty-two floodplain estimates demonstrates how vastly different the monthly floodplain estimates may be compared to the actual operation of the Proposed Project. Because the modeled estimates are so different from how the Proposed Project will be implemented, the environmental analysis based on the monthly modeling does not actually reflect the floodplain habitat that will result from the Proposed Project.

Fifth, Staff's estimate of acre-days is misleading. Staff estimates acre-days by taking the monthly floodplain output and dividing by 30. Thus, the acre-day calculation is the same for every day of each month, making it really an acre-month estimate, rather than an acre-day estimate.

Sixth, Staff's analysis determining the relationship between improved floodplain habitat and fish benefit is deficient. Staff makes several unsupported assumptions. For example, Staff determines that a 10 percent increase in floodplain habitat will have a significant benefit. (SED , at 19-56.) Staff fails to identify what will benefit – whether the benefit is to salmon population, rearing, or other metric is not clear. Further, Staff is contradictory about the role of the 10 percent metric. Staff states:

> "A 10% change in the frequency of floodplain flows, in combination with professional judgment, is used to determine a significant benefit or impact. Ten percent was selected because it accounts for a reasonable range of potential error associated with the assumptions used in the various analytical and modeling techniques." (SED, at 19-56.)

This explanation makes no sense, in addition to being grammatically incorrect. The first sentence appears Staff is suggesting that professional judgment of an unnamed party plus a 10 percent floodplain improvement were used to determine significant benefit. It is unclear which party is supposed to use the 10 percent and the unidentified professional judgment to make the determination of significance. To make things even more confusing, the second sentence suggests that the 10 percent only covers a range of error. This means, by definition, a 10 percent improvement could mean no benefit at all. If the range of error is 10 percent, Staff certainly cannot assume that the same 10 percent will result in significant benefits.

Staff states that generally, floodplain habitat has a positive effect on the growth of salmonids. (SED, at 19-53.) This positive effect is due to improvement of food resources on in floodplains. The support for this conclusion is based on studies of lowland bypass habitat and may not apply to the incised conditions of the Plan Area. Further, Staff has not identified food resource shortages as a factor limiting salmonid survival. Improving food resources may be helpful if there is a shortage, but it would have diminishing returns if the Plan Area already offers adequate food resources.

16.3.3 Temperature Improvements

Staff's temperature thresholds of significance are also deficient and do not properly identify and evaluate the impacts of the Proposed Project on aquatic species. First, the method by which Staff measures temperature improvements is deficient. Staff measures temperature improvement by the change in number of days in which the United States Environmental Protection Agency (USEPA) temperature criteria will be met. This measurement is fraught with problems. First, the USEPA temperature criteria do not apply in the Plan Area. Instead, the USEPA criteria were developed in the Pacific Northwest region where water temperatures are much colder. Staff has not attempted to explain or provide support for its use of non-applicable criteria. Second, it is unclear why Staff did not simply reflect temperature improvements by showing the improved temperature of the water in degrees. The likely reason fails to analyze the impact of the Proposed Project in specific degree improvement is that the improvements are minimal. For example, using the threshold of number of days meeting the USEPA criteria, Staff is able to show that the 40 percent unimpaired flow requirement in the Proposed Project would result in a 12 percent improvement in meeting the USEPA criteria at the confluence of the Stanislaus and San Joaquin Rivers. (SED, at Table 19-3.) However, expressing the same improvement in degrees would show that the improvement only lowered the temperature by 1.2 degrees for 3.75 days. (See SED, at Table 19-4; 12% of 31 days in October is 3.75 days.)

Third, Staff only modeled the temperature improvements of the Proposed Project with mitigation of minimum reservoir levels. Staff concedes that sending down the proposed 40 percent of unimpaired flow without minimum reservoir storage has a negative impact on water temperature (CITE). Staff failed to disclose the results of the Proposed Project without minimum reservoir levels. Instead, Staff decided that minimum reservoir levels must be implemented to ensure the negative temperature impacts of the Proposed Project were avoided. (CITE) This approach violates the most basic tenants of CEQA, which require the impacts of the Proposed Project be disclosed and, only after such disclosure should mitigation be developed. (CITE)

Fourth, Staff misrepresents the resulting temperature improvements from the Proposed Project in several ways. First, the WSE Model, which generates the estimated temperature changes is run on a 30 day or monthly average. Similar to the floodplain results, this means that Staff only has twelve different temperature data points for each year. However, Staff divides these monthly temperature impacts by 30 and attempts to represent that it generated daily temperature results. (12/5/16 Workshop, at 114.) This misrepresentation is especially egregious because the Proposed Project requires implementation at a 7-day average, which would have different impacts than those modeled by staff. Thus, the temperature modeling does not reflect the temperature impacts that the Proposed Project will have. Second, Staff attempts to represent that the temperature improvements are a result of increased flows. (SED, 19-47 ["This temperature evaluation indicates that increasing flows during the February through June time period can provide significant temperature benefits to juvenile fall-run Chinook salmon and steelhead."].) However, Staff later conceded the exact opposite was true – increasing the flow requirements actually had a negative effect on temperature, which Staff then had to mitigate by increasing minimum reservoir storage levels. Staff specifically stated:

> "with the increased drawdowns that would occur to meet the flow requirements, that was found to have temperature effects. So this was done to not have those effects by increasing the carryover storage." (12/5/16 Workshop, Les Grober, at 73.)

Thus, the statement in the SED that increased flows would result in temperature improvements is not correct. But, rather, the opposite is true – increased flow releases would empty reservoirs and cold water pool reserves, which increases temperature impacts. (12/5/16 Workshop, Les Grober, at 78 [stating more clearly that "there would be some reservoir carryover requirements included to offset any temperature effects."].)

Fifth, Staff does not explain how the improvement in temperature will change the environment. In other words, Staff does not support its conclusion that temperature improvements will result in fishery benefits. Staff determines that a ten percent increase in days in which the EPA temperature criteria is met is a significant benefit. (SED, at 19-18.) Staff employs the same confusing and unclear language used in the floodplain section and states: "A 10% change in the amount of time that USEPA criteria is met, in combination with professional judgment, is used to determine a significant benefit or impact." (SED, at 19-18.) Again, Staff adds to the confusion of this sentence with a second sentence stating that "Ten percent was selected because it accounts for a reasonable range of potential error associated with the assumptions used in the various analytical and modeling techniques." (Id.) Staff cannot use the 10 percent both for margin of error and for indication of a significant benefit; the two concepts are mutually exclusive.

Most critically, Staff is unable to offer a direct link between temperature improvements and change in aquatic environment; i.e. fish improvements. The only method by which Staff attempts to equate temperature improvements into fish benefit is through SalSim. However, SalSim estimated a very small, almost statistically insignificant change in the environment, estimating only 1103 more fish into production. Production is the total number of fish in the system, which means the Proposed Project increases the total production of fish by less than xxx percent. Staff's position is that SalSim is flawed and this number is not correct. (CITE) However, Staff has no other mechanism or other estimate that links the estimated temperature improvement to a change in the aquatic resources environment.

16.4 The Evaluation of Groundwater Impacts is Not Supported by Substantial Evidence.

Staff's analysis of groundwater impacts in the 2016 SED was significantly different from the 2012 analysis. Although that may not seem surprising due to the passage of SGMA and changing role of the State Water Board with regard to groundwater, none of the changes were SGMA related.

In 2012, staff assumed all surface water shortages from the proposed project would be offset by groundwater pumping. (2012 SED, at 9-26.) Staff set a threshold of significance at five percent (5%) or more increase in groundwater pumping. (Id.) Staff disclosed it estimated the 40 percent flow objective would result in an increase in groundwater pumping of approximately 269,000 acre feet in an average year across all four subbasins. (Id., at 9-23.) Staff determined the State Water Board was unable to mitigate for these impacts, since the State Water Board had little jurisdiction over groundwater resources.

16.4.1 Change in Assumption Regarding Reliance on Groundwater Pumping is Unsupported

In the 2012 SED analysis, Staff assumed that any decrease in surface water deliveries would be made up by pumping groundwater. (SWRCB 2012 SED, at 9-26.) This assumption resulted in the SED estimating that groundwater pumping would increase by approximately 269,000 acre feet. In the 2016 SED, Staff no longer assumes that all surface water decreases will result in groundwater pumping increases on a one to one basis. Instead, Staff assumes the same amount of groundwater pumped in 2009 will again be pumped after the Proposed Project is implemented. Staff does not address the difference in the assumptions between the 2012 and the recirculated version.

16.4.2 Staff Fails to Disclose Estimate of 2009 Pumping

Staff fails to disclose the bases for assumptions regarding increased groundwater pumping are based on 2009 maximum estimates. Staff indicates these numbers are presented in the Irrigation Districts Agriculture Water Management Plans (AWMP). (SED, at G-14.) However, the 2009 maximum groundwater pumping is not based on the existing maximum capacity of facilities in 2009. (Id., at G-15.) Rather, the total maximum capacity in 2009 indicates that as much as 626,000 acre feet could be pumped in 2009. (Id.) Similarly, the SED includes different estimates for pumping depending on the year type. The estimated 2009 pumping capacity in an average year is 364,000 acre feet, while in a dry year, the estimated pumping capacity is 524,000 acre feet. (Id.) Therefore, the term "capacity" is a misnomer and misleading.

The SED explains that these numbers are the "likely increase in groundwater pumping." (Id.) However, the SED fails to explain how the State Water Board determined these to be the "likely" numbers. The SED does not explain how the State Water Board calculated the 2009 maximum pumping estimates. The numbers provided by the State Water Board at G-15 clearly indicate the State Water Board understands there is capacity to replace all decreases in surface water with groundwater pumping. This was the 2012 assumption – i.e. that all surface water decreases would be made up with groundwater pumping. In 2009 the existing facilities could have supported the same assumption of total replacement that the State Water Board made in 2012. However, the State Water Board did make that assumption, but instead selected an amount that was less full replacement and somewhat based on pumping that existing in 2009. The State Water Board failed to explain the change in analysis. The State Water Board's failure to explain its change in assumptions and failure to disclose the reasoning behind the new assumptions that some, but not all, of the decreased in surface water would be replaced by groundwater pumping result in a failure to explain, disclose or support the SED groundwater analysis.

16.4.3 Thresholds of Significance Are Deficient and Not Supported by Substantial Evidence

Staff established only two thresholds of significance to evaluate the environmental impacts of the Proposed Project on groundwater pumping. One of the two thresholds analyzes the decrease in groundwater balance. This threshold is deficient for several reasons, the main reason being that it does not properly reflect the environmental impacts of the Proposed Project.

Staff considers a groundwater impact significant if the groundwater balance decreases by more than one inch. The groundwater balance is the net contribution of each irrigation district to the basin calculated by adding the off-stream reservoirs seepage, conveyance losses, and deep percolation from irrigation lands and subtracting irrigation district groundwater pumping. (G-30; 9-46.) Staff determines the net change in the groundwater balance between the baseline and the Proposed Project. This change (i.e. decrease) in the groundwater balance is then divided by the acreage in the basin to determine whether there is one or more inches in groundwater balance depletion.

This threshold of significance does not properly reflect environmental impacts for several reasons. First, spreading the impact over the entire subbasin acreage is misleading and not reflective of environmental impacts. For example, Staff determined that the reduction in groundwater balance for Oakdale and South San Joaquin Irrigation Districts does not have a significant environmental impact on the Eastern San Joaquin subbasin. (SED, at 9-62.) This conclusion is driven by the fact that the Eastern San Joaquin subbasin is, by far, the largest of the subbasins at 707,000 acres. Because of this large subbasin acreage, Staff concludes that there is no environmental impact to the Eastern San Joaquin subbasin because the Proposed Project only reduces the groundwater balance by .6 of an inch. (SED, at 9-58.) However, the existing or baseline balance in inches is only 1.1 inches in total, because the subbasin is so large at 707,000 acres. Therefore, in order to reflect a significant impact, the existing 1.1 inches would have had to have been reduced by 90 percent or more. As set forth in the SED, the 40 percent unimpaired flow of the Proposed Project will reduce the groundwater balance in the Eastern San Joaquin subbasin by <u>more than fifty (50) percent</u>. (9-58.) However, this reduction of groundwater balance by <u>more than half</u> is not considered a significant environmental impact because it does not amount to more than an inch reduction. Staff discloses that the groundwater balance will be reduced by 82 percent in the Merced subbasin, 27 percent in the Turlock subbasin, and 19 percent in the Modesto subbasin. These are considered significant impacts, while the 54 percent reduction in the Eastern San Joaquin subbasin is not a significant impact. These numbers establish that using a threshold of one inch does not reflect the actual impact to the subbasin, but instead, masks the existence of significant environmental impacts. For this reason, this threshold should not be accepted as a reasonable method to determine environmental impacts and the SED is not supported by substantial evidence.

Second, inches of groundwater balance is not an accepted standard or groundwater threshold used by groundwater professionals. The inches of groundwater balance reduction is not found in any [add groundwater plans, studies, etc.]. It is unclear how Staff selected this threshold. Further, Staff offers no explanation regarding scientific support, validity or other technical based support for the selection of this threshold.

It is not clear why Staff did not express or analyze impacts in reduction in groundwater elevation, which is a fairly standard and accepted measure of groundwater impacts.

16.4.3.1 Subsidence Threshold of Significance is Deficient

Staff's second threshold of significance is the potential subsidence of lands. (SED, at 9-47.) However, Staff does not undertake a true analysis of potential subsidence. Instead, Staff assumes that subsidence is significant only in areas "where subsidence has previously occurred." (SED, at 9-47.) The assumption that subsidence will only be significant where is has previously occurred is unexplained and unsupported. Staff fails to explain why this assumption is valid. Instead, Staff concludes that only the El Nido portion of the Merced subbasin has reported subsidence. Staff states: "Despite reports of periods of declining groundwater levels, subsidence has not been reported for the other three subbasins of interest." (9-47.) Staff's conclusions are not cited; it is not disclosed or understood which reports Staff has relied upon for concluding that the other subbasins have not reported any subsidence. Further, when evaluating whether the Proposed Project will result in subsidence, Staff states that outside the Merced subbasin, " subsidence in other subbasins is less likely to occur given there is little evidence that soils in these subbasins are subject to inelastic compaction." (SED, at 9-68.) Staff fails to provide citation, reference or other support for the conclusion regarding the remaining subbasins being exempt from compaction and subsidence. (Id.) The basis upon which the State Water Board concludes that soils in the other basins are not subject to inelastic compaction is not clear. Staff does not provide any soil analysis; it is unclear if any such analysis was performed. Staff does not provide any evaluation of subsidence and appears to be an unsupported assumption. Staff's subsidence threshold are not supported by substantial evidence; Staff simply makes conclusions regarding subsidence and offers no real evaluation or analysis.

16.4.4 Failure to Analyze SGMA Undesirable Results.

Since the 2012 SED was released, the Sustainable Groundwater Management Act (SGMA) was passed in 2014. SGMA provides the State Water Board with enforcement authority over basins that are not managed to sustainable levels by 2040. SGMA defines sustainability as the avoidance of six undesirable results: (1) reduction in groundwater storage; (2) lowered groundwater elevations; (3) degraded water quality; (4) seawater intrusion; (5) land subsidence; and (6) depletions of interconnected surface water. (Water Code section 10721(m).) Staff failed to evaluate the environmental impacts with regard to SGMA compliance and chose deficient thresholds of significance.

SGMA requires that high and medium priority groundwater basins be managed to achieve sustainability. SGMA allows each basin to establish its own definitions of sustainability, however, SGMA requires that such sustainability be based on the avoidance of six undesirable results. These six undesirable results include: decrease in groundwater storage, elevation, subsidence, degradation of water quality, intrusion of seawater, and depletion of interconnected surface waters. Staff fails to evaluate the six factors that SGMA identifies as the metrics upon which groundwater sustainability is defined. Instead of evaluating these six factors, Staff states: "since the groundwater protections that will be afforded by SGMA cannot be determined at this time with precision, this chapter evaluates the potential impacts on groundwater levels from LSJR alternatives without including SGMA as an ameliorating factor, which means that the estimates of impacts are likely more conservative (i.e. worse) than would occur in the groundwater basins over time." (SED, at 9-3.) Simply because Staff cannot determine the "precise" implementation of SGMA, does not mean that it may ignore SGMA and the reasonably foreseeable impacts from the implementation of SGMA. (CEQA Guidelines, § 15145l *Berkeley Keep Jets Over The Bay Committee v. Board of Port Commissioners*, (2001) 91 Cal.App.4th 1344, 1370.) Rather, SGMA provides specific guidelines for evaluating sustainability, which requires Staff to, at the very least, evaluate the impact of the Proposed Project on the six factors that define sustainability under SGMA.

First, Staff should have evaluated the impacts of the proposed project Objective on groundwater storage. Staff includes a brief discussion of each groundwater basin in the impacted Plan Area. (SED, at 9-24 to 9-31.) This description fails to include any disclosure of groundwater storage for any of the basins in the Plan Area. (Id.) Specifically, Staff fails to discuss the groundwater storage available in each basin, the amount of drawdown or elevation change, the ability to recharge each basin, the quantity of groundwater storage lost due to compaction, or any other technical issue related to groundwater storage. Further, the ability to store groundwater and recover stored groundwater is vitally important to each groundwater basin's ability to achieve sustainability. Staff fails to identify these issues in each basin. In addition, Staff failed to analyze the potential impacts of the Proposed Project on the issue of groundwater storage. The SED is deficient because it simply does not attempt to evaluate how the Proposed Project will affect groundwater storage.

Second, Staff should have evaluated the impacts of the Proposed Project on groundwater elevations. As noted above, Staff performs an indirect analysis of groundwater elevation impacts. Specifically, Staff estimates the decrease in groundwater balance by measuring each Irrigation District's groundwater balance and dividing by the acres in each corresponding basin. The metric of inches of groundwater balance per acre is compared before and after each proposed alternative. As noted above, this groundwater balance inches metric is not an accepted measurement; it is not used by any other groundwater analysis; it is not accepted as valid by any groundwater experts. It is not clear why Staff chose to use such a complicated measurement, when the measurement of groundwater elevation is often used, is accepted as technical practice and can be more readily understood and compared to other basins. Further, Staff offers an approximate conversion of each inch of groundwater balance equating to about 10 inches of groundwater elevation. (SED, at 9-46 – 9-47.) Staff fails to explain how it analyzed the impacts of the Proposed Project on the groundwater elevation of each basin.

Third, Staff should have evaluated the impacts of the Proposed Project on seawater intrusion. This evaluation would likely be limited and not extensive. The Plan Area is not influenced by coastal conditions and seawater intrusion is not likely to result from the Proposed Project. There are existing sea water intrusion maps that indicate the existence, direction and extent of sea water intrusion. Staff should have disclosed the existing information along with hydrogeologic information from the Plan Area subbasins and provided a brief analysis about whether seawater intrusion applied to the subbasins affected by the Proposed Project.

Fourth, Staff should have evaluated the impacts of the Proposed Project on subsidence. As mentioned above, Staff did not perform a proper analysis of subsidence. Staff assumed that no significant subsidence would occur in areas where subsidence had not yet occurred. (SED, at 9-47.)

This obscenely simplistic conclusion contradicts the subsidence information provided in the background section and fails to satisfy the evaluation required by CEQA.

In the background section of the groundwater chapter, Staff recognized that subsidence is a major issue in the San Joaquin Valley. (SED, at 9-17.) The SED acknowledges that the "extensive withdrawal of groundwater from the unconsolidated deposits has cause[d] widespread land subsidence in the San Joaquin Valley (USGS 1986). Long-term groundwater level declines can result in a vast one-time release of "water of compaction" from compacting silt and clay layers in the aquifer system, which causes land subsidence (USGS 1999). Land subsidence in the region due to groundwater pumping began in the mid-1920's (USGS 1975; USGS 1991; USGS 1999.)" (SED, at 9-17.) With the understanding that subsidence has been an issue in the region and that the Plan Area continues to have decreasing groundwater levels (SED, at 9-13), it is contradictory for the SED to then conclude that only a small portion of one of the basins in the Plan Area could potentially experience subsidence impacts.

CEQA requires Staff identify all reasonably foreseeable impacts that could result from the Proposed Project. (*Laurel Heights*, at 404-410.) To recognize that the San Joaquin Valley has a history of subsidence and that groundwater levels are falling, but fail to identify and evaluate potential impacts from subsidence is irresponsible and certainly not compliant with CEQA requirements.

Further, the failure to evaluate the impacts on subsidence ignores the best available science. There are several models that evaluate subsidence and are able to estimate subsidence impacts from groundwater depletion. Staff should have analyzed subsidence with one of these tools. Further, DWR has released *Best Management Practices* and Staff could have used these or other similar practices to evaluate subsidence. The cursory set of conclusions that are included in the existing subsidence chapter do not amount to sufficient analysis under CEQA or SGMA requirements.

Fifth, Staff should have evaluated the impacts of the Tributary Flow Objective on water quality. Staff fails to identify the existing groundwater quality in each of the groundwater basins in the Plan Area. Staff states that the groundwater quality varies substantially throughout the basins of the Plan Area. (SED, at 9-19.) Staff states generally that elevated salinity levels exist, especially in the western portion of the Valley. (SED, at 9-20.) Nitrates are not found in high concentrations, but exist increasingly due to groundwater pumping and irrigated agriculture. (Id.) These highly generalized statements do not disclose the water quality in each basin, which Staff must do to comply with CEQA. In its analysis, the also concedes that the Proposed Project could degrade groundwater quality. (SED,at 9-63.) However, instead of identifying and analyzing potential groundwater quality impacts, Staff simply states the analysis is speculative. (SED, at 9-63.) This statement is odd, provided Staff was able to conclude that the impacts could result in degradation. Staff states:

"Specifically, determining the changes to groundwater quality is speculative as it is dependent upon many factors including, but not limited to, the location of groundwater pumping, the amount of groundwater pumped, the frequency at which pumping would occur, location of contaminants, the type of contaminants (e.g. water soluble or not), proximity of contamination to aquifers, hydrogeological characteristics of the aquifer, individual well construction, well depth, groundwater levels, and localized conditions such as proximity to unused or abandoned wells." (SED, at 9-63.)

Staff is able to correctly identify the components and information necessary to properly analyze groundwater quality impacts. Simply because it would be a large amount of work does not mean that the analysis is speculative. The analysis is not speculative; CEQA requires Staff analyze the environmental impacts of the Proposed Project. To the extent such evaluation must be caveated or otherwise rely on reasonable assumptions, it does not mean that such evaluation is so speculative it cannot be performed. (CEQA Guidelines, § 15145l *Berkeley Keep Jets Over The Bay Committee v. Board of Port Commissioners*, (2001) 91 Cal.App.4th 1344, 1370.)

Finally, Staff should have evaluated the impacts of the Proposed Project on depletion of interconnected surface water supplies. Staff fails to identify which groundwater aquifers are interconnected to surface water. Staff states that the Proposed Project would increase water in the channels that could recharge groundwater basins. (SED, at 9-62.) Staff continues on to state that such recharge is not likely, as recharge from the existing River channels is insubstantial. (Id.) Staff also notes that if groundwater levels decrease "over time, the aquifer may eventually no longer intersect with portions of the rivers." (9-62.) These statements are general, contradictory, and unsupported. The statements are general: Staff fails to look at any specific river (Stanislaus, Tuolumne, Merced or San Joaquin) and determine whether or not it is interconnected to surface water at any specific point. Further, Staff fails to analyze whether the Proposed Project would affect the interconnected relationships that may exist. The statements are contradictory: on one hand Staff takes the position that increased water in the channel will benefit interconnected groundwater, but on the other hand Staff recognizes that groundwater levels may decrease and not have any interconnection with surface water at all. The reader is left to wonder which one of these environmental impacts Staff believes is reasonably foreseeable.

16.4.5 The SED Does Not Accurately Describe the Groundwater Baseline Conditions.

Staff fails to accurately describe the baseline groundwater conditions. Staff identifies the four groundwater basins that underlie the Plan Area. (SED, at 9-1.) Staff discloses the acres overlying each basin and includes a chart that denotes which aquifer characteristics (such as formations and deposits) exist within each basin. Staff also provides general information regarding water balance and groundwater movement that is text book language and not specific to any basin. However, Staff fails to describe the actual baseline for each groundwater basin. For example, Staff does not provide a contour map showing the hydrogeolic features of each basin. Staff does not explain how water moves vertically or horizontally within each basin. Staff does not estimate or summarize the estimated recharge for each basin. Staff does not identify which basins have specific groundwater quantity or quality challenges or the origins or cause of any such challenges. Further, Staff does not address movement of water between the basins or address the different depths within each basin. Staff explains that its analysis includes several "simplifying assumptions" which include the assumption that the four connected basins are separate pools of water and that each basin has no separation between shallow and deeper aquifers. (SED, at 9-44.) These assumptions simply misstate the characteristics, challenges and specific attributes of each groundwater basin. Staff must accurately describe each groundwater basin potentially affected by the proposed project and identify the regional reliance on each groundwater basin in the description of the groundwater baseline.

16.4.6 Failure to Analyze if Groundwater Pumping is Reasonable

Staff estimates that, in an average year, the 40 percent unimpaired flow requirement will result in an increase of approximately 105,000 acre feet of groundwater pumping per year. (SED, at G-15.) This same alternative would increase groundwater pumping by 302,000 acre feet in dry years. (Id.) Staff fails to analyze whether there would be groundwater available to support the increased pumping. Staff never undertakes even a superficial analysis of whether such water may be available in the future. The assumption that groundwater will be available to sustain increased pumping is not reasonable. For example, if there are three dry years in a row, Staff assumes that the groundwater basins will be able to support a drawdown of 1.572 million acre feet of groundwater pumping in that three year period. The total quantity of storage in the four basins is xxxx. For this reason, it is not reasonable for Staff to assume that the amount of groundwater Staff relies upon will be available will actually be available. If Staff must revise the SED to include an analysis of whether the amount of groundwater Staff assumes will be pumped is available.

16.4.7 Failure to Analyze Whether Groundwater Pumping is Sustainable

Since the 2012 SED release, SGMA was passed and has become law. SGMA requires the sustainable management of groundwater. Because local groundwater sustainability agencies are required to develop groundwater sustainability plans that define sustainability for each basin, Staff concludes that evaluating whether the proposed project will be sustainable is speculative. (SED, at 9-3.) The statement that the SED is exempt from analyzing sustainability due to speculation is incorrect.

First, Staff provides its own definition of sustainability. Staff states that "declining groundwater levels over a period of time indicate that groundwater use within a subbasin is unsustainable." (SED, at 9-24.) In addition, Staff stated that in the Eastern San Joaquin basin groundwater levels have declined over the past 40 years and that such sustained decline is "unsustainable." (SED, at 9-24.) Therefore, it appears that the Staff has established its own definitions of sustainability and has begun to apply the definitions to the conditions in the basins. Per Staff's definition, the decline of groundwater levels equates to sustainability. Staff has access to historical groundwater elevation changes. In addition, Staff has predicted the impact of the Proposed Project on groundwater use, which it could use to estimate elevation changes. For this reason, the conclusion that the evaluation of sustainability is speculative is not correct or supported. Staff must evaluate whether the Proposed Project will be sustainable.

Second, even without Staff's definition, sustainability under SGMA is not speculative. To the contrary, SGMA provides that sustainability must be based on the avoidance of six undesirable results. Therefore, SGMA provides the roadmap to how sustainability must be defined. For this reason, sustainability under SGMA is not speculative, but rather, defined by six specific metrics. It is not speculative to evaluate the six factors that define sustainability under SGMA. This analysis is not speculative and if performed will allow Staff to estimate whether the Proposed Project will result in groundwater sustainability.

16.4.8 Failure to Evaluate Environmental Impacts Outside the Irrigation District Service Areas

Staff only evaluates impacts in the service areas of the Irrigation Districts. (SED, at 9-45 to 9-47.) Staff evaluated groundwater pumping of the Irrigation Districts. (Id., at 9-45.) In addition, Staff evaluated the impacts to Irrigation District groundwater pumping. (Id., at 9-46.) However, Staff failed to evaluate the impact of the Proposed Project on the area outside the Irrigation District service area. Instead, Staff makes the assumption that the impacts to the Irrigation Districts will impact those inside and outside the Irrigation District service areas in the same manner. This assumption is unexplained and undisclosed. Only after reading the document several times does it become clear that Staff failed to analyze how the Proposed Project will impact areas outside the Irrigation District service areas. Staff must revise the SED to include an analysis of how the Proposed Project will impact areas outside the Irrigation District service areas.

16.4.9 Failure to Analyze Basin Characteristics

Staff fails to consider the attributes of the subbasins in its analysis of the impacts of the Proposed Project. Specifically, Staff failed to evaluate how water moves and flows in and between the subbasins. Rather, Staff acknowledged that it considered each subbasin "to be four separate pools of water." (SED, at 9-44.) Staff went on to concede that "in reality, water can move slowly between subbasins." (Id.) However, Staff explained that the "simplifying assumptions", such as the subbasins being separate pools, are "acceptable because the purpose of the analysis is to estimate the general magnitude of the average effect" of the Proposed Project. (Id.) However, making assumptions that do not reflect the reality of how the subbains work will not provide a correct estimate of the general magnitude of how the systems work. Instead, proceeding on fundamental and knowing mischaracterizations of how groundwater flows in the subbasins will only provide an incorrect analysis; regardless of whether the analysis is general or specific, it will be incorrect.

In addition, Staff failed to evaluate the geomorphology, depth, substrates, and other technical attributes of each subbasin. Staff concedes it assumed there was no "separation between shallow and deep aquifers." (SED, at 9-44.) Staff explained that the failure to evaluate varying depths and substrates was appropriate because it assumed groundwater pumping would increase and it would increase in "both shallow and deep wells." (Id.) Staff also failed to analyze the different substrate materials and/or permeability between aquifer sections. (Id.) Staff acknowledged this failure, but stated that such precision was unnecessary because Staff assumed that "water pumped from a deeper confined section of the aquifer would eventually be replaced by water from above or from surrounding basins." (Id.) This assumption is unsupported, as Staff failed to evaluate how water moves from surrounding basins and also failed to evaluate how water would move between from higher to lower depths.

16.4.10 Failure to Analyze and Rely upon the Best Available Science

There are several local and regional groundwater modeling tools that are publicly available that Staff failed to use to analyze the groundwater impacts of the Proposed Project.

16.5 The Evaluation of the Impacts to Hydropower Not Supported by Substantial Evidence

Staff's evaluation of the Proposed Project's impact on hydropower is based entirely on results from the WSE Model. (SED, at 14-30.) As more fully set forth above, the WSE Model assumes any reduction from the proposed project will be taken in water deliveries and therefore reservoir storage will remain unaffected. Also as explained more fully above, this assumption is incorrect, unrealistic, and completely without support. One of the absurdities that results from this unsupported assumption is that the SED concludes the proposed project has almost no hydropower impact. Because the hydropower analysis is based entirely on faulty assumptions that reservoir storage will remain unchanged, it is deficient and unsupported by substantial evidence.

Apart from the fundamental defect of incorrectly assuming hydropower will not be affected, the hydropower analysis has other deficiencies as well.

First, it fails to properly analyze the impact from shifting the seasonal timing of water releases from reservoirs. Appendix J concedes the Proposed Project will decrease hydropower generation during the months of July and August because of reduction in reservoir releases during those months. (SED, at 14-32.) Likewise, the Proposed Project will increase hydropower generation during the months of May and June due to increased reservoir releases. (*Id*.) However, Staff only evaluates annual hydropower impacts and therefore fails to analyze the impact of shifting hydropower generation from summer to spring.

During summer months, energy demands peak, supply is low and transmission is constrained. This combination makes summer energy more valuable and costly. Spring demand is lower, supply is higher, and transmission is less constrained compared to summer. Thus, the proposed transfer of summer hydropower generation to spring hydropower generation is not without impact. It has the potential to result in increased costs, increased supply problems, and increased capacity issues. Because Staff fails to analyze these impacts, it is not supported by substantial evidence.

Second, Staff fails to consider the cost of replacement energy. The spring season is a high production period for wind and Pacific Northwest hydropower generation which drives down the value and price of energy. The summer months are high demand months with low supply, which drive energy costs up. Thus, the proposed project's shift of hydropower generation from summer to spring will require stakeholders to purchase energy in summer months when it is most expensive. Because Staff fails to consider this cost and the environmental impact therefrom, it is not supported by substantial evidence. Fourth, Staff incorrectly assumes regional economic effects due to hydropower loss are "virtually imperceptible" when compared to annual statewide electricity production. (SED, at 18-22.) To the contrary, the proposed project will impact the local regions that depend on the hydropower that would be reduced by the Proposed Project. The region includes hydropower sources that supply only regional customers and do not contribute to the statewide grid. Therefore, the impacts of the proposed project will be much more substantial and concentrated to the project area. Staff misleadingly dilutes the regional effects by spreading the effects statewide, when in fact those effects will be localized. Because Staff fails to analyze the regional hydropower impacts, the analysis is not supported by substantial evidence.

16.6 The Analysis of Flood Risk is Not Supported by Substantial Evidence.

Staff finds the proposed project will have a less than significant impact on flooding and flood risk. (SED, at 6-25 to 6-26.) Staff's flooding risk analysis, however, is inadequate. Staff's analysis is inadequate for two primary reasons.

First, Staff's evaluation of the proposed project's impact on flood risk is based entirely on results from the WSE Model. (SED, at 6-20.) As more fully set forth above, the WSE Model assumes any reduction from the proposed project will be taken in water deliveries and therefore reservoir storage will remain unaffected. Also, as explained more fully above, this assumption is incorrect, unrealistic, and completely without support. For instance, Staff states, "The same flood control curves and daily operations would be used for actual operations of the three reservoirs under the LSJR alternatives as under the baseline." (*Id*., at 6-22.) In other words, Staff did not evaluate the impacts of the proposed project on flood control, it simply assumed reservoir storage levels would remain unchanged and there was no analysis to perform.

Second, because Staff relies on the faulty operational assumption of the WSE Model, it fails to evaluate the flood risks that will occur if the proposed project results in increased reservoir fluctuation. For example, the proposed project may increase reservoir fluctuation and alleviate flood risk by increasing the frequency that reservoir levels are low or close to empty. Staff does not disclose or analyze this potential impact.

Third, the SED lacks transparency regarding flood control relief from the proposed project. The SED seems to indicate that Staff has yet to identify the level at which the proposed requirements would cease to apply due to flood control requirements by stating:

> "[T]he percent of unimpaired flow requirement, as specified by a particular LSJR alternative, would cease to apply during high flows or flooding to preserve public health and safety. The State Water Board would coordinate with federal, state and local agencies to determine when it is appropriate to waive the requirements."

(SED, at 6-20.) This statement, however, is misleading. The WSE Model includes a specific flood control maximum for each tributary. (SED, Appx. F, at 1-17 [capping flows on the Tuolumne River at 3,500 cfs, the Stanislaus River at 2,500 cfs and the Merced River at 2,000 cfs].) Therefore, the SED is internally inconsistent and misleading; the flood analysis fails to disclose that flood control limits have already been selected and instead states that such limits will be determined at a later date after coordination with appropriate agencies. In reality, however, the WSE Model has already included specific flood control limits for each tributary. These limits were not specifically disclosed and Staff fails to analyze whether the selected limits are sufficient or overly protective of flood risk. For these reasons, Staff's flood risk analysis is not supported by substantial evidence.

16.7 The Analysis of Air Quality is Not Supported by Substantial Evidence.

Staff does not analyze the impacts to air quality that may be caused by the proposed amendments to the water quality control plan, despite the fact that the San Joaquin Valley is designated as an area of "serious" "nonattainment" for the particulate matter standards under the Clean Air Act.

16.7.1 The San Joaquin Valley is an area of Serious Nonattainment

Pursuant to Section 109 of the Clean Air Act, the United States Environmental Protection Agency ("USEPA") has established national ambient air quality standards ("NAAQS") for certain air pollutants. (42 USC § 7409.) As relevant here, in 1997 the EPA established a new standard for particulate matter (PM) for particles with an aerodynamic diameter less than or equal to 2.5 micrometers ($PM_{2.5}$), known as the 1997 $PM_{2.5}$ standards. (62 Fed. Reg. 38652.) The purpose of the revised standard was to provide "increased protection against a wide range of PM-related health effects," including premature death, respiratory symptoms and disease (such as asthma), decreased lung function, and alterations in lung tissue and structure. (68 Fed. Reg. 38652.) The EPA set annual and 24-hour standards for $PM_{2.5}$ (50 C.F.R. § 50.7.)

The EPA has designated the San Joaquin Valley area (which includes all or parts of San Joaquin, Stanislaus, Merced, Madera, Fresno, Tulare, Kings and the valley portion of Kern Counties) as "serious" "nonattainment" for both the annual and 24-hour 1997 $PM_{2.5}$ standards (40 C.F.R. 81.305.) This area covers more than 23,000 square miles and is home to more than four million people, in addition to being the nation's leading agricultural region. (See Notice of Proposed Rulemaking: Findings of Failure to Attain the 1997 $PM_{2.5}$ Standards; California; San Joaquin Valley, p. 6.) As a result of this designation, the California Air Resources Board (CARB) became obligated to submit a "Serious area plan" for the San Joaquin Valley with "provisions to assure that the best available control measures for the control of direct $PM_{2.5}$ and $PM_{2.5}$ precursors [will] be implemented" and a "demonstration . . . that the plan provides for attainment as expeditiously as practicable but no later than December 31, 2015." (Notice of Proposed Rulemaking, p. 8.)

CARB submitted its Serious area plan to the USEPA in two parts on June 25, 2015, and August 13, 2015, along with a request to extend the attainment date by three years for the 24-hour $PM_{2.5}$ standard, and by five years for the annual $PM_{2.5}$ standard. (Notice of Proposed Rulemaking, p. 9.) The EPA initially proposed to approve most of the San Joaquin Valley's Serious area plan, and to grant the requested attainment date extensions. (Notice of Proposed Rulemaking, p. 9.) However, after receiving adverse comments on its proposal, the USEPA revised its proposal and determined that it could not extend the attainment date beyond December 31, 2015. Accordingly, USEPA reviewed the relevant data on San Joaquin Valley air quality for PM to determine if the standards for annual and 24-hour $PM_{2.5}$ had been attained from the 2013 to 2015 period. Upon a review of that information, USEPA proposed to determine "that the San Joaquin Valley failed to attain the 1997 annual and 24-hour $PM_{2.5}$ standards by the December 31, 2015 attainment date." (Notice of Proposed Rulemaking, p. 20.)

If the USEPA adopts its proposed determination that the San Joaquin Valley failed to attain the requisite standards by the applicable attainment date, California must submit a revised state implementation plan (SIP) by December 31, 2016, that demonstrates "expeditious attainment of standards within the time period . . . and that provides for annual reduction in the emissions of $PM_{2.5}$ or a $PM_{2.5}$ plan precursor pollutant within the area of not less than five percent until attainment." (Notice of Proposed Rulemaking, p. 21-22.)

16.7.2 Large Scale Fallowing can result in fugitive dust and particulate matter emissions

Both the State Water Board and the California Air Resources Board have previously acknowledged that abandoning, fallowing or otherwise reducing vegetation cover on fields can create dust and particulate matter problems. For instance, in Revised Water Right Order 2002-0016, involving a joint application for the long term transfer of water from Imperial Irrigation District (IID) to San Diego County Water Authority (SDCWA)[64], the State Water Board determined that "there is a potential for significant unavoidable impacts associated with fallowing." (WRO 2002-0016, at 70.) The Board explained, "fallowed lands may be subject to wind erosion, creating fugitive dust impacts unless actions are taken to reduce these effects." (WRO 2002-0016, at 70.) In approving the long-term transfer of water from IID to SDCWA, the Board required IID to implement mitigation measures and best management practices, such as conservation crop sequencing and wind erosion protection measures, application of soil stabilization chemicals to fallowed land, re-application of drain water to allow growth of protective vegetation, or reuse of irrigation return flows to irrigate windbreaks across stretches of land. (WRO 2002-16, at 70.) The Board also required IID to comply with all applicable requirements in the final updated SIP for the Imperial Valley. (WRO 2002-16, at 70.)

The Air Resources Board has also acknowledged the potential for PM emissions resulting from land fallowing. CARB previously sponsored a report from the Biology Department at San Diego State University to explore dust suppression methods in the Antelope Valley in response to increased air quality problems caused by the abandonment of farms in the area. The report notes

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[64] *In the Matter of Imperial Irrigation District's (IID) and San Diego County Water Authority's (SDCWA) Amended Joint Petition for Approval of a Long-Term Transfer of Conserved Water from IID to SDCWA and to Change the Point of Diversion, Place of Use, and Purpose of Use*; Revised Water Right Order 2002-0016.

that the loss of farming and other human disturbances led to high levels of PM in the towns of Lancaster and Palmdale. (Research into the Development of Biological Methods of Dust Suppression in the Antelope Valley, 2006 Final Report, at 1.)

16.7.3 The SED fails to analyze the impacts of fallowing on air quality in the San Joaquin Valley

Staff estimates the Proposed Project will result in an average loss of approximately 24,000 acres of farmland in the San Joaquin Valley. (SED, at 11-51, Figure 11-17.) In dry years, approximately 100,000 acres would be fallowed under the new plan as compared to the no action alternative. (SED, Figure 11-9 to 11-14.) Despite the vast amount of fallowing that is predicted to occur as a result of the proposed changes to the water quality control plan, Staff fails to evaluate any of the potential impacts to air quality in the San Joaquin Valley.

Public Resource Code section 21080.4 requires that the lead agency, in this case the State Water Board, send a notice of preparation to, among others, "those public agencies having jurisdiction by law over the natural resources affected by the project. . .." The Notice of Preparation circulated by the State Water Board indicates that the SED will evaluate potential environmental effects on air quality,[65] but the Board did not send the notice of preparation to the Air Resources Board. Furthermore, an EIR, or in this case an SED, must identify and describe all "significant" environmental effects of the project, including short-term and long-term effects, as well as all mitigation measures to minimize the significant environmental effects. (Public Resources Code, § 21100(b); Cal. Code Regs., tit. 14, § 15126.2.) If an environmental effect is found to be "not significant," the document must nevertheless include a statement explaining the reasons for that determination. (Public Resources Code, § 21100(c); Cal Code Regs., tit. 14, § 15128.) While Staff identifies and provides brief analysis of *some* effects of fallowing, including the potential for increased distribution and abundance of invasive plants (SED, at 18-42), it fails to address any

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[65] Notice of Preparation and of Scoping Meeting for Environmental Documentation for the Update and Implementation of the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary: South Delta Salinity and San Joaquin River Flows, page 10, available at http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/bay_delta_plan/environmental_review/docs/nop2009feb13.pdf

impacts to air quality caused by the widespread fallowing that will occur if the amendments to the water quality control plan are implemented. Given the State Water Board's prior acknowledgement and determination that fallowing can cause significant and unavoidable impacts to air quality, and the already perilous condition of air quality in the San Joaquin Valley, Staff's analysis is fatally deficient for failing to address the potential impacts to air quality that could be caused by wide-spread fallowing of currently productive farmland. (See e.g. *County of Sanitation Dist. No. 2 v. County of Kern*, (2005) 127 Cal.App.4th 1544, 1594-1598 [where the County adopted an ordinance that would affect 23,594 acres of farmland by restricting the application of Class B biosolids on agricultural lands, the County was required to prepare an EIR before adopting the ordinance; the court observed that the County "failed to study the impact of dust on air quality and, as a result, there exists a plausible inference" that the ordinance could cause the addition of 150 pounds per day of PM-10 to the air as a result of soil loss caused by wind erosion on fallowed fields].)

17.0 The Cumulative Impact Analysis is Not Supported by Substantial Evidence.

Staff is required to analyze past, present, and future projects whose "individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." (Cal. Code Regs., tit. 14, § 15355.) A cumulative impact from multiple projects is "the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonable foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time." (Cal. Code Regs., tit. 14, § 15355 [b].) Staff's cumulative analysis is deficient and lacking in substantial evidence for several reasons.

First, Staff's cumulative analysis is often cursory, without any evaluation of the relationship between the Proposed Project and the future project or the cumulative potential impacts. For example, Staff discloses that Waterfix is a future potential project which could, together with the Proposed Project, result in cumulative impacts. However, the analysis does not explain or estimate the nature of the potential impacts. In addition, Staff fails to disclose that the Proposed Project would actually provide water to the WaterFix project proponents. Staff is required to disclose and analyze how the Proposed Project along with WaterFix would affect the environment. Certainly disclosing how the Proposed Project relates to WaterFix is an integral part of that requirement. Staff failed to evaluate how the Proposed Project and WaterFix are related and also failed to evaluate how the two projects together will impact the environment. For these reasons, Staff's cumulative analysis is not sufficient and not supported by substantial evidence.

Second, Staff fails to evaluate how the Proposed Project is related to or affected by the Phase 2 review of the Bay Delta Plan. (SED, at 17-19.) Staff briefly describes the Phase 2 phase of the Bay Delta Plan review and discloses this project may change the flows in the Delta and export/inflow ratios. Staff also offers that these flow alterations may impact salinity conditions of Delta waters. (Id.) However, Staff offers no further discussion or evaluation of how the flow changes will impact the environment. Provided the entire purpose of the Proposed Project is to provide flow to protect beneficial uses and Staff discloses the Phase 2 project will impact the same Bay-Delta flow component, Staff must provide more analysis than simply "this project will alter flows." The existing analysis is deficient and for this reason the cumulative analysis portion of the SED is not supported by substantial evidence.

Third, Staff's analysis of water transfers is deficient. Staff states generally that water transfers would occur with or without the Proposed Project and that most transfers may require additional approvals. (SED, at 17-20.) Although these may be true, it does not lessen or reduce the need for Staff to consider the cumulative impacts of transfers. Further, Staff fails to disclose the water transfer in which it proposes will occur due to the Proposed Project – the transfer of water to the City and County of San Francisco from water right holders on the Tuolumne. Given Staff's reliance on this hypothetical transfer in the analysis of the impacts of the Proposed Project, Staff is required to identify that transfer here and evaluate its cumulative impacts. The section in which Staff attempts to evaluate the cumulative impacts of water transfers is also flawed. (Id.) This section makes unsupported sweeping assumptions, such as: "Because any increases in flows resulting from the transfers would be well within normal channel capacities, water transfers are typically not expected to result in a change to levee stability, flooding potential, or sediment and erosion potential." (Id.) It is not clear why Staff makes such assertion and Staff does not provide support for these assertions; certainly such unsupported conclusions are not sufficient to evade environmental review of cumulative impacts.

18.0 CONCLUSION.

The proposed revisions to the Bay-Delta plan set forth in Appendix K are unlawful for the various reasons set forth above, and the Board should decline to adopt them. In addition, the SED must be revised and recirculated.

An environmental document must be recirculated when significant new information is added after its release to the public. (Pub. Resources Code, § 15088.5(a).) Significant new information includes:

- a new significant environmental impact would result from the project or from a new mitigation measure proposed to be implemented;
- a substantial increase in the severity of an environmental impact would result unless mitigation measures area adopted that reduce the impact to a level of insignificance;
- a feasible project alternative or mitigation measure considerably different from others previously analyzed; and
- the draft document was so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded.

(Pub. Resources Code, § 15088.5(a)(1)-(4).)

As the substance of these comments make clear, the revisions necessary to the SED will include increased severity of environmental impact, considerably different project alternatives, and considerably different mitigation measures. For these reasons, the SED will need to be revised and recirculated.

As currently drafted, the SED is fundamentally inadequate. As mentioned elsewhere in these comments, the SED does not analyze the environmental impacts stemming from the Narrative Objective, the program of implementation, methods of compliance, mitigation measures, or a reasonable range of alternatives. The environmental analysis included in the SED is deficient; it is filled with errors, unsupported assumptions, conjecture, internal inconsistencies, and promises to develop appropriate analysis at a later date. Perhaps most importantly, these deficiencies are so fundamental that the SED does not allow for meaningful review of the environmental impacts. For these reasons, Staff is required to redraft and recirculate the SED.

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STATE WATER RESOURCES CONTROL BOARD

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Draft Substitute Environmental Document	)
In Support of Potential Changes to the Water	)
Quality Control Plan for the San Francisco Bay-	)
Sacramento/San Joaquin Delta Estuary; San	)
Joaquin River Flows and Southern Delta Water	)
Quality	)

SAN JOAQUIN TRIBUTARIES AUTHORITY

Comments on the Draft Substitute Environmental Document

Dated: March 17, 2017

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1. INTRODUCTION

On September 15, 2016, the State Water Resources Control Board ("State Water Board" or "Board" or "SWRCB" or "SWB") released its draft revised substitute environmental document ("SED") in support of potential changes to the Water Quality Control Plan for the San Francisco Bay-Sacramento/San Joaquin Delta Estuary ("Bay Delta Plan"): San Joaquin River flows and southern Delta water quality (Phase I). The SED is characterized as a "recirculated SED", in reference to a draft substitute environmental document that was released by the State Water Board on December 31, 2012 ("2012 Draft SED"). (SED, at 1-2.) Contrary to the State Water Board's characterization, the SED is not a recirculation of the 2012 Draft SED in any sense of the word. The State Water Board received approximately 4,000 responses to the 2012 Draft SED. Apart from providing a summary of certain concerns raised in 119 of those 4,000 responses, the Board has neglected the thousands of comments and criticisms of the 2012 Draft SED, and has released an entirely new document that bears no resemblance to the original, other than the flawed and incomplete analysis that plagues both documents. (SED, at Appx. M, p. 1)

The stated purpose of the SED is to analyze the environmental impacts of the State Water Board's proposed revision to the Bay Delta Plan, and to fulfill the requirements of the California Environmental Quality Act ("CEQA") and the Porter-Cologne Water Quality Control Act ("PCWQA"). (SED, at ES-2.) The proposed revision to the Bay Delta Plan would, among other things, expand the geographic scope of 2006 Bay Delta Plan to cover certain tributary watersheds to the San Joaquin River, and replace the existing Lower San Joaquin River flow objective at the Vernalis compliance point with a requirement to maintain a percent of unimpaired flow between 30 and 50 percent on each of the Stanislaus, Tuolumne, and Merced Rivers from February through June. (SED, at Appx. K, p. 1, 18.) The SED purports to analyze the environmental impacts – on a "programmatic level" - of requiring a range of unimpaired flow between 20 and 30 percent (LSJR Alternative 2), between 30 and 50 percent (LSJR Alternative 3), and between 50 and 60 percent (LSJR Alternative 4). (SED, at ES-2, ES-14.) The SED has identified LSJR Alternative 3 as the "Recommended LSJR Alternative," with an initial unimpaired flow of 40 percent and an adaptive range of 30 to 50 percent on each of the three tributaries ("Tributary Flow Objective"). (SED, at ES-21.)

The San Joaquin Tributaries Authority ("SJTA")[1] provides the following comments on the SED. In sum, the SED should not be adopted by the State Water Board because the environmental analysis does not comply with CEQA, nor with the Board's obligations for analyzing the environmental impacts of a water quality control plan as a certified regulatory program. In addition, the SED should not serve as a basis for the adoption of the proposed amendments to the Bay Delta Plan. The proposed water quality objectives and the program of implementation violate the PCWQA, Article X, Section 2 of the California Constitution, the rules of water right priority, and various other laws and regulations. For these reasons and others, all of which are set forth in detail below, the Board should decline to adopt the SED and the proposed revisions to the Bay-Delta Plan.

The SJTA incorporates the comments of the City and County of San Francisco ("CCSF"), Modesto Irrigation District ("MID"), Turlock Irrigation District ("TID"), Oakdale Irrigation District ("OID"), and South San Joaquin Irrigation District ("SSJID").

The SJTA also incorporates by reference previous comments and information the SJTA and its member agencies provided the State Water Board in Phase 1 and Phase 2.

1.1. History of Water Quality Control Plans for the San Francisco Bay/Sacramento – San Joaquin Delta

The State Water Board has long recognized that California's two massive water projects, the Central Valley Project ("CVP") operated by the United States Bureau of Reclamation ("USBR") and the State Water Project ("SWP") operated by the Department of Water Resources ("DWR"), have had significant impacts on fish, wildlife and water quality in the Sacramento-San Joaquin Delta ("Delta").[2] Indeed, the State Water Board has stated that the protection of all fishery species

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[1] The San Joaquin Tributaries Authority is a California Joint Powers Authority, duly organized and existing in accordance with the provisions of Sections 6500 *et seq*. of the Government Code, and comprised of Modesto Irrigation District, Oakdale Irrigation District, South San Joaquin Irrigation District, Turlock Irrigation District and the City and County of San Francisco, a Public Utilities District, all of which are authorized by the laws of the State of California to administer water supplies and to appear and represent their landowners in matters relating to water resources.

[2] In 1959, the California Legislature fixed the legal boundaries of the Sacramento-San Joaquin Delta. (Water Code, § 12220.)

within the Delta, including the protection of salmon, "would require the virtual shutting down of the project export pumps" operated by USBR and DWR. (Water Rights Decision 1485, p. 13.) In recognition of these impacts, the Board has been developing and adopting water quality standards to protect the Delta since 1965. (*United States v. State Water Resources Control Bd.* (1986) 182 Cal.App.3d 82, 107 ("*Racanelli*".))[3]

The first set of comprehensive water quality standards for the Delta was developed by several agencies, including DWR and USBR. (*Racanelli, supra,* 182 Cal.App.3d at 110.) The State Water Board later incorporated these standards into DWR's permits for the operation of the SWP in Water Right Decision 1275. (*Ibid.)* In 1967, the State Water Board submitted these standards to the United States Secretary of the Interior for approval in accordance with the Federal Water Pollution Control Act, and the standards were approved on the condition that the Board consider adopting more stringent Delta salinity requirements. (*Ibid.)*

Several years later, in 1971, the State Water Board established new water quality standards for the Delta in Decision 1379. (*Racanelli, supra,* 182 Cal.App.3d at 110.) The standards were denominated as "State Delta Standards," and established protections for agriculture, municipal/industrial supply, and fish and wildlife. (Water Rights Decision 1379, p. 37.) The State Delta Standards used a set of compliance points exclusively within the Delta, the southernmost point of which is at Vernalis. (Water Rights Decision 1379, p. 53; Water Code, § 12220)

In 1976, the State Water Board convened an evidentiary hearing lasting 11 months for the purpose of formulating a water quality control plan for the Delta, and to assess whether the plan should be implemented by amending USBR and DWR's permits for operation of the CVP and SWP. (*Ibid.)* The hearing culminated in the Board's adoption of the 1978 Water Quality Control Plan for the Sacramento-San Joaquin Delta and Suisun Marsh, and Water Rights Decision 1485. (*Racanelli, supra,* 182 Cal.App.3d at 111.) As with the previously-adopted water quality standards for the Delta, the Board sought to protect agriculture, municipal/industrial supply, and fish and

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[3] Justice Racanelli's opinion in *United States v. State Water Resources Control Bd.* is commonly referred to as the "*Racenlli*" Decision, and that reference is used throughout these comments.

wildlife within the Delta. (Water Rights Decision 1485, p. 10.) In addition, the Board once again sought to implement the plan by imposing conditions on USBR and DWR's permits for the operation of the CVP and SWP, and established a set of water quality control stations exclusively within the boundaries of the legal Delta. (Water Rights Decision 1485, p. 21-30; Plate 1, Tables 1-3.) Subsequent litigation seeking to invalidate the water quality control plan and Decision 1485 resulted in a decision from the First District Court of Appeal holding that the Board defined the scope of its water quality role too narrowly by limiting it in terms of enforceable water rights. (*Racanelli,supra,* 182 Cal.App.3d at 119-120.) However, the First District declined to invalidate the plan, or D-1485, because the State Water Board had already announced its intention to conduct hearings in 1986 to establish new and revised water quality objectives for the Delta. (*Id.* at 120.)

The State Water Board adopted a Water Quality Control Plan for Salinity for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary on May 1, 1991, pursuant to State Water Board Resolution No. 91-34. (*State Water Resources Control Bd. Cases* (2006) 136 Cal.App.4th 674, 699-700; see Resolution 91-34.) As relevant here, water contributions from the San Joaquin River for the protection of the Bay-Delta estuary were controlled and measured at Vernalis (1991 Water Quality Control Plan, Table 6-3(B) & (C).) The United States Environmental Protection Agency (USEPA) approved the salinity and dissolved oxygen objectives in this plan, but disapproved the remaining fish and wildlife objectives. (*State Water Resources Control Bd. Cases*, 136 Cal.App.4th at 699-700.) In response, the Board reconvened proceedings to revise the water quality objectives for the Bay-Delta and adopted a new water quality control plan in May 1995. (*Id.* at 700.)

1.2. The 1995 Water Quality Control Plan and Water Right Decision 1641

In 1995, the State Water Board adopted the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary ("1995 Bay-Delta Plan"). The 1995 Bay-Delta Plan identified 17 beneficial uses "both within the Delta and throughout the state, to be served by the waters of the Delta." (*State Water Resources Control Bd. Cases, supra,* 136 Cal.App.4th at 701.) Consistent with past practice, and despite the broad reach of the beneficial uses to be protected, the Board confined all of the water quality control stations for its objectives to the legal Delta. (1995 Bay Delta Plan, p. 16-26, 45; Figure 2.) Again, water contributions from the San Joaquin River for the protection of the Bay-Delta estuary were controlled and measured at Vernalis, the southernmost point in the legal Delta. (1995 Bay Delta Plan, p. 19.)

In order to implement the 1995 Bay Delta Plan, the State Water Board issued Water Rights Decision 1641 ("D-1641"). As part of D-1641, the Board imposed responsibility for meeting the objectives on USBR and DWR by amending their permits for the operation of the CVP and SWP. (D-1641, p. 146-166.) Notably, instead of implementing the Vernalis pulse flow objective from the 1995 Bay-Delta Plan, the Board implemented the Vernalis Adaptive Management Plan ("VAMP") pursuant to the San Joaquin River Agreement ("SJRA"), which was a 12-year experimental program that would provide flows at Vernalis at a level that would not meet the pulse flow objective. (*State Water Resources Control Bd., supra*, 136 Cal.App.4th at 706-709; D-1641, *passim*.) In subsequent litigation, the Third District Court of Appeal held that the Board had no authority to implement a lesser flow regime than was required by the 1995 Bay-Delta Plan because such an act would violate Water Code section 13247. (*State Water Resources Control Bd. Cases*, *supra*, 136 Cal.App.4th at 727-730.) The Board ultimately amended the plan to authorize a staged implementation of the Vernalis pulse flow objective "to allow for scientific experimentation by conducting the Vernalis Adaptive Management Plan (VAMP) experiment." (2006 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary, Plan Amendment Report, Appx. 1, p. 2.) None of the amendments changed USBR's responsibility for meeting the flow objectives at Vernalis, nor the location of the compliance point for San Joaquin River contributions at Vernalis.

1.3. Delta Reform Act

In 2009, the State passed the historic Sacramento-San Joaquin Delta Reform Act, codified in Water Code section 85000 *et seq*. An important component of the Bay-Delta Reform Act was Water Code § 85086[c]. This section required the State Water Board to, among other things, "develop new flow criteria for the Delta ecosystem necessary to protect public trust resources" based upon a “review [of] existing water quality objectives” and using “the best available scientific information.” (Water Code, § 85086[c][1].) The flow criteria needed to “include the volume, quantity, and timing of water necessary for the Delta ecosystem under different conditions.” (Water Code, § 85086[c][1].)

In 2010, the State Water Board adopted and sent to the Legislature a report entitled, “Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem” (“Delta Flow Criteria Report”). The purpose of the report was to inform decision makers about the flow necessary into the Delta to fully protect public trust resources. The State Water Board noted the scope of its report in the document itself:

> Due to the limited nine-month time period … the notice for the informational proceeding requested information on what volume, quality and timing of *Delta outflows* are necessary … Delta outflows are of critical importance to various ecosystem functions … This report recognizes the role of source inflows used to meet Delta outflows . . . (p. 14 [Emphasis added].)

1.4. The 2012 Draft SED

On December 31, 2012, the State Water Board released its draft substitute environmental document in support of potential changes to the San Joaquin River flow and southern Delta water quality objectives in the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (“2012 Draft SED”). Consistent with prior iterations of the Bay-Delta water quality control plan, the 2012 Draft SED proposed a set of objectives with water quality control stations within the boundaries of the legal Delta, namely at Vernalis. (2012 Draft SED, Appx. K, p. 1). However, and for the first time, the 2012 Draft SED suggested that a set of objectives with water quality control stations might be established *outside* the boundaries of the legal Delta. Specifically, the 2012 Draft SED listed objectives for inflows from the Tuolumne, Merced and Stanislaus Rivers at locations to be decided later. (2012 Draft SED, Appx. K, p. 1.) Rather than addressing the needs of the Delta for the purpose of protecting fish and wildlife beneficial uses, the 2012 Draft SED concluded that “more flow is needed from the existing salmon and steelhead bearing tributaries in the LSJR watershed down to Vernalis.” (2012 Draft SED, Appx. K, p. 3.) In addition, and again for the first time, the 2012 Draft SED indicated that responsibility for meeting the objectives would be placed on parties *other* than USBR. The 2012 Draft SED stated that the plan would be implemented, in part, through Federal Energy Regulatory Commission (“FERC”) hydropower licensing processes. (2012 Draft SED). As USBR does not need a FERC license to operate its hydropower facilities on the Stanislaus River, and as DWR has no hydropower facilities on any of the tributaries to the San Joaquin, the plan of implementation clearly targeted water right holders on the Merced, Tuolumne and Stanislaus Rivers.

1.5. Recirculated Staff Draft

On September 16, 2016, State Water Board Staff (“Staff”) recirculated a revised Draft of the Bay-Delta Plan and a revised SED (“Proposed Project”). The shift from a Bay-Delta plan to some type of hybrid Basin/Bay-Delta planning effort - which began in 2012 - is solidified in the Proposed Project. Throughout these comments, it will become clear that the proposed water quality control plan, and the lack of focus therein on Bay-Delta issues, leads to unsolvable legal problems, procedural defects, and an un-implementable plan.

2. VIOLATIONS OF PORTER-COLOGNE WATER QUALITY CONTROL ACT

The Porter-Cologne Water Quality Control Act (“PCWQCA”), which is part of the California Water Code, controls the review and revision of water quality control plans (“WQCP”). Each WQCP must contain three components: (1) a list of beneficial uses to be protected by the plan, (2) water quality objectives to ensure the reasonable protection of those beneficial uses, and (3) a program of implementation for achieving the water quality objectives. (Water Code, §§ 13050[j], 13241, 13242.) Staff’s proposed revisions to the Bay-Delta Plan violate the Porter-Cologne Act requirements in several ways.

2.1. The Proposed Objectives Are Unclear and Will Not Protect the Beneficial Uses Identified in the Plan

The WQCP identifies numerous beneficial uses to be protected. (SED, at Appx. K, p. 10-11.) As relevant here, the revised water quality objectives in Table 3 are intended to protect fish and wildlife beneficial uses in the Bay-Delta Estuary, including (1) Estuarine Habitat (EST), (2) Cold Freshwater Habitat (COLD), (3) Warm Freshwater Habitat (WARM), (4) Migration of Aquatic Organisms (MIGR), (5) Spawning, Reproduction, and/or Early Development (SPWN), (6) Wildlife Habitat (WILD), (7) and Rare, Threatened, or Endangered Species (RARE). (SED, at Appx. K, p. 10-13.)

State Water Board Staff proposes three different objectives to protect these beneficial uses: (1) the Narrative Flow Objective; (2) the numeric Tributary Flow Objective (30-50% unimpaired flow from the Stanislaus, Tuolumne and Merced Rivers); (3) the Vernalis Flow Objective; and (4) the Salmon Doubling Objective. Staff also proposes a southern Delta salinity objective for the protection of agricultural beneficial uses.

The objectives intended to protect fish and wildlife beneficial uses are addressed in turn below. Each objective lacks the legally required clarity for a regulation. In addition, the analysis in the SED does not reflect a true implementation of these objectives, and thus does not demonstrate that the objectives will protect the beneficial uses as required by the Porter-Cologne Act. Even if the objectives were implemented in the manner set forth in the SED, the analysis fails to show that the identified beneficial uses will be protected. In response to Staff's failure to model a true implementation of the objectives, the SJTA and its member agencies have hired consultants to perform additional analysis of the proposed plan. That analysis shows that the revised objectives will not protect the beneficial uses identified in the plan, and will instead adversely affect those beneficial uses. Because the proposed objectives are unclear and do not protect the beneficial uses, the plan violates the Porter-Cologne Act (Water Code, § 13000 et seq.), and the Board should decline to adopt it.

2.1.1. Narrative Objective

The State Water Board proposes a Narrative Objective that reads as follows:

> "Maintain inflow conditions from the San Joaquin River watershed to the Delta at Vernalis sufficient to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta. Inflow conditions that reasonably contribute toward maintaining viable native migratory San Joaquin River fish populations include, but may not be limited to, flows that more closely mimic the natural hydrographic conditions to which native fish species are

> adapted, including the relative magnitude, duration, timing, and spatial extent of flows as they would naturally occur. Indicators of viability include population abundance, spatial extent, distribution, structure, genetic and life history diversity, and productivity." (SED, at Appx. K, p. 18.)

2.1.1.1. The Narrative Objective lacks clarity

Any water quality control plan, or revision thereof, adopted by the State Water Board must be submitted to the Office of Administrative Law ("OAL") for review and a determination of compliance with "the standards of necessity, authority, clarity, consistency, reference, and nonduplication . . .." (Government Code, § 11353[b][4]; see Government Code, § 11349.1[a].) The term "clarity" means "written or displayed so that the meaning of regulations will be easily understood by those persons directly affected by them." (Government Code, § 11349[c].) A regulation is presumed not to comply with the clarity requirement if any of the following conditions exist: (1) "the regulation can, on its face, be reasonably and logically interpreted to have more than one meaning," or (2) "the language of the regulation conflicts with the agency's description of the effect of the regulation," or (3) "the regulation uses terms which do not have meanings generally familiar to those 'directly affected' by the regulation, and those terms are defined neither in the regulation nor in the governing statute," or (4) "the regulation uses language incorrectly," or (5) "the regulation presents information in a format this is not readily understandable by persons 'directly affected,'" or (6) "the regulation does not use citation styles which clearly identify published material cited in the regulation." (Cal. Code Regs., tit., 1, § 16.)

The Narrative Objective is unlawful because, among other things, it can be interpreted to have more than one meaning, the language conflicts with the agency's description of the effect of the regulation, and it uses terms which do not have meanings generally familiar to those directly affected by the regulation. (Cal. Code Regs., tit. 1, § 16[a][1],[2],[3].)

2.1.1.1.1. The Narrative Objective can be interpreted to have different meanings

The phrase "support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta" is ambiguous, undefined, and could be logically interpreted to have multiple meanings.

First, the words “support and maintain” are unclear and could have various interpretations. Merriam-Webster defines “support” as “to provide a basis for the existence or subsistence of.” (http://www.merriam-webster.com/dictionary/support.) Thus, the regulated community could interpret the Narrative Objective to require the regulated entities provide a basis for the existence or subsistence of fish populations migrating through the Delta. The words “support and maintain” could also imply that upstream operations need to make up for losses in the Delta and the ocean (most notably, harvest) to support natural production. However, the Narrative Objective does not explain whether any of this is necessary, nor what must be done by regulated entities to provide support and maintenance, nor what level of support and maintenance is needed.

Second, the term “viable” is unclear and could have various interpretations. Merriam-Webster defines “viable” as “capable of existence and development in an independent unit.” (http://www.merriam-webster.com/dictionary/viable.) The Narrative Objective lists indicators to measure viability: “Indicators of viability include population abundance, spatial extent, distribution, structure, genetic and life history diversity, and productivity.” (SED, at Appx. K, p. 18.) However, the indicators do not have any benchmarks that must be achieved to ensure viability. For instance, there is no indication as to what level of population abundance is needed to achieve viability. Likewise, there is no indication as to what level of distribution, structure, diversity or productivity is needed to achieve viability. Without a specific measure of success, these indicators are meaningless and open to varied interpretations.

Third, the term “natural production” is not defined anywhere in the WQCP. Both of these words need to be defined. A reasonable interpretation of natural would be that hatchery fish are not included. However, it is unclear whether the offspring of hatchery fish would be considered natural. Similarly, it is unclear whether the offspring of a hatchery and non-hatchery fish would be considered natural.

Fourth, the phrase “flows that mimic the natural hydrographic conditions” is similarly confusing and vague. The extent to which the natural hydrograph needs to be mimicked is unclear. Specifically, it is unclear whether mimicking a general trend is sufficient, or whether exact quantities are required.

Fifth, the objective lacks clarity with regard to which fish populations are covered. Specifically, the Narrative Objective calls for the maintenance of inflow conditions from the San Joaquin River "sufficient to support and maintain the natural production of viable native San Joaquin River watershed fish populations **migrating through the Delta.**" (SED, at Appx. K, p. 18 [emphasis supplied].) Although the SED discusses many fish species in Section 19, most of these species are not targeted by the objective, primarily because most species do not migrate through the Delta. Of the fish species listed in Section 7.2.1, the following do not fall within the protection of the Narrative Objective because they do not migrate from the three eastside tributaries to the Delta:

Late Central Valley fall-run Chinook salmon	Late Central Valley fall-run Chinook salmon do not occur on the three Tributaries. Late Central Valley fall-run Chinook Salmon are not a separate Evolutionarily Significant Unit ("ESU") or Distinct Population Segment ("DPS") from Central Valley fall-run Chinook salmon. There is no evidence of genetic differences between Central Valley fall-run Chinook salmon that arrive late and those that arrive early.
Spring-run Chinook salmon	There are no spring-run Chinook salmon on the three tributaries. The tributaries are not designated as critical habitat. Rule 4[d] of the Endangered Species Act ("ESA) is currently in effect for an experimental population under the San Joaquin River Restoration Program ("SJRRP"). The SJRRP and its flows are not in the Plan Area and are not evaluated.
Green sturgeon	Do not migrate from the tributaries.
Delta smelt	Do not migrate from the tributaries.
Longfin smelt	Do not migrate from the tributaries.
Sacramento split-tail	Do not migrate from the tributaries.
Kern Brook lamprey	Do not migrate from the tributaries.
River lamprey	Do not migrate from the tributaries.
California roach	Do not migrate from the tributaries.
Hardhead	Do not migrate from the tributaries.
Rainbow trout	Do not migrate from the tributaries.
Largemouth bass	Do not migrate from the tributaries.

White sturgeon	Do not migrate from the tributaries.
American shad	Do not migrate from the tributaries.
Kokanee	Do not migrate from the tributaries.

Thus, it appears - but is not clear - that of the fish species listed in Section 7.2.1, the Narrative Objective is only intended to protect Central Valley fall-run Chinook salmon, Central Valley steelhead (*Oncorhynchus mykiss*) and Pacific lamprey, as these are the native San Joaquin River watershed fish that migrate through the Delta.

2.1.1.1.2. The language of the Narrative Objective conflicts with Staff's description of the effect of the regulation

The language of the Narrative Objective is unclear because it "conflicts with the agency's description of the effect of the regulation." (Cal. Code Regs., tit., 1, § 16.) Specifically, the Narrative Objective states that flows should more closely mimic the natural hydrograph from February through June by bypassing or releasing a percentage of unimpaired flow from the Stanislaus, Tuolumne and Merced Rivers. (SED, at Appx. K, p. 18.) However, the proposed program of implementation states that the percentage of unimpaired flow may be treated as a "total volume of water" that is shifted to other times of the year and shaped in such a way that is deemed – by some unspecified standard – to be better for fish than flows which mimic the natural hydrograph. (SED, at Appx. K, p. 30-31.) State Water Board Staff has repeatedly referred to the flow requirement as a "block" or "budget" of water that can be shifted or shaped, rather than an unimpaired flow requirement that tracks the natural hydrograph.[4] In comparing the unimpaired flow approach and the block of water approach, State Water Board Staff has explicitly stated, "you can't do both those things . . ." (Transcript of Public Hearing before SWRCB, January 3, 2017, p. 27, lns.

[4] Transcript of Public Hearing before the SWRCB, November 29, 2016, p. 14, lns. 5-7 [Chair Marcus: Staff conceive the proposal "as a block of water that they hope groups will come together to shape and use in the most effective way as possible."]; Transcript of Public Hearing before the SWRCB, November 29, 2016, p. 26, lns. 15-20 [Les Grober: "So it's not intended to be rigid adherence with say a flat 40 percent. But you can use that as a block of water for that February through June time period, so that you can have a much higher amount to achieve a pulse flow as makes sense and less at other times."]; Transcript of Public Hearing before SWRCB, December 16, 2016, p. 31, lns. 21-23 ["It's intended to provide some of the natural variability, but also a budget of water that can be shifted."]; Transcript of Public Hearing before SWRCB, January 3, 2017, p. 28, ln. 10 [Les Grober: "but it's also a block of water that can be used to the benefit of fish and wildlife."]

22-23.) Given these descriptions, it is apparent that the Narrative Objective is unclear and unlawful because "the language of the regulation conflicts with the agency's description of the effect of the regulation." (Cal. Code Regs., tit., 1, § 16.)

2.1.1.1.3. The Narrative Objective uses terms which do not have meanings generally familiar to those directly affected by the regulation

As noted above, the terms "support and maintain," "natural production," "viable," and "mimic the natural hydrographic conditions" are not defined in the WQCP. These terms do not have standard or consistent definitions within the regulated community, i.e., within the irrigation districts and water service providers that will be directly affected by the proposed project. The absence of any meaningful definition of these terms in the WQCP leaves the regulated community at a loss as to what must be accomplished to comply with the objective. For this reason, the Narrative Objective amounts to an unclear and unlawful regulation. (Cal. Code. Regs., tit. 1, § 16[a][3].)

2.1.1.1.4. The Narrative Objective is impermissibly vague

In addition to being unlawful for lack of clarity, the Narrative Objective is also impermissibly vague. Due process protections proscribe the enforcement of vague regulations like the Narrative Objective. (*Cranston v. City of Richmond* (1985) 40 Cal.3d 755 ("*Cranston*").) Similar to the clarity standard discussed above, due process precludes enforcement of a regulation based upon impermissible vagueness when the regulated party "could not reasonably understand that [their] contemplated conduct is proscribed." (*Cranston,* at 764.) The ambiguous terms, such as support, viable, natural production and mimic, make the Narrative Objective so vague the regulated community would not be able to understand whether their conduct is proscribed or authorized. To remedy this problem, the Narrative Objective needs to incorporate metrics by which the regulated community – and the regulators – can measure success or failure. As written, it will be impossible to determine if compliance has been achieved.

2.1.1.2. The Narrative Objective will not protect beneficial uses

As noted above, the objectives must "ensure the reasonable protection of beneficial uses." (Water Code, § 13241.) Although the WQCP identifies numerous beneficial uses to be protected by the Narrative Objective, the objective will not protect those uses.

Specifically, the objective provides no protection for cold or warm freshwater habitats (COLD and WARM). The language focuses solely on inflow to the Delta and does not include a water temperature component of any kind. Second, by focusing solely on inflows necessary to support native migratory San Joaquin River fish populations, the objective ignores all other conditions and components that are necessary to protect estuarine and wildlife habitat (EST and WILD), migration of aquatic organisms (MIGR), spawning, reproduction and/or early development of fish (SPWN), and rare, threatened or endangered species (RARE). The Narrative Objective lists conditions that will reasonably contribute towards maintaining viable native migratory San Joaquin River fish populations, but the list is extremely limited in scope, focusing exclusively on "flows that more closely mimic the natural hydrographic conditions . . . including the relative magnitude, duration, timing, and spatial extent of flows as they would naturally occur." (SED, at Appx. K, p. 18.) Critically, the list fails to include any non-flow measures, such as predator control, changes in salmon ocean harvest regulations, changes in hatchery operations, and floodplain habitat restoration work. The omission of any non-flow measures in the objective renders it insufficient to protect the beneficial uses. The SED states, "flow alone cannot solve the many issues that native fish populations face in the SJR Watershed. To reach the goal of achieving and maintaining viable populations of native fish, many other non-flow actions must be taken." (SED, at 19-88 [internal parentheticals omitted].) While the SED notes that the program of implementation identifies non-flow measures that should be taken to achieve the Narrative Objective (*Ibid.*) those measures should be identified in the objective itself in the same way that the flow measures are identified. A program of implementation need only describe the actions "necessary to achieve the objectives." (Water Code, § 13242.) If both flow and non-flow measures are needed to protect the beneficial uses (SED, at 19-88), then the Narrative Objective should contain a list of necessary non-flow measures as well. Without a list of the necessary non-flow measures, the Narrative Objective will not protect the beneficial uses.

Moreover, history demonstrates that the Board will not implement non-flow measures if they are not included as objectives. The 2006 Water Quality Control Plan includes several non-flow measures in its plan of implementation. These measures include installation of screening facilities on diversions, modification of existing commercial and sport fishing regulations, expansion of the illegal harvest program, improvement of hatchery programs, and expansion of gravel replacement and maintenance. (2006 Bay Delta Plan, at 34-37.) However, the State Water Board never took any action to implement these measures, nor did it encourage other agencies to implement the measures.

2.1.1.3. Narrative Objective Summary

As the Narrative Objective is both unclear and insufficient to protect the beneficial uses identified in the WQCP, the Board should decline to adopt it.

2.1.2. The Tributary Flow Objective

The Tributary Flow Objective in the water quality control plan is as follows: "A percent of unimpaired flow between 30% - 50%, inclusive, from each of the Stanislaus, Tuolumne and Merced Rivers shall be maintained from February through June" in accordance with a "[m]inimum 7-day running average flow rate." (SED, at Appx. K, p. 18.) Unimpaired flow is defined as "the natural water production of a river basin, unaltered by upstream diversions, storage, or by export or import of water to or from other watersheds." (SED, at Appx. K, p. 20 [fn. 14].)

2.1.2.1. The Tributary Flow Objective lacks clarity

As set forth below, the Tributary Flow Objective lacks clarity in several key respects.

2.1.2.1.1. Relationship between the Narrative Objective and the Tributary Flow Objective is Not Clear

Staff suggests that the Tributary Flow Objective (and the adaptive adjustments that can be made thereto) is in place to further the Narrative Objective. (SED, at Appx K, p. 30.) However, it is unclear whether compliance with the Tributary Flow Objective alone is intended to constitute compliance with the Narrative Objective, or whether the Narrative Objective might be unachieved despite compliance with the Tributary Flow Objective. It is also unclear whether other measures are required or otherwise intended to meet the Narrative Objective. For these reasons, Staff must revise the WQCP to more clearly explain the relationship between the Narrative Objective and the Tributary Flow Objective.

2.1.2.1.2. The Relationship between the Tributary Flow Objective and the Vernalis Flow Objective is unclear

It is unclear whether flows from the upper San Joaquin River will be counted for purposed of determining compliance with the Vernalis requirement, or whether only flows from the three eastside tributaries will count towards the Vernalis requirement. In the SED, Staff seems to assume that flows from upstream of the Tributaries will contribute to flows at Vernalis. (SED, at 5-1.) However, Appendix K states that the Tributary Flow Objective is "in addition to flows in the Lower San Joaquin River from sources other than the Lower San Joaquin River tributaries," and **"[w]hen the percentage of unimpaired flow requirement** is insufficient to meet the minimum base flow requirement" at Vernalis, then the three eastside tributaries must contribute additional flows to maintain the required based flow at Vernalis. (SED, at Appx. K, p. 29.) Since only the tributaries contribute to the unimpaired flow requirement, it is not clear whether flows from the upper San Joaquin River will go to meet the Vernalis flow requirement or whether the requirement is in "addition" to upstream flows. For these reasons, the relation between the Tributary Flow Objective and the Vernalis Flow Objective is not clear and the regulated community cannot reasonably interpret the two regulations together.

2.1.2.1.3. There is no agreement on how unimpaired flow is to be calculated

The WQCP defines "unimpaired flow" as "the natural water production of a river basin, unaltered by upstream diversions, storage, or by export or import of water to or from other watersheds." (SED, at Appx. K, p. 20.) At best, this definition allows for a generalized conceptualization of unimpaired flow. It provides no indication as to how unimpaired flow should be calculated. Instead, the WQCP defers this critical component to the Stanislaus, Tuolumne and Merced ("STM") Working Group, which is charged with creating annual adaptive operations plans that will "identify how unimpaired flows are calculated" (SED, at Appx. K, p. 34.) In order to provide clarity to the Tributary Flow Objective so that the regulated community can comply with the objective, the method of calculation for unimpaired flow needs to be set forth in the plan itself. There is currently no agreed upon method of calculation for unimpaired flow, and this critical issue cannot be deferred to an outside group which the Board has no authority to create or compel participation in.

2.1.2.1.4. The Quantity of Water Subject to Regulation Is Not Clear

A regulation will be deemed unlawful for lack of clarity if it "presents information in a format that is not readily understandable by persons 'directly affected'" by it. (Cal. Code Regs., tit. 1, § 16[a][5].) A regulation will also be deemed unclear if it "conflicts with the agency's description of the effect of the regulation." (Cal. Code Regs., tit. 1, § 16[a][2].) The Tributary Flow Objective violates these rules because it fails to clearly state the amount of water that the SJTA member agencies will be required to refrain from diverting to satisfy the objective. The objective states that between 30% and 50% of unimpaired flow must be left instream for the benefit of fish and wildlife. However, the objective does not specify the exact percentage within that range that must remain instream. Accordingly, based upon a plain reading of the language, the objective would seemingly be satisfied by simply maintaining any percentage of unimpaired flow at the compliance point between 30% and 50%, based on a running average of 7 days or more. However, the proposed program of implementation ("POI"), which is not a regulation, confuses the matter. The POI states, "[t]he LSJR flow objectives for February through June shall be implemented by requiring 40 percent of unimpaired flow, based on a minimum 7-day running average, from each of the Stanislaus, Tuolumne, and Merced Rivers." (SED, at Appx. K, p. 29.) This plan to implement a 40% unimpaired flow requirement conflicts with the language of the objective, which is written so broadly that compliance can be achieved with as little as 30% unimpaired flow. Accordingly, the proposal to require 10% more unimpaired flow through the POI creates confusion, rather than clarity. Simply stated, "the language of the regulation conflicts with the agency's description of the effect of the regulation." (Cal. Code Regs., tit., 1, § 16[a][2].)

The POI confuses the matter further by stating, "[t]his required percentage of [40%] unimpaired flow . . . may be adjusted within the range allowed by the LSJR flow objectives through adaptive methods . . .." (SED, at Appx. K, p. 29.) These adaptive adjustments to the flow requirements must be "approved by the State Water Board on an annual or long-term basis, or by the Executive Director . . . if all members of the Stanislaus, Tuolumne, and Merced Working Group (STM Working Group) . . . agree to the changes. (SED, at Appx. K, p. 30.)" (SED, at Appx. K, p. 30.) Thus, it appears that the range set forth in the objective is not a range of compliance that the *regulated* community must achieve, but rather a range that the *regulators* must stay within while continually modifying the required percentage of unimpaired flow that the regulated community must achieve. The purpose of setting objectives in a water quality control plan is to clearly set forth regulations with which the regulated community must comply (see generally Government Code, § 11353[b][4]; § 11349.1[a]), not to create a broad range that the regulators must comply with as they continually modify the regulation without further oversight by OAL.

2.1.2.1.5. The flow rate calculation is not clear

The method for calculating the required amount of unimpaired flow is unclear. The objective states that the chosen percentage of unimpaired flow must be maintained based upon a *minimum 7-day running average*. (SED, at Appx. K, p. 18.) A plain reading of this requirement indicates that the unimpaired flow percentage must be calculated using a running average of 7 days or more. Unlike the unimpaired flow percentage which has an upper and lower boundary (i.e., 30% and 50%), this requirement has only a lower boundary (i.e., 7 days). Standing alone, this characteristic does not make the objective unclear; the regulated community could achieve compliance by using any running average of at least seven days. However, other aspects of the requirement create significant confusion. For instance, it is unclear how the running average should be calculated during the first six days of the Feb.-June time period. Prior to February 7th, there will not be a sufficiently long historical record of unimpaired flows during the Feb.-June period to calculate a 7-day running average within the regulated time period. While it may be the regulators' intent that the initial running average be calculated using unimpaired flow data from January and the year before, that intent is not made clear in the WQCP. Moreover, if this is the intent of the regulators, then the absence of an upper boundary on the running-average requirement would theoretically allow for a calculation using unimpaired flow rates that date back to July of the previous year, when unimpaired flow is at its lowest due to minimal summer precipitation and runoff. While such a computation would be permissible under a plain reading of the Tributary Flow Objective, it would be antithetical to the Narrative Objective which prioritizes flows that mimic natural hydrographic conditions.

The program of implementation creates further confusion regarding the minimum 7-day running average component of the Tributary Flow Objective. The POI states that the required percentage of unimpaired flow from February to June "may be managed as a total volume of water" and "released on an adaptive schedule," rather than on a minimum 7-day running average of unimpaired flow. (SED, at Appx. K, p. 30.) However, the POI does not explain how the "total volume of water" (also known as a block or budget of water) will be calculated. While estimates of precipitation and snowmelt runoff can be made in February, such early estimates are frequently inaccurate. Moreover, the authority to make this change to the objective is granted to the Executive Director, provided that s/he receives a recommendation from "one or more members of the STM Working Group." (SED, at Appx. K., p. 18.) The plan does not specify what action the Executive Director should take if one member of the STM Working Group recommends the change, but all others recommend against it. Moreover, unlike the unimpaired flow percentage requirement, which has a range that the Executive Director must work within, the authority granted to the Executive Director to deviate from the minimum 7-day running average is unchecked by anything other than his or her own assessment as to whether "scientific information" indicates that another flow pattern would "better protect fish and wildlife beneficial uses." (SED, at Appx. K., p. 30.) This grant of authority to the Executive Director and the STM Working Group renders the 7-day running average component of the objective uncertain and unclear. At the very least, the language of the regulation (which speaks in terms of unimpaired flow based on a running average) conflicts with the agency's description of the effect of the regulation, insofar as the agency states that the water will be managed as a "total volume of water" that is "released on an adaptive schedule" with no requirement of adhering to a running average of any kind. (Cal. Code Regs., tit., 1, § 16[a][2] [a regulation is presumed to be unclear if "the language of the regulation conflicts with the agency's description of the effect of the regulation"].)

2.1.2.1.6. WSE modeling makes the Tributary Flow Objective unclear

The Tributary Flow Objective requires the maintenance of between 30% and 50% unimpaired flow on each of the Stanislaus, Tuolumne and Merced Rivers from February through June, based upon a minimum 7-day running average. (SED, at Appx. K, p. 18.) The analysis Staff presents in the SED does not portray an accurate implementation of these objectives. Instead, the analysis assumes the implementation of numerous operational constraints that are not required by the Tributary Flow Objective and, in some cases, contradict the Tributary Flow Objective, thereby making the objective unclear to the regulated community. The unrequired operational assumptions are as follows.

- Flow Shifting

The Tributary Flow Objective requires the maintenance of a percentage of unimpaired flow from February through June. The Water Supply Effect ("WSE") model used in the SED assumes that when the required unimpaired flow percentage is 40% or higher, some of the required instream flows (not to exceed 25% of the total quantity of instream flow required from Feb.-June) will be shifted to the *July-November* period, mostly in *wet years*. (SED, at Appx. F1, p. F.1-13, F.1-17, F.1-36-38, F.1-43-45.) In the SED, this modeling assumption is referred to as flow shifting. Staff also used another type of flow shifting in the SalSim model, where a full 25% of the required unimpaired flow from February through June was shifted to the months of *September-December* in *all water years*. (SED, at 19-80.) The document acknowledges that flow shifting is "not part of the unimpaired flow objective." (*Ibid.*) Nevertheless, it is used in the modeling "to provide temperature control, to reduce the likelihood of negative effects [on fish and wildlife], and to increase the overall potential benefit" of the objectives. (SED, at Appx. F1., p. F.1-17.) Flow shifting contradicts the Tributary Flow Objectives by (1) requiring flows outside the February through June time period, and (2) reducing the amount of unimpaired flow required during the February through June period to a lower percentage than would otherwise be required by the objective. It is unclear from the WQCP whether the regulated community should comply with the objectives which do not require flow shifting (and which will supposedly harm beneficial uses), or with the flow shifting modeling assumptions that are purportedly needed to ensure that the objectives do not adversely impact fish and wildlife.

- Minimum Reservoir Storage

The Tributary Flow Objective requires the maintenance of a percentage of unimpaired flow on the Stanislaus, Tuolumne and Merced Rivers, irrespective of how those flows might impact reservoirs on those rivers. However, the analysis in the SED assumes that reservoirs will be operated in such a way that adherence to the Tributary Flow Objective will not result in a drawdown of storage in New Melones Reservoir, New Don Pedro Reservoir and Lake McClure below certain points. (SED, at Appx. F1, p. F.1-2.) This minimum reservoir storage assumption is needed "to minimize impacts on instream temperature that would be caused by lower reservoir levels and a limited coldwater pool." (SED, at Appx. F1, p. F.1-31.) According to the SED, the minimum reservoir targets "*do not* represent regulatory requirements of how the reservoir storage and use system must be operated . . .." (SED, at Appx. F1, p. F.1-31, fn. 4.) In fact, the SED explicitly states, "[t]hese operational constraints, as components of modeling simulations, do not by themselves comprise a plan of implementation or otherwise carry the weight of regulatory requirements." (SED, at Appx. F1, p. F.1-31.) However, after the release of the SED, Staff has taken the opposite position, insisting that minimum reservoir storage is "very much a part of the project." (Transcript of Public Hearing before SWRCB, January 3, 2017, p. 22, ln. 17.) This contradiction creates confusion as to whether carryover storage – which is not included in the objectives – is nevertheless intended to constitute a requirement with which the regulated community must comply.

-Refill Criteria

The analysis in the SED assumes that when the required unimpaired flow percentage is 40 percent or higher, reservoir withdrawals will be restricted if reservoir levels are below a certain point. This assumption is not required by the Tributary Flow Objective, but it is included in the modeling of the Tributary Flow Objectives so that "coldwater pools recover more quickly after a drought," thereby avoiding adverse temperature impacts. (SED, at Appx. F1, p. F.1-32.) The inclusion of this modeling assumption creates confusion as to whether the regulated community must comply with the refill criteria or not.

-Minimum Base Flows

If adherence to the unimpaired flow requirement in the Tributary Flow Objective results in instream flows dropping below *current* instream requirements (such as instream flow requirements contained in Federal Energy Regulatory Commission ("FERC") licenses or in Biological Opinions issued as part of a Section 7 consultation under the Endangered Species Act), then the analysis in the SED assumes that the current regulatory requirements will be followed, rather than the Tributary Flow Objective. (SED, at Appx. F1, p. F.1-13.) The "[p]roposed percentages of unimpaired flow are considered an additional requirement, and thus the greater of either the baseline flow requirements or the unimpaired flow requirement was selected for each month" for modeling purposes. (*Ibid.*) However, these minimum flows are not included in the objectives and could be changed at any time through separate legal processes. It is unclear from the SED whether the regulated community should comply with Tributary Flow Objective or the minimum flows that are incorporated into the modeling. This confusion will create a significant problem if the current instream requirements that were modeled are ever changed through separate processes.

-Monthly Modeling

The Tributary Flow Objectives require that flows be maintained on the Stanislaus, Tuolumne and Merced rivers based upon a 7-day running average. (SED, at Appx. K, p. 18.) Adhering to a 7-day *running* average means that flows will change on a daily basis. Despite the fact that daily modeling programs are available, the analysis in the SED used a monthly model, where flows remain the same over the course of an entire month. Specifically, "the WSE model calculates monthly flow targets for each eastside tributary based on the existing regulatory minimum flow schedules or user-specified percent of unimpaired flow." (*Ibid.*) The SED states, "[t]he February – June minimum instream flow requirement is calculated as a percentage of that month's unimpaired flow, for each month in February – June." (*Ibid.*)

The difference between a daily model and a monthly model is striking. The following hypothetical demonstrates the discrepancies. Assume that in the month of March there is 60,000 acre-feet of unimpaired flow on the Stanislaus River. A monthly model would spread the 60,000 acre-feet evenly across the entire 31 days of March, resulting in approximately 2,000 acre-feet of water per day. Using a conversion rate of 1 cfs = 2 acre-feet/day, the flow rate would be approximately 1,000 cfs for the entire month. Assuming an unimpaired flow requirement of 40 percent, the model would assume releases of 400 cfs every day in the month of March (40% of 1,000 cfs). This assumption would remain in place even if total inflow during the first 10 days of March was 50,000 acre feet (i.e., 5,000 acre feet per day, or 2,500 cfs), and total inflow during the last 20 days was a mere 10,000 acre feet (i.e., 500 acre feet per day, or 250 cfs). If these flows were modeled based on the required 7-day running average, then the unimpaired flow requirement on March 7 would be 1,000 cfs (i.e., 40% of 2,500 cfs), while the unimpaired flow requirement on March 17 would be 100 cfs (i.e, 40% of 250 cfs). This result is drastically different than the steady 400 cfs under the monthly model.

The following graph shows the difference between using a monthly model and a daily model. The *dark* red and *dark* blue lines depict flows on the Tuolumne River at Modesto and LaGrange, respectively, in 1978 using the Tuolumne River Daily Flow model.[5] The *light* red and *light* blue lines depict flows at Modesto and LaGrange, respectively, in the same year using the monthly WSE model. It is evident from this graph that the monthly WSE model fails to capture the numerous high and low flow events that occurred in February, March and April of that year.

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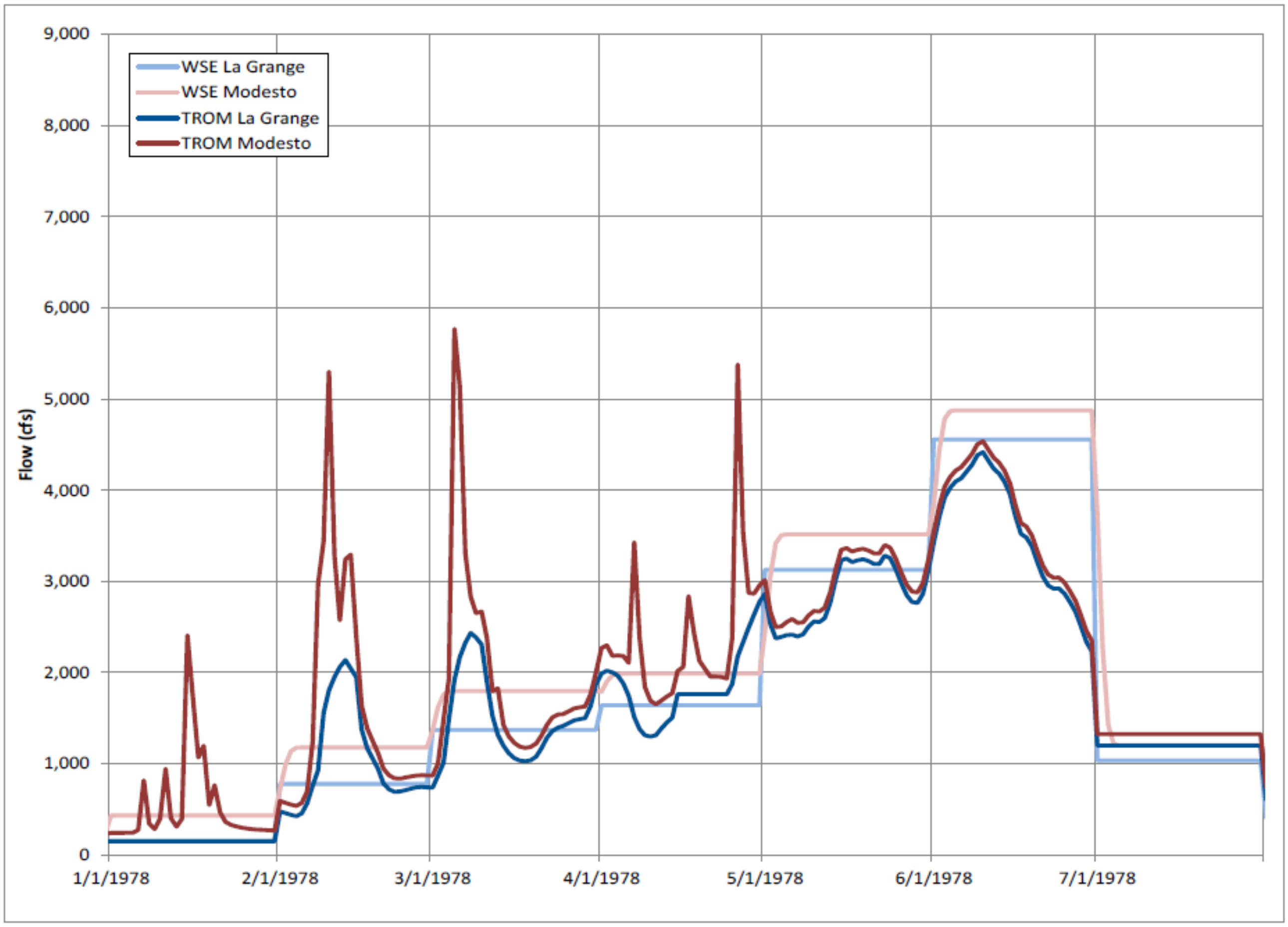
[5] Additional examples of the inconsistency between monthly and daily flow modeling is presented in the comments submitted by MID and TID.



SJTA Figure 2-1

The conflict between the minimum 7-day running average requirement and the monthly model used in the SED creates confusion as to which flow regime should be followed. This is particularly true because the supposed benefits of the project set forth in the SED are based on monthly modeling, and the "minimum" 7-day running average requirement would technically allow for a smoothing of the flows by using a 30, 60, or even 90-day running average that more closely mimics the SED's monthly model.

2.1.2.1.7. The time period of compliance is not clear

The objective states unimpaired flow will be required from February through June. However, the February-June component of the objective is made uncertain by the program of implementation. Specifically, the POI states that "a portion of the February through June unimpaired flow may be delayed until after June" or even "until the following year." (SED, at Appx. K, p. 30-31.) The authority to make this change to the temporal component of the objective is again granted to the Executive Director, provided s/he receives a recommendation from one or more members of the STM Working Group. This grant of authority to the Executive Director and the STM Working Group to change the time period of the objective renders it uncertain and unclear. Again, the language of the regulation is in direct conflict to the agency's description of the effect of the regulation. (Cal. Code Regs., tit., 1, § 16[a][2].)

It is also unclear when and to what extent flood flows will reduce the unimpaired flow requirement. The program of implementation states:

> The required percentage of unimpaired flow does not apply to an individual tributary during periods when flows from that tributary could cause or contribute to flooding or other related public safety concerns as determined by the State Water Board or Executive Director through consultation with federal, state, and local agencies and other persons or entities with expertise in flood management.

(SED, at Appx. K, p. 29.)

The text states the unimpaired flow requirement would "not apply" when flows contribute to flooding. It is unclear whether the requirement would "not apply" to the localized area that was experiencing flood flows or if it would not apply to the entire tributary. It is unclear whether the requirement would "not apply" for a whole year or just until the flood risk subsided. It is unclear which public health and safety concerns would trigger the relaxation of the requirement. Therefore, the flood and public safety component of the regulation is not clear and the regulated community can reasonably interpret the regulation to have more than one meaning.

2.1.2.1.8. The compliance point location is not clear

The objective identifies specific compliance points on each of the three tributaries. (SED, at Appx. K, p. 18.). However, the program of implementation allows the Executive Director to change the compliance locations on the regulated rivers "if information shows that another location . . . more accurately represents the flows of the LSJR tributary at its confluence with the LSJR." (SED, at Appx. K., p. 29.) The Executive Director's authority to make this change is not tied to a recommendation or consultation with the STM Working Group, and is entirely unchecked. This arrangement fails to provide any certainty to the regulated community with respect to the location of the compliance points.

In sum, *every* component of the Tributary Flow Objective (i.e., the percentage of unimpaired flow, the 7-day running average, the regulated months, and the compliance points) is rendered unclear by the POI and/or subject to further change by the Executive Director. This lack of clarity or certainty with respect to every component of the objective contravenes the stated purpose of the objective, which is to "provide certainty to the regulated community . . .." (SED, at 3-2.) More importantly, the objective lacks clarity and will not be approved by OAL pursuant to Government Code section 11353[b][4].

2.1.2.2. The State Water Board's analysis of the Tributary Flow Objective fails to demonstrate protection of beneficial uses

As noted above, the Board must set water quality objectives that provide reasonable protection to beneficial uses. (Water Code, §§ 13000, 13241.) Although the WQCP identifies several beneficial uses to be protected by the Tributary Flow Objective (SED, at Appx. K, p. 13), Staff does not analyze the impact of this objective on these beneficial uses. Instead, Staff focuses exclusively on the impact that the objective will have on water temperature and floodplain inundation. (SED, at 19.2 and 19.3.) Staff then uses the SalSim program in an attempt to extrapolate the changes to water temperature into benefits to Central Valley fall-run Chinook salmon production. (SED, at 19.4.) In focusing exclusively on the impacts to water temperature, floodplain inundation and production of fall-run Chinook salmon, Staff fails to demonstrate that the specific beneficial uses identified in the WQCP will be protected by the objectives. Moreover, to the extent that cooler water temperatures, additional floodplain inundation and improvements to salmon production might serve as proxies for the protection of the various beneficial uses identified in the WQCP, the State Water Board's own analysis shows no benefits to water temperature, floodplain habitat or Central Valley fall-run Chinook salmon production.

Prior to commenting on the results of Staff's analysis, several comments are warranted on (1) how Central Valley fall-run Chinook salmon became the sole focus of Staff's analysis (Section 2.1.2.2.1), (2) the current status of Central Valley fall-run Chinook salmon (Section 2.1.2.2.2), and

(3) the results of the Delta Flow Criteria Report from 2010 addressing the flows necessary at Vernalis to protect juvenile fall-run Chinook salmon (Section 2.1.2.2.3). Following the discussion of these issues are comments on (1) the SED analysis of water temperature (Section 2.1.2.2.4), (2) the SED analysis of floodplain habitat (Section 2.1.2.2.5), and (3) the SalSim analysis regarding fall-run Chinook salmon production (Section 2.1.2.2.6).

2.1.2.2.1. Central Valley fall-run Chinook salmon are the sole focus of the SED analysis

The purpose of the Tributary Flow Objective and the Narrative Objective is to protect native fish migrating to and from the eastside tributaries through the Delta. The Narrative Objective explicitly states that Delta inflow conditions from the San Joaquin River watershed must be "sufficient to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta." (SED, at Appx. K, p. 18.) The Tributary Flow Objective is similarly singular in its protective goal; the WQCP states that the Tributary Flow Objective will be adaptively implemented "to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta," i.e., the Tributary Flow Objective will be adaptively implemented to achieve the Narrative Objective. (SED, at Appx. K, p. 30.)

The SED lists 16 native and nonnative fish species that are present in the lower San Joaquin River, the three eastside tributaries and the southern Delta. (SED, at 7-9 – 7-29) As written, the objectives concede they offer no protection to any of the nonnative species. Furthermore, of the 16 species listed in the SED, only 3 migrate to and from the eastside tributaries: Central Valley fall-run Chinook salmon[6] ("CVFRCS"), Central Valley steelhead[7] (*Oncorhynchus mykiss*) and Pacific lamprey (*Entosphenus tridentatus*). Thus, of the 16 species listed in Section 7.2.1 of the SED, only 3 fit the description of the fish populations to be protected by the objectives.

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[6] Late Central Valley fall-run Chinook salmon do no occur on the three tributaries, and are not a separate evolutionarily significant unit (ESU) or distinct population segment (DPS). There is no evidence of genetic differences between Central Valley fall-run Chinook salmon that arrive late and those that arrive early. Moreover, Central Valley spring-run Chinook salmon do not occur in the three eastside tributaries.

Staff's analysis narrows the focus of protection even further. Chapter 19 of the SED, which addresses benefits to native fish populations, does not discuss Pacific lamprey at all. With respect to Central Valley steelhead (*O. mykiss*), the Stanislaus River is the only one of the three eastside tributaries that has a self-sustaining population, and that population is admittedly small. (SED, at 7-18.) The SED asserts that there is a "paucity" of information regarding C.V. steelhead run sizes (SED, at 7-17), and *O. mykiss* production was not analyzed in the SED. In short, the SED focuses solely on the protection afforded by the objectives to the production of fall-run Chinook salmon. Accordingly, a review of the current status of C.V. fall-run Chinook salmon is set forth below so that the results of Staff's analysis can be put into perspective.

2.1.2.2.2. Current status of Central Valley fall-run Chinook salmon

CVFRCS are the predominate focus of the Proposed Project and therefore must be put into context. The evolutionarily significant unit ("ESU") of Central Valley fall-run/late fall-run Chinook salmon includes all fall-run Chinook salmon in the Sacramento and San Joaquin River Basins; there is no independent ESU for *San Joaquin River* fall-run Chinook salmon, nor for *late* fall-run Chinook salmon. (SED, at 7-9, 7-15.) CVFRCS are not a Distinct Population Segment ("DPS") under the ESA. (SED, at 7-9.) Because CVFRCS are only identified as a species of concern under the ESA (SED, at 7-9), the ESU is not currently protected under the ESA because it was not found to be at risk of extinction or at risk of becoming endangered in the foreseeable future.

Average annual production[8] of CVFRCS from 1976-2014 was 707,598.[9] The vast majority of these fish were harvested. Under current fishing regulations, CVFRCS cannot be legally harvested in the Plan Area[10], and thus provide no harvest value in the Plan Area itself. As for the harvest value outside the Plan Area, average annual commercial ocean harvest from 1976-2014 was

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[7] Rainbow Trout do not migrate. The anadromous form of Rainbow Trout, referred to in the SED as steelhead, do migrate from the Stanislaus River (SED, at 7-3.) The Tuolumne River does not have a viable, sustainable *O. mykiss* population. (SED, at 7-18.)

[8] Production is defined as ocean commercial harvest, ocean sport harvest, in-river harvest, escapement and returns to hatchery.

[9] Chinookprod, June 2016, available at http://www.casalmon.org/PDFs/Chinookprod_CompleteDraft2015Reports6.30.16.pdf

[10] California Freshwater Sport Fishing Regulations, 2016-2017; California Department of Fish and Wildlife, available at https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=117095&inline

426,949 (SED, at 20-62); average annual recreational ocean harvest over the same time period was 128,189 (SED, at 20-65); and average annual in-river catch from 1992-2010 was 64,900. (SED, at 20-65.) Using these figures, the average annual harvest is approximately 620,038 CVFRCS. Thus, on average, slightly more than 700,000 CVFRCS are produced each year, with more than 600,000 being harvested.

The Staff analysis estimates that the Proposed Project will result in an additional production of 1,103 CVFRCS annually (SED, at 19-84), at the cost of reducing water supply by 293,000 acre feet annually (assuming supply is subsidized by maximum groundwater pumping). (SED, at 5-73.) With average annual production of more than 700,000 CVFRCS, the increase in production expected to be achieved from the objectives amounts to an incremental gain of approximately 0.15%, or less than a quarter of 1 percent.

The average dress weight of CVFRCS is approximately 10.7 pounds.[11] The SED states that the price per pound at the dock is $5.54. (SED, at 20-63.) Using these numbers and the average annual commercial ocean harvest number of 426,949 to calculate a crude estimate of annual economic value, the amount exchanged at the dock is approximately $25.4 million annually (426,949 fish * 10.7 lbs/fish = approx. 4.57 million lbs. * $5.54/lb = approx. $25.4 million). Assuming an increase in production of 1,103 fish, and assuming a commercial ocean harvest rate of 60%, the total increase in commercially harvested fish would be approximately 662 fish. With an average dress weight of 10.7 pounds, the increase in food production would be approximately 7,083 pounds. At a price per pound of $5.54, the increase in economic production would be approximately $39,2442.00, which is 0.15% of the $25.4 million that is exchanged annually.

A review of the scientific data on migration of CVFRCS juveniles in the San Joaquin River system is also illuminating, as juvenile migration is a common subject of study and analysis. California Department of Fish and Wildlife ("CDFW") has estimated the number of CVFRCS juveniles entering the Delta on the San Joaquin River at Mossdale. The yearly numbers, as well as

[11] Review of 2015 Ocean Salmon Fisheries: Stock Assessment and Fishery Evaluation Document for the Pacific Coast Salmon Fishery Management Plan, Table D-1, p. 309 (available at http://www.pcouncil.org/wp-content/uploads/2016/02/Review_of_2015_Salmon_Fisheries_FullDocument.pdf)

the average annual number, are depicted below in SJTA Table 2-1. The numbers vary from as low as 13,286 to as high as 2,677,063.

Year	Juveniles at Mossdale
1996	1,146,584
1997	637,072
1998	2,677,063
1999	437,853
2000	484,712
2001	852,639
2002	738,640
2003	554,246
2004	335,313
2005	770,728
2006	2,058,741
2007	920,006
2008	388,548
2009	141,250
2010	89,417
2011	1,736,274
2012	722,432
2013	1,031,458
2014	273,452
2015	13,286
2016	38,857
Average	**764,218**

SJTA Table 2-1[12]

The total number of juvenile Chinook salmon from the entire Central Valley that migrate through the Delta can be measured at Chipps Island. As shown in SJTA Table 2-2 below, the average annual number of juvenile Chinook salmon from the *entire Central Valley* is more than 4 million, which is more than 5 times the number that leave the San Joaquin River.

[12] Unpublished data provided by California Department of Fish and Wildlife to FishBio; estimates calculated using efficiency tests conducted at Mossdale trawl. (SJTA Attachment 1, CDFW unpublished Mossdale data to FishBio.)

Year	Chipps Island Estimate
2007	3,905,855
2008	1,631,739
2009	3,403,357
2010	6,865,558
2011	9,985,473
2012	5,320,060
2013	4,185,417
2014	2,928,438
2015	1,119,249
Average	4,371,683

SJTA Table 2-2[13]

In addition, fall-run Chinook salmon are raised at five major Central Valley hatcheries that release more than 32,000,000 smolts each year. (SED, at 7-15.)

Year	Total Hatchery Releases in Central Valley
2007	32,611,297
2008	26,888,531
2009	27,960,923
2010	34,854,314
2011	46,644,134
2012	29,625,104
2013	28,813,281
2014	25,624,498
Average	31,627,760

SJTA Table 2-3[14]

The SED is silent as to how many more juveniles will be produced at Mossdale or Chipps Island by the increase in flow. However, an independent SalSim run conducted by SJTA consultants (SJTA Attachment 3 [summarized below]), showed an average increase in the number of juveniles at Mossdale under the SWB's 40% unimpaired flow of 146,503 over the SWB baseline (SJTA

[13] Chipps Island is the westernmost edge of the Delta. The juvenile numbers at Chipps Island represent fish from the entire Central Valley. Numbers are from unpublished data provided by United States Fish and Wildlife to FishBio on March 23, 2016. (SJTA Attachment 2, USFWS unpublished Chipps Island data to FishBio.)
[14] Regional Mark Processing Center RMIS database accessible at http://www.rmpc.org

Attachment 3.) If survival through the Delta is roughly 5% (Ferguson, et al. 2016[15]), then approximately 7,325 of these juveniles would be expected to survive to Chipps Island. With hatchery releases of approximately 32,000,000, the additional 7,325 fish at Chipps Island are essentially immeasurable, amounting to approximately 0.02% of the hatchery releases alone.

2.1.2.2.3. Delta Flow Criteria Report on protection of Chinook salmon

The State Water Board's Delta Flow Criteria Report from 2010 analyzes the flows necessary at Vernalis to protect juvenile fall-run Chinook salmon moving down the San Joaquin River into and through the Delta. (Delta Flow Criteria Report, at 55.) In Section 5.3 of the Report, the State Water Board sets forth the flows necessary at Vernalis. On page 119, the Report states:

> "San Joaquin River inflows are important for much of the year to support various life stages of San Joaquin basin fall-run Chinook Salmon … However, given the focus of this proceeding on inflows to the Delta and the lack of information received concerning spring-run flow needs on the San Joaquin River, the San Joaquin River inflow criteria included in this report focus on flows needed to support migrating fall-run Chinook Salmon from and to natal streams through the Delta." (Delta Flow Criteria Report, at p. 119.)

As this paragraph makes clear, there was no analysis conducted on the flows needed from the three eastside tributaries; the focus was solely on flows from the San Joaquin River at Vernalis.

Focusing on inflow to the Delta, the Report makes two key findings. First, the Report states that average March through June flows of 5,000 cfs on the San Joaquin River at Vernalis is a "flow threshold" where survival of juveniles and adult abundance of fall-run Chinook salmon is "substantially improved." (Delta Flow Criteria Report, p. 119.) Second, the Report states that average flows of 10,000 cfs at Vernalis during the same time period may provide conditions necessary to double San Joaquin basin fall-run. (Delta Flow Criteria Report, p. 119.)

The State Water Board then determined what percentage of unimpaired flow would be necessary to achieve these flow rates of 5,000 and 10,000 cfs at Vernalis. In doing so, the drafters of the Report examined all of the flows in the San Joaquin Valley. Specifically, unimpaired flow was

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[15] Ferguson et al 2016. see page 235 at http://scienceconf2016.deltacouncil.ca.gov/sites/default/files/2016-10-29-Accepted-Oral-Abstracts.pdf

computed as “the sum of estimates from **nine** sub-basins in the watershed and are understood to represent the flow that would occur on the San Joaquin River at Vernalis.” (Delta Flow Criteria Report, p. 97.) The nine sub-basins include “the Stanislaus River at Melones Reservoir, San Joaquin Valley Floor, Tuolumne River at Don Pedro Reservoir, Merced River at Exchequer Reservoir, Chowchilla River at Buchanan Reservoir, Fresno River near Daulton, San Joaquin River at Millerton Reservoir, Tulare Lake Basin Outflow, [and the] San Joaquin Valley West Side Minor Streams.” (Delta Flow Criteria Report, p. 97.)[16] The report concluded that “60% of the unimpaired flow [of the entire San Joaquin River basin upstream of Vernalis] from February through June is needed in order to achieve a threshold flow of 5,000 cfs or more in most years (over 85% of years) and flows of 10,000 cfs slightly less than half of the of time (45% of years).” (Delta Flow Criteria Report, p. 120.)

The analysis presented in the SED demonstrates that these flow thresholds of 5,000 cfs and 10,000 cfs will rarely be met by requiring 40% unimpaired flow from only the Stanislaus, Tuolumne and Merced Rivers (three of the nine sub-basins that contribute to San Joaquin River flows at Vernalis). Figure F.1.4-4a in the SED, reproduced below, shows that average flows of 5,000 cfs from February to June (or 1,500 TAF) are only achieved in about 50 percent of water years under a 40% unimpaired flow requirement.[17] (see also SED, at Appx. F1, Table F.1.4-4, p. F.1-168.) The graph also shows that average flows of 10,000 cfs (or 3,000 TAF) are only achieved in about 15% of water years under a 40% unimpaired flow requirement. (see also SED, at Appx. F1, Table F.1.4-4, p. F.1-168.)

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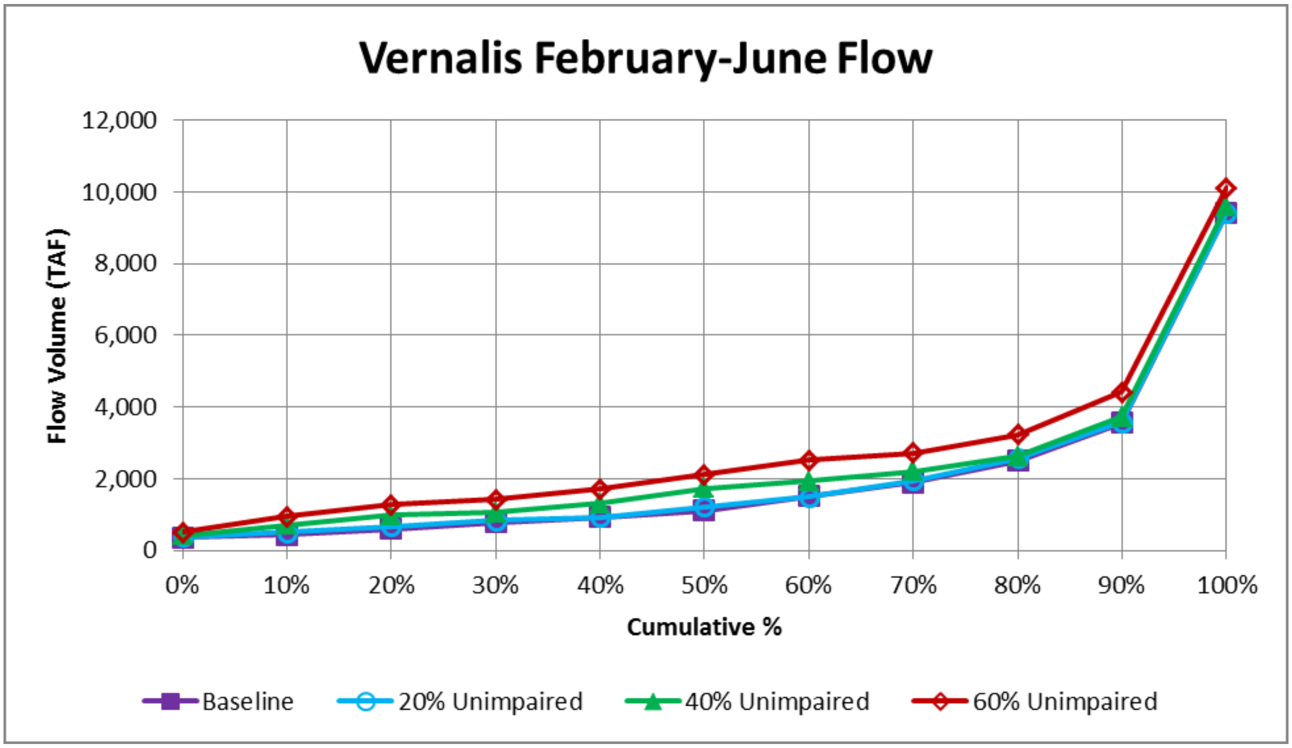
[16] The average unimpaired flow at Vernalis for the months of February through June (1921 – 2003) is 529,000 acre feet (February), 668,000 acre feet (March), 929,000 acre feet (April), 1,467,000 acre feet (May), 1,117,000 acre feet (June), for a summed average amount of 4,710,000 acre feet over all five months. (Delta Flow Criteria Report, p. 97; *California Central Valley Flow Data,* Fourth Edition Draft (May 2007), p. 45.)

[17] The flows in Figure F.1.4-4a are expressed in acre feet, not cfs. Using a conversion rate of 1 cfs = 2 acre feet per day, which is the same conversion rate used in Appendix F1 (SED, at F.1-143), average flows of 5,000 cfs are equivalent to approximately 1,500 TAF because there are 150 days in the February to June time period: 5,000 cfs * 2 acre feet/day = 10 TAF/day * 150 days = 1,500 TAF. The SED does not contain a similar graph for the February to June time period using cfs.



SED Figure F.1.4-4a. WSE-Simulated Cumulative Distribution of SJR at Vernalis February-June Flow Volumes (TAF) for Baseline Conditions and 20%, 40%, 60% Unimpaired Flow (LSJR Alternatives 2-4)

The frequency of achieving 5,000 cfs and 10,000 cfs flow thresholds are significantly lower under the Proposed Project than under the 60% unimpaired flow proposal in the Delta Flow Criteria Report where the flow thresholds were expected to be achieved in 85% of years and 45% of years, respectively. This reduction is due in large part to the fact that only three basins are contributing to the flows at Vernalis, as opposed to all nine. Indeed, the median annual unimpaired flow of the upper San Joaquin (which is not required to contribute any percentage of unimpaired flow under the objectives) is 1.44 MAF, whereas the Stanislaus, Tuolumne and Merced are only 1.08 MAF, 1.72 MAF, and 0.85 MAF, respectively.

The Delta Flow Criteria Report concludes that the benefit to fall-run Chinook salmon migrating through the Delta is dependent on Vernalis flow. The SED fails to explain how the Vernalis-centric flow analysis which covered the entire San Joaquin River basin evolved into a narrowly focused objective covering only the three eastside tributaries. There is also no explanation of the impact of reducing unimpaired flow from 60% of the entire San Joaquin basin to 30-50% of the three eastside tributaries. If there will not be significant improvements to fall-run Chinook salmon under the proposed flow objectives because the flow thresholds from the Delta Flow Criteria Report will rarely be met, then there is a disconnect between the proposed objectives and the beneficial uses that they are intended to protect.

2.1.2.2.4. The water temperature analysis in the SED is flawed and does not show improvements that will benefit fall-run Chinook salmon

Staff has asserted in several public hearings that the Tributary Flow Objective will protect fall-run Chinook salmon by improving water temperature conditions on the Stanislaus, Tuolumne and Merced Rivers, irrespective of the fact that the SalSim analysis only shows an increase in production of 1,103 fish.[18] Before addressing the results of the temperature analysis in the SED, it must be noted again that the analysis does not presume implementation of the Tributary Flow Objective as written. Rather, flows were shifted outside the February-June period to the July-November period to avoid "an undesirable result of elevated temperatures when compared to baseline." (SED, at Appx. F1, p. F.1-43.) In other words, Staff found that without the flow shifting measures, water temperatures were cooler under Baseline conditions than under the Tributary Flow Objective conditions. Since flow shifting is "not part of the unimpaired flow objective" (SED, at Appx. F1, p. F.1-17), any assertion by Staff that the Tributary Flow Objective itself will improve water temperature conditions is belied by the information in the SED, assuming acceptance of Staff's premise that cooler temperatures are universally better for Chinook salmon production. In any event, even with the flow shifting measures, the analysis in the SED does not demonstrate that the temperature changes will result in improved conditions for fall-run Chinook salmon.

First, the temperature analysis in the SED uses monthly data and converts the monthly output to daily values. (SED, at 19-18.) As a result, the model assumes that the same flow rate will occur every day of the month. This result is contrary to the Tributary Flow Objective which requires

[18] Transcript of Public Hearing before SWRCB, November 29, 2016, p. 272, lns. 15-23 [Les Grober: "the main thing to say is that we're not relying on [SalSim results] to say this is the benefit. We're relying on the things that we showed that we have temperature improvements, we have floodplain habitat improvements, and these are things that have been shown to lead to increases in populations and resiliency and all sorts of measures elsewhere in other systems. So that's what we're relying upon to show the benefit."]

a percentage of unimpaired flow based upon a minimum 7-day running average. Using a daily running average approach means that flows will change every day, not once per month. Accordingly, the analysis in the SED does not capture the daily changes in flow that would occur if the Tributary Flow Objective were implemented. As these changes in flow will cause corresponding changes to water temperature, the results shown in the SED are not reflective of what temperature impacts might occur, and thus do not demonstrate that the Tributary Flow Objective will protect beneficial uses. .

Furthermore, in modeling the temperature impacts, State Water Board Staff used the San Joaquin River Basin-Wide Temperature and EC Model, also known as the SJR HEC-5Q model. (SED, at 19-17.) The temperature thresholds were based on the USEPA recommended temperature criteria for protection of salmonids using the 7-day average of the daily maximum (7DADM) metric. (SED, at 19-18.) The analysis presented in the SED examines the percentage of days during each month over the modeled 34-year period that USEPA criteria are expected to be met at various locations on the Stanislaus, Tuolumne and Merced Rivers. (SED, at 19-18.) The SED characterizes a "significant benefit" as being a 10% change in the amount of time that USEPA criteria are met. (SED, at 19-18.) However, there was no legitimate or scientific basis for characterizing a 10% change as a "significant benefit", or a benefit at all. Specifically, the SED acknowledges there is no data to support the position that a 10% change will have any impact on population metrics such as survival or abundance. (SED, at 19-18 [noting that there is a lack of "quantitative relationships between a given change in environmental conditions and relevant population metrics (e.g. survival or abundance)"].) The only apparent reason for choosing 10% as a marker is that it purportedly covers the expected margin of error of the model, although this reasoning seems to be based on guesswork rather than statistics. (SED, at 19-18 ["Ten percent was selected because it accounts for a reasonable range of potential error associated with the assumptions used in the various analytical and modeling techniques"].) In acknowledging these many uncertainties, the drafters of the SED provided the following statement for the State Water Board to consider: "a 10% change was considered sufficient to *potentially result* in beneficial or adverse effects to sensitive species at the population level." (SED, at 19-18 [emphasis supplied].) In light of the significant impacts to water supply that will be caused by the proposed objectives, the Board should demand a more reliable and scientifically-grounded conclusion as to what measure of temperature change will result in a benefit to salmon population. The *potential* for a benefit does not justify the drastic reduction to surface water supply, nor the significant impact to groundwater supply, that will be caused by the objectives.

In any event, a review of the SED analysis demonstrates that this 10% change is rarely achieved under Alternative 3. [19] For instance, on the Stanislaus River, the 10% change over Baseline is only consistently achieved under 40% UIF in the month of October, and only for purposes of adult migration. (SED, at Table 19-3, p. 19-22.) The month of October is not targeted by the objectives, and presumably this increase in temperature is only achieved as a result of the flow shifting that is not part of the Proposed Project. Notably, the percentage of time when the USEPA criteria is met in October for adult migration purposes under Baseline is already fairly high, i.e., it is achieved between 71% and 88% of the time at all locations on the river. (SED, at Table 19-3, p. 19-22.) Apart from the 12% change seen in October for adult migration purposes, the 10% change threshold is only achieved at two other times and locations on the Stanislaus River under 40% UIF, namely for spawning, egg incubation, and fry emergence in March at the ½ and ¾ locations on the river. (SED, at Table 19-3, p. 19-22.) On the Tuolumne River, there are no reported improvements in February at 40% unimpaired flow, and there are no relevant temperature changes in March for the simple fact that the temperature threshold of 60.8 degree Fahrenheit for fall-run Chinook juvenile rearing is already established under baseline conditions. (SED, at 19-26, Table 19-7.) As explained in the comments submitted by MID and TID, the remainder to the Tuolumne temperature results reported in the SED do not demonstrate a benefit to fall-run Chinook salmon.[20]

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[19] The temperature analysis is also addressed in the comments from Oakdale Irrigation District and South San Joaquin Irrigation District at 19-34. The Board's temperature analysis is also addressed in comments submitted by MID and TID

[20] See Comments submitted by MID and TID.

Given the results reported in the SED, and given the fact that there is no evidentiary support for the assertion that a 10% improvement will have a positive impact on survival or abundance of salmonids, it cannot be said that the Tributary Flow Objectives – even as modeled in the SED – protect the beneficial uses identified in the plan.

2.1.2.2.5. The SED's floodplain habitat analysis is flawed and does not show improvements to floodplain habitat

Section 19.3 of the SED describes expected benefits to salmon and steelhead from floodplain inundation under the Alternatives. Achieving a certain amount of floodplain inundation is not a WQCP objective. Rather, the State Water Board provides an analysis of floodplain inundation as justification for the proposed instream flows. Based on the analysis, the SED concludes that:

> "Implementation of the proposed project will produce substantial increases in floodplain *habitat* which is available to native fish and wildlife populations, and it is expected that there will be significant positive population responses by native salmonids, and other native fishes." (SED, at 19-74 [emphasis supplied].)

The SED does not provide adequate support for this conclusion. Specifically, the SED (1) does not define floodplain *habitat*, nor does it properly distinguish between inundated land and habitat, (2) does not consider the quality of newly inundated areas, omitting factors such as depth, flow rate, timing, duration, dissolved oxygen, temperature and substrate; (3) does not integrate findings of the temperature assessment with the floodplain assessment to evaluate the expected thermal suitability of inundated areas; (4) does not consider other reasonable measures such as floodplain restoration to create more frequently inundated off-channel habitats, and (5) does not address empirical findings which validate that wetted area does not always equate to usable habitat. These critiques are addressed in turn below.

2.1.2.2.5.1. The SED does not define floodplain habitat

In order to properly assess whether the additional flows required by the proposed objectives will create floodplain *habitat*, as opposed to inundated land unsuitable as habitat, the term floodplain habitat must first be defined and distinguished from inundated land. However, the SED does not provide such a definition. Before the Board makes any decision as to whether the proposed objectives provide reasonable protection to fish and wildlife due to the creation of additional floodplain habitat, the term floodplain habitat must first be defined so that the Board can assess whether the objectives merely inundate more land or create habitat that will be beneficial to fish and wildlife.

Floodplain habitat is characteristically broad flat, low-lying land that is accessible to rising river conditions (Sommer et al. 2001[21], Jeffres 2008[22], Katz et al. 2013[23]). The otherwise dry area becomes inundated and floods terrestrial invertebrates, providing an abundant, otherwise inaccessible, food-source for fish. As waters warm, productivity increases key food sources like zooplankton in densities greatly exceeding the main channel. The relatively shallow, open-water habitat, spread over a large expanse also creates several important features. First, it allows for water to warm from ambient exposure. Second, the large area has slower moving water (low-velocity) requiring minimum effort for juveniles to search for food or hold in place. Finally, the inundated terrestrial vegetation and broad expanse lower the potential for predator-prey interactions. None of these key factors are addressed in the SED's determination of how floodplain habitat is identified.

The SED compares floodplain creation on the three eastside tributaries to the Yolo Bypass. This is not a proper or helpful comparison. The Yolo Bypass is a 59,000-acre area that doubles the inundated area of the Delta and is "equivalent to about one-third the area of the San Francisco and San Pablo bays" (Sommer et al. 2001). The sum of the fragmented, wetted areas in the San Joaquin Basin that the SWRCB is referencing is not comparable in size or function. This disparity alone highlights a fundamental misunderstanding of what floodplain habitat is and how it works. This misunderstanding was further highlighted in the SED when it stated, "…exactly how much faster salmon grow on a floodplain depends on many variables that are not completely understood in

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[21] Sommer, T. R., Nobriga, M. L., Harrell, W. C., Batham, W., & Kimmerer, W. J. (2001). Floodplain rearing of juvenile Chinook salmon: Evidence of enhanced growth and survival. Canadian Journal of Fisheries and Aquatic Sciences, 58(2), 325-333.
[22] Jeffres, C. A., Opperman, J. J., & Moyle, P. (2008). Ephemeral floodplain habitats provide best growth conditions for juvenile Chinook salmon in a California river. Environmental Biology of Fishes, 83(4), 449-458.
[23] Katz, J., Jeffres, C., Conrad, L., Sommer, T., Corline, N., Martinez, J., Brumbaugh, S., Takata, L., Ikemiyagi, N., Kiernan, J., & Moyle, P. (2013). Experimental agricultural floodplain habitat investigation at Knaggs Ranch on Yolo Bypass, 2012-2013. Sacramento, CA: US Bureau of Reclamation.

California…" (SED, at 19-74). As just explained, the "many variables" are understood from past research, but clearly not addressed within the SED analyses.

2.1.2.2.5.2. The SED does not examine the quality of the inundated areas, nor the suitability of the inundated areas as habitat

The SED analysis relies upon the United States Fish & Wildlife Service ("USFWS") (2013) model to estimate floodplain inundation for the Stanislaus River. (SED, at 19-57.) The USFWS abandoned use of its own model in light of a superior model being developed by NewFields (2013). The USFWS used the NewFields model in its assessment of survival relative to floodplain inundation. (*Identification of the Instream Flow Requirements for Anadromous Fish in the Streams Within the Central Valley of California and Fisheries Investigations* (2014) USFWS Annual Progress Report Fiscal Year 2014, Sacramento, CA ("USFWS 2014").) Annual Progress Report Fiscal Year 2014. Sacramento, CA.) The SED references the USFWS 2014 analysis, and therefore the SWRCB must be aware that the NewFields model exists. It is unclear why the SWB chose not to use the best available science in its assessment of floodplain inundation in the Stanislaus River. A presentation by Paul Frank (NewFields, February 2014) of the reported conclusions of the NewFields (2013) findings state that rearing habitat is best increased by creating perennially accessible habitat through habitat restoration, not temporary habitat from elevated overbanking flows.

Even if the SWRCB accurately identified the quantity of created floodplain habitat (which appears highly unlikely), there is little consideration of the habitat quality differences that occur across a river. The SWRCB briefly broached the idea of 'differences in habitat quality' by stating, "…as an example, flooding a parking lot with sufficient timing, frequency, magnitude, and duration necessary for fish will not produce the kinds of ecosystem responses that are desired" (SED, at 19-55). Each river does have its 'parking lots' of unusable habitat. For such an important model, outputs should be validated in the field. At a minimum, the SED should provide a reasonable correction factor to its floodplain estimates bringing numbers into a more realistic representation. Not only did the SED not conduct any validation, but it assumed *100 percent* of the newly wetted area was not only usable by juvenile Chinook salmon or other native fishes, but that it provided greater benefit than other wetted areas. As a result, the modeled wetted area increases from additional flow cannot be confirmed as quality usable habitat or verified as floodplain habitat at all.

One of the key factors in determining whether a newly inundated area will create suitable floodplain habitat is timing. The proposed objectives require significant amounts of additional flow with questionable resulting benefits to floodplain habitat that are poorly timed. Under current conditions in the San Joaquin River basin the total capacity for floodplain creation is relatively limited. Even under the most optimistic scenario, the maximum amount of floodplain that is predicted to be inundated on the Stanislaus River is 789 acres during the month of May. (SED, at 7-87, Table 7-15a [Alternative 4].) This figure represents the amount of area that is inundated with water, not necessarily the amount of area that will provide significant ecological benefits to native fish. Moyle et al. (2007)[24] stated that "Re-creation of floodplains with a high degree of ecological function is not easily accomplished…" and provided a set of guidelines for restoring native fishes to floodplains. The most relevant recommendations were to: (1) provide early opportunities for flooding, primarily from January through April, which were important to increase algal and invertebrate production; and (2) maintain a mosaic of habitats, with a primary focus on large open areas covered with annual terrestrial plants. The authors also note that limited sampling in more forested habitats yielded few fish, relative to the nearby open areas. These considerations should be more fully recognized in the SED as quality of floodplain habitats are not addressed and the timing of inundation may tend to favor non-native species over native species based on results from Moyle et al. (2007).

The timing of floodplain inundation is a critical component to restoring this particular habitat for native fish. For Chinook salmon in particular, usage of the floodplain in the Cosumnes River occurred primarily in late-winter and early spring with most fish observed in February and March (Moyle et al. 2007, Table 4 therein). Native fish (e.g., Splittail, Sacramento sucker, and Chinook salmon) made up less than half of the observed catch beginning in the month of May (Moyle et al. 2007; Figure 3 therein). By June, a high proportion of observed catches were made up

[24] Moyle, P., Crain, P., & Whitener, K. (2007). Patterns in the use of a restored California floodplain by native and alien fishes. San Francisco and Estuary Watershed Science, 5(3), 1-29.

of non-native fishes. While Jager (2014)[25] showed increased recruitment of Chinook salmon under a pulse flow scenario (used for floodplain inundation) that had relatively late timing, the author also found that a late-winter pulse was also associated with increased recruitment rates. These differing viewpoints highlight the need for a more thorough evaluation of the timing of floodplain inundation in the SED. Jager (2014) also noted "the natural hydrograph may not always be the best solution for fishes in regulated rivers because relationships with mediating factors have changed."

Under the proposed alternative, floodplain inundation appears to increase more substantially (over baseline conditions) during the months of April and May (SED, at Tables 7-15a-d, p. 7-87 – 7-90.) Slight decreases, increases, or no change in available floodplain habitat are predicted to occur during the months of February and March. The impact of creating more inundated areas in the later months, while achieving similar available floodplain habitat in the earlier months, needs to be further evaluated. There may be more benefit to more-numerically-abundant fry- and parr-sized Chinook salmon during the early months, and an increase in the risk of favoring non-native species during the later months.

2.1.2.2.5.3. The SED does not consider the physical and biological interconnected relationships between temperature and flow as they relate to floodplain habitat

The SED does not fully consider the effect of temperature and flow in the timing and presence of juvenile salmon in the river. Floodplain created in later months from mid-April through June offers little benefit to juvenile salmon. As shown above, this is the time when the greatest amount of wetted area is created under the objectives. (SED, at Tables 7-15a-c, p. 7-87 – 7-89.) This oversight occurs because the SED addresses interrelated factors (such as flow and temperature) individually and cites to segments of scientific findings without providing much needed empirical results from the rivers being analyzed. This error further ignores the implicit and fundamental relationship of flow, temperature, rearing habitat, and food resources in the development and migration of a young salmonid.

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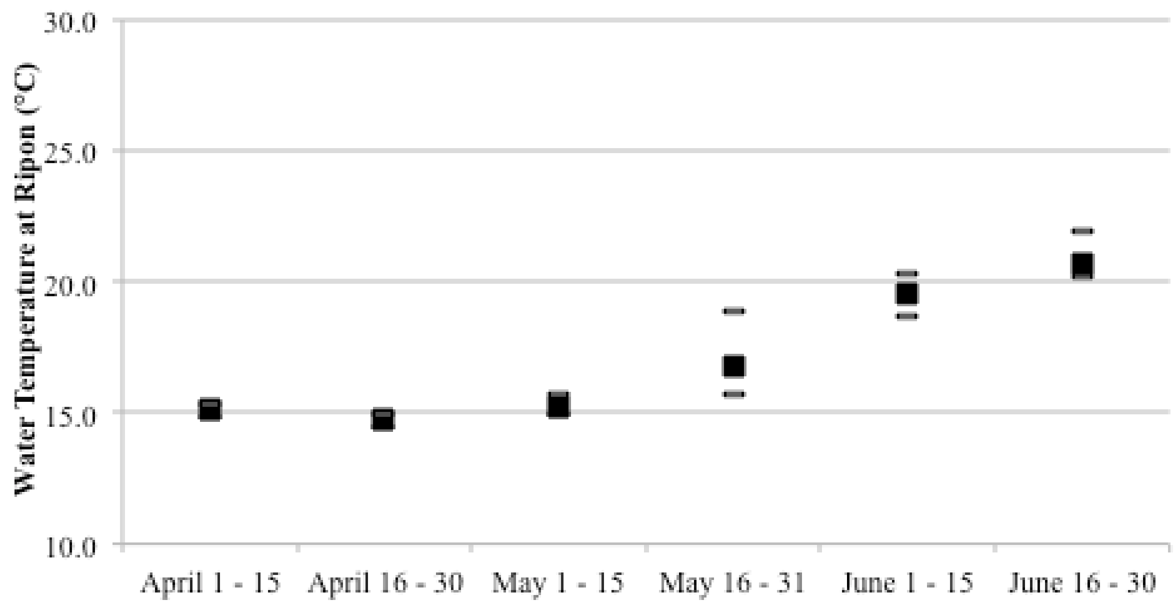
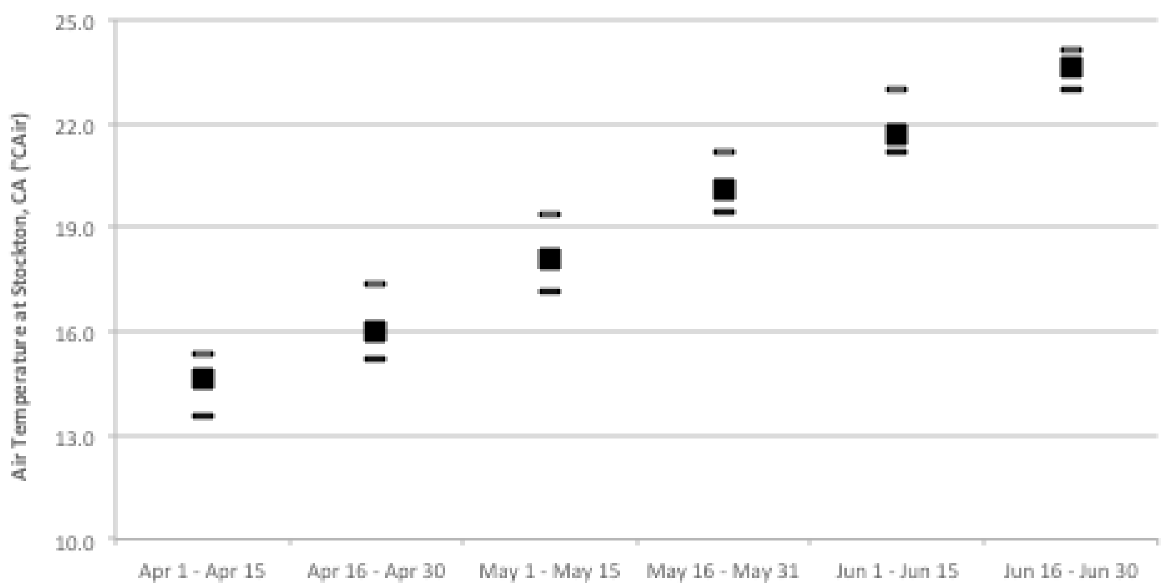
[25] Jager, H. I. (2014). Thinking outside the channel: Timing pulse flows to benefit salmon via indirect pathways. Ecological Modelling, 273, 117-127.

The SED inappropriately attributes survival to floodplain acre-days. On page 19-53, the SED states: "On the Stanislaus River, USFWS (2014) found a significant relationship between juvenile survival and floodplain acre-days, with floodplain acre-days explaining 77% of the year to year variation in juvenile survival." While the statistical correlation may be valid, the biological causation or underlying mechanism may be different. Survival indices are almost entirely driven by whether fry survive during migration, not while rearing. In wetter years with freshets, fry have shown good survival rates to the lower rotary screwtrap at Caswell. This is not due to floodplain inundation. These fry are actively migrating and quickly moving from the primary spawning and rearing reach to the Delta. These fry are not rearing on the floodplains, they are exiting the system.

In addition to the freshet-influenced survival of fry, temperature also becomes an issue in May and June. The SED states that 14°C (57.2°F) should be maintained to the confluence of all eastside tributaries from April to June for smoltification (SED, at 7-122 – 7-125). While most outmigration already occurs in February and March, water temperature conditions in the Stanislaus River historically remain cool (mean of approximately 15°C or 59°F) through April (SJTA Figure 2-2, below) as remaining fish leave the system as smolts. Ambient warming drives elevated water temperature in May through June (SJTA Figure 2-3, below) beyond the control of reservoir releases and outside of desirable outmigration conditions. By failing to integrate results of the temperature assessment with the floodplain assessment, the SED neglects to recognize that temperatures in most of the floodplain areas will exceed the criteria set forth in Tables 19-1 and 19-2. For example, on the Stanislaus river at Ripon (RM 16) water temperatures exceed 14°C (57.2°F) from April-June which is the primary period that the SWB concluded that the majority of floodplain inundation and benefit to salmon would occur.



SJTA Figure 2-2. Minimum, average and maximum of daily water temperatures at Ripon (RM 16) 1998-2016 (USGS Station 11303000).[26]

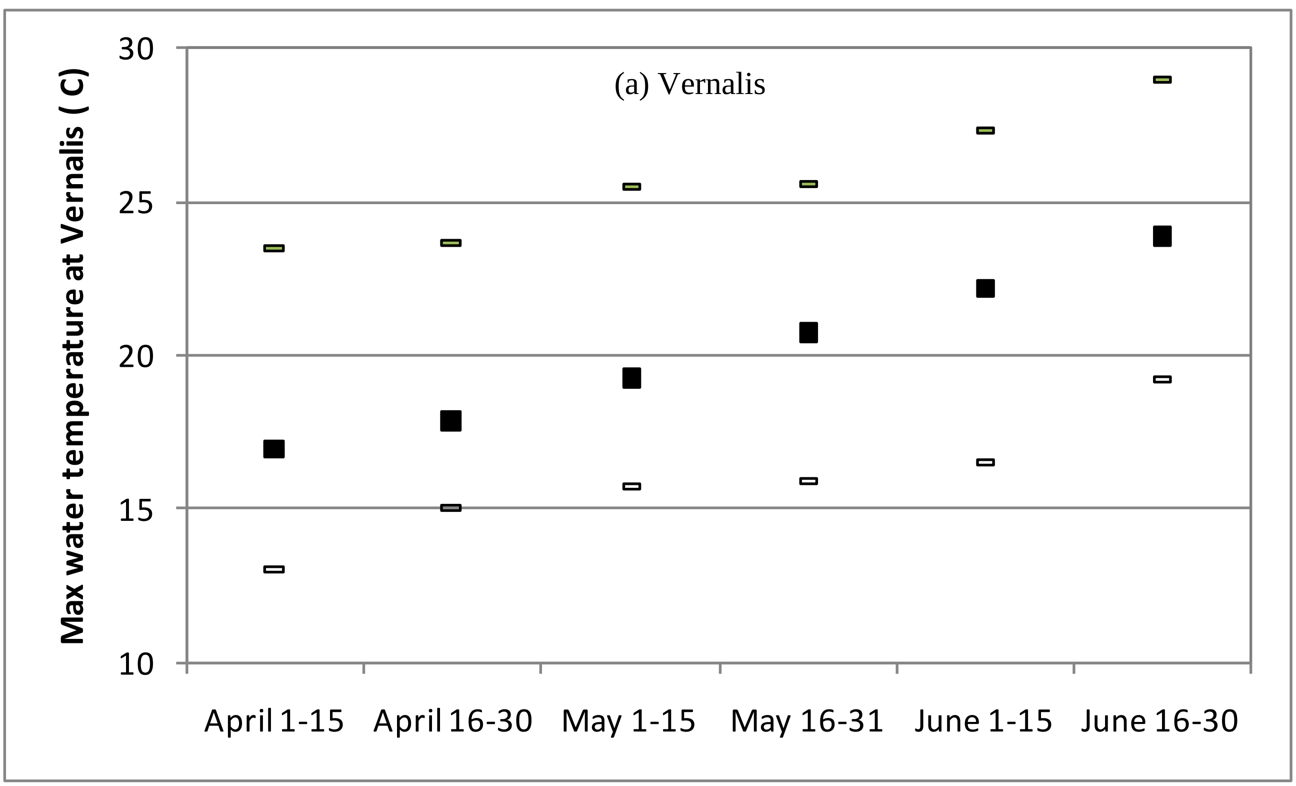


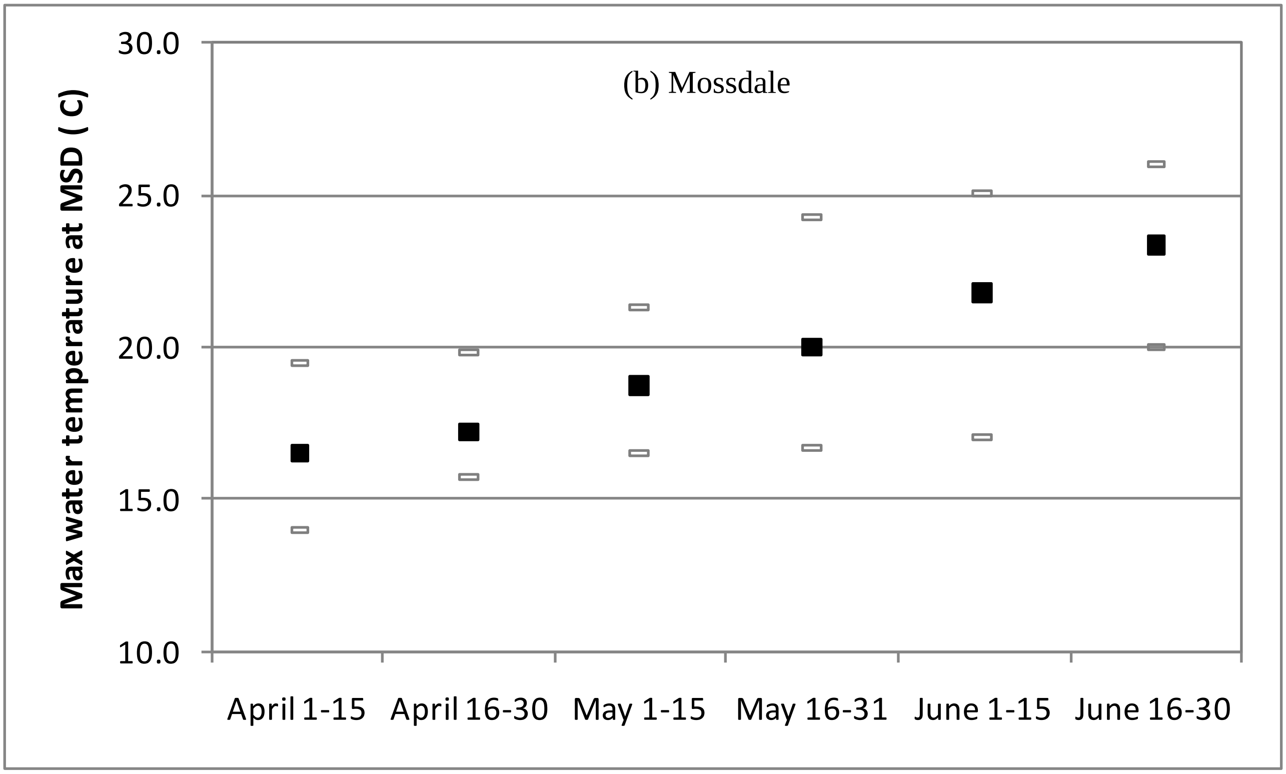
SJTA Figure 2-3. Minimum, average and maximum average air temperatures at Stockton Metro Airport, 1950-2016.[27]

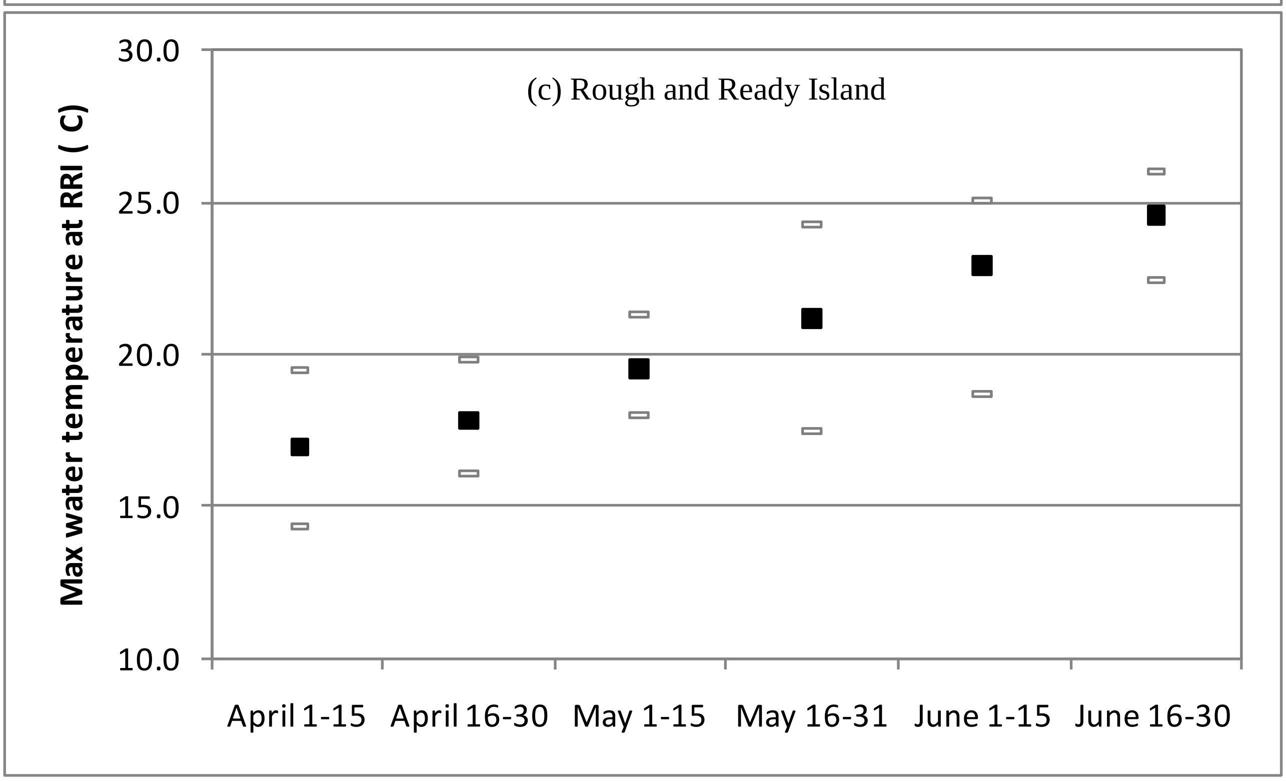
[26] Data for SJTA Figure 2-2 available at https://waterdata.usgs.gov/nwis/dv/?site_no=11303000&agency_cd=USGS&referred_module=qw. Figure prepared by FishBio, Inc.

[27] Data for SJTA Figure 2-3 available at http://www.wrcc.dri.edu/climatedata/climsum/. Figure prepared by FishBio, Inc.

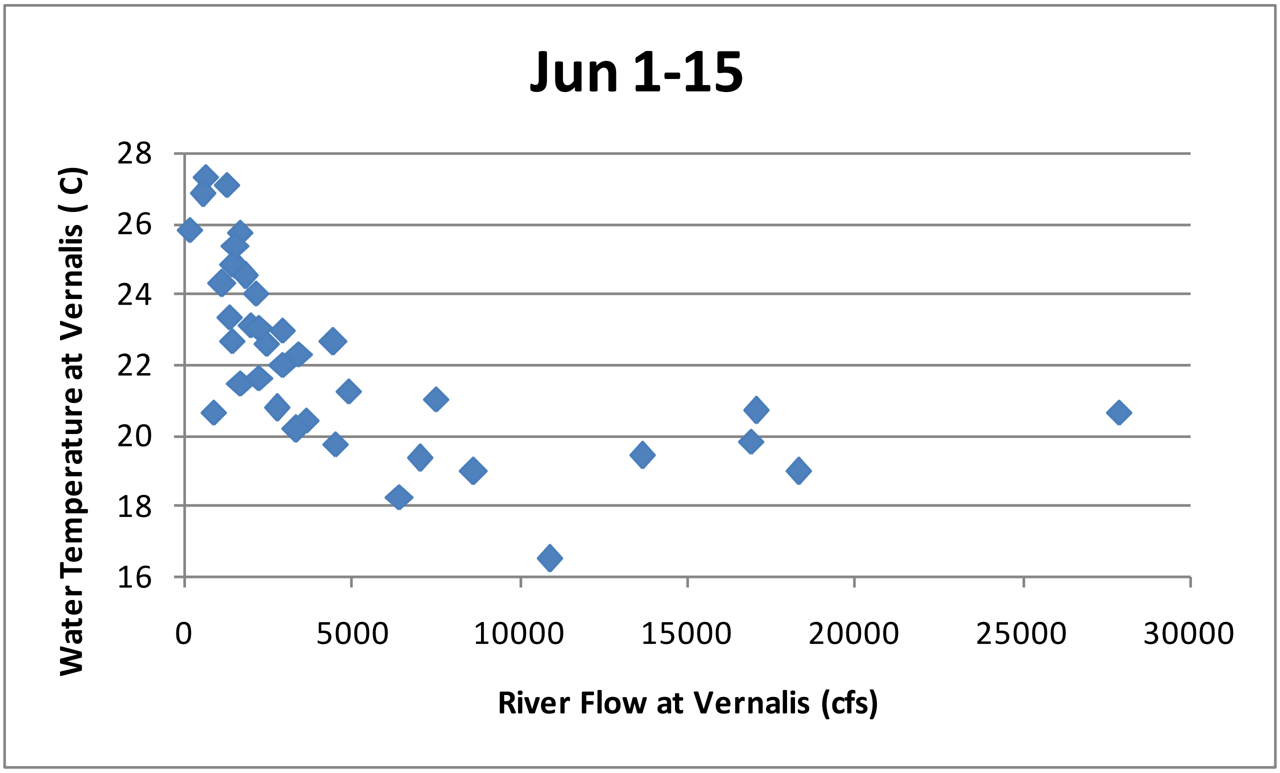
Outside of the Stanislaus River, warming occurs earlier and more rapidly. In the San Joaquin River, water temperature steadily rises from median temperatures near 16°C (60.8°F) in early April to approaching 20°C (68°F) by early May (SJTA Figure 2-4, below). Again, increased flow releases did not appear to counteract the ambient warming conditions. Monthly water temperatures collected at Vernalis show a nonlinear pattern, with a clear threshold at which water temperature operates independently of discharge. Monthly discharge levels below 2,500 cfs appear to have a strong negative relationship with water temperatures. However, above 2,500 cfs, the relationship between monthly discharge and water temperature changes to a different pattern. Data in this portion of the relationship clearly shows that water temperature is not associated with increased discharge (SJTA Figure 2-5, below). This result also shows that the water temperature above approximately 20°C (68°F) cannot be reliably managed by flow and any out-migrant salmonid in May and June will experience uncontrollably high and potentially undesirable water temperature conditions in the San Joaquin River.



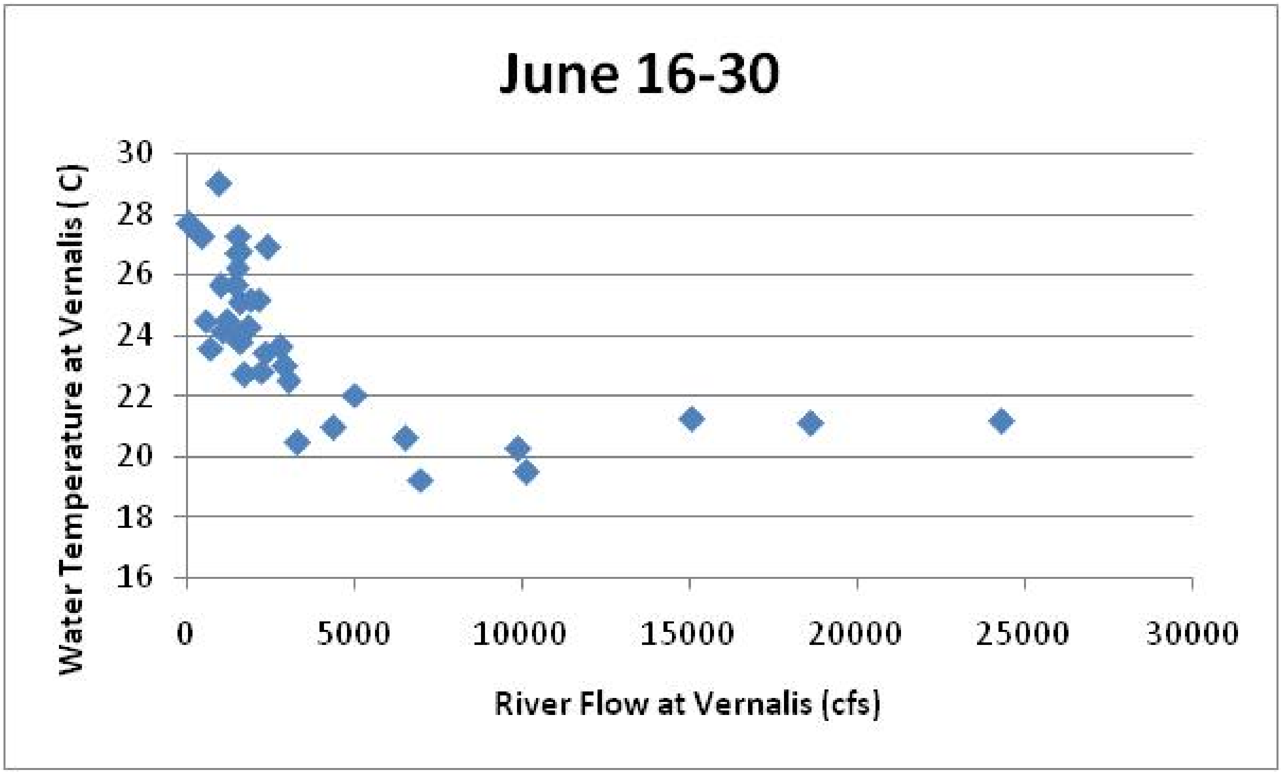

(b) Mossdale
Max water temperature at MSD (C)
30.0
25.0
20.0
15.0
10.0
April 1-15
April 16-30
May 1-15
May 16-31
June 1-15
June 16-30


(c) Rough and Ready Island
Max water temperature at RRI (C)
30.0
25.0
20.0
15.0
10.0
April 1-15
April 16-30
May 1-15
May 16-31
June 1-15
June 16-30

STJA Figure 2-4. Minimum, mean, and maximum of average maximum water temperatures at (a) Vernalis 1973-2011 (USGS station 113035000), (b) Mossdale 2002-2011 (CDEC station MSD), and (c) Rough and Ready Island 2001-2011 (CDEC station RRI).[28]



[28] USGS data is available at https://waterdata.usgs.gov/nwis and CDEC data is available at http://cdec.water.ca.gov/cgi-progs/selectQuery. Figure provided by FishBio, Inc.



SJTA Figure 2-5. Average river flow (cfs) and average maximum water temperature (°C) at Vernalis, 1973-2011 (USGS station 113035000).[29]

The SWRCB's goal to increase floodplain and to meet unreasonable water temperature thresholds during the latter portion of the outmigration period will provide little benefit to a numerically small number of native salmonids and may carry with it higher risks than other potential alternatives. The primary risk is to the coldwater pool in the upstream rim reservoirs, a risk that may carry many unintended consequences that will affect summer rearing areas of *O. mykiss* and fall migration and spawning conditions for adult Chinook salmon. A secondary risk is that later inundation of floodplains may favor non-native fish species, not the native species that it is intended to benefit. Therefore, a more biologically beneficial alternative is to provide off-channel habitat that is available at a wide range of flows, specifically designed to function for multiple life stages of native salmonids.

2.1.2.2.5.4. The proposed objectives ignore the only viable solution of bringing habitat to flow, rather than flow to the habitat

[29] Data is available at https://waterdata.usgs.gov/nwis. Figure provided by FishBio.

The objectives narrowly focus on using sizeable flows to bring water to floodplain habitat. This focus ignores other potential solutions that should be considered in a resource-limited landscape. The SED acknowledges that the Central Valley historically contained approximately one million hectares (2.47 million acres) of floodplain habitat, and that 90% of this habitat has been lost due to land-use changes and habitat conversion. (SED, at 19-53). This leaves 247,105 acres remaining in the entire Central Valley. Combined, the Yolo bypass (59,305 acres) and Cosumnes River Preserve (45,999 acres) amount to approximately 105,000 acres, or nearly 43 percent of the total floodplain habitat. The combined inundated areas on the Stanislaus, Tuolumne, Merced, and San Joaquin Rivers at flows of 5,000 cfs on the tributaries and 15,000 cfs on the San Joaquin (which is well above 60% unimpaired flow), equal 11,418 acres of fragmented "floodplain" habitat – less than 5% of the remaining floodplain habitat in the Central Valley. (SED, at Tables 19-22 – 19-27, p. 19-63 – 19-68.)

Instead of focusing exclusively on flow, the objectives should include restoration of off-channel habitat, which has already been shown to provide salmonid habitat at base case flow levels in the Stanislaus River. Recent restoration projects, including Honolulu Bar, Russian Rapids side-channel complex, and Lancaster Road restoration area, have utilized alterations to channel morphology and the riparian community to provide continuously wetted and accessible habitat for native fish. These projects are a more appropriate and reasonable means of providing salmonid habitat for multiple life stages, year-round rather than increasing flows to provide relatively small amounts of temporary marginal floodplain habitat.

2.1.2.2.5.5. Empirical findings validate that wetted area does not always equate to usable habitat

The analysis in the SED fails to acknowledge empirical findings which have shown that wetted area does not always equate to usable habitat. On the Stanislaus River, FISHBIO was able to sample fish use of off-channel "floodplain" habitats identified from NewFields model outputs (2013) during periods of increased flow from Goodwin Dam in 2013 and 2014. A report on this sampling was sent to the Stanislaus River Forum and is attached hereto as SJTA Attachment 4. Sampling in 2013 occurred between April 25 and May 9 at flows ranging from 3,009 to 3,045 cfs at

Goodwin Dam. No juvenile fall-run Chinook salmon were observed in 2013 despite an estimated passage of over 145,000 individuals at the Oakdale rotary screw trap between April 25 and May 10. Sampling in 2014 occurred between April 21 and April 30 at flows ranging from 2,400 to 2,700 cfs. With an estimated passage of 48,600 individuals at the Oakdale rotary screw trap during the sampling period, a total of 265 juvenile fall-run Chinook salmon were observed in off-channel habitats during 2014. However, 199 of the 265 fish were observed in recently restored side-channel habitats (i.e., Honolulu Bar, Russian Rapids side-channel complex, and Lancaster Road restoration area) that remain connected at all flow levels. Therefore, the presence of fish in these areas cannot be attributed to increased flow from Goodwin Dam.

Non-restored off-channel areas surveyed in the Stanislaus River did not have the characteristics of productive and beneficial floodplain habitat that was assumed from the NewFields model outputs. Large, shallow, warm-water floodplains (like Yolo Bypass) provide refuge from high flows, high biotic diversity, and abundant food sources, which have been shown to be ideal conditions for growth of juvenile salmonids (Jeffres 2008, Katz et al. 2013, Sommer et al. 2001). However, floodplain areas in the Stanislaus River were generally comprised of narrow bands of flooded margin habitat where riparian encroachment, resulting in very dense vegetation, was common.

Temperatures in the off-channel areas remained low (12.0 – 18.7°C or 53.7 – 65.7°F) throughout the duration of each sampling period. Water temperatures on average were less than 0.55°C (1°F) warmer in off-channel habitats compared to surface waters of the main channel, though some areas with limited water circulation (i.e., backwater areas with no current) warmed to greater than 2.8°C (7°F) above in-river temperatures. Sampling of specific habitat types in 2014 showed that in wetted margin habitat and side channels, average temperatures were only 0.144°C and 0.10°C (0.26°F and 0.18°F) warmer than the main channel. Temperatures in this range do not promote optimal growth rates in juvenile salmonids, but they are within tolerable limits for rearing. Thermal benefits (i.e., warmer water temperatures) are frequently associated with floodplain rearing of juvenile salmonids, and are thought to provide increased food productivity and, subsequently, improved growth conditions compared to the main channel (Sommer et al. 2001). The minimal differences in temperature between most off-channel areas and the corresponding mid-channel were indicative of the lack of suitable floodplain at 2,400 to 3,000 cfs.

Although it is clear that fragments of off-channel habitat, some of which may be considered floodplain, are created by increasing discharge out of Goodwin Dam, the quality and usefulness of this habitat is questionable. Environmental conditions of inundated areas varied greatly (i.e., relative quality or potential for usage of habitats). While most sampled locations were determined to have conditions that were within thresholds for juvenile salmonid rearing, most lacked the warmer temperatures, shallow depths, and open sunlit areas more typical of the larger floodplain areas in the Sacramento – San Joaquin basin. Essentially the habitats did not ecologically function like a floodplain.

Throughout the duration of the study, no Chinook salmon were documented in any of the off-channel habitats sampled below Oakdale (river mile 42.4), despite large numbers of juvenile salmon migrating through the system. This finding is consistent with findings by Moyle et al. (2007), who reported prevalence of non-native species on floodplains and very limited habitat use by Chinook salmon after April. A limited number of Chinook salmon were observed in side channels in 2014, with the majority of these fish seen in recently restored areas including Honolulu Bar, the Russian Rapids side-channel complex, and Lancaster Road restoration area in the upstream reaches (i.e., between Oakdale and Knights Ferry). Given that the majority of juvenile salmon that remain in the system after April are smolts, and considering evidence that larger migrating juveniles typically use mid-channel, higher velocity areas for migration (Kemp et al. 2005[30]; Svendsen et al. 2007[31]), it is likely that these salmon do not utilize the floodplain habitat for extended rearing, but instead migrate rapidly through the lower reaches of the Stanislaus River.

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[30] Kemp, P. S., Gessel, M. H., & Williams, J. G. (2005). Seaward migrating subyearling Chinook salmon avoid overhead cover. Journal of Fish Biology, 67(5), 1381-1391.

[31] Svendsen, J. C., Eskesen, A. O., Aarestrup, K., Koed, A., & Jordan, A. D. (2007). Evidence for non-random spatial positioning of migrating smolts (Salmonidae) in a small lowland stream. Freshwater Biology, 52(6), 1147-1158.

2.1.2.2.5.6. Summary of Floodplain Habitat Analysis in SED

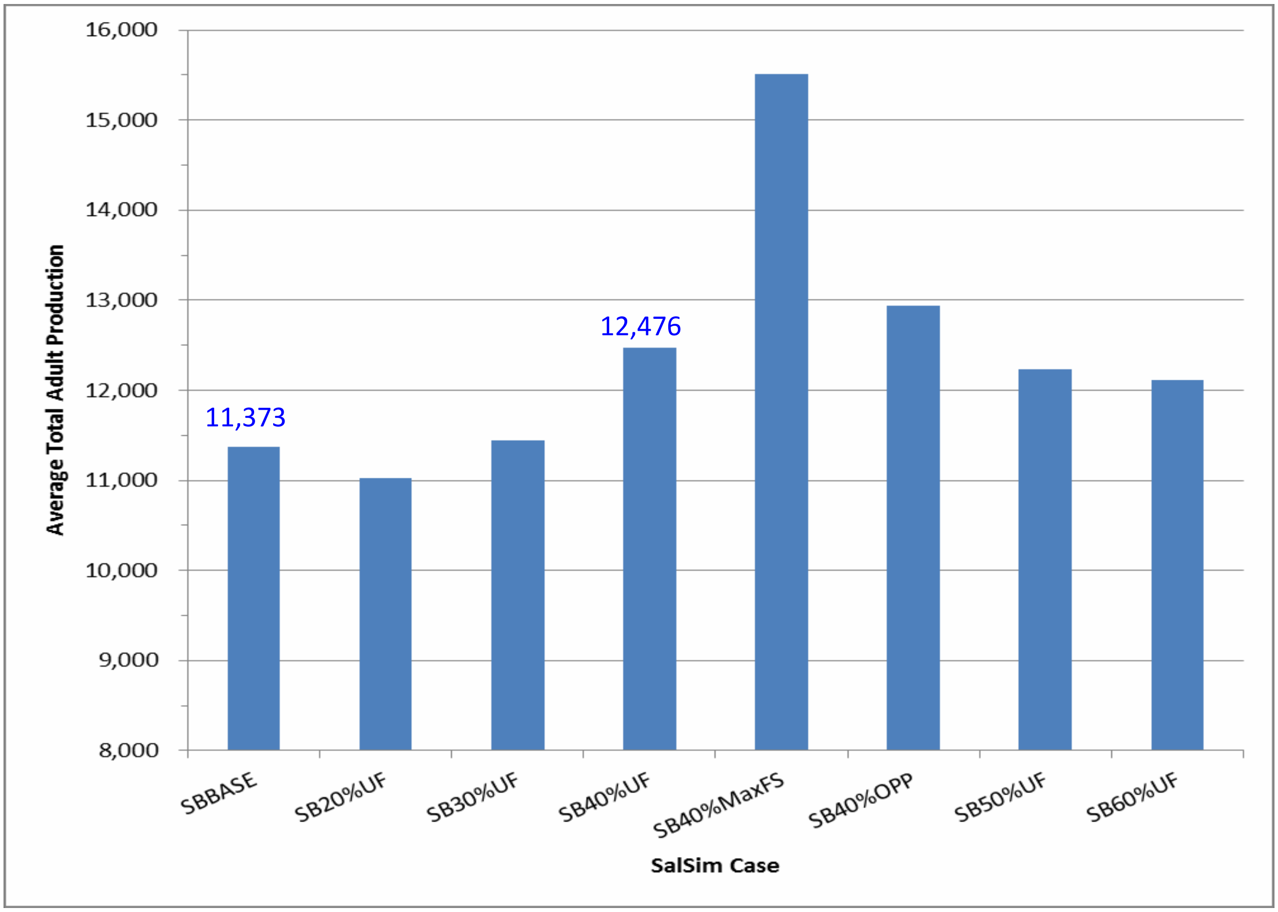
In sum, the floodplain habitat analysis in the SED fails to examine whether the additional flows required by the Tributary Flow Objective will create suitable floodplain habitat on any of the three eastside tributaries. Inundating more land with higher flows does not translate directly into suitable habitat for Salmonids. The Board should consider the studies cited above and the work performed by outside entities such as FishBio, which perform the vast amount of studies on the impacted tributaries. Without proper consideration of this work, the Board cannot determine whether the Tributary Flow Objective will create suitable floodplain habitat, much less determine that the objective provides reasonable protection to the beneficial uses identified in the Water Quality Control Plan.

2.1.2.2.6. The SalSim analysis in the SED shows no benefit to Central Valley fall-run Chinook salmon production

The Narrative Objective states that flows are needed to "support and maintain" the migratory fish population from the San Joaquin River through the Delta. (SED, at Appx. K, p. 18.) Table 19-32 shows the current population under Baseline conditions. Approximately 11,373 Central Valley fall-run Chinook salmon are produced annually on the three tributaries. There is no indication or analysis that the current flow regimes on the three tributaries would not "support and maintain" this population. If Baseline conditions are continued with no changes to the systems, there will be 11,373 Central Valley fall-run Chinook salmon annually, on average. It can be inferred from the document that the current flow regimes will maintain this productivity on the three tributaries.

The SED goes further than the Narrative Objective of "support and maintain" the population. It states there will be a *benefit* to the Central Valley fall-run Chinook salmon. Reading between the lines, this means that the Narrative Objective is not the standard being analyzed. Instead, the analysis focuses on *improving* production, not supporting and maintaining the population. The SED states, "it is expected that there will be **substantial** increases in fall-run Chinook salmon abundance on these tributaries from unimpaired flows at or greater than 40%." (SED, at 19-87 [emphasis supplied].)

The supposed substantial increase in Central Valley fall-run Chinook salmon production is depicted in Figure 19-13 of the SED, which is reproduced below with the addition of the specific numbers taken from Table 19-32.



SED Figure 19-13. SalSim average total adult fall-run Chinook salmon production per year from 1994 to 2010 resulting from different flow cases. These results are the combined results for the Stanislaus, Tuolumne, and Merced Rivers. (Actual numbers from Table 19-32)

The total increase in production from the baseline (SBBASE) to the 40% unimpaired flow requirement (SB40%UF) will be 1,103 Central Valley fall-run Chinook salmon annually. (SED, at Table 19-32, p. 19-84.) Given average annual production of CVFRCS of 707,598 (yrs. 1976-2014),[32] an increase of 1,103 is essentially immeasurable, amounting to an increase of less than a quarter of one percent, or 00.16%.

32 http://www.casalmon.org/PDFs/Chinookprod_CompleteDraft2015Reports6.30.16.pdf

For purposes of SalSim analysis only, SWB Staff created an alternative flow-shifting scenario where 25% of the total volume of unimpaired flow from the February-June period was shifted to the months of September through December on all three eastside tributaries and in all water years. (SED, at 19-80.) This flow-shifting scenario, known as maximum flow shifting (SB40%MaxFS) differs from the flow shifting scenarios modeled in the rest of the SED, where *up to* 25% of the volume of unimpaired flow from the February-June period was shifted to July-November, mostly in wet years. (SED, at Appx. F1, p. F.1-43.) The maximum flow shifting scenario was not modeled for any other purpose, and the impacts of maximum flow shifting on water temperature, floodplain habitat, storage, agriculture, groundwater pumping and hydropower were never analyzed in the SED.

In touting the benefits of maximum flow shifting, Staff has failed to point out that by shifting 25% of the February-June flow to later in the year, much of the floodplain habitat that is supposedly created by the 40% unimpaired flow from February through June will be forfeited. Reducing February-June flows by 25% will reduce unimpaired flow from 40% to 30%. The SED measures floodplain inundation changes in acre*days. The percentage increase in acre*days under 40% unimpaired flow as compared to baseline is 35%. (SED, at 19-71.) However, the percentage increase in acre*days under *30% unimpaired flow* as compared to baseline is only 16%. (SED, at 19-71.) Since maximum flow shifting under 40% unimpaired flow will reduce unimpaired flow during the February-June period to 30%, Staff cannot claim both the 35% increase in floodplain inundation under 40% unimpaired flow, *and* the supposed increase in Chinook salmon production under maximum flow shifting. Simply put, Staff cannot have it both ways. This trade-off should be identified in the SED. Before the Board decides whether it will adopt the water quality control plan, Staff should analyze how maximum flow shifting will impact floodplain inundation, water temperature, storage, agriculture, groundwater pumping and hydropower.

In sum, the benefits to Chinook salmon production under the 40% unimpaired flow requirement are essentially immeasurable, amounting to an increase of less than a quarter of one percent. Although the SED suggests that production numbers could be increased under the maximum flow shifting scenario, Staff failed to account for the impact of such flow shifting on floodplain inundation. Since Staff has indicated that benefits should be measured in terms of floodplain creation and water temperature improvements (rather than SalSim results),[33] the benefit of maximum flow shifting, if any, is unknown. As the SalSim analysis fails to demonstrate that the Tributary Flow Objective will achieve any meaningful benefit to Chinook salmon production (which Staff has used as a proxy for protection of all fish and wildlife beneficial uses), the Board should decline to adopt the proposed objective because it does not protect a beneficial use.

2.1.2.3. The SJTA Analysis demonstrates that the objectives do not protect the beneficial uses

The SED does not analyze a true implementation of the Tributary Flow Objective. The various modeling assumptions which Staff added to the Objective are outlined above. Accordingly, the SJTA hired consultants to analyze the impacts of implementing the Tributary Flow Objective without the various modeling assumptions included in the SED analysis. The SJTA consultants evaluated impacts on reservoir storage, water temperature, Chinook salmon production, and the fate of San Joaquin River flows in the Delta. Consulting engineer Daniel B. Steiner coordinated the development of two modeling runs on the Stanislaus, Tuolumne and Merced Rivers: (1) a baseline run, and (2) a 40% unimpaired flow run. Mr. Steiner performed the studies for the Stanislaus and Tuolumne Rivers, and MBK Engineers performed the studies for the Merced River. The tributary studies were combined with information from a contemporary CalSim study to derive results for the San Joaquin River and Vernalis. The results were used to examine impacts to storage on the Stanislaus River at New Melones Reservoir, Don Pedro Reservoir on the Tuolumne River, and Lake Exchequer on the Merced River. Consultant Avry Dotan of AD Consultants used the two sets of modeling runs to perform temperature analysis using HEC-5Q, and Chinook salmon production

[33] Transcript of Public Hearing before SWRCB, November 29, 2016, p. 272, lns. 15-23 [Les Grober: "the main thing to say is that we're not relying on [SalSim results] to say this is the benefit. We're relying on the things that we showed that we have temperature improvements, we have floodplain habitat improvements, and these are things that have been shown to lead to increases in populations and resiliency and all sorts of measures elsewhere in other systems. So that's what we're relying upon to show the benefit."]

analysis on all three tributaries and the San Joaquin River using SalSim. Using Mr. Steiner's data, consultant Dr. Susan Paulsen performed an analysis of the fate of San Joaquin River flows in the Delta.

The first run reflects current baseline conditions (SJTA Baseline). The full set of modeling assumptions and results of the SJTA Baseline can be found in SJTA Attachment 5. Stated briefly, the SJTA Baseline conditions on the Stanislaus River at times differ from the WSE baseline conditions: (1) VAMP flow requirements were not used, (2) CVP contractor allocations were revised to current assumptions (0-49-155 at <1,400<1,800>), and (3) a flow surrogate was used to represent minimum releases (June-September) for satisfaction of dissolved oxygen requirements. Differences in the modeling of Baseline conditions on the Tuolumne River were again VAMP-related and associated with water demand and water diversion protocols. The same differences occurred with the Merced River modeling.

The second set of modeling runs (SJTA 40% UIF) reflected the Tributary Flow Objective assuming the 40% unimpaired flow requirement, without several modeling assumptions embedded into the WSE model. The modeling assumptions and results of the SJTA 40% UIF condition can be found in SJTA Attachment 5. Briefly stated, the differences between the STJA 40% UIF and the SED's Alternative 3 on the Stanislaus River were as follows: (1) the carryover storage requirement at New Melones Reservoir was reduced from 700 TAF to 80 TAF, effectively eliminating the carryover storage requirement, while retaining a minimum reservoir level to ensure continued operation of the model, (2) the refill criteria used in the WSE was eliminated entirely, (3) the minimum required diversions to OID and SSJID were eliminated, (4) flow shifting was eliminated, (5) CVP contractor allocation was revised to current assumptions (0-49-155 at <1,400<1,800>), and (6) a flow surrogate was used to represent minimum releases (June-September) for satisfaction of dissolved oxygen requirements. Differences in the modeling of the SJTA 40% UIF and the SED's Alternative 3 on the Tuolumne River included a reduction of the required carryover storage target at Don Pedro Reservoir, elimination of reservoir refill criteria and minimum diversion requirements, and elimination of the flow shifting. Similar differences occurred with the Merced River modeling.

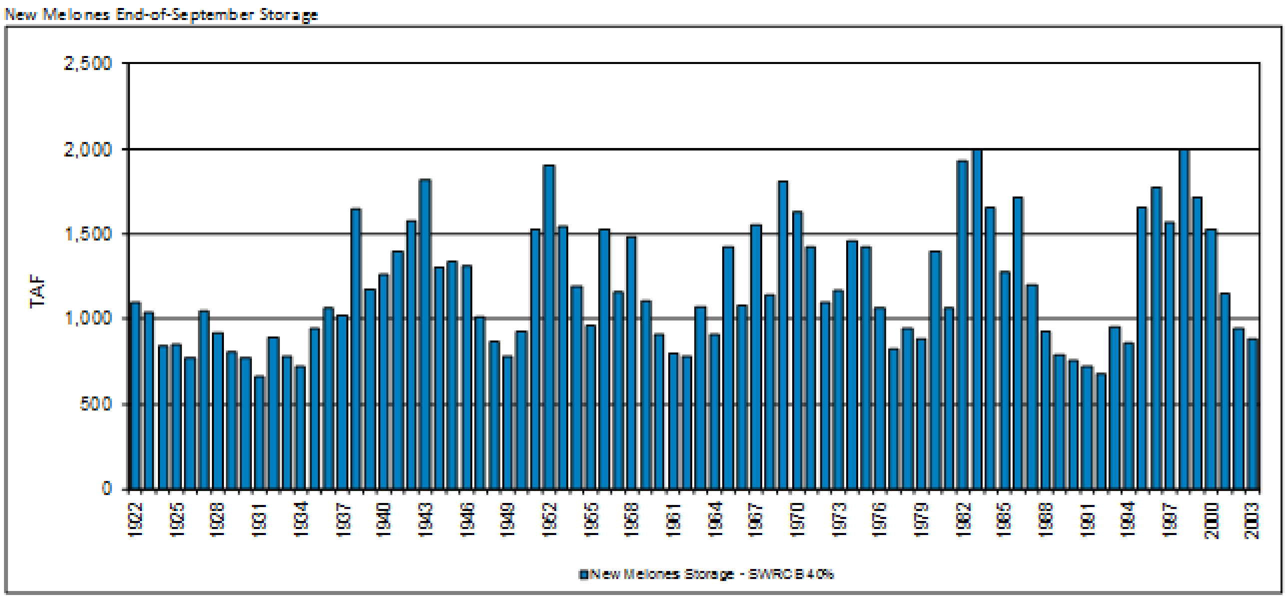
The SJTA's results show drastically different impacts to reservoir storage than those shown in the SED. In addition, the SJTA's water temperature analysis shows increases in temperature across the entire stretch of the Stanislaus River from July through January that are not reflected in the Alternative 3 results. With respect to Chinook salmon production, the SJTA Baseline conditions show *higher* production numbers than the SJTA 40% UIF, *and* all the alternatives analyzed in the SED except for the maximum flow shifting alternative known as SB 40%MaxFS. The SJTA analysis also showed that San Joaquin River flows do not support the migration of fish through the Delta, insofar as approximately 1% of San Joaquin River flow would contribute towards Delta outflow under a true 40% unimpaired flow regime. The STJA's analyses for reservoir storage, water temperature, Chinook salmon production, and the fate of San Joaquin River flows in the Delta are summarized in turn below.

2.1.2.3.1. Reservoir Storage

The Stanislaus River was chosen as an example for examining impacts to reservoir storage caused by the Tributary Flow Objective. The modeling assumptions used in Alternative 3 of the SED to avoid depleting New Melones Reservoir were removed in the STJA 40% UIF model run. Among the assumptions eliminated were carryover storage, refill criteria, flow shifting and minimum diversions for OID and SSJID (SJTA Attachment 5). A comparison of 40% unimpaired flow with those conditions and without those conditions is below.

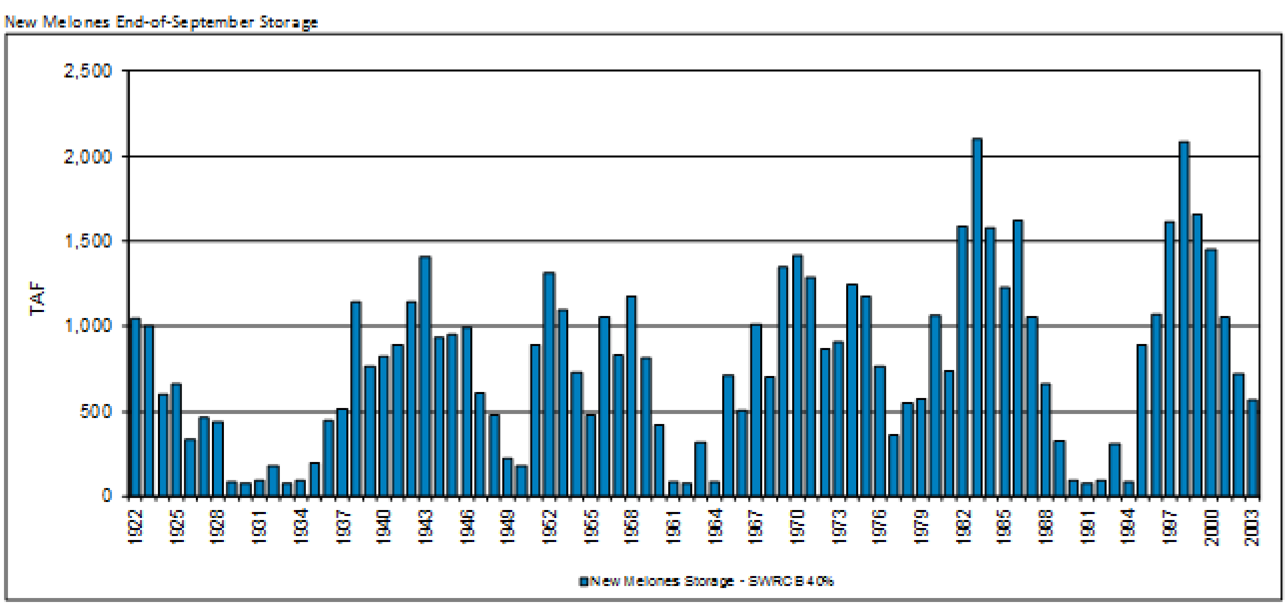
2.1.2.3.1.1. New Melones Storage under 40% unimpaired flow

A complete summary of would-be storage levels in New Melones Reservoir at the end of September for the years 1922 through 2003 under a 40% unimpaired flow regime is reported in the SED in Appx. F1, Attachment 1 thereto, pages 7-9, Table 3. The storage levels reflected in this Table include all the assumptions in the WSE model, including carryover storage, refill criteria, flow shifting, and minimum district diversions. (SED, at Appx. F1, p. F.1-36.) The end-of-September storage levels were plotted on the graph below (SJTA Figure 2-6).



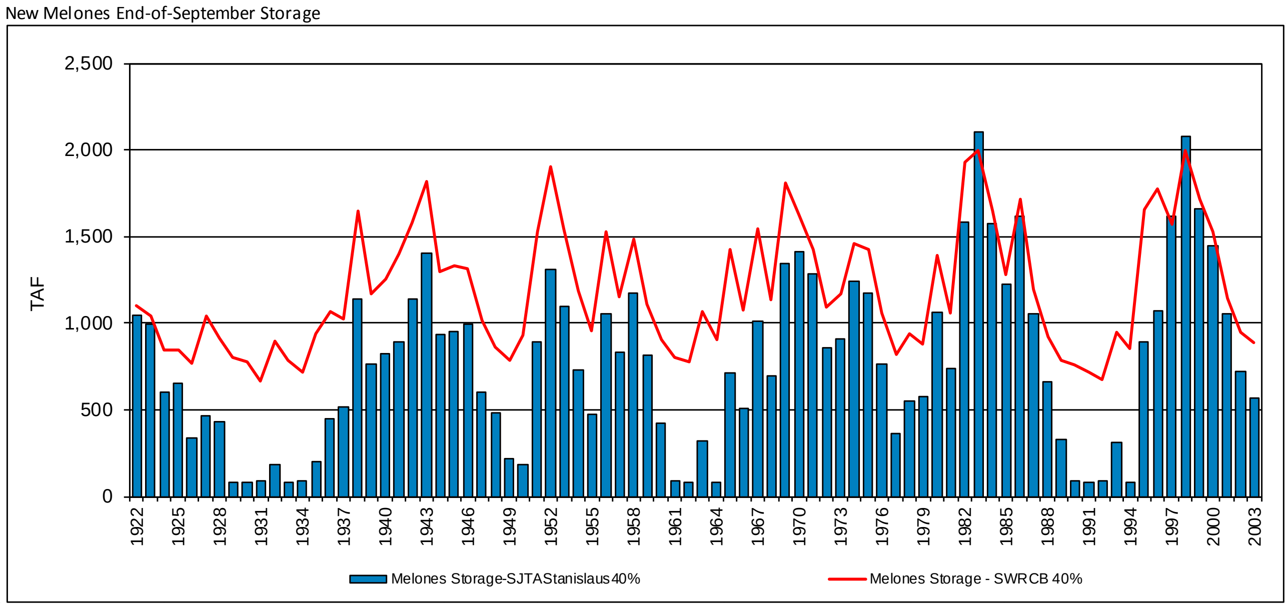
SJTA Figure 2-6. Storage levels (TAF) for New Melones Reservoir under 40% unimpaired flow, as reported in the SED for Alternative 3.

When the WSE storage target modelling assumptions are removed, storage in New Melones Reservoir changes drastically. The following graph (SJTA Figure 2-7) shows reservoir storage under SJTA 40% UIF, i.e., without carryover storage, refill criteria, flow shifting, or minimum district diversions.



SJTA Figure 2-7. Storage levels (TAF) for New Melones Reservoir with SJTA 40% UIF assumptions (no carryover storage, no refill criteria, no flow shifting and no minimum district diversions)

The difference between SED Alternative 3 and SJTA 40% UIF are shown in the following graph (SJTA Figure 2-8), where the blue bars represent end-of-September Storage in New Melones Reservoir under SJTA 40% UIF, and the red line represents storage under SED Alternative 3.



SJTA Figure 2-8. Comparison of New Melones Reservoir storage – SJTA 40% UIF v. SED Alternative 3

The impact of the WSE modeling assumptions in Alternative 3 is clear. Without carryover storage requirements, refill criteria and various other assumptions that are not required by the water quality objectives, New Melones storage is repeatedly depleted down to the 80 TAF level used as a minimum for purposes of the SJTA model run. In other words, the model shows that New Melones Reservoir will repeatedly drain to dead pool in drier years if the Tributary Flow Objective is implemented at 40% unimpaired flow.

SWB Staff did not model a 40% unimpaired flow requirement without carryover storage, refill criteria or flow shifting, and thus the true impact of the Tributary Flow Objective on reservoir storage is not included in the SED. As shown in this example for New Melones, the difference between the Tributary Flow Objective with carryover storage and refill criteria, and the Tributary Flow Objective without carryover storage and refill criteria, is substantial. Before the Board decides whether to adopt the proposed changes to the Bay-Delta Plan, Staff needs to present the Board with an analysis that shows the true impact of the Tributary Flow Objective on *all* the reservoirs impacted by the project, without carryover storage, refill criteria and the other modeling assumptions designed to mitigate the impact of the project on storage.

2.1.2.3.2. Water Temperature

Consultant Avry Dotan of AD Consultants performed an analysis of water temperature on the Stanislaus River using HEC-5Q, the same modeling program used to perform the temperature analysis in the SED (SJTA Attachment 3). The Stanislaus River modeled operations simulation developed by Mr. Steiner for the SJTA 40% UIF were used for this analysis, meaning that carryover storage, refill criteria and flow shifting were not included in the modeling assumptions.

In the table below (SJTA Table 2-4), SJTA Baseline was compared to SJTA 40% UIF, with increases in temperature shown in red, and decreases in temperature shown in blue. The results show increases in temperature across the entire stretch of the Stanislaus River from July through January, i.e., the months during which unimpaired flows are not required under the Tributary Flow Objective. Without flow shifting, carryover storage and refill criteria, there will be higher temperatures in all months outside the February-June period.

Stanislaus Average 7DADM	Life Stage	Month/USEPA Criteria (°F)	Confluence (RM0)		1/4 River (RM13.3)		1/2 River (RM28.2)		3/4 River (RM 43.7)		Below Goodwin (RM 58.5)	
			Base (F)	40%UF (F)	Base (F)	40%UF (F)	Base (F)	40%UF (F)	Base (F)	40%UF (F)	Base (F)	40%UF (F)
Sep	AM	64.4	69.8	0.9	69.0	1.0	67.5	1.2	63.6	1.3	56.6	1.5
Oct	AM / R	64.4 / 55.4	62.1	1.0	61.6	1.1	60.5	1.2	58.8	1.4	56.5	1.6
Nov	R	55.4	56.7	0.6	56.6	0.7	56.3	0.8	55.9	1.0	55.2	1.4
Dec	R	55.4	50.9	0.2	51.1	0.3	51.2	0.3	51.7	0.5	52.3	0.6
Jan	R	55.4	49.8	0.0	49.9	0.1	49.7	0.1	49.5	0.1	48.9	0.1
Feb	R	55.4	52.5	-0.7	52.3	-0.7	51.7	-0.7	50.5	-0.5	48.7	0.0
Mar	R / CR	55.4 / 60.8	56.3	-1.2	55.9	-1.2	54.9	-1.3	53.1	-1.0	50.4	-0.4
Apr	CR / S	60.8 / 57.2	58.8	-1.1	58.2	-1.0	56.8	-1.0	54.6	-0.7	51.4	-0.2
May	CR / S	60.8 / 57.2	61.6	-1.5	60.8	-1.4	59.2	-1.3	56.5	-0.8	52.5	0.0
Jun	S / SR	57.2 / 64.4	67.2	-1.8	66.4	-1.8	64.4	-1.6	60.4	-0.9	53.7	0.4
Jul	SR	64.4	73.2	0.1	72.3	0.2	70.3	0.4	65.0	0.6	54.9	0.9
Aug	SR	64.4	73.2	0.7	72.3	0.7	70.3	0.9	65.1	1.1	55.9	1.3

SJTA Table 2-4. Comparison of water temperature on the Stanislaus River under SJTA Baseline and SJTA 40% UIF

The SED assumes that higher water temperatures are adverse to fish and wildlife beneficial uses. These adverse impacts are not reflected in the SED's analysis because SWB Staff used a trial and error approach to avoid these impacts by iteratively tweaking the modeling assumptions to minimize (or mitigate against) adverse impacts to water temperature caused by implementation of the Tributary Flow Objective. Staff refers to this trial and error approach as an iterative process: "we had to iterate multiple times to find a set of operational constraints that did not make temperatures worse." (Transcript of Public Hearing before SWRCB, November 29, 2016, p. 62, lns. 5-7 [Will Anderson, Water Resources Control Engineer].) Of course, one of the many problems with this approach is that real-world operations do not allow for an iterative process where different constraints are tested in real time to minimize or avoid adverse results. This is critical because the temperature modeling is for "comparative analysis" purposes; it is not a predictive tool. (SED, at Appx. F1, p. F.1-190.) Thus, even if operators chose to follow all the operational constraints devised by State Water Board Staff during the iterative process, the water temperature results shown in the SED would not necessarily be achieved, and the model would not necessarily provide any guidance as to how they could be achieved.

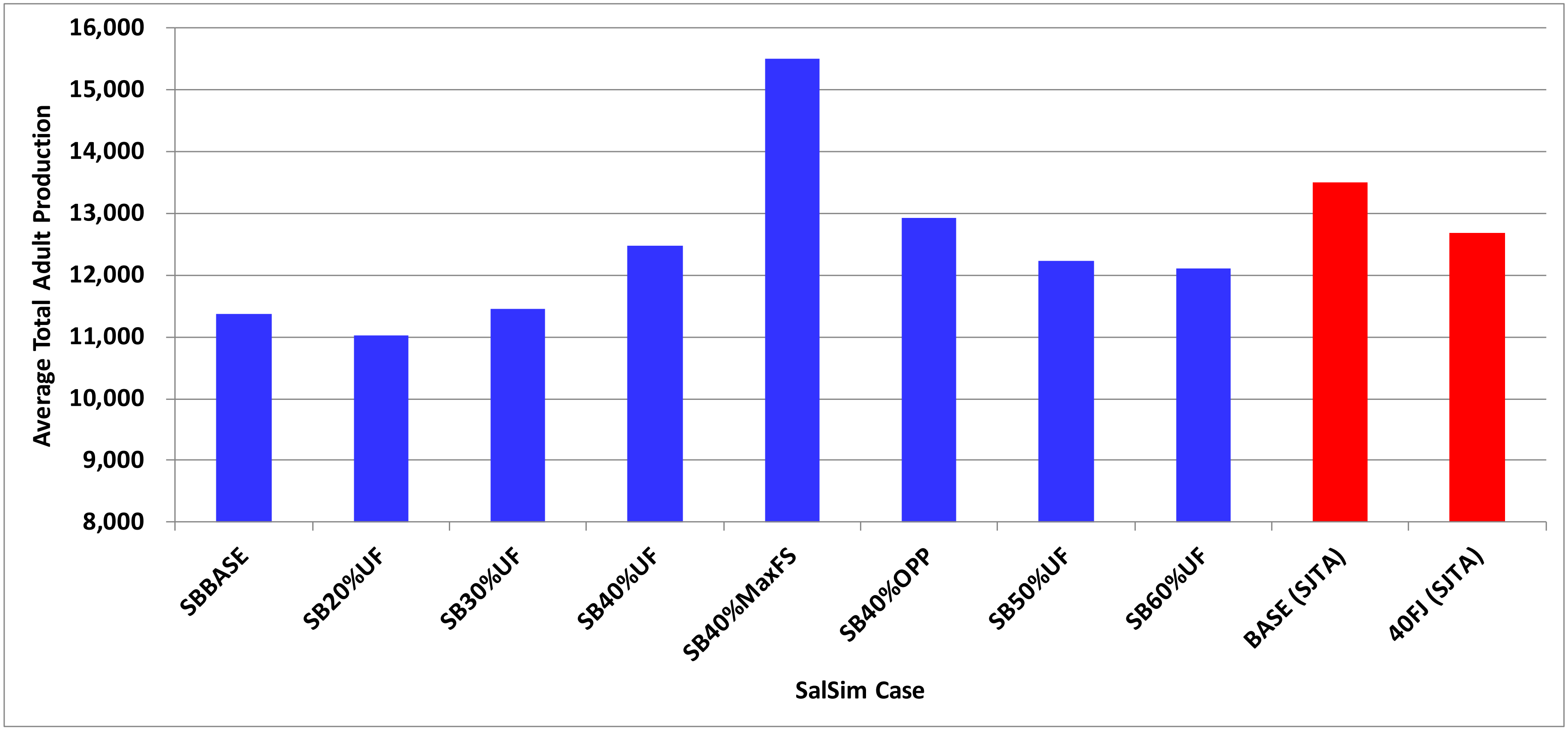
Before the State Water Board decides whether to adopt the proposed revisions to the Bay-Delta, Staff must present the Board with an analysis that shows the actual impact of the Tributary Flow Objective on water temperature in all three tributaries – without the operational constraints that were added to the model through trial and error to mitigate against higher instream temperatures.

2.1.2.3.3. Floodplain Habitat

The SJTA incorporates the comments of TID, MID, OID, and SSJID on floodplain habitat into these comments.

2.1.2.3.4. SalSim

SJTA consultant Avry Dotan performed a SalSim analysis for SJTA Baseline and SJTA 40% UIF. (SJTA Attachment 3.) As explained above, the SJTA Baseline does not include VAMP flows, as that program has ended. As shown in SJTA Figure 2-9, the SJTA Baseline run produces higher numbers (13,490) than all of the State Water Board's runs, except for the SB40% MAX Flow Shifting run. SJTA Baseline also produces more fish than SJTA 40% UIF (12,680). (SJTA Figure 2-9). The specific production numbers for each model run for water years 1994 through 2009 are set forth in SJTA Table 2-5.



SJTA Figure 2-9. SalSim for SJTA Baseline and SJTA 40% UIF compared to SalSim results in SED

SalSim Case	Total Adults Production by Year																
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Average
SBBASE	5,365	10,250	14,328	28,745	8,433	21,001	33,753	17,892	14,289	11,075	6,613	1,129	461	161	3,812	4,665	11,373
SB20%UF	5,696	10,571	14,407	25,499	8,685	19,983	30,996	16,007	14,507	11,349	6,850	1,173	680	169	4,008	5,755	11,021
SB30%UF	6,334	10,460	14,843	26,121	9,357	20,253	33,125	16,984	15,289	11,983	7,436	1,278	952	185	2,587	5,922	11,444
SB40%UF	7,213	10,484	15,170	30,888	9,872	22,289	38,824	19,996	15,801	12,613	8,072	1,392	579	216	2,594	3,611	12,476
SB40%MaxFS	6,843	10,540	15,474	38,226	10,704	26,833	56,691	24,875	18,557	17,604	11,252	1,332	693	194	2,499	5,870	15,512
SB40%OPP	7,212	11,664	14,106	31,598	10,122	25,432	36,359	20,923	16,689	13,248	8,198	1,479	489	323	2,696	6,399	12,934
SB50%UF	7,462	10,791	14,632	29,908	8,959	22,803	36,206	19,362	15,411	13,252	8,486	1,517	671	219	2,681	3,460	12,239
SB60%UF	7,229	11,162	14,441	28,770	7,473	23,601	35,632	18,404	14,633	14,258	9,158	1,575	723	204	2,834	3,677	12,111
BASE (SJTA)	5,966	10,313	13,848	37,450	8,580	24,764	39,997	22,624	14,369	11,081	6,693	2,354	2,222	634	6,571	8,376	13,490
40FJ (SJTA)	6,016	10,990	14,038	26,280	9,500	22,369	33,601	18,625	16,938	13,980	9,107	2,708	698	799	7,888	9,344	12,680

SJTA Table 2-5. SalSim results for SJTA Baseline and SJTA 40% UIF compared to SalSim results in SED

These SalSim results suggest that current conditions will result in higher Chinook salmon production numbers (13,490 fish) than Staff's proposed project, regardless of whether that project is modeled *with* carryover storage, refill criteria and WSE flow shifting (SB40% UF) (12,476 fish), or *without* those assumptions (SJTA40% UIF) (12,680 fish). The only conditions under which SalSim produces better results than current conditions are under Staff's maximum flow shifting scenario, where 25% of the volume of unimpaired flow from February-June is shifted to September-December in all water years. (SED, at 19-80.) This maximum flow shifting scenario differs from Staff's other flow shifting scenario where no more than 25% of the volume of unimpaired flow from February-June is shifted to July-November in wet water years. Notably, Staff did not analyze the impacts of its maximum flow shifting scenario on floodplain habitat. Thus, any benefits to floodplain habitat that Staff perceived from Alternative 3 will not coexist with these supposed benefits to Chinook salmon production shown in SalSim under maximum flow shifting. Moreover, Staff did not analyze the impacts of maximum flow shifting on any other components, including water temperature, storage, agriculture, groundwater or hydropower. As such, it is not a viable option for the SWB to choose at this time.

If the SalSim model is to be trusted, then the current conditions, as reflected in SJTA Baseline, are superior to any of the analyzed options set forth in the SED. Before the State Water Board decides whether it will adopt the proposed revisions to the Bay-Delta Plan, these results need to be analyzed. If current conditions would result in higher production numbers for Chinook salmon, and if the goal of the water quality control plan is to increase those production numbers, then Staff's proposed plan does not achieve the goal and must be rejected.

2.1.2.3.5. Fate of San Joaquin River flows in the Delta

Dr. Susan Paulsen is a renowned expert in the hydrodynamics, hydrology, and water quality of the Delta. In collaboration with Dan Steiner, Dr. Paulsen used the Delta Simulation Model II (DSM2)[34] to analyze the fate of San Joaquin River flows that reach the Delta under baseline conditions (Case 1) and under the SJTA's 40% unimpaired flow scenario (Case 2). (SJTA

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[34] For more information, see http://baydeltaoffice.water.ca.gov/modeling/deltamodeling/models/dsm2/dsm2.cfm

Attachment 6.) Specifically, she examined the fate of San Joaquin River inflow in a below normal year (1966), a dry year (1968), and a critically dry year (1988). The results demonstrate that very little San Joaquin River inflow to the Delta – even at 40% unimpaired flow on the three eastside tributaries (Case 2) – moves through the Delta and exits via the San Francisco Bay.

The table below is a summary of Dr. Paulsen's results comparing Delta Inflow from the San Joaquin River, Delta exports and Delta outflow under baseline (Case 1) and 40% unimpaired flow (Case 2) conditions.

	DELTA INFLOW – SJR[a] (TAF)		**EXPORTS - CVP, SWP, Contra Costa Canal (TAF)[b]**		**SJR CONTRIBUTION TO DELTA OUTFLOW (TAF)[c]**	
	Base	**40%**	**Base**	**40%**	**Base**	**40%**
1966 (BN)	884	1491	723	1014	2	19
1968 (Dry)	816	1223	647	837	3	15
1988 (Critical)	456	843	304	462	0.6	7

[a] San Joaquin River water that enters the Delta between February 1 and June 30.
[b] Amount of San Joaquin River water that entered the Delta between February 1 and June 30 and that was exported or diverted from the Delta during the given water year.
[c] Volume of San Joaquin River water that entered the Delta between February 1 and June 30 that left the Delta as Delta outflow.

SJTA Table 2-6: Summary of Delta Inflow, Exports and Outflow derived from SJTA Attachment 6.

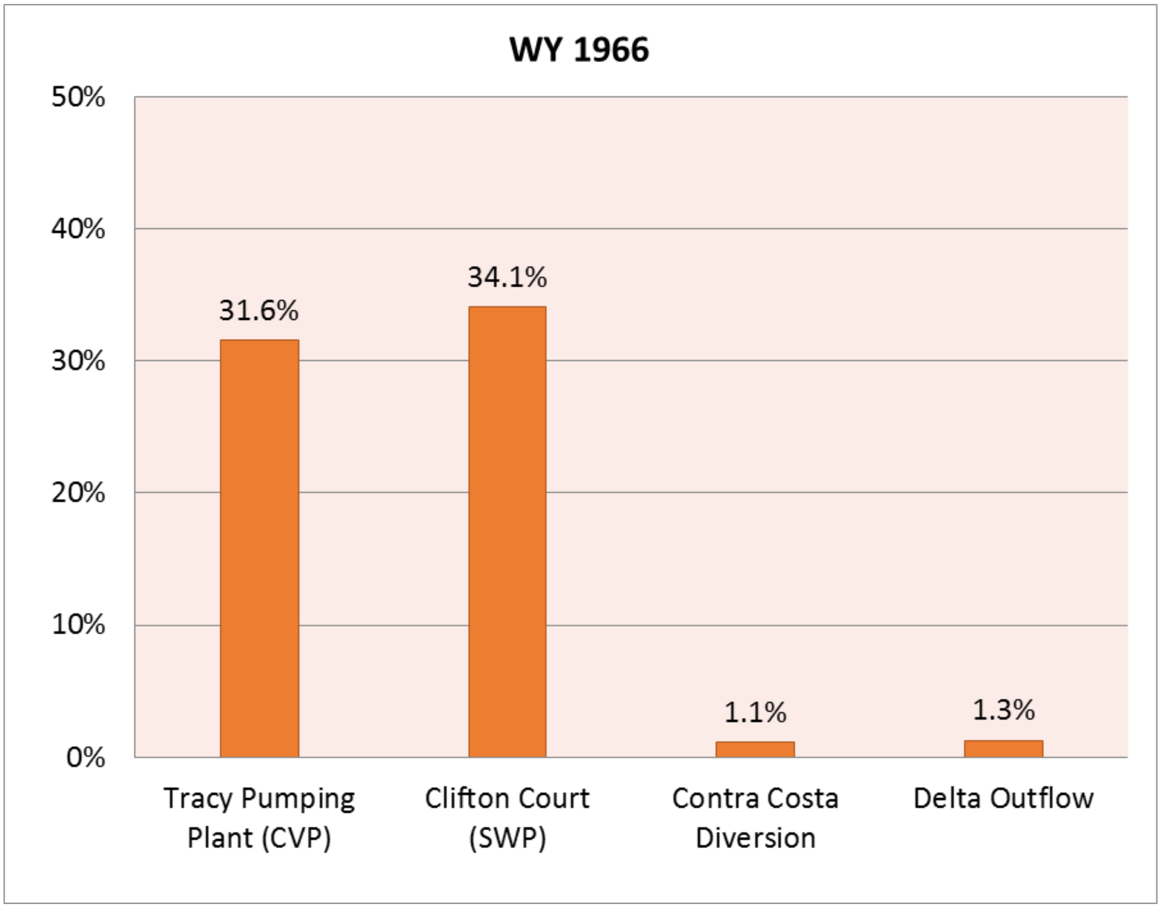
As can be seen in the table above, very little San Joaquin River inflow to the Delta contributes to Delta outflow under baseline *or* 40% unimpaired flow conditions. Instead, most of the water is exported by the CVP and SWP. (SJTA Attachment 6, p. 7, 18.) In fact, under 40% unimpaired flow, *more* water is exported by the CVP and SWP than under baseline conditions. The increased Delta inflow from the San Joaquin River under 40% unimpaired flow simply does not translate to an increase in Delta outflow for the benefit of fish "migrating through the Delta." (SED, at Appx. K, p. 18.) As shown in the table below – also derived from Dr. Paulsen's results – approximately 1% of San Joaquin River inflow contributes to Delta Outflow. (SJTA Attachment 6, p. 7, 17.)

	Base			40% UIF		
	Delta Outflow (TAF)[a]	**San Joaquin River contribution to outflow (TAF)[b]**	**% of SJR Inflow[c]**	**Delta Outflow (TAF)[a]**	**San Joaquin River contribution to outflow (TAF)[b]**	**% of SJR Inflow[c]**
1966 (BN)	4288	2	0.055%	4804	19	0.39%
1968 (Dry)	6742	3	0.047%	7087	15	0.21%
1988 (Critical)	2848	0.6	0.022%	3157	7	0.22%

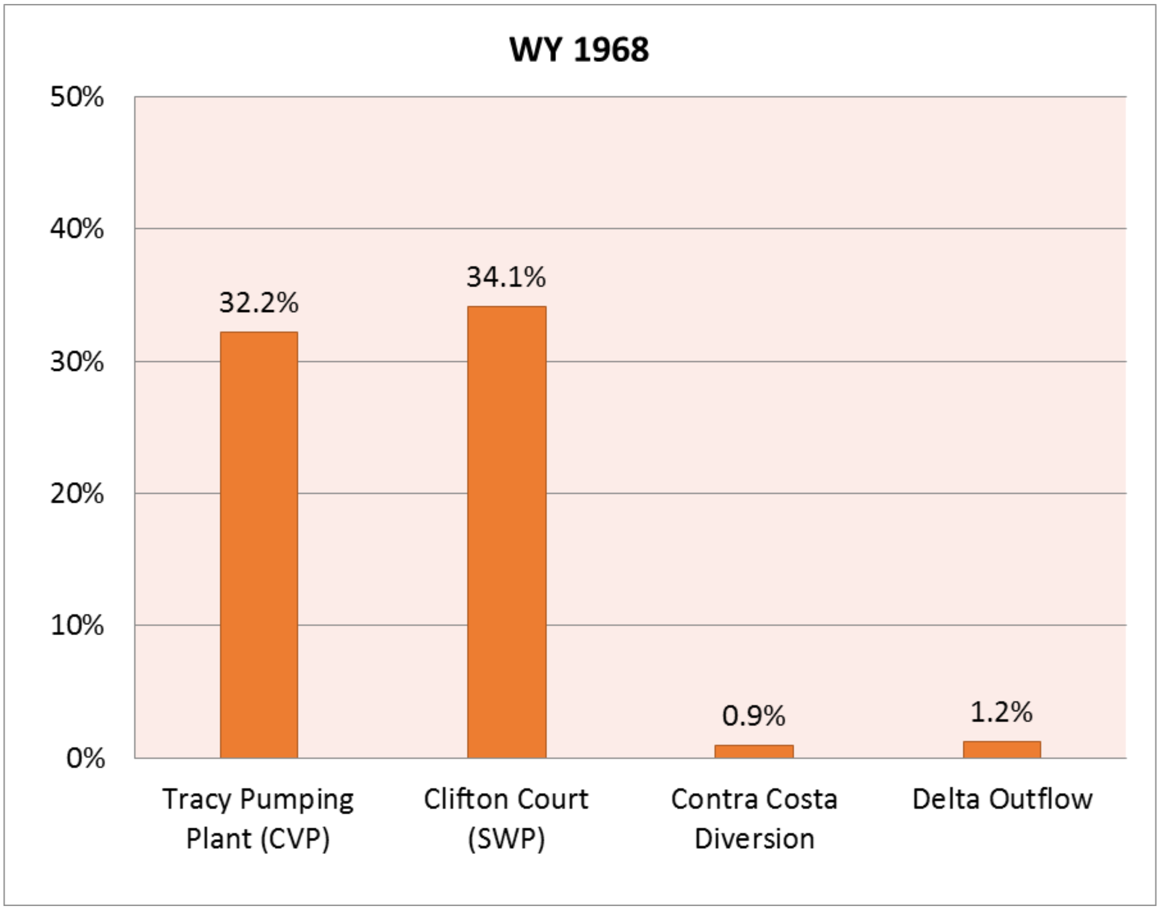
[a] Delta outflow is total outflow from February 1 through June 30.
[b] San Joaquin River outflow is the volume of water that entered the Delta between February 1 and June 30 and that flowed out of the Delta during the water year.
[c] Calculated as San Joaquin River contribution to outflow divided by Delta outflow.

SJTA Table 2-7: Summary of Delta Outflow in TAF; Percentage of SJR inflow contributing to Delta Outflow

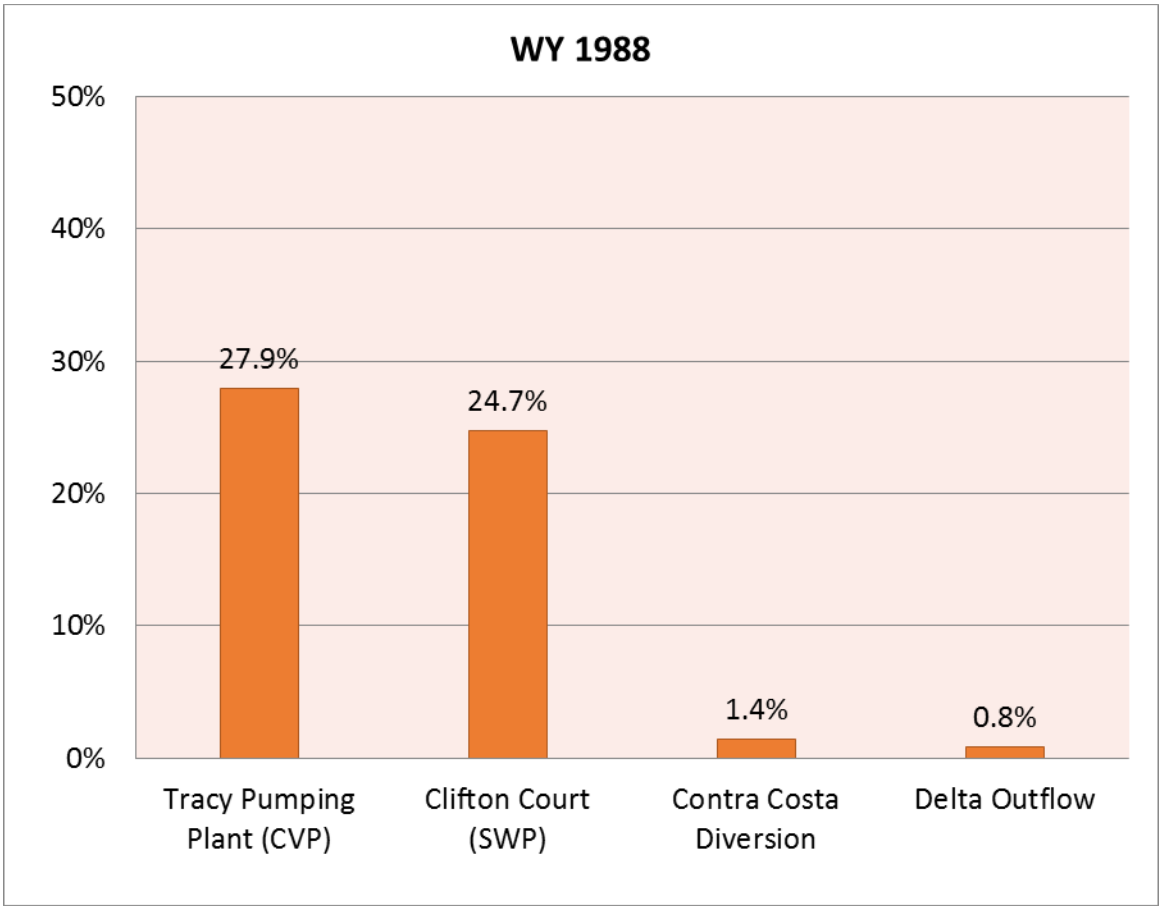
The following graphs depict the amount of San Joaquin River inflow (February 1 – June 30) that leaves the Delta via exports, diversions, and as Delta outflow in the three exemplar water years under 40% unimpaired flow.



SJTA Figure 2-10: Consumption of San Joaquin River inflow that reaches Vernalis under 40% unimpaired flow in a below normal year (1966)



SJTA Figure 2-11: Consumption of San Joaquin River inflow that reaches Vernalis under 40% unimpaired flow in a dry year (1968)



SJTA Figure 2-12: Consumption of San Joaquin River inflow that reaches Vernalis under 40% unimpaired flow in critically dry year (1988)

Without any analysis, the WQCP assumes that the Tributary Flow Objective can be adaptively implemented to support and maintain San Joaquin River watershed fish "migrating through the Delta." (SED, at Appx. K, p. 30.) In light of Dr. Paulsen's results regarding the fate of San Joaquin River inflow, the SJTA submits that the Board should reject this assumption. The imposition of a 40% unimpaired flow requirement on the three eastside tributaries will increase the amount of San Joaquin River water contributing to Delta outflow by 1.1% or less (e.g., from 0.2% to 1.3% in WY 1966) compared to baseline conditions in below normal, dry and critically dry years. (SJTA Table 2-7.) Even with the increased inflow under 40% unimpaired flow, far less than 2 percent of San Joaquin River inflow will leave the Delta as Delta outflow. In stark contrast, more than 50% of San Joaquin River inflow will be exported out of the Delta by the CVP and SWP under

40% unimpaired flow. In fact, with the increased flows at Vernalis under 40% unimpaired flow, exports and diversion (CVP + SWP + CCWD) can be expected to increase by 291,000 acre-feet in below normal years, by 190,000 acre feet in dry years, and by 158,000 acre feet in critically dry years. (SJTA Table 2-6.) The real beneficiary of the increase in San Joaquin River flows is the exporters, not the fish migrating through the Delta.

Moreover, Dr. Paulsen's results call into question the conclusions from the Board's Delta Flow Criteria Report of 2010, which found that 60% unimpaired flow from the San Joaquin River would result in significant benefits to fall-run Chinook salmon migrating through the Delta. The Delta Flow Criteria Report focused solely on San Joaquin River inflow, neglecting to analyze Delta outflow. It is evident from Dr. Paulsen's results that San Joaquin River inflow provides very little contribution to Delta outflow, and thus the Delta Flow Criteria Report does not provide a complete picture of what is necessary to create significant benefits to migrating Chinook salmon.

In sum, the Board should reject the assumption in the WQCP that the Tributary Flow Objective can be adaptively adjusted to benefit San Joaquin River watershed fish in their migration through the Delta. San Joaquin River flows do not provide any significant contributions to Delta outflow, and will not assist in migratory fish moving through the Delta, even at 40% unimpaired flow.

2.1.2.4. Summary: Comparison of SWB results and SJTA results for Tributary Flow Objective

The analysis provided by the SJTA demonstrates that when the Tributary Flow Objective is modeled without the various operational constraints that are not required by the objective itself, such as carryover storage, refill criteria and flow shifting, the impact to reservoir storage is far more significant than what is portrayed in the SED. In addition, the supposed benefits of the project, such as lower water temperatures, will not be achieved in the manner suggested in the SED. Specifically, water temperatures in the July-January period will increase compared to baseline. Moreover, the

SalSim results show that current conditions are actually superior to any of the analyzed proposals set forth in the SED. Assuming Staff is correct that improved conditions for fall-run Chinook salmon will translate to protection of all the beneficial uses identified in the water quality control plan, then the proposed project needs to be rejected. The SJTA analysis demonstrates that the supposed temperature benefits achieved by the Tributary Flow Objective will not occur, nor will the supposed benefits to Chinook salmon production numbers. Finally, as nearly none of the San Joaquin River water contributed to Delta outflow, the Board should reject the assumption in the SED that increased flows on the three eastside tributaries will assist fish migrating through the Delta. Given the SJTA's analysis, the Board must decline to adopt the proposed Tributary flow objective.

2.1.3. Salmon Doubling Objective

The narrative objective for the protection of salmon is set forth as:

> "Water quality conditions shall be maintained, together with other measures in the watershed, sufficient to achieve a doubling of natural production of chinook salmon from the average production of 1967-1991, consistent with the provisions of State and federal law." (SED, at Appx. K, p. 17.)

The 2012 version of the draft WQCP did not reference the salmon doubling objective and was silent on whether it would remain a requirement or not. However, the 2016 draft version makes clear that Staff "expects that implementation of the numeric flow-dependent objectives and other non-flow measures will implement this objective." (SED, at Appx. K, p. 53.) This statement was written in reference to the flows required under D-1641, but it remains unchanged in the revised WQCP, suggesting that the Board anticipates the implementation of the new flow objectives will result in doubling of the natural production of Chinook salmon. (SED, at Appx. K, p. 52-53.) Both the history of the salmon doubling objective, and existing science (as reported in the 2010 Delta Flow Criteria Report), demonstrate that the Doubling Objective cannot be achieved through the implementation of the proposed flow objectives. When the Board chooses a method of implementation that is shown to be incapable of meeting the objectives, then that aspect of the program of implementation will be deemed "illusory" and in violation of the Board's obligation to implement its own plan. (*State Water Resources Control Bd. Cases* (2006) 136 Cal.App.4th 674, 734 [if it had been shown that DWR and USBR were incapable of meeting the salinity objectives in the water quality control plan, then the Board's allocation of that responsibility to DWR and USBR in D-1641 would have been "illusory" and a violation of the Board's obligation to implement its own plan]; see Water Code, § 13247 [requiring the Board to comply with its own water quality control plan].) By choosing a method of implementation that has been shown to be incapable of achieving the Salmon Doubling Objective, the revised WQCP will violate Water Code section 13247, which requires the Board to comply with its own water quality control plan.

2.1.3.1. The Doubling Objective lacks clarity

As a preliminary matter, it is noted that the Doubling Objective lacks clarity. The plain language of the objective is clear that it refers only to the natural production of Chinook salmon. (SED, at Appx. K, p. 17.) Fish & Game Code section 6900, et seq., and the Central Valley Project Improvement Act ("CVPIA") are also clear that the regulation is limited to the natural population.

As part of these comments on the WQCP, the SJTA submits a letter from the San Joaquin River Group Authority to Charlie Hoppin of the State Water Resources Control Board, dated October 12, 2011, which more fully summarizes the legislative history of SB 2661, Fish & Game Code § 6900 et seq. (SJTA Attachment 7). The Pacific Coast Federation of Fisherman's Association requested the word "natural" be inserted in front of "production" throughout the bill. The legislation was changed accordingly to include the modifier of "natural" before the word "production" throughout the bill. In every section except the "Definitions" section, the term "natural production" occurs. In the "Definitions" section, the term "Production" is not limited to "natural." (Fish & Game Code, § 6911.) This change to "natural production" made the ascertainment of the Doubling Objective impossible to discern.

The interpretation of the regulation with regard to natural production has lacked clarity and is simply fraught with error. The Department of Fish & Game was tasked with determining the elements of the fish doubling program and transmitting a report to the Legislature describing those elements. (Fish & Game Code, § 6924.) The report includes a fundamental flaw: it makes no distinction between hatchery fish and natural fish. The Department of Fish & Wildlife relied on carcass surveys on the three tributaries to arrive at a population number. Carcass surveys are inherently unreliable due to the level of effort extended, timing of the survey, expertise of the spotters and predation. Carcass surveys are conducted by two to three people in a boat moving downstream looking for carcasses. When a carcass is found, it is counted and the head is removed for otolith sampling and its body is returned to the River. This leads to human error, double counting and the inability to distinguish between hatchery and natural fish populations.

In contrast, the Stanislaus and Tuolumne Rivers have weirs which automatically count and photograph every Central Valley fall-run Chinook salmon returning to the river to spawn. While not 100% accurate, direct counts from the weirs are more accurate and precise than estimates from the Department of Fish & Wildlife carcass surveys.

Comparing the direct counts at the weirs and the estimates generated by the carcass surveys with the early Department of Fish & Wildlife carcass survey reveals a large margin of error which may have overstated the 1967-1991 population by more than 50% due to the lack of distinction between natural and hatchery fish. This renders the baseline unreliable.

	Tuolumne			Stanislaus		
Monitoring Season	**Weir**	**Carcass Survey**	**% Difference**	**Weir**	**Carcass Survey**	**% Difference**
2010	782	540	-31%	1,355	1,086	-20%
2011	2,906	893	-69%	815	1,309	61%
2012	2,304	783	-66%	7,249	4,006	-45%
2013	3,742	1,926	-48%	5,459	2,845	-48%
2014	673	438	-35%	5,534	3,060	-45%
2015	437	113	-74%	12,708	6,136	-52%

SJTA Table 2-8: Comparison of weir data and carcass survey data[35]

This failure violates the Fish and Game Code section 6901[e][f], which requires distinction:

> “[e] Proper salmon and steelhead trout resource management requires maintaining adequate levels of natural, as compared to hatchery, spawning and rearing.
>
> “[f] Reliance upon hatchery production of salmon and steelhead trout in California is at or near the maximum percentage that it should occupy in the mix of natural and artificial hatchery production in the state. Hatchery production may be an appropriate means of protecting and increasing salmon and steelhead in specific situations; however, when both are feasible alternatives, preference shall be given to natural production.”

Department of Fish & Wildlife made no such distinction. The numbers to set the goal are wrong.

[35] Sources for SJTA Table 2-8: (1) Peterson, Matthew L., Andrea N. Fuller, and Doug Demko. Environmental Factors Associated with the Upstream Migration of Fall-Run Chinook Salmon in a Regulated River. North American Journal Of Fisheries Management Vol. 37 , Iss. 1,2017; (2) Azat, J. 2016. GrandTab 2016.04.11. California Central Valley Chinook Population Database Report. California Department of Fish and Wildlife (available at http://www.dfg.ca.gov/fish/Resources/Chinook/CValleyAssessment.asp); (3) TID/MID (Turlock Irrigation District and Modesto Irrigation District). 2016. 2015 Lower Tuolumne River Annual Report Pursuant to Article 58 of the License for the Don Pedro Project, No. 2299 (available at http://www.tuolumnerivertac.com/documents.htm); (4) FISHBIO unpublished data. (SJTA Attachments 8A and 8B.)

2.1.3.2. The Doubling Objective Cannot be Met

The salmon doubling objective cannot be met for many reasons.

2.1.3.2.1. Doubling requires state-wide contribution

The doubling requirement contemplates the doubling of natural salmon production across the entire State, not merely the San Joaquin River or the three eastside tributaries. (see Fish & Game Code, § 6912 [defining the term "program" as "the program protecting and increasing the naturally spawning salmon and steelhead trout **of the state**"]; CVPIA, P.L. 102-575, § 3402[a] [stating the purpose of the act as being "to protect, restore, and enhance fish, wildlife, and associated habitats in the Central Valley and Trinity River basins in California"].) Thus, if the total natural production of salmon in the Central Valley is doubled, the statute will be satisfied irrespective of whether the natural production is doubled in any particular river. The SJTA provided a letter to the State Water Board to this effect on October 12, 2011, when the Board indicated that it was considering adoption of a doubling objective. (SJTA Attachment 7.)

2.1.3.2.2. The fishery is dominated by hatchery fish

There is no natural production of Central Valley fall-run Chinook Salmon. The entire Central Valley fall-run Chinook salmon fishery has been overrun by hatchery practices. Currently, hatcheries dump 32,000,000 smolts (not fry or parr) into the Bay-Delta. (SED, at 7-15.) The natural production of Central Valley fall-run Chinook salmon smolts pales in comparison to this number.

In determining whether a natural population exists, the term "natural production" must be explained and examined. In the true sense of the word "natural," there is no such production on the tributaries. Starting in Spring 2007, Department of Fish & Wildlife began the Constant Fractional Marking ("CFM") program to determine, among other things, the proportions of hatchery and natural origin returning fish. Under the program, 25% of hatchery releases for fall-run Chinook salmon were marked by the removal of the adipose fin (ad-clipped) and tagged with an internal Code Wire Tag ("CWT"). Since 2010, the Stanislaus River weir has recorded 22% to 86% ad-clipped fish, and the Tuolumne River weir has recorded 11% to 50% ad-clipped fish.

Year	Total Chinook Observed	Total Ad-clip Observed	Percent Ad-clipped
2010	1,355	341	25%
2011	815	698	86%
2012	7,249	4782	66%
2013	5,459	1272	23%
2014	5,534	1223	22%
2015	12,708	3279	26%
2016	14,396	3718	26%

SJTA Table 2-9. Stanislaus River weir data[36]

Year	Total Chinook Observed	Total Ad-clip Observed	Percent Ad-clipped
2010	782	258	33%
2011	2,906	1454	50%
2012	2,304	615	27%
2013	3,742	407	11%
2014	673	101	15%
2015	437	100	23%
2016 (Dec. 8)	3,241	771	24%

SJTA Table 2-10. Tuolumne River weir data[37]

[36] Sources for Table 2-0: (1) Peterson, Matthew L., Andrea N. Fuller, and Doug Demko. Environmental Factors Associated with the Upstream Migration of Fall-Run Chinook Salmon in a Regulated River. North American Journal Of Fisheries Management_Vol. 37 , Iss. 1, 2017; (2) FISHBIO unpublished data. (SJTA Attachment 8A.)

[37] Source for SJTA Table 2-10: (1) TID/MID (Turlock Irrigation District and Modesto Irrigation District). 2016. 2015 Lower Tuolumne River Annual Report Pursuant to Article 58 of the License for the Don Pedro Project, No. 2299 (available at http://www.tuolumnerivertac.com/documents.htm); (2) FISHBIO unpublished data. (SJTA Attached 8B.)

Approximately 25% of hatchery production is marked through the CFM Program. So only 1 out of 4 hatchery fish released is identifiable by an adipose fin clip. As the proportions of tagged fish observed at the Stanislaus and Tuolumne weirs in recent years is also roughly 25%, (and sometimes higher) this indicates that adult abundance in these streams continues to be dominated by hatchery fish. There are no hatcheries on the Stanislaus or Tuolumne Rivers so these are fish straying to these streams to spawn.

2.1.3.2.3. Ocean harvest impedes achievement of the doubling goal

The initial population levels (should be production levels) for San Joaquin River Central Valley fall-run Chinook salmon could not be done because Department of Fish & Wildlife did not know how many fish were being harvested. (DFW (1994) p. 26, 32.)[38] Harvest plays a key role in determining "production." "Production" is all adult Central Valley fall-run Chinook salmon. It includes harvest, both in the ocean and inland, recreational and commercial.

The doubling goal will never be achieved because the Magnusson-Stevens Act directs National Marine Fisheries Service to maximize the harvest of Central Valley fall-run Chinook salmon. NMFS has determined that 122,000 to 180,000 natural and hatchery spawners is sufficient to maintain ocean harvest of 50-65% Central Valley fall-run Chinook salmon. (see SJTA Attachment 9, p. 4) [Combined Memorandum of Federal Defendants' Cross-Motion for Summary Judgment and Opposition to Plaintiff's Motion for Summary Judgment, *San Joaquin River Group Authority v. National Marine Fisheries Service, et al.*, U.S. District Court, Eastern Dist. of California, Case 1:11-cv-00725 (Document 73-1), filed 8/19/11].) Given the number of spawners and the ocean harvest rates set by NMFS, the doubling of production itself cannot be achieved.

2.1.3.2.4. The Delta Flow Criteria Report demonstrates the Implementation of the flow objectives will not achieve the Salmon Doubling Objective

The 2010 Delta Flow Criteria Report drafted in accordance with Water Code section 85086[c][1] concluded that an average of 10,000 cfs at Vernalis from the period of March through

[38] As explained in the letter, Department of Fish & Wildlife focused on 1967-1991 population, i.e., escapement, or adult fish returning to the streams. Why they looked at population and not production is unknown.

June “may provide conditions necessary to achieve doubling of San Joaquin basin fall-run.” (Delta Flow Criteria Report, p. 119.) The report also concluded that 10,000 cfs at Vernalis from March through June could be achieved in approximately 45% of water years with an unimpaired flow of 60% from the San Joaquin Valley. (Delta Flow Criteria Report, p. 121, Figure 20a.) Critically, this calculation assumed 60% unimpaired flow contributions from the entire San Joaquin Valley, comprising nine sub-basins, including the Stanislaus River at Melones Reservoir, the San Joaquin Valley Floor, the Tuolumne River at Don Pedro Reservoir, the Merced River at Exchequer Reservoir, the Chowchilla River at Buchanan Reservoir, the Fresno River near Daulton, the San Joaquin River at Millerton Reservoir, the Tulare Lake Basin Outflow, and the San Joaquin Valley West Side Minor Streams. (Delta Flow Criteria Report, p. 97.) From all of these sources, the average unimpaired flow at Vernalis for the months of February through June (1921 – 2003) was 529,000 acre feet (February), 668,000 acre feet (March), 929,000 acre feet (April), 1,467,000 acre feet (May), 1,117,000 acre feet (June), for a summed average amount of 4,710,000 acre feet over all five months. (Delta Delta Flow Criteria Report, p. 97; see also *California Central Valley Flow Data,* Fourth Edition Draft, California Department of Water Resources (May 2007), p. 45.)

When unimpaired flow contributions from the San Joaquin Valley are reduced from nine sub-basins to three, as Staff is proposing in Phase 1, the flow rate of 10,000 cfs can only be achieved at Vernalis in the wettest of water years. For instance, under a requirement of 40% unimpaired flow, 10,000 cfs is only achieved at Vernalis from February through June at the 90% exceedance level and above. (SED, at Appx. F1, p. F-129.) Even under a requirement of 60% unimpaired flow from the Stanislaus, Tuolumne and Merced Rivers, 10,000 cfs is only achieved at Vernalis from February through June at the 90% exceedance level and above, although 10,000 cfs can be achieved in the months of May and June at the 80% exceedance level as well. (SED, at Appx. F1, p. F.1-142.) Thus, maintaining 30% to 50% unimpaired flow from the Stanislaus, Tuolumne and Merced Rivers will never achieve the doubling goal.

2.2. The Proposed Objectives are unreasonable and violate the Porter-Cologne Act

In the Porter-Cologne Water Quality Control Act (the "Porter-Cologne Act"), the Legislature declared that the people of the state have "a primary interest in the conservation, control, and utilization of the water resources of the state," and that the quality of the waters must be protected for "use and enjoyment by the people . . .." (Water Code, § 13000.) The Legislature has charged the State Water Board, and the regional water boards, with the "primary responsibility for the coordination and control of water quality." (Water Code, § 13001.) The authority of the water boards to regulate water quality is not unchecked. The boards must adhere to specific policies, the most fundamental of which is that the regulation of any activities affecting water quality must be "**reasonable, considering all demands** being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible." (Water Code, § 13000; see also Water Code, § 13001, 13140.) Moreover, while the boards have primary responsibility for controlling water quality, they must "consult with and carefully evaluate the recommendations of concerned federal, state and local agencies." (Water Code, § 13144, 13240.)

The mechanism provided to the water boards for protecting water quality is the "water quality control plan." (Water Code, § 13170, 13240.) A water quality control plan must include (1) a set of beneficial uses to be protected by the plan, (2) a set of objectives designed to protect those beneficial uses, and (3) a program of implementation for achieving those objectives. (Water Code, § 13050[j], 13241, 13242.) In establishing the objectives, the boards must "ensure the reasonable protection of beneficial uses and the prevention of nuisance." (Water Code, § 13241.) The boards must also consider, at a minimum, all of the following factors: (1) past, present and probable future beneficial uses of water[39], (2) environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto, (3) water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water

[39] The requirement that the Board consider past, present and future beneficial uses of water under Water Code section 13241 is similar to the mandate that the Board consider all demands being made upon the waters involved under Water Code section 13000, but the latter requirement is slightly broader because not every demand being made on the waters involved constitutes a beneficial use in and of itself.

quality in the area, (4) economic considerations, (5) the need for developing housing within the region, and (6) the need to develop and use recycled water. (Water Code, § 13241.) Simply put, the objectives must be "reasonable" in their protection of the identified beneficial uses, considering all relevant factors. (Water Code, § 13000, 13241.)

The State Water Board acts in a legislative capacity in setting water quality objectives, and is thus accorded a measure of deference in doing so. (*Racanelli,* 182 Cal.App.3d at 112.) However, this deference has several concrete limitations: (1) the Board must act within the scope of its delegated authority, (2) the Board must employ fair procedures, and (3) and the Board's action must be reasonable. (*Ibid.*) The courts have authority to assess whether the Board's action meets the reasonableness standard, and will not uphold the agency's action if it is "arbitrary, capricious, or lacking in evidentiary support." (*Id.* at 113, citing *California Hotel & Motel Assn. v. Industrial Welfare Com.* (1979) 25 Cal.3d 200, 212.) When assessing reasonableness, courts "must ensure that an agency has adequately considered all relevant factors, and has demonstrated **a rational connection** between those factors, the choice made, and the purposes of the [Porter-Cologne Act]" (*Ibid.* [emphasis supplied].)

As demonstrated below, the analysis in the SED is insufficient for the Board to conclude that the revised objectives for the protection of fish and wildlife are reasonable considering all relevant factors. The SED does not demonstrate any rational connection between the objectives chosen and the factors that must be considered when setting water quality objectives. Accordingly, the Board must decline to adopt the proposed objectives set forth in Appx. K of the SED.

2.2.1. The SED fails to consider whether the objectives provide reasonable protection considering all the demands and other beneficial uses of the waters involved

The Tributary Flow Objective and the Vernalis Flow Objective target the waters of the Stanislaus, Tuolumne and Merced Rivers. (SED, at Appx. K, p. 18, 29.) Specifically, the Tributary Flow Objective requires that a percentage of unimpaired flow between 30% and 50% (calculated on a minimum 7-day running average) be maintained from each of the Stanislaus, Tuolumne and Merced Rivers from February through June. (SED, at Appx. K, p. 18.) The Vernalis Flow Objective requires a minimum base flow between 800 and 1,200 cubic feet per second ("cfs") at Vernalis from

February through June, notwithstanding the unimpaired flow requirement. (SED, at Appx. K, p. 18.) The Vernalis Flow Objective requires contributions from the Stanislaus, Tuolumne and Merced Rivers, at 29 percent, 47 percent and 24 percent, respectively. (SED, at Appx. K, p. 29.)

The WQCP states that fish and wildlife beneficial uses will be protected by the flows required from these objectives. (SED, at Appx. K, p. 18.) However, the analysis in the SED fails to properly consider whether the protection afforded to fish and wildlife by these objectives is reasonable, considering all the demands placed on the waters involved (Water Code, § 13000), and all the past, present and potential future beneficial uses. (Water Code, § 13241[a].) The absence of a proper analysis will render the administrative record in this matter devoid of the necessary "evidentiary support" for the Board's decision as to whether the required instream flows provide protection that is reasonable. (*Racanelli, supra*, 182 Cal.App.3d 82, 113.) Courts will refuse to uphold Board decisions that have no evidentiary support, as there is no means of ensuring that "the agency has adequately considered all relevant factors, and has demonstrated a rational connection between those factors, the choice made, and the purposes of the enabling statute." (*Ibid.*) Simply put, the Board's determination of reasonableness – and the evidence supporting that determination – must be in the document that forms the basis for the Board's decision. As explained below, the SED fails to provide sufficient evidentiary support or analysis for a determination that the proposed objectives are reasonable in light of all demands being made on the waters involved. Accordingly, the Board must decline to adopt the WQCP and the proposed revisions to the objectives therein.

2.2.1.1. The SED fails to analyze whether the proposed objectives are reasonable considering the demand for municipal supply

The SED properly acknowledges that the SJTA members supply local municipalities with surface water. (SED, at Table 2-3; 22-2.) There are also multiple municipal service providers upstream of the rim dams in the "extended plan area." (SED, at Table 13-6, p. 13-20.) The SED states that the proposed alternatives (namely, Alternative 2 with adaptive implementation, and Alternatives 3 and 4 with or without adaptive implementation) would cause "substantial reductions of surface water" and impact municipal supplies. (SED, at 22-13.) In fact, municipal suppliers on the three tributaries "would likely be greatly affected" by a reduction in surface supply caused by

Alternatives 2 and 3. (SED, at 13-61, 13-66.) The SED also states that the water supply reductions caused by the LSJR Alternatives could be "shifted from agricultural uses downstream in the plan area to consumptive domestic and municipal uses upstream in the extended plan area," thereby increasing the impact to municipal service providers in the extended plan area. (SED, at 13-89.)

Although the SED recognizes that municipal surface supply will be greatly impacted by the proposed objectives, it dismisses those impacts in two ways. First, the SED states that the impact of reduced surface water supply on municipal suppliers is only "a function of their ability to use existing alternative supplies (e.g. groundwater) or develop alternative water supplies." (SED, at 13-49.) In other words, the analysis effectively dismisses the demand for municipal supply by assuming that it will be satisfied from another source, such as groundwater. Second, the WQCP suggests that the Board will protect against any impacts to municipal supply by prioritizing municipal uses over other beneficial uses, without consideration of water right priority. Specifically, the WQCP states that the State Water Board will "take actions as necessary to ensure that implementation of the [LSJR] flow objectives does not impact supplies of water for minimum health and safety needs, particularly during drought periods." (SED, at Appx. K, p. 28; 13-61, 13-66.) The WSE Model implements this proposed protection of municipal uses as follows: "Volumes of water assumed not to be subject to a water shortage (e.g., municipal and industrial water supply, riparian rights) are subtracted from the total diversions for each river to calculate the remaining water. Any water left over is then delivered to the irrigation districts to be used for applied water demands . . .." (SED, at 11-36.) As explained below, providing this assurance of protection to municipal supplies, regardless of the priority of the water rights that currently serve those supplies, constitutes an unlawful prioritization of a municipal beneficial use over other beneficial uses, such as agricultural uses, without due consideration of the priority of the water rights that serve those beneficial uses, and without consideration of any contracts which control distribution to municipal suppliers.

As stated in the SED, California recognizes domestic water use as the most important use, with irrigation as the second most important. (SED, at 13-61; Water Code, § 106.) However, this hierarchy cannot be used as a basis for altering water right priority, nor for diverging from the rule of first in time, first in right. As stated by one commentator, "there is no legislative or judicial authority in California for the enforced advancing of the priority of an appropriation for one beneficial purpose over that of a prior appropriation for another beneficial purpose, either in time of water shortage or otherwise, without making due compensation." (Hutchins, *California Law of Water Rights,* p. 174.) The only mechanism by which the State Water Board can assign a higher priority to a later appropriation serving a more preferred beneficial use is through the imposition of permit terms and conditions on the earlier appropriation. (see *Racanelli, supra,* 182 Cal.App.3d at 132 [recognizing the very limited authority of the Board to impose permit conditions that give a higher priority to a more preferred beneficial use even though later in time].) Thus, where a water right is not based on a permit issued by the State Water Board or its predecessor agency, the Board has no authority to prioritize one beneficial use over another where doing so would contravene water right priority. (*Young v. State Water Resources Control Bd.* (2013) 219 Cal.App.4th 397, 404 ["the Water Board does not have jurisdiction to regulate riparian and pre-1914 appropriative rights"].)

By establishing a set of objectives for the benefit of fish and wildlife that will have an impact on municipal uses, and then dismissing that impact by proposing a method of protection that the Board has no authority to implement, the Board has circumvented its statutory obligation to set water quality objectives that provide "reasonable" protection to fish and wildlife, considering all demands and other beneficial uses. (Water Code, § 13000, 13241.) The assessment of whether the proposed objectives for fish and wildlife are reasonable considering all demands will depend upon, among other things, the extent of the impact on municipal supply. The Board has ignored the impact on municipal supply by (1) assuming the demand will be satisfied from another source of water, and (2) improperly assuming that municipal uses can be systematically protected at the expense of other beneficial uses, such as agriculture. However, the Board has no authority to prioritize municipal uses over other beneficial uses based on the preference for municipal supply, as such an act would violate the rules of water right priority. Because the Board lacks this authority, the Board must reexamine the municipal demand for the waters of the Stanislaus, Tuolumne and Merced Rivers without the assumed systematic protection of municipal uses. As the SED improperly assumes the impact on municipal supply can be effectively eliminated, further consideration by the Board is necessary to determine whether the proposed objectives offer a reasonable level of protection for fish and wildlife considering the impact on municipal demand.

2.2.1.2. The SED fails to analyze whether the proposed objectives are reasonable considering the demand for agricultural supply

According to the information provided in the SED, there are approximately 516,722 acres of farmland in the area that will be impacted by the Tributary Flow Objective and the Vernalis Flow Objective. (SED, at Table 11-15, p. 11-48.) These areas include the lands serviced by OID, SSJID, TID and MID. The SED recognizes that the proposed objectives will have significant and unavoidable impacts on agricultural resources across these areas. (SED, at Table ES-20, p. ES-52.) Succinctly stated, “any increases in unimpaired flows would reduce surface water supplies that are available for irrigation purposes.” (SED, at 11-1.) The SED estimates that “approximately 22,879 acres, on average, of Prime or Unique Farmland of Statewide importance requiring irrigation could have reduced surface water diversions” under LSJR Alternative 3 (40% UIF), and that this impact would be significant and unavoidable irrespective of whether the alternative is adaptively implemented. (SED, at 11-5.) These estimated impacts to agriculture are significantly understated in the SED, and as a result the document fails to provide the Board with sufficiently accurate information to determine whether the objectives are reasonable in light of the agricultural demand being made on the waters involved.

As stated above, the Board is tasked with setting water quality objectives that ensure the reasonable protection of beneficial uses, such as fish and wildlife, “considering all demands being made and to be made on those waters.” (Water Code, § 13000, 13241.) The Stanislaus, Tuolumne and Merced Rivers provide surface water that supports a vast and diverse agricultural industry in the affected area, as evidenced by Table 11-5 of the SED which shows that there are more than 500,000 acres of farmland that will be impacted by the proposed LSJR objectives. These figures demonstrate that the agricultural demand on the waters of the Stanislaus, Tuolumne and Merced Rivers is significant. Instead of giving consideration to this demand for surface water, as is required by Water Code section 13000, the SED preemptively diminishes the agricultural demand for surface water in the affected area by assuming that groundwater will serve as a substitute for the lost surface water. (SED, at 11-36.) By doing so, the SED fails to assess the actual agricultural demand for the waters affected by the objectives. Specifically, the WSE Model assumes that agricultural demands could be "satisfied by surface water and groundwater, or a combination of the two." (SED, at 11-36.) The SED states that, within the irrigation districts in the affected area, including OID, SSJID, TID and MID, "there is a minimum amount of groundwater pumping that occurs every year." (SED, at 11-37.) Under the WSE Model, when the amount of available surface water, combined with the minimum amount of groundwater pumping, is insufficient to meet the irrigation demands in a particular district, "then additional groundwater pumping" is assumed to occur up until the point that the irrigation demands are satisfied or the maximum capacity of groundwater pumping is reached. (SED, at 11-37.) Under the SED, agricultural demands are only deemed to be impacted when the additional groundwater pumping is maximized, and when there is still insufficient water to satisfy all irrigation demands. (SED, at 11-37.) The flaw in this assumption is twofold.

First, irrespective of whether the assumed maximum capacity for groundwater pumping is accurate or legally permissible under SGMA, proper consideration of the agricultural demands under Water Code section 13000 requires an assessment of those demands in their undiminished capacity and without an assumption that supply can be subsidized by groundwater. While the Board is afforded some deference in determining what constitutes a reasonable measure of protection for fish and wildlife considering all the demands being made on the waters involved, its determination cannot be "arbitrary, capricious, or lacking in evidentiary support." (*Racanelli*, 182 Cal.App.3d at 113, citing *California Hotel & Motel Assn. v. Industrial Welfare Com.* (1979) 25 Cal.3d 200, 212.) This deference is premised upon "the separation of powers between the Legislature and the judiciary, [and] the legislative delegation of administrative authority to the agency . . ." (*California Hotel*, *supra*, 25 Cal.3d at 212.) The mandate from the legislature to the State Water Board in this instance is to set reasonable objectives "considering **all demands** being made and to be made on those waters." (Water Code, § 13000 [emphasis supplied].) The directive to consider "all demands" compels an objective assessment of all the agricultural demands being made on the surface waters involved, and precludes the State Water Board from tinkering with the demand figures in such a way as to diminish the total demand when deciding what objectives are reasonable. This issue of downwardly adjusting values where an agency has been directed consider *all* values in determining what is reasonable has been addressed in other legal contexts. For instance, in a case involving Proposition 39's requirement that school districts provide charter schools with "reasonably equivalent" facilities, the Sixth District Court of Appeal held that a school district improperly understated the amount of "non-teaching" space at "comparison" schools when determining the amount of "non-teaching" space that should be made available to the charter school. (*Bullis Charter School v. Los Altos School Dist.* (2011) 200 Cal.App.4th 1022, 1046-1047.) Pursuant to the implementing regulations for Proposition 39, the school district was required to consider "all of the space that is not identified as teaching station space . . . [including, but not limited to] administrative space, kitchen, multi-purpose room, and play area space" when calculating "non-teaching station space." (*Bullis Charter School, supra,* 200 Cal.App.4th at 1046-1047; Cal. Code Regs., tit. 5, § 11969.3[b][3].) Instead of taking "an objective look at all of such space available" at the comparison schools, the district employed a "common usage approach" where it only considered the "non-teaching" spaces that were common to all of the schools in the comparison group. (*Bullis Charter School*, *supra*, 200 Cal.App.4th at 1047.) Under this approach, the comparison group schools could control the "reasonably equivalent" analysis by changing their use of non-teaching space. (*Ibid*.) The example provided by the court was as follows: if all schools in the comparison group had tennis courts, but one school chose to use the court only for badminton, then the school district would not consider that space to be "non-teaching" space for Proposition 39 analysis. (*Id*.) The effect of this methodology was that the school district excluded a substantial amount of "non-teaching" space from its analysis, thereby reducing the resources that it needed to provide to the charter school in order to attain the reasonably equivalent requirement. (*Id.*) The court concluded that this was error and that the school district acted arbitrarily. (*Id.*) The Court also determined that the school district erred by failing to consider the overall site size for the charter school in relation to the comparison schools because the regulations for Proposition 39 state that the school district "'shall' use as a factor 'school site size.'" (*Id.* at 1051-1052.)

Like the regulations for Proposition 39, which require school districts to consider "all" non-teaching space, as well as site size, when determining "reasonably equivalent" school facilities for charter schools, Water Code, § 13000 requires the State Water Board to consider "all demands" being made on the waters involved when determining what constitutes a "reasonable" water quality objective. (Water Code, § 13000, 13241.) In *Bullis*, the court determined that the school district acted arbitrarily by failing to consider "all" of the non-teaching space held by the comparison schools, instead relying on a reduced number that was subject to alteration. The SED makes a similar error. Rather than using the actual agricultural demands being made of the surface waters of the Stanislaus, Tuolumne and Merced Rivers, the SED uses a reduced demand number that is effectively subsidized by an estimated "maximum" groundwater pumping capacity. (SED, at 11-37.) As in *Bullis*, any determination that the proposed LSJR objectives are "reasonable, considering all demands" being made on the waters involved would be arbitrary in the absence of any consideration of the *actual* agricultural demand, i.e., the agricultural demand without the assumption that a portion of that demand will be satisfied by maximum groundwater pumping. In addition, any such determination would be beyond the scope of the authority granted to the State Water Board to set water quality objectives insofar as that authority is constrained by the requirement that the Board consider all demands being made on the waters involved. (*California Hotel, supra,* 25 Cal.3d at 212 [an agency must act "within the scope of its delegated authority"].) The Board's decision to only examine impacts to Prime or Unique Farmland of Statewide importance also improperly diminishes the agricultural demand for the same reasons.

Second, the assumption that the agricultural demands from the surface waters of the Stanislaus, Tuolumne and Merced Rivers can be satisfied, at least in part, from the pumping of groundwater is inaccurate and legally unsupportable. The issue of whether agricultural demands can be satisfied by available groundwater in the affected area is a technical matter which requires expert analysis. "[A]bsent any indication of arbitrariness or evidentiary or procedural defect, in these technical matters requiring the assistance of experts and the collection and study of statistical data, courts let administrative boards and officers work out their problems with as little judicial interference as possible." (*Racanelli, supra,* 182 Cal.App.3d at 113 [internal quotations omitted], citing *Industrial Welfare Com. v. Superior Court* (1980) 27 Cal.3d 690, 702.) However, a determination will be deemed arbitrary if the evidentiary support upon which it is based "is physically impossible or inherently improbable and such inherent improbability plainly appears." (*California Sportfishing Protection Alliance v. State Water Resources Control Bd.* (2008) 160 Cal.App.4th 1625, 1640, quoting *Kunec v. Brea Redevelopment Agency* (1997) 55 Cal.App.4th 511, 518.) The SED acknowledges that the estimated groundwater needed to supplement the lost surface water supply is not physically attainable. Specifically, in assessing maximum groundwater pumping capacity, the SED uses two different approaches, one of which is based upon groundwater pumping infrastructure and estimated capacity under 2009 conditions, and another which is based upon groundwater pumping infrastructure and estimated capacity under 2014 conditions. (SED, at 11-37.) The groundwater pumping capacity estimates are higher under 2014 conditions than under 2009 conditions due to the drilling of additional wells over the course of those years in response to drought conditions. (SED, at 11-37.) The SED openly acknowledges that exercising groundwater pumping capabilities under 2014 conditions is not "a sustainable practice given groundwater conditions." (SED, at 11-52.) Given the acknowledgement of this physical impossibility, or at least the inherent improbability of it, the Board currently lacks the necessary information and analysis needed to make a decision that is not arbitrary or capricious on the issue of whether the proposed objectives are reasonable considering demands being made on the surface waters involved. (*California Sportfishing, supra*, 160 Cal.App.4th at 1640.)

Furthermore, the Sustainable Groundwater Management Act ("SGMA") (Water Code, § 10720 et seq.) "will impact groundwater management as it places a mandatory duty upon local agencies in high- and medium- priority groundwater basins to form groundwater sustainability agencies (GSAs) by June 30, 2017, in order to adopt and implement groundwater sustainability plans (GSPs) to sustainably manage groundwater resources." (SED, at 9-2.) GSAs will have the ability to "control groundwater extractions by regulating, limiting, or suspending extractions from wells." (SED, at 9-2, citing Water Code, § 10726.4.) The agricultural analysis performed in the SED does not account for the potential regulations and restrictions on groundwater pumping that will inevitably result from the implementation of SGMA. Accordingly, the assumption that the proposed objectives for unimpaired flow can be built on the back of the dwindling groundwater supply is legally untenable. The State Water Board should decline to adopt water quality objectives that would directly contradict the goals of SGMA, including (1) "[t]o provide for the sustainable management of groundwater basins," (2) "[t]o avoid or minimize subsidence," and (3) "[t]o increase groundwater storage and remove impediments to recharge." (Water Code, § 10720.1.)

In sum, the SED fails to account for the true agricultural demand being made on the surface waters of the Stanislaus, Tuolumne and Merced Rivers, and overestimates the extent to which the demand can be satisfied by groundwater. As a result, the SED does not include a proper assessment of the agricultural demands being made of the waters impacted by the water quality control plan, and thus cannot support a decision by the State Water Board that the protections afforded to fish and wildlife beneficial uses are reasonable in the face of all demands as required by the Water Code.

2.2.1.3. The SED fails to analyze whether the proposed objectives are reasonable considering the impact to groundwater recharge

The Water Code requires that the State Water Board consider "all demands" being made on the waters subject to a water quality control plan when determining what constitutes a reasonable protection of a beneficial use such as fish and wildlife. (Water Code, § 13241.) While passive groundwater recharge, in itself, is not a beneficial use, it is incidental to irrigation, the second-most preferred beneficial use. (Water Code, § 106.) As such, it is part of the demands being made on the waters subject to the objectives and must be considered in determining what constitutes a reasonable protection for fish and wildlife.

The SED states that "sustainable yield estimates [for groundwater] are highly dependent on recharge from surface water applications for irrigation and seepage from distribution systems [and] if surface water applications are modified, then the subbasin's sustainable yield changes." (SED, at

9-15.) According to the information in the SED, total average recharge in SSJID from applied irrigation water and seepage from canals and reservoirs is approximately 97 TAF annually. (SED, at 9-25.) Groundwater recharge within OID, on average, is estimated to be 87 TAF annually. (SED, at 9-27.) Because of OID's contributions, "groundwater levels in portions of the Eastern San Joaquin Subbasin underlying the OID service area have decreased much less than groundwater levels in the rest of the subbasin." (SED, at 9-27.) In MID, groundwater recharge has increased significantly in recent years, from approximately 81 TAF in 2012, to 152 TAF in 2015, the majority of which comes from MID irrigation water. (SED, at 9-28.) Total recharge in TID is estimated to be 238 TAF annually, most of which comes from applied surface water. (SED, at 9-29.) Across these four irrigation districts, total recharge is approximately 574 TAF annually. Except in dry years, the irrigation districts are net rechargers, adding more water to the groundwater basin than they extract from it. (SED, at Figure 9-9, p. 9-53.) This net recharge helps "compensate for groundwater pumping outside of the irrigation district lands." (SED, at 9-54.) However, the proposed objectives will drastically reduce the amount of recharge to groundwater due to the reduction in applied surface water. (SED, at Figure 9-10 –9-12, p. 9-55 – 9-56; and Table 9-12, p. 9-58.) Specifically, under a 40% unimpaired flow requirement, the districts would still be net positive rechargers in most years, but the positive balance would decrease and "be detrimental because it could reduce the amount of compensation for groundwater pumping that happens outside of the irrigation district lands." (SED at 9-62.) Moreover, the irrigation district groundwater balance would be negative in the Eastern San Joaquin and Extended Merced Subbasins in approximately the driest 40 percent of years." (SED,at 9-62.) A reduction in groundwater levels can cause a "degradation of groundwater quality." (SED, at 9-63.) The SED notes that a 40% unimpaired flow requirement could "substantially deplete groundwater supplies and interfere with groundwater recharge and affect groundwater quality" in the affected subbasins. (SED, at 9-63.)

This impact to groundwater recharge must be considered by the Board in determining whether a 40% unimpaired flow requirement for the protection of fish and wildlife is reasonable. Apart from noting that the impact is significant and unavoidable for purposes of CEQA, the SED contains no analysis of whether a different objective, such as a functional flow approach, would provide the same protection for fish and wildlife with less impact on groundwater recharge. This analysis needs to be performed before the Board can find that the objectives are reasonable considering all demands being made upon the waters affected by the WQCP.

2.2.1.4. The SED fails to analyze whether the proposed objectives are reasonable considering the impact to water storage

On the Stanislaus and Tuolumne Rivers there are at least eight major reservoirs with a total storage capacity of more than 5 million acre feet. (SED, at 2-3.) This storage is critical to maintaining a robust agricultural industry and ensuring a reliable municipal supply, especially in dry years and sequential dry years. The ability of water users to store water in these reservoirs for later use is one of the many demands being made on the waters of the Stanislaus and Tuolumne Rivers. However, the SED provides no analysis of whether the 40% unimpaired flow requirement for the benefit of fish and wildlife is reasonable considering the impact that it will have on storage. In fact, the modeling in the SED assumes that reservoir operators will adhere to certain minimum carryover storage targets in New Melones Reservoir and New Don Pedro Reservoir, even though those storage targets are not required by the objectives. (SED, at Appx. F1, p. F.1-36, F.1-37.) By modeling a minimum storage target that is not required by the objectives, the analysis fails to demonstrate the real impact of the objectives on storage. Without any modeling or analysis to show how the 40% unimpaired flow requirement will impact storage, the Board cannot determine whether the objectives are reasonable in light of their impact to storage. For this reason, the Board cannot fulfill its obligation under Water Code section 13000 of setting an objective that is reasonable considering all demands being made on the waters, and must therefore decline to adopt the WQCP.

2.2.1.5. The SED fails to analyze whether the proposed objectives are reasonable considering the impact they will have on water transfers

The SED fails to consider the impact that the objectives will have on the ability of water right holders to effectuate water transfers. The Water Code allows for water transfers where the water will be put to beneficial use. (Water Code, § 1725.) These water transfers can have significant economic benefits to the transferor, as well as the transferee. Additionally, some water transfers can be used to benefit fish and wildlife. As indicated in the comments submitted by OID and SSJID, water transfers can help fund water delivery system projects and water conservation projects. (OID/SSJID Joint Comments, District Revenue Impacts Section.) The SED does not consider the impact that the 40% unimpaired flow requirement will have on the ability of water right holders to effectuate water transfers. The failure to consider the impact of the objectives on this demand is a violation of Water Code section 13000.

2.2.1.6. The SED fails to properly consider whether the proposed objectives are reasonable considering the impact they will have on hydropower

There are numerous hydropower plants on the Stanislaus and Tuolumne Rivers, including one at each of the rim dams (New Melones and New Don Pedro) and one below each of the rim dams (Tulloch and La Grange). (SED, at 14-6.) The SED fails to properly analyze the impact of the objectives on hydropower. The modeling presented in the SED assumes that reservoir operators will adhere to certain end-of-September carryover storage requirements on the rim dams. (SED, at 14-30; Appx. F1, p. F.1-36, F.1-37.) These carryover storage requirements will have a direct effect on hydropower generation because they create constraints on the release of water. However, the carryover storage targets are not required by the objectives, and thus the modeling presents an unrealistic scenario of how hydropower generation will be impacted, both in timing and quantity. Moreover, the carryover targets ensure that the reservoirs are not drawn down to dead-pool levels during dry and sequential dry years, which is an unrealistic occurrence if the 40% flow requirement is implemented, as shown in the SJTA's analysis set forth above. Thus, the SED analysis improperly assumes the availability of water for hydropower generation in years where such water would likely not be available if the objectives were implemented.

Furthermore, the SED states that the timing of hydropower generation will shift from baseline conditions if the proposed objectives are implemented, with a general increase in production during the February through June period, and a decrease in production during the July to September period. (SED, at 14-32.) The SED notes that this shift has the "potential of stressing the gird" because peak demand for energy occurs during the summer months of June to August. (SED, at 14-32.) There is no discussion in the SED of the reasonableness of increasing the risk of stress to the grid during summer months in exchange for ostensibly providing protection to fish and wildlife earlier in the year. This is type of assessment is necessary if the Board is to demonstrate a "rational connection" between the chosen objective and the cost of attaining the benefits achieved by that objective. (*Racanelli,* 182 Cal.App.3d at 113.)

2.2.2. The SED fails to consider whether the objectives are reasonable considering the environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto

The SED is devoid of any data or analysis of this component of the WQCP. The closest the State Water Board comes is in Chapter 5. Chapter 5 describes the Water Quality issues: salinity, pesticides/herbicides and water temperature.

Salinity is not a component of the flow objective. Salinity is dealt with as a constituent and is the sole responsibility of Reclamation. (Water Rights Decision 1641, p. 87-88.) Pesticides/herbicides as described on page 5-10 of the SED are not addressed. Storage and or releases of water instream do not cause these pollutants to be in the river.

Water temperature is addressed in the SED as a water quality characteristic that may be improved by the proposed flow objectives. Water Temperature on the tributaries and San Joaquin River have been a source of longstanding controversy. In 2010, the State Water Board declined to list the San Joaquin River or its tributaries (the Merced, Tuolumne and Stanislaus) as impaired water bodies for temperature for which total maximum daily loads ("TMDLs") must be set under Clean Water Act section 303[d]. (SWRCB Resolution 2010-0040.) EPA disapproved the Board's decision and listed the Lower San Joaquin River and tributaries as impaired for water temperature using the Pacific Northwest objectives. (SJTA Attachment 10 [USEPA Letter to SWRCB, October 11, 2011, Encl., p. 1.])

The San Joaquin River Group Authority ("SJRGA") challenged the EPA's listing of the San Joaquin River and its tributaries as temperature impaired water bodies under CWA Section 303(d). (SJTA Attachment 11.) The United States District Court for the Eastern District of California dismissed the suit, finding that the issue was not ripe for review because the SWRCB had not yet developed TMDLs for the newly listed water bodies. (SJTA Attachment 11, p. 2.) The Eastern District explained that California must develop TMDLs in response to the EPA's listing decision, after which the State will submit those TMDLs to the EPA for approval or disapproval. (SJTA Attachment 11, p. 2.) Because the State had not yet developed any TMDLs for temperature on the San Joaquin River or its tributaries, the Court dismissed the suit. (SJTA Attachment 11, p. 2-3.)

The CWA does not set a deadline for the development of TMDLs following a listing decision by EPA. (33 U.S.C. § 1313[d]; 40 C.F.R. § 130.7[d].) To date, the SWRCB has not started developing temperature-related TMDLs for the San Joaquin River or its tributaries in response to EPA's listing decision. (SED, at Table 5-5, p. 5-12.) If the Board intends to address the issue of water temperature on the San Joaquin River and the three eastside tributaries, it should do so within the TMDL process, not through the WQCP process using flow as a surrogate for temperature, as is being attempted here. Notably, the proposed objective of 40% unimpaired flow from February-June will not obtain the Pacific Northwest water temperature guidelines which formed the basis of the 303[d] listing. (See SJTA Table 2-4, above.)

In setting the Tributary Flow Objectives with the aim of attempting to control water temperature in the San Joaquin River and three eastside tributaries, the SED fails to properly account for the temperature characteristics of the waters involved. The analysis in the SED shows that there will be small incremental reductions in water temperatures downstream of the rim dams on the Stanislaus, Tuolumne and Merced Rivers at 40% unimpaired flow. (SED, at 19-22 – 19-30.) This analysis was done with a carryover storage target, reservoir refill criteria and flow shifting. (SED, at Appx. F.1, p. F.1-36 – F.1-38.) As pointed out elsewhere in these comments, this is the wrong analysis as none of those components are required by the objectives. When the temperature modeling is run without these components, many of the supposed temperature benefits are lost (see SJTA Table 2-4, above), and by the SED's own account, water temperatures are worse than under baseline conditions (SED, Appx. F1, p. F.1-42).

The SED provides three tables purportedly showing the anticipated temperature changes on the San Joaquin River, including at Vernalis. (SED, at 19-31 – 19-33.) As this is the Bay-Delta Plan designed to protect migration of native San Joaquin River watershed fish through the Delta, the quality of the waters on the San Joaquin River through the Delta need to be examined if the Board is to fulfill its statutory obligation of setting reasonable objectives considering the "[e]nvironmental characteristics of the hydrographic unit under consideration." (Water Code, § 13241[b].) However, the SED provides no analysis of the temperature results on the San Joaquin River, instead limiting its analysis to the temperature results on the three eastside tributaries. Specifically, in Chapter 19, Staff explains the water temperature benefits for each significant life stage of Central Valley fall-run Chinook salmon on the three tributaries. (SED, at 19-34 – 19-43.) However, with respect to the anticipated water temperature changes on the San Joaquin River, the SED provides no analysis as to how such changes (if any) would impact adult migration (SED, at 19-34), reproduction (SED, at 19-34 – 19-35), core rearing (SED, at 19-37 – 19-38), or smoltification (SED, at 19-39 – 19-40). The absence of any analysis on the San Joaquin River is explained by the acknowledgment in the SED that 40% unimpaired flow is "not expected to produce significant benefits or impacts on optimal salmonid temperature habitat." (SED, at 19-43.) The reason that no significant benefits or impacts to temperature occur is because San Joaquin River water temperatures, including those at Vernalis, are almost entirely a function of ambient air temperature. In fact, in the 1991 Bay Delta Plan, the SWRCB stated, "controlling water temperature in the Delta utilizing reservoir releases does not appear to be reasonable, due to the distance of the Delta downstream of reservoirs, and uncontrollable factors such as ambient air temperature, water temperature in the reservoir releases, etc." (SWRCB, 1991 Bay-Delta Plan, p. 5-16.) The Board went so far as to say that it "considers reservoir releases to control water temperatures in the Delta a waste of water." (SWRCB, 1991 Bay-Delta Plan, p. 5-16.) There is no mention of this previous State Water Board finding in the SED. Clearly, the inability to control temperature in the Delta (which includes Vernalis) via reservoir releases is an environmental characteristic which must be considered by the Board in setting water quality objectives designed to protect fish migrating through the Delta. The failure to consider this fact is a violation of Water Code Section 13241[b].

Thus, on the one water quality constituent the State Water Board identified, i.e., water temperature, it completely whiffed when providing data or analysis as to how the proposed flow objectives would make water quality (water temperature) better as San Joaquin River water enters the Delta. State Water Board staff fails again to understand the planning process is the Bay-Delta Plan, not the Lower San Joaquin River Basin Plan.

2.2.3. The SED fails to consider water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area (Water Code, § 13241[c])

2.2.3.1. Failure to coordinate control of all water resources in the Bay-Delta

The Porter-Cologne Act requires the State Water Board to consider "[w]ater quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area." (Water Code, § 13241[c].) In setting the LSJR objectives, the State Water Board failed to fulfill its obligation of considering all factors that affect water quality in the area.

The State Water Board's Narrative Objective defines the *area* in which water quality is targeted by the proposed water quality control plan. Specifically, the Narrative Objective states that certain inflow conditions are to be maintained "from the San Joaquin River watershed to the Delta at Vernalis sufficient to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta." (SED, at Appx. K, p. 18.) Thus, the area to be protected by the objectives is the San Joaquin River watershed and the migratory path of native San Joaquin River watershed fish through the Delta. In other words, the geographic scope of the area targeted extends from the farthest reaches of the San Joaquin River watershed, all the way through the Delta.

Pursuant to Water Code section 13241[c], the State Water Board was required to consider "all factors which affect water quality" in the San Joaquin River watershed through the Delta. Similarly, the Board must consider "all demands being made and to be mode on those waters"

(Water Code, § 13000.) The First District Court of Appeal addressed this issue in *Racenelli*, in which the State Water Board employed a "without project" standard, meaning the number of days in a year that suitable water quality would be available in the Delta if the Central Valley Project and State Water Project had never been constructed. (*Racanelli, supra,* 182 Cal.App.3d at 116.) The *Racanelli* court held that the Board "erroneously based its water quality objectives upon the unjustified premise that upstream users retained unlimited access to upstream waters, while the projects and Delta parties were entitled only to share the remaining water flows." (*Racanelli*, *supra,* 182 Cal.App.3d at 118.) In other words, the Board considered "only the water use of the Delta parties . . . and the needs of the customers served by the projects . . ." without giving any attention "to water use by the upstream users." (*Racanelli, supra,* 182 Cal.App.3d at 118.) The Court stated that, to remedy this problem, the Board must "take the larger view of the water resources in arriving at a reasonable estimate of all water users." (*Racanelli*, *supra,* 182 Cal.App.3d at 119.) As it did in setting the "without project" standards, the State Water Board has again failed to consider all the factors that might affect water quality in the area targeted, and all demands being made on those waters.

2.2.3.1.1. Failure to coordinate control of all water resources in the San Joaquin River watershed

While the area to be protected by the LSJR Objectives covers the entire Delta and San Joaquin River watershed (SED, at Appx. K, p. 18), the Tributary Flow Objective and the Vernalis Flow Objective are significantly more narrow in scope. To begin, these objectives do not call for any contributions from the San Joaquin River watershed upstream of its confluence with the Merced River. The Tributary Flow Objective only targets the waters of the Merced, Tuolumne and Stanislaus Rivers, and the Vernalis Flow Objective only requires contributions from those same three tributaries. (SED, at Appx K, p. 18, 29.) Similarly, neither objective requires any contribution from water users on the mainstem of the San Joaquin River downstream of its confluence with the Merced River, including any diverters on the west side of the San Joaquin River. The objectives also do not require any contributions from water users in the Delta, despite the Board's assertion that the objectives are to protect fish and wildlife beneficial uses through the Delta. By ignoring the water users and resources in these areas, the objectives fail to achieve “the coordinated control of all factors which affect water quality in the area” that is required by Water Code, § 13241[c].

2.2.3.1.2. Phasing of the WQCP update precludes coordinated control of all water resources in the Bay- Delta

Historically, the State Water Board has performed its review of the Bay Delta Plan in one comprehensive process. (SWRCB, 2006 Bay Delta Plan; see also 1995 Bay Delta Plan; 1991 Bay Delta Plan; and 1978 Bay Delta Plan.) Although the objectives are complex and multi-faceted, the Bay Delta Plan is a single plan that sets forth water quality objectives which contribute to the beneficial uses in the Bay Delta Estuary. (*See* 1995 Bay Delta Plan, at 3.) Because the purpose of the water quality objectives is to benefit a Bay Delta watershed, the objectives are often inextricably interrelated. For example, the San Joaquin River objectives are affected by and affect the objectives which set reverse flows, export/inflow ratios, and floodplain habitat flows.

The revised objectives do not require any new contributions from water users on the Sacramento River or its tributaries, which also contribute to water quality in the Delta. The purported reason for this exclusion is that revisions to all other parts of the Bay-Delta Plan (including contributions from the Sacramento River watershed, Delta outflows and export restrictions) will be addressed in a separate phase of the update, namely Phase II. (SED, at 1-3.) “Phases I and II are independent of each other, addressing different water quality objectives and associated programs of implementation.” (SED, at 1-3.)

This phased approach to addressing conditions in the Bay-Delta violates the Board’s obligation to consider “all factors which affect water quality in the area.” (Water Code, § 13241[c].) Separating south Delta and San Joaquin River flows from the remainder of the basin plan review results in a piece-mealed analysis that is non-comprehensive. The San Joaquin River is one of the two rivers whose confluence makes up the Delta. Separating the flow objectives on the San Joaquin River from the larger “comprehensive” review of the remainder of the Bay Delta Plan makes little sense. The quantity of San Joaquin River flows that will reasonably be required to protect the beneficial uses in the Delta is affected by reverse flows, exports, and other factors being reviewed in the “comprehensive” review including inflow from the Sacramento River. The Board cannot make a decision as to what contributions are necessary (or reasonable) from the San Joaquin River watershed for the protection of fish migrating through the Delta, without a corresponding assessment of what contributions are necessary (or reasonable) from the Sacramento River watershed. Indeed, "[p]ast experience has shown that piecemeal efforts to address the Bay-Delta's problems have failed because those problems are interrelated and because conflicting interest groups and stakeholders can block actions that promote some interests at the expense of others" (*In re Bay-Delta*, *supra*, 43 Cal.4th at 1165 [acknowledging that CALFED properly "determined that the four primary project objectives had to be addressed concurrently"].) For this reason, evaluating San Joaquin River flows in isolation, without considering the other basin-wide mechanisms that are interrelated, violates the Board's obligation to set objectives that consider "the coordinated control of all factors which affect water quality in the area." (Water Code, § 13241[c].)

The phasing process is problematic for other reasons as well. Separating the processes will require water users on the San Joaquin River to expend twice the resources to achieve the same result. Notably, the Board intends to address Delta outflows and interior Delta flows in Phase II. (SED, at Appx. K, p. 6.) To the extent that the Board believes San Joaquin River inflow may play a role in these components of the plan, SJTA members will be officially part of the Phase II update as well. Moreover, the WQCP states that the San Joaquin River flow objectives may even be updated as part of Phase II. (SED, at Appx. K, p. 6.) Because SJTA interests will be subject to all "phases" of the Bay Delta Plan review, it will be required to participate in two different review processes in front of the State Water Board, review at least two different environmental documents, and to the extent the adoption and/or implementation of any revised objectives do not comply with law, the SJTA will have to challenge two different actions adopting objectives and two different implementation plans. This unfairly prejudices the regulated parties on the LSJR.

2.2.3.2. Failure to coordinate control of factors other than flow

One of the Water Quality impairments listed by the State Water Board in Chapter 5 is invasive species. (SED, at 5-11.) In the State Water Board SED there is no discussion of how controlling this pollutant will benefit native fish migrating to and from the tributaries and through the Delta.

The Board has repeatedly recognized in the 1995 Bay-Delta Plan, the 2006 Bay-Delta Plan, and now in this update that predation is a problem in the Bay-Delta. Nevertheless, the Plan consistently fails to tackle the issue directly through the objectives, and as a result, the discussion about predation has never translated into action by the State Water Board. The failure of the Board to directly address the issue of predation by invasive species through an amendment of the objectives is a violation of the Board's obligation to coordinate control of all factors which affect water quality in the area. (Water Code, § 13241[c].)

2.2.4. The SED fails to properly consider the economic impact of the objectives

The Water Code requires that the economic impact of the objectives be examined. (Water Code, § 13000, 13241[d].) As noted above, courts will strike down a Board's decision as unreasonable if it is "arbitrary, capricious, or lacking in evidentiary support." (*Racanelli, supra,* 182 Cal.App.3d at 113, citing *California Hotel & Motel Assn. v. Industrial Welfare Com.* (1979) 25 Cal.3d 200, 212.) As shown below, the economic analysis in the SED lacks the necessary evidentiary support to demonstrate that the objectives are reasonable in light of their economic impact, and otherwise fails to show that there is a "rational connection" between the objectives chosen and the economic cost of attaining the benefits anticipated to be achieved by the objectives. (*Racanelli, supra,* 182 Cal.App.3d at 113.)

The SED states that the economic analysis contained in Chapter 20 will "help inform the State Water Board's consideration of potential changes to the 2006 Bay-Delta Plan related to LSJR flow and southern Delta water quality objectives." (SED, at 20-3.) However, it also states that there is no analysis of the economic impact of *implementing* the objectives, as that type of "project-level" change will be addressed in subsequent proceedings. (SED, at 20-3.) The level of analysis contained in the SED is problematic for two reasons.

First, although the SED states that the economic analysis is intended to assist the Board in its consideration of the proposed changes to the water quality objectives, it also states – in the preceding paragraph – that the analysis should not be used to compare "costs and benefits of the LSJR alternatives." (SED, at 20-2.) The document states that the new objectives will result in potential *costs* (e.g. reduced agricultural production) and potential *benefits* (e.g. improved fisheries), but the analysis does not attempt to compare those costs and benefits, nor does it attempt "to sum values across resource topics." (SED, at 20-12.) In fact, "the reader is strongly discouraged from trying to draw conclusions across topics concerning the overall net benefits of a particular alternative." (SED, at 20-2.) Of course, the problem with this limitation in the analysis is that the Board is required to perform this exact type of cost-benefit assessment in fulfilling its obligation under the Water Code to set objectives that provide *reasonable* protection to beneficial uses considering the economic impact of the objectives, as well as the other demands and beneficial uses of the water. (Water Code, § 13000, 13241.) If the cost-benefit assessment is not contained in the document that the Board relies upon to adopt the objectives, then the record will be devoid of evidentiary support for the Board's ultimate decision. A court will not assume from the Board's adoption of the WQCP that the Board members must have silently and internally conducted the very cost-benefit analysis that the drafters of the SED strongly discouraged. Courts must be assured that the Board "adequately considered all relevant factors, and . . . demonstrated a rational connection between those factors, the choice made, and the purposes of the [Porter-Cologne Act]" (*Racanelli, supra*, 182 Cal.App.3d at 113.) Without a discussion of the cost-benefit analysis, there is no such assurance. Accordingly, the Board should decline to adopt the WQCP based on the insufficient economic analysis provided.

Second, the economic impact of implementing the objectives cannot be delayed to subsequent proceedings. As the Board is required to adopt a WQCP that includes both objectives and a program of implementation, the economic impact of the entire plan needs to be assessed to determine if the objectives are reasonable considering their economic impact. (Water Code, §§ 13050(j), 13241(d).)

Moreover, the analysis understates the impact to the agricultural economy in several ways. First, Board staff used a model known as the Statewide Agricultural Production ("SWAP") model to analyze the impacts to agriculture. (SED, at 20-15.) The SWAP model optimizes available land and water so that net returns to farmers are maximized. (SED, at 20-15.) It achieves this result by assuming that crops which use large amounts of water and generate low net revenue per acre, such as pasture, alfalfa and rice, are fallowed when water is more scarce. Higher-revenue crops are fallowed last under the model. The SWAP model employs this trade-off method across the entire system, not within individual farms. Accordingly, it assumes that some farmers will fallow fields while others will not, based entirely on the type of crops being grown. It also assumes that farmers will act rationally and with perfect information in directing water towards the highest value crops in times of shortage. None of these assumptions are likely to occur in the real world, or even permitted to occur within the irrigation districts impacted, and thus the model significantly understates the economic impact on agriculture. The analysis also assumes that surface water reductions are offset by maximum groundwater pumping rates at 2009 capacity levels, without any analysis as to whether pumping at this rate would be lawful under SGMA. (SED, at 20-16.) This assumption likely overstates the amount by which surface water will be replaced by groundwater, and thus understates the economic impact to agriculture.

For these reasons, the economic analysis is insufficient, and the Board should decline to adopt the WQCP.

2.2.5. The Proposed Objectives Fail to Consider the need for developing housing within the region

SWB Staff has failed to consider the need for developing housing within the region as required under Water Code section 13241, subdivision [e] of the Water Code. In developing a water quality control plans the SWB must take into consideration the beneficial uses to be protected, and the water quality objectives reasonably required to achieve that purpose. Of the factors necessary for consideration by the SWB in establishing water quality objectives is the need for developing housing within the region. (Water Code, §13241[e].) The scant analysis of the growth-inducing effects of the proposed alternatives in the SED (SED, at 17-68.) is insufficient to comply with this directive.

Currently, consideration and analysis of the need for developing housing within the region is of critical importance. California is suffering from a serious housing shortage. (Taylor, *Perspectives on Helping Low-Income Californians Afford Housi*ng (Legislative Analyst's Office 2016) p. 1.) This is due in part to environmental protection policies that constrain new housing development. (*Id.* at 6.) The WQCP will increase dependence on groundwater resources within the region, thus, reducing the water source relied on for domestic use within the plan area. As an example, the Planada Community Service District in Merced County recently dealt with major challenges in meeting its community water service needs. Several of its wells went dry due to the increased dependence on groundwater, resulting in a need for emergency funding in order to put new wells in place. Without reliable water sources, future residential development may be restrained.

The Board should not adopt the WCQP until the SWB has considered the need for developing housing within the region as required by the Water Code.

2.2.6. The Proposed Objectives Fail to Consider the need to develop and use recycled water

The Water Code requires consideration of "the need to *develop* and use recycled water. (Water Code, §13241[f] [emphasis supplied].) The SWB's proposed objectives only consider the need to use recycled water as an offset for reduced surface water. The WQCP, as written, passes on the necessary consideration of development to waste water treatment plants ("WWTPs"). It states, "[m]odifications required for existing WWTPs cannot be known at this time because they would depend on the type of wastewater treatment currently conducted at a WWTP, the availability of resources (e.g., funding and space), and the management of the WWTP by the local wastewater treatment special district or municipality." (SED, at 16-49.) It goes on to say "details of the modifications to existing WWTPs and respective distribution systems to support the development of recycled water sources, are unknown at this time. It is assumed these modifications may be carried out by the municipalities and wastewater treatment service providers." (*Ibid*.) Merely alluding to unknown, but available, information is insufficient to comply with the directive to consider the need to develop recycled water. Accordingly, the Board should not adopt the WQCP until proper consideration is given to this factor.

2.2.7. Intangible Considerations

The State Water Board SED claims benefits to the ecosystem. The beneficial use is to be in the Bay-Delta, not the Lower San Joaquin River. Other than FPH and water temperature, the State Water Board SED has no discussion of how the ecosystem will be improved other than the belief that flow is the master variable and if there is more flow the ecosystem will be better.

2.2.8. SUMMARY

In sum, the Water Code requires that the Board set reasonable water quality objectives to protect beneficial uses, considering all demands being made on the waters involved, and all other relevant factors. (Water Code, §§ 13000, 13241.) As highlighted above, the SED fails to properly consider the impacts of the objectives on municipal and industrial supply, agricultural supply, groundwater recharge, water storage, water transfers and hydropower. The SED also fails to consider whether the objectives are reasonable considering past, present and future beneficial uses, environmental characteristics of the hydrographic unit under consideration, water quality conditions that can be reasonably achieved through the coordinated control of all factors, the economy, the need for housing, and the need to develop and use recycled water. The Board needs to balance all of these factors against the supposed benefit achieved by the objectives, which is the additional production of 1,103 fall-run Chinook Salmon, i.e., an increase of less than a quarter of 1% of the average annual production of one species. The SED does not present sufficient information for the Board to conduct this weighing and balancing, primarily because SWB Staff never modeled the actual project. Nevertheless, the information and analysis provided by the SJTA and its member agencies clearly demonstrates that the proposed objectives are not reasonable. The significant impacts are simply not justified by the supposed benefits to one fish species.

2.3. The Program of Implementation violates the Porter-Cologne Act

A Water Quality Control Plan must include a program of implementation. (Water Code, § 13050[j].) The POI is a road map for achieving the objectives in the plan, and must include (1) a "description of the nature of actions which are necessary to achieve the objectives, including recommendations for appropriate action by any entity, public or private," (2) a "time schedule for the actions to be taken," and (3) a "description of surveillance to be undertaken to determine compliance with objectives." (Water Code, § 13242.) All three of these components must be in the plan itself. (see e.g., *State Water Resources Control Bd. Cases, supra,* 136 Cal.App.4th at 727 [holding that the time schedule for implementing the objectives must be in the plan itself, not constructed after the adoption of the plan].)

As demonstrated in detail below, the proposed POI is deficient for numerous reasons and the Board should not adopt the proposed water quality control plan.

2.3.1. The Program of Implementation is unlawful because it does not describe the actions necessary to achieve the objectives, and instead allows for changes to the objectives without a properly noticed hearing

The Water Code mandates that the program of implementation describe the actions "necessary to achieve the objectives." (Water Code, § 13242.) The proposed WQCP violates this rule by treating the program of implementation as a tool for modifying the objectives, not achieving the objectives. Revisions to a WQCP, including any revisions to the objectives therein, can only be made after a properly noticed and conducted hearing. The proposed POI, which would allow for changes to the objectives without a properly noticed hearing, is unlawful and should not be approved by the Board.

When the State Water Board decides upon a plan of action that is "necessary to achieve the objectives" (Water Code, § 13242[a]), and adopts that plan of action as part of its water quality control plan, it must adhere to it. (Water Code, § 13247 ["in carrying out activities which may affect water quality," the State Board "shall comply with water quality control plans approved or adopted by the state board . . ."]; *State Water Resources Control Bd. Cases, supra,* 136 Cal.App.4th at 730 ["having determined in a water quality control plan that a water rights proceeding was necessary to achieve the water quality objectives in that plan," the Board cannot decide that it will not fully allocate responsibility for the objective in the water right proceeding and thereby "refuse to enforce its own plan"].) The Board cannot refuse to take the actions it has deemed necessary to achieve the objectives, as doing so would "make a de facto amendment to a water quality objective." (*State Water Resources Control Bd. Cases, supra,* 136 Cal.App.4th at 732.) Such amendments are unlawful because a plan cannot be changed "without complying with the procedural requirements for amending a water quality control plan." (*State Water Resources Control Bd. Cases, surpa*, 136 Cal.App.4th at 734; see Water Code, § 13244.) Where the method of implementation would "fundamentally alter[] [the] objectives, such an alteration [can] be accomplished only through a properly noticed and conducted regulatory proceeding." (*State Water Resources Control Bd. Cases, supra*, 136 Cal.App.4th at 729.)

Here, the POI states that the LSJR flow objectives for February through June will be implemented by 2022 through water rights actions or water quality actions. (SED, at Appx. K, p. 28.) Specifically, the LSJR flow objectives on the tributaries will be implemented "by requiring 40% unimpaired flow, based on a minimum 7-day running average, from each of the Stanislaus, Tuolumne and Merced Rivers." (SED, at Appx. K, p. 29.) The LSJR base flow objective will be implemented "by requiring a minimum base flow of 1,000 cfs, based on a minimum 7-day running average, at Vernalis at all times." (SED, at Appx. K, p. 29.) This plan is designed to satisfy the requirement of describing the actions necessary for achieving the objectives. (Water Code, § 13242.) However, the plan also describes a series of "[a]daptive adjustments" that can be made to the flow requirements as part of implementing the objectives. (SED, at Appx. K, p. 30.) These adaptive adjustments render the POI unlawful.

The POI identifies four adaptive adjustments that can be made after implementation of the 40% unimpaired flow and 1,000 cfs requirements: (a) adjusting the required percent of unimpaired flow to any value between 30 percent and 50 percent, (b) managing the required percent of unimpaired flow as "a total volume of water" that can be released on "an adaptive schedule" in the February through June time period, (c) delaying the release of a portion of the February through

June unimpaired flow "until after June to prevent adverse effects to fisheries, including temperature, that would otherwise result from implementation of the February through June flow requirements," and (d) adjusting the required base flow at Vernalis for February through June to any value between 800 and 1,200 cfs. (SED, at Appx. K, p. 30-31.)

Two of these adjustments fall within the broad constraints of the objectives themselves. For example, adjustment "*a*" merely allows for a change in the required unimpaired flow from February through June from 40% (the initial implementation number) to some other percentage within the permitted range of the objective itself, i.e., between 30% and 50%. Similarly, adjustment "*d*" merely allows for a change in the required base flow from 1,000 cfs (the initial implementation number) to some other flow requirement within the permitted range of the objective, i.e., between 800 cfs and 1,200 cfs. Making these adjustments would not change the objectives because the changes would be within the permissible range of the objective.

However, the other two adjustments in the POI allow for actual changes to the objectives. For instance, adjustment "*b*" allows for the required percent of unimpaired flow from February through June to be "managed as a total volume of water and released on an adaptive schedule during that [time] period where scientific information indicates that a flow pattern *different* from what would occur by tracking the unimpaired flow percentage would better protect fish and wildlife beneficial uses." (SED, at Appx. K, p. 30 [emphasis supplied].) This adjustment allows for two fundamental changes to the Tributary Flow Objective. First, the objective requires a "*percent of unimpaired flow* . . . be maintained from February through June." (SED, at Appx. K, p. 18 [emphasis supplied].) This adjustment would allow for a change to the unimpaired flow component of the objective. Pursuant to this adaptive adjustment, a percent of unimpaired flow would no longer be required, and flow could be released on some unspecified schedule entirely unrelated to unimpaired flow. Second, the objective requires a percent of unimpaired flow to be maintained based upon *a minimum 7-day running average*. (SED, at Appx. K, p. 18.) On its face, the objective allows for an upward adjustment of the number of days used to compute the running average. However, adaptive adjustment "*b*" allows for a complete repudiation of the minimum 7-day running average component of the objective. In other words, it allows for managing releases from February through June based on a total volume of water, without adherence to a running average of any kind. This adjustment method constitutes an actual change to the objective insofar as it dispenses with the two components that define it, i.e., THE unimpaired flow percentage and minimum 7-day running average.

Similarly, adjustment "*c*" impermissibly enlarges the time period applicable to the February-June objectives. By their terms, the Tributary Flow Objective and the Vernalis Base Flow Objective are limited to requiring the maintenance of certain flows from February through June. (SED, at Appx. K, p. 18.) However, adjustment "*c*" allows for the required releases to be delayed "until after June," and, in certain circumstances, "until the following year." (SED, at Appx. K, p. 30-31.) This is a change to the actual objectives, which only require the maintenance of flows from February through June.

There are several other components of the POI that are not set forth as adaptive adjustments, but nevertheless allow for – and in some circumstances require – modification of the objectives. For instance, the POI states that the Executive Director "may approve changes to the compliance locations and gage station numbers set forth in Table 3 if information shows that another location and gage station more accurately represent the flows of the LSJR tributary at its confluence with the LSJR." (SED, at Appx. K, p. 29.) This change is not identified as part of the adaptive implementation methods, but it nevertheless allows for a change to the actual objectives which have predefined compliance points. (SED, at Appx. K, p. 18.) Changing the location of the compliance point will change the amount of flow required, as it will adjust the accretions/depletions which occur between the bypass/release point and the compliance point.

Another example of an improper modification of the objectives through the POI is the carryover storage requirement. The POI states, "[w]hen implementing the LSJR flow objectives, the State Water Board **will include** minimum reservoir carryover storage targets or other requirements to help ensure that providing flows to meet the flow objectives will not have adverse temperature or other impacts on fish and wildlife or, if feasible, on other beneficial uses." (SED, at Appx. K, p. 28

[emphasis supplied].) Because the plan states that the Board "will include" carryover storage requirements, and because Water Code section 13247 requires the Board to comply with all aspects of its water quality control plan once approved, the Board will be required to create carryover storage requirements, despite the assertion in the SED that carryover storage is "not intended in a regulatory sense but, rather, to provide an example of reservoir operations . . ." (SED, at Appx. F.1, p. F.1-4, fn. 2.) Requiring minimum carryover storage in a reservoir will, under certain hydrologic conditions, directly conflict with the Tributary Flow Objective requiring the maintenance of 30% to 50% unimpaired flow. For instance, if requiring 30% unimpaired flow (i.e., the minimum allowable unimpaired flow percentage) would result in a drawdown of a reservoir to a level below the carryover storage requirement, then this implementation component (which is required by the plan) would directly conflict with the 30% to 50% unimpaired flow objective.[40] Neither the objective, nor the program of implementation, specifies which of these requirements would control in the case of a conflict. In this regard, the POI not only allows for changes to the objectives without a properly noticed hearing, it actually compels that the objectives be changed in certain circumstances.

The POI is not saved by the fact that it only calls for changes to the objectives in order to avoid adverse impacts to fish and wildlife beneficial uses. The three components of a water quality control plan (the beneficial uses, the objectives, and the program of implementation) have different purposes. The purpose of the objectives is to provide "reasonable protection of the beneficial uses of water." (Water Code, § 13050[h].) In turn, the purpose of the program of implementation is to "achieve the objectives." (Water Code, §§ 13242,13050[j][3].) Through this two-step process designed by the legislature, the beneficial uses are protected. The current proposal subverts this statutorily-required two-step process, and improperly uses the program of implementation as a

[40] For example, the carryover storage requirement at New Melones is 700 TAF. (SED, at Appx. F1, p. F.1-36, Table F.1-2-23a.) Minimum diversions on the Stanislaus River are set at 210 TAF. (*id.*) Assume New Melones reservoir is at 700 TAF on February 1. If total inflow from February through June is 270 TAF, then instream releases for unimpaired flow would be 81 TAF if the UIF requirement was set at 30%. However, if carryover storage of 700 TAF is to be maintained with an inflow of only 270 TAF, and an outflow of 210 TAF for minimum diversions, then instream releases would need to be reduced from 81 TAF to 60 TAF (270 TAF inflow – 210 TAF diversions = 60 TAF available for instream releases). As 60 TAF only amounts to approximately 22% of the 270 TAF inflow, the carryover storage requirement would compel a violation of the UIF objective.

means of directly protecting the beneficial uses, irrespective of the objectives. This procedure is unlawful for several reasons. First, it violates Water Code section 13242, which states that the POI must include a description of the actions necessary to achieve the objectives, not a description of the actions necessary to directly protect the beneficial uses. Second, Water Code section 13241 requires that water quality objectives be established for the "reasonable protection" of beneficial uses, after balancing and considering all beneficial uses of water. (Water Code, § 13241.) There is no balancing required when establishing a program of implementation, mainly because the balancing is achieved in the prior step. (Water Code, § 13242.) Thus, by constructing a program of implementation with adaptive adjustments that can be used to change the objectives (or create new objectives), the critical step of weighing and balancing is skipped. The proposed POI reflects this very point. It focuses solely on adaptive adjustments (i.e., changes to the flow objectives) that are needed to protect fish and wildlife beneficial uses. There is no corresponding requirement that impacts to other beneficial uses be considered before making the change: "[t]he adjustments in (a), (b), and (c) may . . . be made independently on each of [the tributaries], so long as the flows are coordinated to achieve beneficial results in the LSJR *related to the protection of fish and wildlife beneficial uses*." (SED, at Appx. K, p. 31 [emphasis supplied].) In other words, the weighing and balancing of other beneficial uses of water is not required before changing the objectives via the adaptive adjustments allowed by the POI. By setting up a procedure where the POI (rather than an objective) is used as a direct means of protecting beneficial uses, Board staff has effectively skipped the weighing and balancing that must be conducted when determining what level of protection for fish and wildlife beneficial uses is "reasonable." (Water Code, § 13241.) This error is compounded by the granting of authority to the Executive Director to modify the objectives as part of the program of implementation. Specifically, adjustments "*b*" and "*c*" allow the Executive Director to approve changes to the objectives on an annual basis if the change is "recommended by one or more members of the STM Working Group." (SED, at Appx. K, p. 30-31.) However, the State Water Board is the only entity that has been granted authority by the legislature to approve revisions to the water quality control plan. (Water Code, § 13245.) As such, the State Water Board is the final authority on whether "reasonable protection" has been provided for beneficial uses. (Water Code, § 13240.) The legislature has not authorized the Executive Director, nor the STM Working Group, to revise objectives, nor to weigh and balance other beneficial uses in order to determine whether the protection afforded to fish and wildlife beneficial uses is reasonable. Even if the Water Code granted the Board the authority to preemptively conduct the necessary balancing of interests as part of a broad grant of authority to the Executive Director to change the objectives (which it does not), the unlimited number of changes permissible under the adaptive adjustments would render such a task impossible.

In sum, the program of implementation is unlawful because it does not contain a description of the actions necessary to achieve the objectives, and instead allows for changes to the objectives without a properly noticed hearing, and without the statutorily required weighing and balancing of all demands being made on the waters involved. (Water Code, §§ 13000, 13241.)

2.3.2. The program of implementation fails to describe the actions necessary to achieve the Narrative Objective

The program of implementation includes a plan of action for purportedly achieving the February through June unimpaired flow objectives (SED, at Appx. K, p. 28-31), and the October pulse flow objective (SED, at Appx. K, p. 34). However, there is no plan of action for achieving the newly created Narrative Objective. Notably, the POI states that the narrative objective for the protection of salmon, referred to herein as the Doubling Objective (SED, at Appx. K, p. 17), is expected to be achieved through the "implementation of the numeric flow-dependent objectives and other non-flow measures." (SED, at Appx. K, p. 53.) The POI does not contain a similar plan of action for the new Narrative Objective. Water Code section 13242 requires a description of the actions necessary to achieve the objectives, a time schedule for the actions, and a description of the surveillance to determine compliance with the objectives. The failure to include any of these components in the POI for the Narrative Objective is a violation of Water Code section 13242.

Even if the unstated intention of Board staff is that the Narrative Objective will be implemented through the implementation of the Tributary Flow Objectives, such a plan is inadequate. The Narrative Objective enlarges the scope of the protected area beyond the compliance points on the tributaries, stating that inflow conditions should be maintained in the San Joaquin River watershed "to the Delta at Vernalis sufficient to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta." (SED, at Appx. K, p. 18.) Although the POI states that the State Water Board "will exercise its water right and water quality authority to help ensure that the flows required to meet the LSJR flow objectives are used for their intended purposes and are not diverted for other purposes" (SED, at Appx. K, p. 28), the POI does not include the required description of surveillance measures that will be undertaken to ensure that the flows which reach the compliance points on the tributaries are not diverted for other purposes as soon as they hit the San Joaquin River. Such a description is required under Water Code section 13242[c].

2.3.3. The State Water Board overstates its authority to implement the objectives

The State Water Board has overstated its implementation authority in several key respects which render the POI unlawful. The POI identifies two primary implementation methods. The first method is a water right proceeding where the Board will assign responsibility for contributing flows to water right permit and license holders, taking into consideration "the requirements of the Public Trust Doctrine and the California Constitution, article X, section 2." (SED, at Appx. K, p. 26.) The second method is assigning responsibility through water quality certifications under Clean Water Act section 401. For the various reasons stated below, the Board has overstated its authority to implement the objectives through these methods.

2.3.3.1. The Water Code does not grant the State Water Board continuing jurisdiction to amend water right licenses

Water Code section 1394 allows the State Water Board to amend, revise or supplement water right *permit* terms and conditions after a permit has been issued. However, the Water Code does not grant a similar authority to change the terms and conditions of a water right *license*. Specifically, the Water Code states, "in no case shall [this continuing] jurisdiction be exercised after the issuance of the license." (Water Code, § 1394[b]; Water Code, § 1600, et seq.)

Most of the water diverted in the geographic area of the proposed project is diverted pursuant to licensed or pre-1914 water rights. Accordingly, the State Water Board will only be able to make limited use of its continuing jurisdiction under Water Code section 1394 when implementing the flow objectives, and will not have control over a sufficient quantity of water to compel compliance with the unimpaired flow requirements.

2.3.3.2. The Board's authority to prevent waste and unreasonable use of water does not permit the Board to compel the use of water to meet an objective that protects a particular beneficial use

The POI states that the Board will consider the requirements of article X, section 2 of the California Constitution during any water right proceeding initiated to assign responsibility for meeting the objectives. (SED, at Appx. K, p. 26.) Article X, section 2 of the California Constitution prohibits the "waste or unreasonable use or unreasonable method of use of water." (Cal. Const., art. X, § 2.) Pursuant to this Constitutional provision, the State Water Board has the authority to prevent waste or unreasonable use of water. (Water Code, § 275; *California Farm Bureau Federation v. State Water Resources Control Bd.* (2011) 51 Cal.4th 421, 429.) However, the State Water Board's authority under the doctrine of waste and unreasonable use is limited, and the Board should not assume that this authority will permit it to implement the proposed water quality objectives. The determination of whether a use is reasonable is a question of fact and must be made according to the circumstances of each particular case. (*Joslin v. Marin Mun. Water Dist.* (1967) 67 Cal.2d 132, 139.) Therefore, before curtailing water use pursuant to a finding of waste and/or unreasonable use, the State Water Board will need to make a factual determination based on the specifics of each use it seeks to curtail. The State Water Board cannot make a broad determination that a type of use is unreasonable without a case-specific analysis. (see *Imperial Irrigation Dist. v. State Water Resources Control Bd.* (1990) 225 Cal.App.3d 548, 554 ("*Imperial*"); *Light v. State Water Resources Control Board* (2014) 226 Cal.App.4th 1463, 1482-1487.)

In addition, the power to curtail a specific use of water because it is being wasted or unreasonably used should not be equated with an authority to reallocate that water to a different beneficial use; the two powers are fundamentally distinct. For example, the State Water Board may determine a specific water use is unreasonable under certain circumstances. This determination would allow the Board to prohibit a water user from using water in the manner determined unreasonable. (*Imperial*, *supra*, 225 Cal.App.3d at 554-55.) That determination would not, however, prohibit the water user from using the water in a different manner that is reasonable and beneficial under the circumstances. In other words, a State Water Board determination that a use is unreasonable only curtails that particular use under the set of circumstances analyzed; it does not extinguish the underlying right and does not provide the State Water Board the authority to otherwise control the water that was the subject of the unreasonable use finding. The unreasonable use doctrine only empowers the State Water Board to ensure water is used reasonably under a particular right of use; it does not empower the State Water Board to permanently curtail a right or compel that water be put to a specific beneficial use. For this reason, the doctrine of unreasonable use will be of limited value to the State Water Board in implementing water quality objectives.

2.3.3.3. The State Water Board has limited authority to implement water quality objectives using the Public Trust doctrine

The State "owns all of its navigable waterways and the lands lying beneath them as trustee of a public trust for the benefit of the people." (*Nat'l Audubon Society v. Superior Court* (1983) 33 Cal.3d 419, 433-434.) This is known as the public trust doctrine and it imposes "an affirmative duty" on the State "to take the public trust into account in the planning and allocation of water resources, to protect public trust uses whenever feasible." (*Id.* At 446.) In accordance with this duty, the State Water Board possesses the authority "to exercise supervision over appropriators in order to protect fish and wildlife." (*United States v. State Water Resources Control Bd., supra,* 182 Cal.App.3d at 150.)

To the extent the Board intends to rely on its continuing authority to amend the terms and conditions of a permit or license in order to protect public trust uses, the Board must provide notice and a hearing to the affected parties, and determine that such amendments are "*necessary* to preserve or restore the uses protected by the public trust." (Cal. Code Regs., tit. 23, § 780[a][emphasis supplied].) The "necessary" threshold is more stringent than the standard under which the State Water Board establishes water quality objectives; the latter standard requires the State Water Board to "establish such water quality objectives . . . as in its judgment will ensure the *reasonable* protection" of the identified beneficial use. (Water Code, § 13241 [emphasis added].)

Therefore, even if the analysis in the SED was sufficient to support the establishment of the objectives (which it is not), the State Water Board could not rely on that same analysis to implement the objectives under its public trust authority. Instead, the State Water Board would need to notice and perform separate public trust proceedings to determine whether the objectives were *necessary* to protect the public trust values.

The scope of the Board's continuing authority over appropriations under the public trust doctrine is limited to preventing appropriations that are "harmful to the interests protected by the public trust." (*United States v. State Water Resources Control Bd., supra,* 182 Cal.App.3d at 151.) Thus, the State Water Board may not employ its continuing authority over appropriations in order to increase instream flows with the aim of merely *improving* fish and wildlife beneficial uses. Rather, the State Water Board must show that fish and wildlife are specifically *harmed* by the particular diversion targeted. This greatly limits the State Water Board's authority to implement the objectives pursuant to its public trust authority.

Even if the State Water Board could demonstrate that certain flows were *necessary* to protect the public trust resources and the diversions by certain users specifically *harmed* public trust resources, the State Water Board must further find that the curtailment of the targeted water rights is in the "public interest." (*United States v. State Water Resources Control Bd., supra,* 182 Cal.App.3d at 151; Water Code, § 1253; Cal. Code Regs., tit. 23, § 780[a].) "As a matter of practical necessity, the state may have to approve appropriations [of water] despite foreseeable harm to public trust uses." (*Nat'l Audubon Society v. Superior Court, supra,* 33 Cal.3d at 446.) Therefore, "in determining whether it is 'feasible' to protect public trust values like fish and wildlife in a particular instance," as is the Board's charge, "the Board must determine whether protection of those values, or what level of protection, is 'consistent with the public interest.'" (*State Water Resources Control Bd. Cases, supra,* 136 Cal.App.4th at 778, quoting *Nat'l Audubon Society v. Superior Court, supra,* 33 Cal.3d at 446-447.) A great majority of the water supply that will be affected by the proposed objectives is used for municipal and agricultural uses, which a vast segment of the populace depends upon for their livelihood and health and safety. On the other hand, the quantifiable benefit of the objectives to fish and wildlife is extremely limited. Specifically, the analysis in the SED projects that, on average, the implementation of the objectives will result in an increase of fall-run Chinook salmon production of approximately 1,103 fish. (SED, at Appx. K, p. 19-84.) The established benefit of existing uses, combined with the minimal benefit expected for fish and wildlife, compels a finding that the proposed objectives are not "consistent with the public interest." (S*tate Water Resources Control Bd. Cases, supra,* 136 Cal.App.4th at 778.)

Thus, the public trust doctrine is not a tool the State Water Board can use to implement the objectives. In order to implement flows through the State Water Board's public trust authority, the State Water Board would need to notice public trust proceedings. The Board would need to weigh and balance the information coming out of those proceedings to determine: (a) the objectives are necessary to protect fish and wildlife; (b) the diversions of certain water users are causing harm to the native fishery; and (c) the objectives promote the public interest. Because that evidence does not exist, the State Water Board's reliance on the public trust doctrine is misplaced.

2.3.3.4. The Program of Implementation ignores the State Water Board's limited jurisdiction over pre-1914 and riparian rights

The State Water Board "was created as the State Water Commission in 1913 to administer the appropriation of water for beneficial purposes." (*Light v. State Water Resources Control Bd., supra,* 226 Cal.App.4th at 1481.) Under California's system of water rights, "[r]iparian users and pre-1914 appropriators need neither a permit [from the State Water Board] nor other governmental authorization to exercise their water rights." (*Id.* At 1478.) Moreover, the Board "does not have jurisdiction to regulate riparian and pre-1914 appropriative rights." (*Young v. State Water Resources Control Bd.*, 219 Cal.App.4th 397, 404.) The Board has long recognized this limitation in its regulatory authority. (State Water Board Resolution 96-028 ["The SWRCB has limited jurisdiction over disputes regarding riparian and pre-1914 water rights. The relative priority and authorized diversion quantities of riparian and pre-1914 water rights are under the jurisdiction of the courts"].)

Thus, to the extent the State Water Board intends to utilize water right proceedings to implement the LSJR flow objectives and require contributions from water right holders, it will have no authority to compel such contributions from riparian and pre-1914 appropriative right holders. A significant portion of the water rights held on the Stanislaus, Tuolumne and Merced Rivers are pre-

1914 and riparian rights. As such, there are not sufficient flows under the Board's control for it to implement the unimpaired flow requirements via a water right proceeding.

2.3.3.5. The State Water Board does not have the authority to control reservoir operations by requiring carryover storage requirements

As noted above, the POI indicates that the State Water Board "will include minimum reservoir carryover storage targets or other requirements to help ensure that providing flows to meet the flow objectives will not have adverse temperature or other impacts on fish and wildlife or, if feasible, on other beneficial uses." (SED, at Appx. K, p. 28.) For several reasons, the Board lacks the authority to require that reservoirs be operated with minimum carryover storage requirements.

2.3.3.5.1. Implementing minimum carryover storage requirements could modify the unimpaired flow objectives without a noticed hearing and without balancing the impact of the changed objective on other beneficial uses of water

As set forth in above, minimum carryover storage requirements could conflict with the unimpaired flow objectives under certain hydrologic conditions, assuming minimum diversions are maintained as modeled in the SED. To the extent that the carryover storage requirements would be controlling over the unimpaired flow objectives, they would effectively change the objective. A water quality control plan, including the objectives contained therein, cannot be changed without a noticed hearing. (Water Code, § 13245.) In addition, objectives must be established considering, among other things, "[p]ast, present, and probable beneficial uses of water." (Water Code, § 13241[a].) Permitting the unimpaired flow objectives to be changed through an implementation measure, such as the minimum carryover storage requirement, subverts this statutorily mandated balancing of beneficial uses. Accordingly, the Board does not have the authority to establish minimum carryover storage requirements through a program of implementation.

2.3.3.5.2. The Board cannot implement a minimum carryover storage requirement for the purpose of protecting a beneficial use

The purpose of an objective is to provide reasonable protection to beneficial uses. (Water Code, § 13241.) The purpose of a POI is to describe the actions "necessary to achieve the objectives." (Water Code, § 13242.) This is the two-step process mandated by the legislature for protecting beneficial uses. As explained below, carryover storage requirements will not achieve any of the objectives, and thus the Board has no authority to implement them.

The stated purpose of requiring carryover storage is to “help ensure that providing flows to meet the flow objectives will not have adverse temperature or other impacts on fish and wildlife, or, if feasible, on other beneficial uses.” (SED, at Appx. K, p. 28.) Because the purpose is to directly protect beneficial uses rather than achieve objectives, establishing carryover storage requirements would subvert the two-step process described above for protecting beneficial uses. In addition, establishing a carryover storage requirement through the POI, rather than through an objective, subverts the required balancing that must be done when determining what level of protection for fish and wildlife is reasonable. (Water Code, § 13241.) This issue is compounded by the fact that the POI simply states that the Board “will include minimum reservoir carryover storage targets,” but does not actually set those targets. (SED, at Appx. K, p. 28.) The amount of carryover storage that is required each year will have a direct impact on other beneficial uses, such as agriculture. Accordingly, the Board is required by law to consider whether the specific carryover storage targets provide a “reasonable” level of protection for fish and wildlife. (Water Code, § 13241.) The balancing must be performed now and incorporated into the water quality control plan as an objective; it cannot be deferred to a water right proceeding where no such balancing is required.

Furthermore, to the extent that the purpose of requiring carryover storage is to prevent adverse temperature impacts, the requirement would be improper. The POI must describe “actions which are necessary to achieve the objectives.” (Water Code, § 13242.) As there is no temperature objective in need of implementation, the Board has no authority to implement carryover storage requirements.

Even though carryover storage requirements are not identified as objectives in the WQCP, the POI states that the requirements are intended to protect beneficial uses. Protecting beneficial uses is the purpose of an objective, not the POI. (Water Code, § 13241.) Nevertheless, for the limited purpose of providing the following comments, the carryover storage requirement is examined as if it were a stand-alone objective. When establishing an objective for the “reasonable" protection of fish and wildlife beneficial uses, the Board must consider, among other things, all other past, present and probable beneficial uses. (Water Code, § 13241.) The SED models the project with certain carryover storage requirements in place. (SED, at Appx. F1, p. F.1-36 to F.1-38.) However, there is no comparison between the project with carryover storage requirements and without carryover storage requirements. Without such a comparison, the Board cannot weigh and balance the impact of requiring carryover storage on other beneficial uses. Thus, to the extent the carryover storage requirement can be treated as an objective, the requisite balancing is absent.

2.3.3.5.3. The Board does not have the authority to control reservoir operations

Apart from the jurisdiction issue, the State Water Board authority to control reservoir operations is limited to its reserved jurisdiction over water storage licenses held by the Irrigation Districts. (Cal. Code Regs., tit. 23, § 780.) Two reservations of jurisdiction are relevant to this discussion. The first authorizes the State Water Board to exercise continuing jurisdiction over the license to protect public trust uses or to prevent waste or unreasonable use. (Cal. Code Regs., tit. 23, § 780(a).) It is unlikely the State Water Board will be able to justify the curtailment of water provided to irrigators because the water is beneficially used to grow crops. Furthermore, it is unlikely the fluctuation of reservoir levels will impede upon any public trust uses because the reservoirs already fluctuate and the public interest balancing required by the public trust doctrine will not likely inure to the State Water Board's argument in its application.

The second license condition under which the State Water Board may assert its continuing jurisdiction authorizes the State Water Board to modify "the quantity of water diverted" under the license where "such modification is necessary to meet water quality control objectives." (Cal. Code Regs., tit. 23, § 780(b).) This condition, unlike the one discussed above, does not authorize the State Water Board to insert new conditions into the license; the State Water Board may *only* modify the *amount diverted* under the license. Because the Tributary Flow Objective requires the Irrigation Districts to bypass water for fish and wildlife, the limited ability to curtail diversion to storage will not aid in the meeting of the Tributary Flow Objective. Furthermore, even if this curtailment could be considered "necessary" to accomplish the objectives, it would not have an effect on the Irrigation

Districts' ability to fully control reservoir operations. Thus, this license condition does not empower the State Water Board to control reservoir operations.

Therefore, the State Water Board may only control reservoir operations through modifying the conditions existing in some of the Irrigation Districts' licenses if it can justify the modification through its public trust authority. Even if such a modification could be justified, the action is not authorized under the license condition unless the State Water Board shows "that such specific requirements are physically and financially feasible and are appropriate to the particular situation." (*See* Cal. Code Regs., tit. 23, § 780(a).) Curtailing the ability to deliver water to irrigators is not financially feasible for the thousands of members of the Irrigation Districts who will lose their livelihood if they are unable to receive reservoir water. Furthermore, a condition requiring the Irrigation Districts to curtail their deliveries to their irrigators simply to reduce fluctuation of reservoir levels is not appropriate, as it would deprive thousands of irrigators of their livelihood and impact state and local economies. Therefore, the State Water Board does not have the authority to control reservoir operations.

2.3.3.5.4. The Board cannot impose a minimum reservoir storage requirement through a Section 401 certification because such a requirement does not ensure compliance with a water quality objective adopted by the Board

Section 401 of the CWA states, "[a]ny applicant for a Federal license or permit to conduct any activity . . . which may result in any discharge into the navigable waters shall provide the licensing or permitting agency *a certification* from the State in which the discharge originates." (33 USC 1341[a][1][emphasis supplied].) This certification is often referred to as a *Section 401 certification* and, in California, it is issued by the SWRCB. The United States Supreme Court has held that dams being operated to produce hydroelectricity require a federal license from FERC, and raise the potential for a discharge into navigable waters, thereby requiring state certification under CWA section 401. (*S.D. Warren Co. v. Me. Bd. of Envtl. Prot.*, (2006) 547 U.S. 370.)

A state's authority to impose conditions on a water user through a CWA 401 certification is "not unbounded" (*Pud No. 1 v. Wash. Dep't of Ecology* (1994) 511 U.S. 700, 712.) The state can only impose conditions that "ensure that the project complies with 'any applicable *effluent* *limitations* and *other limitations*, under [CWA § 301, 302]' or certain other provisions of the Act, 'and with any other appropriate requirement of State law." (*PUD No. 1, supra,* 511 U.S. at 712 [emphasis supplied], citing 33 U.S.C. § 1341[d]). "[S]tate water quality standards adopted pursuant to § 303 [of the CWA] are among the 'other limitations' with which a State may ensure compliance through the § 401 certification process." (*Pud No. 1, supra,* 511 U.S. at 712-713.) Thus, as relevant here, the SWRCB may only impose conditions through a CWA 401 certification if the conditions ensure compliance with water quality standards adopted pursuant to Section 303 of the CWA, or other requirements of State law.

Under the CWA, water quality standards "consist of a *designated use or uses* for the waters of the United States and *water quality criteria* for such waters based upon such uses." (40 C.F.R. § 131.3[i][emphasis supplied]; see 40 C.F.R. § 131.6.) The State Water Board treats the establishment of beneficial uses and water quality objectives as satisfying its obligation to adopt water quality standards (i.e., designated uses and water quality criteria) under the CWA. The POI, however, is not a component of a water quality standard (40 C.F.R. §§ 131.3[i], 131.6), and thus cannot be the basis for imposing a condition through a 401 certification. (33 U.S.C. § 1341[d]; *Pud No. 1 v. Wash. Dep't of Ecology, supra,* 511 U.S. at 712-713.) Since the carryover storage requirement is part of the POI, and not an objective itself, the Board cannot use its 401 authority under the CWA to assure compliance with *water quality standards* as a basis for imposing carryover storage requirements. Similarly, because the water quality control plan does not contain any temperature objectives, the Board cannot use its authority to assure compliance with *water quality standards* as a basis for imposing carryover storage requirements.

Furthermore, the Board has taken the position that CWA Section 303(c) is not intended to regulate pollution caused by reduction of flow. (SJTA Attachment 12.) Thus, to the extent the carryover storage requirements might be interpreted as a component of regulating flow, it is not a water quality standard under CWA § 303(c) with which the State can ensure compliance through a 401 certification.

Likewise, since the carryover storage targets are not objectives of the Water Quality Control Plan, they will not be requirements of state law with which the State can ensure compliance through the 401 certification.

2.3.3.5.5. The requirement of carryover storage is a taking that requires just compensation

The final clause of the Fifth Amendment to the United States Constitution provides that "private property" shall not be "taken for public use, without just compensation." (U.S. Const., 5th Amend.) This provision is applicable to the states through the Fourteenth Amendment. (*Chicago, B. & Q. Railrod Co. v. Chicago* (1897) 166 U.S. 266.) The law distinguishes between two types of takings: (1) a *physical* taking of an interest in property by the government, and (2) and a regulatory taking that affects an owner's *use* of his or her property. (see generally *Tahoe-Sierra Pres. Council v. Tahoe-Reg'l Planning Agency* (2002) 535 U.S. 302, 322-323.)

With respect to physical takings, the Supreme Court has held that "a permanent physical occupation authorized by government is a taking [per se] without regard to the public interests that it may serve." (*Loretto v. Teleprompter Manhattan Catv Corp.* (1982) 458 U.S. 419, 426 [holding that a state law which permitted a cable television provider to attach cables to apartment buildings constituted a regulatory taking which required just compensation].) In other words, "when the physical intrusion reaches the extreme form of a permanent physical occupation, a taking has occurred." (*Loretto, supra,* 45 U.S. at 426.) As for the second type of taking, i.e., a regulatory taking which affects the *use* of an owner's property, courts will make an "ad hoc, factual inquiry" to determine if a taking has occurred. (*Penn Cent. Transp. Co. v. New York City* (1978) 438 U.S. 104, 124.) All relevant facts are considered and balanced to determine if a taking has occurred, but there are several factors of particular importance, including (1) the economic impact of the regulation on the claimant, (2) the extent to which the regulation interferes with investment-backed expectations, (3) the character of the governmental action. (*Penn Cent., supra,* 438 U.S. at 124; *Tahoe-Sierra, supra,* 535 U.S. at 322.)

The proposal to impose carryover storage requirements constitutes a physical taking requiring just compensation. Moreover, even if a court were to determine that a carryover storage requirement did not constitute a physical taking, a balancing of the relevant factors would lead to the conclusion that a regulatory taking affecting use of property has occurred.

2.3.3.5.5.1. A taking of reservoir storage space

The California Supreme Court has held that the ability to store water in a reservoir is a property right, and that the right must be valued in a condemnation proceeding. (*Marin Water & Power Co. v. Railroad Com. of California* (1916) 171 Cal. 706, 715 [to the extent that the railroad commission held that the ability of "water storage" derived from the features of the land "was not a property right, it was in error"].) Because the ability to store water is a property right, the government cannot take that property for public use without providing just compensation. (U.S. Const., 5th Amend.) The United States Supreme Court has a long history of finding that the permanent flooding of private property by the government is a physical occupation of that property and thus a taking. For instance, in the case of *Pumpelly v Green Bay Co.* (1872) 13 Wall. 166, a dam was constructed across a river causing flooding on the plaintiff's land. The Supreme Court stated, "where real estate is actually invaded by superinduced addition of water, earth, sand, or other material, or by having any artificial structure placed on it, so as to effectually destroy or impair its usefulness, it is a taking" (*Pumpelly v. Green Bay Co.* 13 Wall. at 181.). In the more recent case of *Loretto*, the Supreme Court observed that in every one of its prior flooding cases "involving a permanent physical occupation . . . [a] taking has always been found" (*Loretto v. Teleprompter Manhattan Catv Corp.* (1982) 458 U.S. 419, 428, citing *United States v. Lynah* (1903) 188 U.S. 445, 468-470; *Bedford v. United States* (1904) 192 U.S. 217, 225; *United States v. Cress* (1917) 243 U.S. 316, 327-328; *Sanguinetti v. United States* (1924) 264 U.S. 146, 149; *United States v. Kansas City Life Ins. Co.* (1950) 339 U.S. 799, 809-810.) By contrast, where the flooding does not result in an actual entry onto an owner's land, but merely impedes access to the land temporarily, no taking will be found to occur. (*Northern Transportation Co. v. Chicago* (1879) 99 U.S. 635.) The distinction has been stated as follows: in order to be a taking, the flooding must "constitute an actual, permanent invasion of the land, amounting to an appropriation of, and not merely an injury to, the property." (*Sanguinetti v. United States* (1924) 264 U.S. 146, 149.)

The carryover storage requirements proposed in the WQCP would require SJTA members to hold a certain amount of water in their reservoirs at all times, thereby occupying physical space in the reservoirs. (SED, at Appx. F.1, p. F.1-36 – F.1-37.) Additionally, the Board will have effectively taken possession of the use of that water (i.e., the water right) because the districts will no longer be able to put it to beneficial use. By effectively taking possession of the water right, and by using that water right to occupy physical space in the districts' reservoirs, the Board will have committed a physical taking *per se* of the reservoir space requiring just compensation.

Moreover, even if a court were to find that a carryover storage requirement did not constitute a physical taking, a court would likely find a taking under the multifactor balancing test used for regulations that effect an owner's use of his or her property. In conducting the multifactor balancing test, courts examine "the economic impact of the regulation on the claimant and particularly, the extent to which the regulation has interfered with distinct investment-backed expectations," as well as "the character of the governmental action." (*Penn Cent., supra,* 438 U.S. at 124; *Tahoe-Sierra*, *supra*, 535 U.S. at 322.) The carryover storage requirement will cause substantial interference with distinct investment-backed expectations. Specifically, the regulation would interfere with the districts' expectations as to the amount of water they can capture in their reservoir and put to beneficial use. Each reservoir has a capacity limit, and that limit was chosen, in part, to accommodate the owners' needs and water rights; it was not chosen to accommodate a carryover storage requirement by the SWRCB. Adjusting the capacity limit of a reservoir in order maintain initial expectations regarding available storage would come at considerable financial expense. In short, there is a substantial investment-backed expectation that parties who own reservoirs will be able to use and operate those reservoirs within their dead pool and flood-control capacity limits, rather than within artificial limits created by the SWRCB.

2.3.3.5.5.2. A taking of water rights

A carryover storage requirement would reduce a party's water rights in two ways: (1) it would effectively raise the minimum pool level of a reservoir, and thus restrict a party's ability to capture water during a high-flow event if the presence of the carryover water caused a spill that would not have occurred in the absence of that water, and (2) it would prevent a party from withdrawing water from storage and putting it to beneficial use.

With respect to the first type of taking (i.e., raising the minimum pool and restricting the capture of water), the ruling from *Casitas Mun. Water Dist. v. United States* (2008) 543 F.3d 1276 (*Casitas III*) demonstrates that a carryover storage requirement would constitute a physical appropriation of a water right and a taking *per se.* In *Casitas III*, the Bureau of Reclamation admitted that its proposed operation of a fish ladder "did not merely require some water to remain in stream, but instead actively caused the physical diversion of water away from the Robles-Casitas-Canal – after the water had left the Ventura River and was in the Robles-Casitas-Canal – and towards the fish ladder, thus reducing Casitas's water supply." (*Casitas III*, 543 F.3d at 1291-1292.) The court in *Casitas III* concluded that "[t]he government requirement that Casitas build the fish ladder and divert water to it should be analyzed under the physical takings rubric." (*Id.* at 1296.) Similarly, if the SWRCB required a reservoir operator to divert and hold a certain amount of water in storage, and if the presence of that storage thereafter caused the reservoir to spill during a high-flow event in such a way that would not have occurred if "carryover" water was not present, then the carryover storage requirement will have caused a physical diversion away from the water right owner's reservoir, thus reducing its supply. This will result in repeated losses of water rights each time a spill occurs that would not have occurred if the carryover water had not been present.

With respect to the second type of taking (i.e., preventing a water right holder from withdrawing water from storage), a carryover storage requirement would cause water to be lost to the bottom of the reservoir and become permanently impounded by the Board in satisfaction of the minimum pool requirement. A carryover storage requirement would effectively transfer possession of the water at the bottom of the reservoir from the water right holder to the State, since the State would be making use of the water and preventing the reservoir owner from putting it to beneficial use, as would be the reservoir owner's right. This would result in a one-time loss of a water right. The recent case of *Klamath Irrigation v. U.S.*, 129 Fed.Cl. 722 (2016) provides ample support for this proposition that restricting the use of water will constitute a physical taking.

2.3.3.6. The State Water Board has limited authority to implement water quality objectives through FERC relicensing

The POI states that the Board will implement water quality objectives through FERC relicensing processes. (SED, at Appx. K, p. 28.) The 401 certification process allows the State Water Board to include water quality measures in the FERC license. However, 401 certification is not intended to be the mechanism through which water quality objectives are implemented. (*State Water Resources Control Board Cases supra,* 136 Cal.App.4th at 734 [stating water quality objectives are usually implemented by amending water right permits].) Further, there are serious limitations to the State Water Board's 401 certification powers.

The rules of water right priority require the State Water Board to undertake a water right proceeding before looking to FERC to satisfy water quality objectives. The State Water Board cannot require senior water rights holders to dedicate water to instream uses before junior water right holders simply because the senior right is tied to a project being relicensed under FERC. (*El Dorado Irr. Dist. v. State Water Resources Control Bd.* (2006) 142 Cal.App.4th 937, 963-964.) Therefore, regardless of the timing of relicensing, the State Board cannot use the FERC proceedings to require senior water right holders to contribute water to meet water quality objectives without first requiring all junior water right holders to cease diversions.

In addition, the 401 certification is limited to conditioning project-related impacts. (Water Code, § 13160 [authorizing the State Water Board to grant any certificate required by any federal agency when "there is a reasonable assurance that an **activity… will not reduce** water quality below applicable standards…" (emphasis added)]; *See also* Cal. Code Regs., tit. 23, § 3855[b][2][B].) Therefore, to the extent the State Water Board wishes to use the FERC proceedings to implement the Tributary Flow Objective, the State Board must first establish that the project undergoing relicensing is preventing the achievement of the Tributary Flow Objective. The State Water Board has not made this finding and the SED does not provide sufficient information upon which such a finding could be made.

2.3.3.7. The State Water Board cannot use the POI to protect flows past Vernalis because there is no objective past Vernalis

"Although the lowest downstream compliance location for the Lower San Joaquin River flow objectives is at Vernalis, the objectives are intended to protect Lower San Joaquin River fish in a larger area, including the Delta, where fish that migrate to or from the Lower San Joaquin River watershed depend on adequate flows from the Lower San Joaquin River …" (Appx. K, p. 28-29). This statement alone in the POI is not sufficient to protect fish and wildlife beneficial uses in the Delta. If the Board intends to protect beneficial uses in a larger area, including the Delta, then it must establish objectives to protect those beneficial uses. It cannot simply declare in the POI the intent of the objectives.

2.3.3.8. The State Water Board has no authority to establish the STM Working Group

The program of implementation states that the State Water Board "will establish" a Stanislaus, Tuolumne and Merced Working Group "to assist with the implementation, monitoring and effectiveness assessment of the February through June LSJR flow requirements." (SED, at Appx. K, p. 32.) The group is to be comprised of California Department of Fish and Wildlife ("DFW"), NMFS, USFWS,, and water users on the Stanislaus, Tuolumne and Merced Rivers, the latter of which would include OID, SSJID, MID, TID and CCSF. (SED, at Appx. K, p. 32.)

While the program of implementation states that the Board "will establish" this group, the Board cannot compel these agencies to join or participate in such a group. The Board has fairly wide authority in its "planning role to identify activities" of water users that may require correction in order to protect water quality. (*United States v. State Water Resources Control Bd.*, *supra*, 182 Cal.App.3d at 124.) However, the Board's "enforcement powers" are far narrower. (*Ibid.*) Apart from regulating water rights and waste discharges, the Board's authority "to implement water quality standards seems limited to *recommending* actions by other entities." (*Id.* At 124-125.) [emphasis in original], citing Water Code, § 13242[a].) Thus, although the Board can recommend that all of the agencies identified above participate in the STM Working Group, it cannot compel them to join or participate in such a group. Since the Board must adhere to its plan once approved

(Water Code, § 13247), it would be acting in excess of its authority if it adopted a plan stating that it "will establish" the STM Working Group.

2.3.3.9. The State Water Board cannot impose carryover storage requirements to manage temperature without a TMDL

If the State Water Board wishes to assert jurisdiction to control instream water temperatures, then it must do so through the Clean Water Act TMDL process. As explained above, this process is ongoing. No water temperature objectives have been set, nor have any maximum daily loads for the Stanislaus, Tuolumne, Merced or San Joaquin Rivers. . Until the TMDL is completed through the Central Valley Regional Water Quality Control Board, or until the State Water Board sets such quality objectives in its Basin Plan, there is no authority for the State Water Board to implement Carryover Storage and other requirements as a surrogate for addressing temperatures. Since the State Water Board cannot require carryover storage in this process as mitigation for its projects' impacts, the requirement that it will be done in the Program of Implemention as mitigation for the project must be deleted.

2.3.3.10. The proposed use of Biological Goals is unlawful

The program of implementation provides that the State Water Board "will seek recommendations on . . . biological goals from the STM Working Group, State Water Board staff, and other interested persons." (SED, at Appx. K, p. 33.) Within 180 days after the OAL approves the amendments to the WQCP, the Board will consider approval of the biological goals. (SED, at Appx. K, p. 33.) These biological goals "will be used to inform the adaptive methods" that are part of the program of implementation. (SED, at Appx. K, p. 33.)

As set forth above, adaptive methods (b) and (c) allow for modifications to the approved objectives. For the various reasons already stated, such changes are unlawful. Moreover, to the extent that the biological goals will be used to inform the changes, their creation is improper. By statute, the Board must consider a multitude of factors before establishing or changing objectives. (Water Code, § 13241.) The biological goals are not one of the factors to be considered in setting objectives, and therefore any consideration of the biological goals when modifying the objectives as part of the POI is improper. Moreover, even if the biological goals could be characterized as constituting one or more of the statutory factors to be considered when setting water quality objectives under Water Code section 13241, the POI does not call for the establishment of the biological goals until *after* the Board and OAL approve the WQCP. In that sense, the biological goals are an improper post-hoc consideration in the process of establishing objectives to ensure the "reasonable" protection of beneficial uses. (Water Code, § 13241.)

This biological goals are a clear example that the WQCP is not a plan, but rather an outline for creating a plan sometime in the future.

2.3.3.11. The Program of Implementation does not include a sufficient time schedule for implementation

A program of implementation must include "[a] time schedule for the actions to be taken." (Water Code, § 13242[b].) The POI states, in relevant part, "[b]y 2022, the State Water Board will fully implement the February through June LSJR flow objectives through water right actions or water quality actions, such as FERC hydropower licensing processes." (SED, at Appx. K, p. 28.) The POI expands slightly on this 2022 deadline by stating that the "February through June LSJR flow objective may be phased in over time, but must be fully implemented by 2022." (SED, at Appx. K, p. 28, fn. 8.)

A single deadline for the implementation of all objectives is not a "time schedule for the actions to be taken." (Water Code, § 13242[b].) The deadline does not create a path or schedule for all of the actions that will be necessary to achieve the objectives. Apart from the final deadline, there is no time schedule for creating or implementing carryover storage targets, nor for "funding and development of water conservation efforts and regional water supply reliability projects and regulation of public drinking water systems and water rights," nor for requiring 40% unimpaired flow on the three eastside tributaries, nor for requiring 1,000 cfs at Vernalis, nor for adaptively adjusting the objectives, nor for creating the STM Working Group. (SED, at Appx. K, p. 28-34.) The failure to include a time schedule for any of these actions is a violation of Water Code section 13242[b].

2.3.3.12. The Program of Implementation fails to include a description of the surveillance to be undertaken to determine compliance with the unimpaired flow objectives

The program of implementation must include, among other things, a "description of surveillance to be undertaken to determine compliance with objectives." (Water Code, § 13242[c].) Under the subheading "Unimpaired Flow Compliance," the program of implementation states, "[i]mplementation of the unimpaired flow requirement for February through June will require the development of information and specific measures to achieve the flow objectives and to monitor and evaluate compliance." (SED, at Appx. K, p. 33.) The plan further states that the "STM Working Group, or State Water Board staff as necessary, will, in consultation with the Delta Science Program, develop and recommend such proposed measures" to the Board for consideration and approval within 180 days of OAL's approval of the amendments to the Bay-Delta Plan. (SED, at Appx. K, p. 33.) This proposal is substantively inadequate and procedurally improper.

First, the program of implementation fails to include the requisite "description of the surveillance to be undertaken to determine compliance" with the unimpaired flow objective. (Water Code, § 13242.) Instead, it asserts that compliance measures have not been established and will require further development. Second, the Water Code requires that the compliance measures be included in the water quality control plan *before* it is adopted by the Board and sent to OAL for approval, not after. Specifically, the WQCP must include a program of implementation (Water Code, § 13050[j]), and the program of implementation must include a description of the compliance measures. (Water Code, § 13242[c].) The Board may only adopt a water quality control plan that complies with these provisions. (Water Code, § 13170.) Accordingly, delaying consideration of the compliance measures until after the plan amendments are approved by the Board and OAL is procedurally improper.

2.3.3.13. The Program of Implementation includes a San Joaquin River Monitoring and Evaluation Program ("SJRMEP") which is not sufficient to satisfy the monitoring requirement

The program of implementation contains a heading entitled, "San Joaquin River Monitoring and Evaluation Program." (SED, at Appx. K, p. 35.) However, the POI does not describe how or when this program will be created, nor does it indicate who will be responsible for running it or participating in it. Furthermore, the program fails to include a description of the specific surveillance that will be "undertaken to determine compliance with the objectives." (Water Code, § 13242[c].) Instead, it merely states that "monitoring, special studies and evaluations" will occur to determine whether compliance with the Narrative Objective is being achieved. (SED, at Appx. K, p. 35.) This statement is nothing more than an assertion that surveillance will be undertaken to determine compliance with the objective; it is not a description of the specific surveillance that will occur, which is the requirement of Water Code section 13242[c].

In addition, the SJRMEP contains annual and comprehensive reporting requirements. (SED, at Appx. K, p. 36.) The POI states that "parties are encouraged to work collaboratively in one or more groups and in consultation with the STM Working Group, USBR and DWR, in meeting" these reporting requirements. (SED, at Appx. K, p. 36.) However, the POI does not actually assign responsibility to any particular party for satisfying these reporting requirements. In addition, the annual and comprehensive reports are to review "progress toward meeting the biological goals. . .." (SED, at Appx. K, p. 36.) These reports will be insufficient. Water Code section 13242[c] requires a description of the surveillance that will be undertaken to determine compliance with the *objectives*, not with biological goals.

Finally, the POI states that the comprehensive reports will recommend "changes to the implementation of the flow objectives." (SED, at Appx. K, p. 36.) To the extent that these recommendations would allow for changes to the objectives without a hearing to amend the water quality control plan, the recommendations would be improper.

2.3.3.14. The Procedure for Implementation of Adaptive Methods is unnecessary and confuses the purpose of the Program of Implementation

The program of implementation includes a "Procedure for Implementation of Adaptive Methods." (SED, at Appx. K, p. 34.) The section states that the Board will consider and approve a set of procedures for allowing the "adaptive adjustments" to the LSJR flow objectives within one year of OAL's approval of the WQCP. These procedures are to be developed by either the STM

Working Group, or State Water Board staff if necessary. The inclusion of this section is unnecessary and improper.

The "adaptive adjustments" are part of the program of implementation. (SED, at Appx. K, p. 26-31.) Under Water Code section 13242, the program of implementation must describe the procedure for implementing the objectives; it should not require its own program of implementation. The inclusion of this section appears to be an outgrowth of Staff's decision to create a program of implementation that improperly allows for changes to the objectives after the WQCP is approved. The notion that the Board can set up a new procedure for making changes to the objectives as part of a program of implementation demonstrates a misunderstanding of the current process. The purpose of the current proceeding is to amend the water quality control plan. Once the Board approves the amendments, it must follow the procedure established by the legislature if it desires to change those objectives again, i.e., a properly noticed and conducted hearing. (Water Code, § 13244.) The Board cannot create a new set of procedures for revising objectives in a water quality control plan under the guise of implementing a component of a program of implementation.

2.3.3.15. The Program of Implementation unlawfully delegates authority to the Executive Director

The WQCP unlawfully delegates several duties to the Executive Director. Pursuant to Resolution No. 2012-0061, the State Water Board has delegated specific authorities to the Executive Director. Resolution No. 2012-0061 delegates the authority to: notice Board meetings and hearings, manage State Water Board staff, meet with other agency officials, implement the State Water Board's policies and regulations, meet with Regional Water Quality Control Board Executive Officers, and approve Clean Water Act section 205 final products. (Resolution No. 2012-0061, at 1.) However, the resolution does not authorize the Executive Director to set policy or change regulations; those authorities are reserved for the State Water Board. (*Id.*) The Executive Director is specifically prohibited from "adopting or approving water quality control plans or plan amendments." (Resolution No. 2012-0061, at 3.3.) This is consistent with Water Code section 13245, which provides that only the State Water Board may approve water quality control plans.

The POI improperly seeks to delegate several duties to the Executive Direction in violation of Resolution 2012-0061 and Water Code section 13240 et seq. First, the POI states that the Executive Direct may approve changes to the compliance locations that are set forth in Table 3. (SED, at Appx K, p. 29.) The compliance locations are part of the objectives, and thus cannot be modified by the Executive Director, nor can they be changed without a new hearing. (Water Code, § 13244.)

Second, the POI states that the Executive Director may approve "[a]daptive adjustments to the flow requirements." (SED, at Appx. K, p. 30.) As explained above, adaptive adjustments *b* and *c* allow for changes to the objectives themselves. Since the objectives are part of the water quality control plan, they can only be amended by the State Water Board; the authority to make such amendments has not been - and cannot be - delegated to the Executive Director. (Water Code, § 13240 et seq.; Resolution 2012-0061.)

Third, the POI states that "[i]mplementation of the unimpaired flow requirement for February through June will require the development of information and specific measures to achieve the flow objectives and to monitor and evaluate compliance." (SED, at Appx. K, p. 33.) The STM Working Group is granted the authority to develop and recommend these measures, and the Executive Director is granted the authority to approve the measures within 180 days of OAL's approval of the amendments to the WQCP. (SED, at Appx. K, p. 33.) This procedure is improper. Two of the required components of the POI are (1) a description of the actions necessary to achieve the objectives, and (2) a description of the surveillance to be undertaken to determine compliance. (Water Code, § 13242.) The State Water Board is supposed to review those descriptions and approve them as part of the water quality control plan – before OAL approves plan. (Water Code, § 13245.) The Board cannot delegate these tasks to the STM Working Group, nor can it delegate to the Executive Director the responsibility of approving components of the POI, especially after the WQCP is approved by OAL. These components of the WQCP should be approved by the Board, not approved by the Executive Director after the adoption of the plan.

Fourth, the POI states that the STM Working Group, or Board staff if necessary, will develop a set of procedures for allowing adaptive adjustments to the February through June flow objectives. For the various reasons stated above, it is improper to create a new set of procedures for revising objectives in a WQCP under the guise of implementing a component of a program of implementation. To the extent that the POI purports to grant the Executive Director the authority to approve these procedures, such grant of authority is also improper.

Fifth, the POI grants the Executive Director the authority to approve annual adaptive operations plans. (SED, at Appx. K, p. 34.) To the extent that the annual operations plans will allow for changes to the objectives, it is improper for the Executive Director to approve those changes, as any modifications to the WQCP must be approved by the State Water Board. (Water Code, § 13240 et. seq.)

2.3.3.16. The Proposal for Annual Adaptive Operations Plans is not Enforceable

The Annual Adaptive Operations Plan proposal is not enforceable. Only the STM Working Group, or members thereof, are required to submit proposed annual plans for adaptive implementation actions. (SED, at Appx. K, p. 34.) However, the State Water Board cannot compel participation in the STM Working Group, and can only recommend participation. (Water Code, § 13242[a]; *United States v. State Water Resources Control Bd.*, *supra*, 182 Cal.App.3d at 124-125). Accordingly, there may not be any participating entities required to submit annual plans. The entire proposal is not enforceable.

2.3.3.17. The Program of Implementation does not identify a responsible party for completing the required annual and comprehensive reports

The program of implementation includes an "[a]nnual reporting" requirement. (SED, at Appx. K, p. 36.) It states, in part, "[t]o inform the next year's operations and other activities, the State Water Board will require the preparation and submittal of an annual report to the State Water Board by December 31 of each year." (SED, at Appx. K, p. 36.) However, the WQCP does not identify who is responsible for preparing this report. There is a list of agencies that are supposed to work together to meet this reporting requirement, but the plan does not place responsibility on any particular party. (SED, at Appx. K, p. 36.) This deficiency should be corrected.

In addition to the annual reporting requirement, the POI requires a comprehensive report every three to five years. (SED, at Appx. K, p. 36.) Again, the WQCP does not identify who is responsible for preparing this report. This deficiency should be corrected.

The comprehensive report is intended to review any progress made toward meeting the "biological goals" and to identify recommended "changes to the implementation of the flow objectives." (SED, at Appx. K, p. 36.) This reporting requirement does not satisfy the compliance monitoring requirement of Water Code section 13242. The program of implementation must describe the "surveillance to be undertaken to determine compliance with *objectives*." (Water Code, § 13242[c][emphasis supplied].) As written, the comprehensive report will not inform the Board of compliance with the objectives, but rather of compliance with the "biological goals," which are not objectives. Moreover, although the report will recommend changes to the "implementation of the flow objectives," it must be noted that neither the objectives, nor the program of implementation, can be changed by the Board without a properly noticed hearing under Water Code section 13244. Thus, to the extent that the purpose of the comprehensive report is "to inform potential adaptive changes to the implementation of the flow objectives" without revising the Bay-Delta Plan (SED, at Appx. K, p. 36), no such changes can be made. (Water Code, § 13244.)

2.3.3.18. The POI does not call for implementation of all the operational criteria included in the project that was modeled in the SED

There are several modeling assumptions included in the SED that are not included in the objectives or the program of implementation. If Board Staff intends for these assumptions to be the water quality control plan, then they should be included as objectives so that the Board can determine whether the protection afforded to beneficial uses as a result of these components is reasonable in light of their impact on other beneficial uses. (Water Code, § 13241.) The components include: (1) minimum diversions, (2) minimum carryover storage requirements, (3) maximum storage draw, (4) shifting of flows outside the February to June period to the fall, and (5) reservoir refill criteria. (SED, at Appx. F1, p. F.1-36 – F.1-38.) Only two of these components are mentioned in the water quality control plan: carryover storage and flow shifting. Both of these components are referenced solely in the program of implementation; they are not included as objectives.

Furthermore, the POI does not identify a quantity of water for carryover storage or flow shifting. Without a specific quantity, the reference is hollow and meaningless. If the modeling assumptions are intended to be part of the water quality control plan, then they must be included as objectives, and the program of implementation must include a description of the actions that are necessary to achieve them.

In addition, the model assumes that the proposed percentages of unimpaired flow are an "additional requirement" to the baseline flow requirements on each tributary. (SED, at Appx. F.1-13.) As a result, the model assumes that flows will be "the greater of either the baseline flow requirements [i.e., FERC and/or ESA requirements], or the unimpaired flow requirement." (SED, at Appx. F.1-13.) This assumption is problematic because the State Water Board has no jurisdiction over these baseline flow requirements, and those requirements could change. For instance, USBR has reinitiated consultation under Section 7 of the ESA on the Long-Term Operation of the CVP, (SJTA Attachment 13), and thus the flow requirements currently set forth in Appx. 2e of the 2009 NMFS BO could change. (*Consol. Salmonid Cases v. Locke* (2011) 791 F.Supp.2d 802, 940 ["If . . . Reclamation's predictions prove incorrect and make the RPAs' implementation infeasible . . . Reclamation must then re-initiate consultation"].) If the baseline flows are intended to be a part of the project, then they must be included as objectives, and there must be a plan of implementation to achieve them.

2.3.3.19. The Program of Implementation fails to explain how the objectives will be implemented without contravening the Sustainable Groundwater Management Act ("SGMA")

The program of implementation must describe the actions that are necessary to achieve the objectives. (Water Code, § 13242.) The SED acknowledges that the unimpaired flow objectives will cause significant and unavoidable impacts to groundwater resources. However, the POI fails to describe how the unimpaired flow requirements will be implemented without contravening the SGMA. The failure to address this issue renders the POI unworkable and unviable.

2.3.3.20. The Program of Implementation fails to adequately explain the emergency relief component

The POI contains a "State of Emergency" section which allows the Board to authorize a "temporary change in the implementation of the LSJR flow objectives in a water right proceeding" under certain conditions. This procedure for emergency relief is inadequate. The plan proposes that some of the objectives be implemented through a certification process under Section 401 of the Clean Water Act. "The limitations included in the certification become a condition on any federal license." (*PUD No. 1 v. Wash. Dep't of Ecology, supra*, 511 U.S. 700, 708.) Thus, if the objectives are implemented in this fashion, the Board will not be able to relax the requirements through a water right proceeding. Additional emergency measures need to be included in the plan.

2.3.3.21. The Program of Implementation does not address implementation of any recommended non-flow measures

The POI contains a list of recommended non-flow actions, including restoration of floodplain habitat, reducing unwanted vegetation, providing coarse sediment for salmonid spawning, and reducing predation and invasive species. (SED, at Appx. K, p. 59-63.) Presumably, these actions are intended to achieve the Narrative Objective because they have no relation to achievement of the flow-related objectives. However, the POI does not include a time schedule for any of these actions, nor a method of surveillance to ensure that these actions assist with compliance with the objectives, as required by (Water Code, § 13242.) Moreover, the State Water Board has an "obligation to implement its own water quality control plan." (*State Water Resources Control Bd. Cases, supra*, 136 Cal.App.4th at 734.) If the Board chooses a method of implementation that is shown to be incapable of meeting the objectives, then that aspect of the program of implementation will be deemed "illusory" and in violation of the Board's obligation to implement its own plan. (*Ibid.* [if it had been shown that DWR and USBR were incapable of meeting the salinity objectives in the water quality control plan, then the Board's allocation of that responsibility to DWR and USBR in D-1641 would have been "illusory" and a violation of the Board's obligation to implement its own plan].)

The 2006 Bay Delta Plan did not include a time schedule or surveillance methods for the non-flow implementation measures. As a result, these measures were never implemented. (SWRCB, 2006 Bay Delta Plan, at 35-41.) The State Water Board is required to fully implement its water quality control plan. (*State Water Resources Control Bd. Cases,* (2006) 136 Cal.App.4th 674, 733.) The State Water Board cannot fully implement its plan if it does not even attempt to require compliance with its recommended actions. Although the State Water Board may not force other agencies or entities to comply with its recommendations, it has tools available to incentivize compliance. For instance, the State Water Board could use flow requirements as leverage by refusing to implement the Tributary Flow Objective until non-flow actions were taken. Conversely, the Tributary Flow Objective could expire upon a date certain if particular non-flow actions are not taken. The State Water Board could enter into an agreement or memorandum of understanding with agencies tasked with non-flow measures which set forth deadlines and reporting requirements. In addition, the State Water Board could modify appropriative permits held by these agencies or entities if they failed to implement the non-flow actions. Because the State Water Board has not included any of these actions in the program of implementation it is deficient. The State Water Board has failed to do anything for the last twenty years regarding its recommendations to other agencies. As is pointed out elsewhere in these comments, until other actions are taken, the narrative objectives cannot be met.

2.3.3.22. Components of the Program of Implementation are unclear and require further clarification before adoption

The following sentence also makes no sense given the objectives proposed by the State Water Board:

"The required percentage of unimpaired flow is in addition to flows in the Lower San Joaquin River from sources other than the Lower San Joaquin River tributaries." (SED, Appx. K, p. 29.)

This sentence makes no sense as there is no flow objective for the Lower San Joaquin River for percentage of flow, only minimum flow. If minimum flows are being met at Vernalis by flows other than flows from the tributaries, then do the tributaries have to release water? If so, what would it be? As to the percentage of UIF flow objective, this makes no sense.

2.3.3.23. Summary of POI

For the various reasons set forth above, the POI is unlawful and should not be adopted by the Board.

3. WASTE AND UNREASONABLE USE

3.1. The Proposed Objectives are Unlawful Because they are a Waste and Unreasonable Use of Water in Violation of Article X, Section 2 of the California Constitution

Article X, section 2 of the California Constitution prohibits the "waste or unreasonable use or unreasonable method of use of water." (Cal. Const., art. X, § 2.) This constitutional mandate knows no exceptions and applies to "the use of all water, under whatever right the use may be enjoyed." (*Peabody v. Vallejo*, 2 Cal.2d 351, 367.) Accordingly, the rule must be followed by water users, the State Water Board and the courts of this State. Specifically, a water user is limited to taking "only such amount [of water] as he [or she] reasonably needs for beneficial purposes." (*Pasadena v. Alhambra* (1949) 33 Cal.2d 908, 925; see also *City of Barstow v. Mojave Water Agency* (2000) 23 Cal.4th 1224, 1241). The State Water Board is statutorily bound to "to prevent waste, unreasonable use, unreasonable method of use, or unreasonable method of diversion of water," and is thus prohibited from requiring water to be used unreasonably. (Water Code, § 275; see *State Water Resources Control Bd. Cases, supra*, 136 Cal.App.4th at 761-762 [analyzing whether the State Water Board's order to use water from New Melones reservoir to dilute salinity at Vernalis and meet the requirements of D-1641 amounts to an unreasonable use of water]; see also *Baldwin v. County of Tehama* (1994) 31 Cal.App.4th 166, 183.) Likewise, the courts of this State are precluded from imposing any physical solution or injunction "if its effect will be to waste water that can be used." (*Rancho Santa Margarita v. Vail* (1938) 11 Cal.2d 501, 558-559.) The purpose of this constitutional provision is "to make it possible to marshal the water resources of the state and make them available for the constantly increasing needs of all of its people." (*Meridian, Ltd. v. San Francisco* (1939) 13 Cal.2d 424, 449.)

The measure of what constitutes a "reasonable use" is a question of fact, to be determined according to the circumstances of each particular case. (*Environmental Defense Fund, Inc. v. East Bay Mun. Utility Dist.* (1980) 26 Cal.3d 183, 194, citing *Joslin v. Marin Municipal Water Dist.* (1967) 67 Cal.2d 132, 139-140; see *Jordan v. City of Santa Barbara* (1996) 46 Cal.App.4th 1245, 1268.) A reasonable beneficial use in areas where water is in excess may not be a reasonable beneficial use "in an area of great scarcity and great need." (*Tulare Irrigation Dist. v. Lindsay-Strathmore Irrigation Dist.* (1935) 3 Cal.2d 489, 567.) Similarly, "[w]hat is a beneficial use at one time may, because of changed conditions, become a waste of water at a later time." (*Tulare Irrigation Dist. supra,* 3 Cal.2d at 567.) The circumstances that must be considered when evaluating whether a use is reasonable include: (1) the quantity of water needed for the beneficial use served (*Lodi v. East Bay Municipal Dist.* (1936) 7 Cal.2d 316, 339-340 [releasing a large quantity of water to force a small quantity of water into the surrounding underground water table is a waste]; *City of Barstow v. Mojave Water Agency* (2000) 23 Cal.4th 1224, 1241); (2) a comparison of other potential uses (*Imperial Irrigation Dist. v. State Wat. Resources Control Bd.* (1990) 225 Cal.App.3d 548, 570-571 [the mere fact "that a diversion of water may be for a purpose 'beneficial' in some respect . . . does not make such use 'reasonable' when compared with demands, or even future demands, for more important uses"]); and (3) local environmental conditions (*Tulare Irr. Dist. v. Lindsay-Strathmore Irr. Dist.* (1935) 3 Cal.2d 489, 567), among others.

In analyzing whether the proposed objectives in the WQCP comport with Article X, section 2 of the Constitution, the first step requires an identification of the beneficial uses to be protected by the proposed objectives, and the quantity of water being required by the proposed objectives to protect those beneficial uses. Once the quantity of water required to protect each beneficial use is identified, the analysis shifts to whether using that quantity of water to protect that beneficial use is a reasonable use of that water under the circumstances. For the reasons stated below, the proposed objectives violate Article X, section 2 of the Constitution because they require waste and unreasonable use of water.

3.1.1. Beneficial Uses to be Served by the Proposed Objectives

As relevant here, the WQCP states that the objectives in Table 3 "provide reasonable protection of fish and wildlife beneficial uses in the Bay-Delta Estuary including EST [estuarine habitat], COLD [cold freshwater habitat], WARM [warm freshwater habitat], MIGR [migration of aquatic organisms], SPWN [spawning, reproduction, and/or early development], WILD [wildlife habitat], and RARE [rare, threatened or endangered species]." (SED, Appx. K, at 13.) The WQCP states that parameters such as dissolved oxygen, temperature and toxic chemical all have threshold levels "beyond which adverse impacts to the beneficial uses occur." (SED, at Appx. K, p. 13.) However, the flow objectives have "no defined threshold conditions that [can] be used to set objectives" and therefore are "based on a subjective determination of the reasonable needs of all the consumptive and nonconsumptive demands on the waters of the Estuary." (SED, at Appx. K, p. 13.)

In sum, the WQCP states that the Narrative Flow Objective, the Tributary Flow Objective, and the Vernalis Flow Objective, all of which are contained in Table 3, protect the seven aforementioned beneficial uses.

3.1.2. Quantity of Water Needed for the Beneficial Use Served

The proposed amendments to the WQCP for the Lower San Joaquin River include a new Narrative Objective, the Tributary Flow Objectives and the Vernalis Flow Objective. (SED, at Appx. K, p. 18.) The Tributary Flow Objective and the Vernalis Flow Objective are quantitative in nature, with the former requiring 30% to 50% unimpaired flow from each of the Stanislaus, Tuolumne and Merced Rivers from February through June based on a minimum 7-day running average, and the latter requiring a minimum flow of 800 to 1,200 cfs at Vernalis from February through June. (SED, at Appx. K, p. 18.) The WQCP states that the Tributary Flow Objectives will be adaptively adjusted to in order to implement the Narrative Objective (SED, at Appx K, p. 30.) The quantity of water needed to satisfy each of these objectives is addressed in turn below.

3.1.2.1. Quantity needed to satisfy the Narrative Objective

The Narrative Objective states,

> "Maintain inflow conditions from the San Joaquin River watershed to the Delta at Vernalis sufficient to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta. Inflow conditions that reasonably contribute toward maintaining viable native migratory San Joaquin River fish populations include, but may not be limited to, flows that more closely mimic the natural hydrographic conditions to which native fish species are adapted, including the relative magnitude, duration, timing, and spatial extent of flows as they would naturally occur. Indicators of viability include population abundance, spatial extent, distribution, structure, genetic and life history diversity, and productivity."

(SED, at Appx. K, p. 18.)

If the Narrative Objective is to be achieved only through the adaptive implementation of the Tributary Flow Objective and the Vernalis Flow Objective (SED, at 11-38 – 11-39), then the quantity of water needed to satisfy the Narrative Objective can only be determined through an examination of the two flow objectives.

3.1.2.2. Quantity needed to satisfy the Tributary Flow Objective

The Tributary Flow Objective requires 30% to 50% unimpaired flow from each of the Stanislaus, Tuolumne and Merced Rivers to be maintained from February through June, based on a minimum 7-day running average. (SED, at Appx. K, p. 18.) A plain reading of this objective requires nothing more than the maintenance of at least 30% unimpaired flow on each of the rivers, based on a minimum 7-day running average, provided that the unimpaired flow never exceeds 50% percent. However, the program of implementation in the WQCP indicates that the Tributary Flow Objective will be implemented by requiring a minimum of 40% unimpaired from each of the Stanislaus, Tuolumne and Merced Rivers, based on a minimum 7-day running average. (SED, at Appx. K, p. 29.)

In spite of the quantitative nature of this objective, the SED does not focus on the volume of water necessary to meet it, but instead on the difference between the flows currently required in each of the three tributaries and the flows that would be required if the proposed objectives were satisfied. Specifically, the SED states that the long-term mean annual *reduction* in surface water supplies under a 40% unimpaired flow requirement would be 293,000 acre feet. (SED, at ES-21.) While the *reduction* in surface supply is the focus of the SED, a thorough examination of the document reveals the total quantity of water necessary to meet the Tributary Flow Objective, assuming that the analysis in the SED is correct. The following tables shed light on the total amount of water needed to satisfy the Tributary Flow Objective at 40% unimpaired flow from February to June.

Merced River	Sum of Unimpaired Flow from Feb. - June[41]	40% of Sum of UIF from Feb. - June
Minimum	94,556	37,822
10	284,014	113,606
20	359,596	143,838
30	467,768	187,107
40	562,150	224,860
50	670,780	268,312
60	763,960	305,584
70	892,006	356,802
80	1,081,452	432,581
90	1,318,660	527,464
Maximum	2,389,214	955,686

SJTA Table 3-1: Merced River cumulative distribution of unimpaired flows and 40% unimpaired flow

[41] The sum of unimpaired flow for February through June is derived from Table 5-8a, showing monthly cumulative distributions of Merced River unimpaired flow at Stevinson in cfs for 1922-2003. The flow rate identified for each month in cfs was converted to acre feet/day using a conversion rate of 1 cfs = 2 acre/feet day, which is the same conversion rate used in Appendix F1 (SED, at F.1-143.) The acre feet/day amount was then multiplied by the number of days in each month to determine the volume of water for each month. The volumes for each month were then added together to arrive at the total volume of water for February through June at each exceedance level.

While the above table shows the cumulative *distribution* of flows, the estimated *median* unimpaired flow from February to June on the Merced River is 969 cfs in February, 1,303 cfs in March, 2,391 cfs in April, 3,955 cfs in May, and 2,451 cfs in June. (SED, at 5-19.) In terms of volume, the median amount would be 54,264 acre feet in February (969 cfs * 2 = 1,938 af/day * 28 days), 80,786 acre feet in March (1,303 cfs * 2 = 2,606 af/day * 31 days), 143,460 acre feet in April (2,391 cfs * 2 = 4,782 af/day * 30 days), 245,210 acre feet in May (3,955 cfs * 2 = 7,910 af/day * 31 days), and 147,060 acre feet in June (2,451 cfs * 2 = 4,902 af/day * 30 days), for a total median volume of 670,780 acre feet for February through June. At an unimpaired flow rate of 40%, the required median amount of water would be 268,312 acre feet.

Tuolumne River	Sum of Unimpaired Flow from Feb. – June[42]	40% of UIF from Feb. - June
Minimum	234,878	93,951
10	594,694	237,878
20	793,418	317,367
30	991,142	396,457
40	1,152,664	461,066
50	1,339,878	535,951
60	1,517,058	606,823
70	1,689,750	675,900
80	1,947,940	779,176
90	2,296,642	918,657
Maximum	3,842,384	1,536,954

SJTA Table 3-2: Tuolumne River cumulative distribution of unimpaired flows and 40% unimpaired flow

[42] The sum of unimpaired flow for February through June is derived from Table 5-9a, showing monthly cumulative distributions of Tuolumne River unimpaired flow in cfs for 1922-2003. The same methodology was used for Tuolumne as was used for the Merced.

The estimated *median* unimpaired flow from February to June on the Tuolumne River is 2,085 cfs in February, 2,566 cfs in March, 4,498 cfs in April, 7,343 cfs in May, and 5,648 in June. (SED, 5-23.) In terms of volume, the median amount would be 116,760 acre feet in February (2,085 cfs * 2 = 4,170 af/day * 28 days), 159,092 acre feet in March (2,566 cfs * 2 = 5,132 af/day * 31 days), 440,580 acre feet in April (7,343 cfs * 2 = 14,686 af/day * 30 days), 455,266 acre feet in May (7,343 cfs * 2 = 14,686 af/day * 31 days), and 338,880 acre feet in June (5,648 cfs * 2 = 11,296 af/day * 30 days), for a total median volume of 1,510,578 acre feet for February through June. At an unimpaired flow rate of 40%, the required median amount of water would be 604,231 acre feet.

Stanislaus River	Sum of Unimpaired Flow from Feb. – June[43]	40% of UIF from Feb. - June
Minimum	106,302	42,521
10	316,710	126,684
20	451,714	180,686
30	561,468	224,587
40	687,036	274,814
50	824,678	329,871
60	950,562	380,225
70	1,058,694	423,478
80	1,195,410	478,164
90	1,482,742	593,097
Maximum	2,609,734	1,043,894

SJTA Table 3-3: Stanislaus River cumulative distribution of unimpaired flows and 40% unimpaired flow

[43] The sum of unimpaired flow for February through June is derived from Table 5-10a, showing monthly cumulative distributions of Stanislaus River unimpaired flow in cfs for 1922-2003. The same methodology was used for Stanislaus as was used for the Merced and Tuolumne.

The estimated *median* unimpaired flow from February to June on the Stanislaus is 1,251 cfs in February, 1,704 cfs in March, 3,247 cfs in April, 4,657 cfs in May, and 2,757 cfs in June. (SED, at 5-26.) In terms of volume, the median amount would be 70,056 acre feet in February (1,251 cfs * 2 = 2,502 af/day * 28 days), 105,648 acre feet in March (1,704 cfs * 2 = 3,408 af/day * 31 days), 288,734 acre feet in May (4,657 cfs * 2 = 9,314 af/day * 31 days), and 165,420 acre feet in June (2,757 cfs * 2 = 5,514 af/day * 30 days), for a total median volume of 629,858 acre feet. At an unimpaired flow rate of 40%, the required median amount of water would be 251,943 acre feet

The total quantity needed to meet the proposed Tributary Flow Objective is as follows:

Three Tributaries	Total[44]
Minimum	174,294
10	478,167
20	641,891
30	808,151
40	960,740
50	1,134,134
60	1,292,632
70	1,456,180
80	1,689,921
90	2,039,218
Maximum	3,536,533

SJTA Table 3-4: Cumulative distribution of unimpaired flows for all three tributaries combined and 40% unimpaired flow

[44] The total for each exceedance level is computed by adding the total amount required from each tributary under 40% unimpaired flow for that particular exceedance level.

The **total *median* amount** required from all the tributaries under a 40% unimpaired flow regime would **be 1,124,486 acre feet** (268,312 af [Merced], 604,231 af [Tuolumne], and 251,943 af [Stanislaus]).

3.1.2.3. Quantity needed to satisfy the Vernalis Flow Objective

Notwithstanding the Tributary Flow Objective, the Vernalis Flow Objective requires "a minimum base flow value between 800 – 1,200 cfs, at Vernalis . . . at all times during February through June." (SED, at Appx. K, p. 18.) The program of implementation states the Vernalis Flow Objective will be implemented by requiring a "base flow of 1,000 cfs, based on a minimum 7-day running average, at Vernalis at all times." (SED, at Appx. K, p. 29.) The program of implementation also states that "[w]hen the percentage of unimpaired flow requirements is insufficient to meet the minimum base flow requirement, the Stanislaus River shall provide 29 percent, the Tuolumne River 47 percent and the Merced River 24 percent of the additional total outflow needed to achieve and maintain the required base flow at Vernalis." (SED, at Appx. K, p. 29.)

There are 150 days from February 1 to June 30, except during a leap year when there are 151 days. Using a conversion rate of 1 cfs equals 2 acre-feet/day, the quantity of water needed to meet the 1,000 cfs requirement is at least 300,000 acre feet (2,000 acre feet/day * 150 days = 300,000 acre feet). This number underestimates the amount of water necessary because it assumes no seepage or other losses between the release points on the Stanislaus, Tuolumne and Merced Rivers and the compliance point at Vernalis.

3.1.2.4. Quantity needed to satisfy the October pulse flow objective

The objectives also contain a requirement that a flow rate of 1,000 cfs be maintained at Vernalis in the month of October in all water years. (SED, at Appx. K, p. 18.) Using a conversion rate of 1 cfs equals 2 acre-feet/day, the quantity of water needed to meet the 1,000 cfs requirement is at least 62,000 acre feet (2,000 acre feet/day * 31 days = 62,000 acre feet). Again, this number likely underestimates the amount of water necessary because it assumes no seepage or other losses between the release points on the Stanislaus, Tuolumne and Merced Rivers and the compliance point at Vernalis.

3.1.2.5. Total Quantity needed to satisfy all the objectives

Assuming that the flows from the Tributary Flow Objectives are sufficient meet the Vernalis Flow Requirement from February through June, and assuming that the Narrative Objective is achieved by the satisfaction of all the flow-related objectives, then the total quantity of water needed to satisfy the objectives will be equal to the sum of the amount required for the Tributary Flow Objective and the October pulse flow objective.

As noted above, the total *median* amount required to satisfy the Tributary Flow Objectives under a 40% unimpaired flow regime would be 1,124,486 acre feet. After adding the 62,000 acre feet required each year for the October pulse flow, the median amount required to satisfy the objectives would be 1,186,486 acre feet, or approximately 1.2 MAF.

As an aside, it is noted that this number is not referenced anywhere in the SED. Instead, the reader is left to compute the number independently. This is a significant deficiency and should be rectified.

3.1.2.6. Instream Flow Incremental Methodology

The results of the Instream Flow Incremental Methodology ("IFIM") conducted by USFWS also require releases of approximately 250 cfs, or approximately 500 acre feet/day, from each of the Stanislaus, Tuolumne and Merced Rivers during the remainder of the year, for a total of 1,500 acre feet per day from the three tributaries combined. Excepting the months of February through June, and October, there are 184 days in the remainder of the year. At a rate of 1,500 acre feet per day, the total amount of water required during the remainder of the year is approximately 276,000 acre feet. These contributions are in addition to the WQCP objectives.

3.1.3. The State Water Board must decline to adopt the revisions to the WQCP under Article X, Section 2 of the Constitution because the analysis in the SED is insufficient to assess whether requiring 40% UIF (or 1.2 MAF) for the protection of beneficial uses constitutes a waste of water

The circumstances that must be considered when evaluating whether a particular use of water is reasonable (and not a waste) include the quantity of water needed for the beneficial use served. (see *Lodi v. East Bay Municipal Dist, supra,* 7 Cal.2d at 339-340 [releasing a large quantity of water to force a small quantity of water into the surrounding underground water table is a waste of water].) The SED does not provide any analysis of whether 40% unimpaired flow (or 1.2 MAF) from the Stanislaus, Tuolumne and Merced Rivers is needed to protect estuarine habitat (EST), cold freshwater habitat (COLD), warm freshwater habitat (WARM), migration of aquatic organisms (MIGR), spawning, reproduction, and/or early development (SPWN), wildlife habitat (WILD), or rare, threatened or endangered species (RARE). Instead, the document focuses on how the chosen amount of water (i.e., 40% unimpaired flow) can be used to inundate more land (ostensibly creating floodplain habitat for fall-run Chinook salmon) without simultaneously depleting reservoirs and adversely affecting instream water temperatures that could harm fall-run Chinook salmon. To the extent that the success of fall-run Chinook salmon can adequately serve as a proxy for protecting all the beneficial uses identified in the plan (a proposition that the SJTA rejects), the analytical approach in the SED is still backwards. It is apparent that Board staff chose the 40% unimpaired flow requirement first - without determining whether that amount of water was necessary to protect any of the beneficial uses - and then attempted to model a way in which that amount of water could be used without causing adverse impacts to instream temperatures that would harm fall-run Chinook salmon. (SED, at Appx. F1, p. F.1-12, F.1-13, F.1-31.) Although the SED acknowledges that requiring 40% unimpaired flow from February through June will deplete reservoirs and adversely affect instream water temperatures, the SED does not contain any analysis of whether a lesser amount of instream flow (such as 20% UIF) during above-normal or wet water years could achieve the same or better results for fall-run Chinook salmon by minimizing the drawdown on reservoirs. Instead, Board staff adhered to the 40% unimpaired flow requirement, and then attempted to mitigate the adverse effects of requiring such a large quantity of water for instream purposes by assuming the implementation of unrequired operational constraints, such as flow shifting, carryover storage and reservoir refill criteria. If the objectives require mitigation in order to avoid harmful effects to beneficial uses, then it is self-evident that the objectives are not protecting those beneficial uses. Moreover, if the same results could be achieved using less water in certain water years, then an objective which requires 40% unimpaired flow in all years would constitute a waste of water, at least to the extent that the same results could be achieved with a lesser amount. Without any analysis in the SED as to whether the same results could be achieved using less water, the Board cannot fulfill its constitutional obligation of ensuring that the objectives do not result in a waste of water. For this reason, the Board should decline to adopt the revisions to the WQCP which will require approximately 1.2 MAF of water.

The 2010 Delta Flow Criteria Report provides an additional point of reference for assessing whether 40% unimpaired flow is necessary to protect the beneficial uses without resulting in a waste of water. The DFCR states that "[a]vailable scientific information indicates that average March through June flows of 5,000 cfs on the San Joaquin River at Vernalis represent a flow threshold at which survival of juveniles and subsequent adult abundance is substantially improved for fall-run Chinook salmon . . . " (2010 Flow Criteria Report, p. 119.) In the report, the San Joaquin River unimpaired flow was computed as "the sum of estimates from nine sub-basins in the watershed and are understood to represent the flow that would occur on the San Joaquin River at Vernalis. These nine sub-basins include the Stanislaus River at Melones Reservoir, San Joaquin Valley Floor, Tuolumne River at Don Pedro Reservoir, Merced River at Exchequer Reservoir, Chowchilla River at Buchanan Reservoir, Fresno River near Daulton, San Joaquin River at Millerton Reservoir, Tulare Lake Basin Outflow, San Joaquin Valley West Side Minor Streams." (2010 Flow Criteria Report, p. 97.) The average unimpaired flow at Vernalis for the months of February through June (1921 – 2003) was 529,000 acre feet (February), 668,000 acre feet (March), 929,000 acre feet (April), 1,467,000 acre feet (May), 1,117,000 acre feet (June), for a summed average amount of 4,710,000 acre feet over all five months. (2010 Delta Flow Criteria Report, p. 97; *California Central Valley Flow Data,* Fourth Edition Draft (May 2007), p. 45.)

The Delta Flow Criteria report chose 60% UIF as a target because, at that rate of unimpaired flow, the average flow at Vernalis (in cfs) for the entire period of February through June is at, or above, 5,000 cfs in 85% of the water years. (2010 Flow Criteria Report, p. 119-122, Figure 20a.) In other words, the amount of water needed at Vernalis was determined first (5,000 cfs from February through June), then the percentage of unimpaired flow at which that flow rate could be achieved in most years was determined. An unimpaired flow of 60% would also meet or exceed 10,000 cfs from

February to June in approximately 45% of years, which the report noted would be needed to achieve the doubling fall-run Chinook salmon in the San Joaquin Valley. (2010 Flow Criteria Report, p. 121, Figure 20a.) However, the report stated that additional information was necessary "to determine whether these flows could be lower or higher and still meet the Chinook salmon doubling goal in the long term." (2010 Flow Criteria Report, p. 121.)

A review of some of the tables in the SED indicates that the DFCR goal of 5,000 cfs can be achieved at Vernalis with much less water than 40% unimpaired flow. For instance, under a 20% unimpaired flow regime, an average of 4,837 cfs (nearly 5,000 cfs) can be achieved at Vernalis at the 60% exceedance level and above. (SED, at Appx. F.1, Table F.1.3-6m, p. F.1-117.) Thus, in years where the unimpaired flow is at the 60% exceedance level and above, the 5,000 cfs target could be nearly achieved with a requirement of only 20% unimpaired flow on the three eastside tributaries. If the information in the 2010 Flow Criteria Report is correct that "[a]vailable scientific information indicates that average March through June flows of 5,000 cfs on the San Joaquin River at Vernalis represent a flow threshold at which survival of juveniles and subsequent adult abundance is substantially improved for fall-run Chinook salmon" (2010 Flow Criteria Report, p. 119), then the SED should have included an analysis of whether more than 20% unimpaired flow was necessary in wetter years where the total unimpaired flow is at the 60% exceedance level or above. Moreover, if 5,000 cfs at Vernalis from March through June will substantially improve survival and abundance of fall-run Chinook salmon, and if that flow can largely be achieved with a 20% unimpaired flow requirement, then requiring additional unimpaired flow, i.e., 30% to 50%, would constitute a waste and unreasonable use of water insofar as the additionally required flow is not needed to protect other beneficial uses. The absence of any analysis in the SED of whether the objectives can be achieved with less unimpaired flow under certain hydrologic conditions leaves the State Water Board without any way to assess whether requiring 40% unimpaired flow in all water years constitutes a waste of water, as the Board is required to do under Article X, Section 2 of the California Constitution.

3.1.4. Comparison of Other Potential Uses

When evaluating whether a use of water is reasonable, there must be a comparison of the current or proposed uses with other potential uses of the same water. The mere fact "that a diversion of water may be for a purpose 'beneficial' in some respect . . . does not make such use 'reasonable' when compared with demands, or even future demands, for more important uses." (*Imperial Irrigation Dist. v. State Wat. Resources Control Bd.* (1990) 225 Cal.App.3d 548, 570-571.) This rule invokes the principle of diminishing marginal returns. For instance, assume it were reasonable to use 20% unimpaired flow from a river to help establish habitat that supports an annual return of 10,000 fall-run Chinook salmon. Further assume that requiring 40% unimpaired flow would help establish habitat that would support an annual return of an additional 15 fish. It is clear that the *additional* 20% unimpaired flow produces *some* benefit to fish and wildlife by ensuring the return of an additional 15 fish. However, in analyzing whether the 40% unimpaired flow requirement constitutes a waste of water under the principle of diminishing returns, the question presented would be whether requiring an *additional* 20% unimpaired flow to protect an additional 15 fish is reasonable considering the other demands being made upon that water.

Apart from the beneficial uses that are identified as being protected by the Table 3 objectives, the WQCP also identifies the following beneficial uses in the plan area: municipal and domestic supply; industrial service supply; industrial process supply; agricultural supply; ground water recharge; navigation; recreation; shellfish harvesting; and commercial and sport fishing. (SED, at Appx. K, p. 10-11.). As explained below, the SED fails to properly analyze whether using 40% unimpaired flow to protect fish and wildlife beneficial uses is reasonable when compared to the other demands being made on the same water because the WSE model includes operational assumptions that are not required by the objectives. As such, the Board cannot assess – as it is required to do – whether requiring 40% unimpaired flow constitutes a waste of water. In any event, even if the operational assumptions included in the WSE were implementable as part of the WQCP, the modeling in the SED demonstrates that requiring 40% unimpaired flow would provide trivial incremental benefits to Central Valley fall-run Chinook salmon, and would constitute a waste of water when compared to the other uses that could be made of the water.

The success of Central Valley fall-run Chinook salmon serve as a proxy in the SED for the protection of all beneficial uses identified as being protected by the revised objectives in Table 3. Accordingly, the benefits to fall-run Chinook salmon that result from using 40% unimpaired flow for instream purposes must be compared to the other beneficial uses that could be protected using the same water. The benefits to fall-run Chinook salmon are quantified using the computer model SalSim, as set forth in Chapter 19 of the SED. However, as with the rest of the analysis in the SED, the SalSim model incorporates various operational assumptions from the WSE model that are not required by the objectives, including carryover storage and flow shifting. As stated in Chapter 19, flows were modeled in SalSim using the same flow constraints as used in the WSE model. (SED, at 19-78). Thus, the SalSim modeling results referred to as SB20%UIF and SB30%UIF include carryover storage requirements that are not part of the objectives. (SED, at Appx. F1, p. F.1-36 – F.1-38). Similarly, the SalSim modeling results referred to as SB40%UIF, SB50%UIF and SB60%UIF include carryover storage requirements *and* flow shifting requirements that are not part of the objectives. (SED, at Appx. F1, p. F.1-36 – F.1-38). In addition, the SalSim model run referred to as SB40%MaxFS includes *additional* flow shifting outside the February through June period that is not required by the objectives, while SB40%OPP includes instream temperature targets that are not required by the objectives. (SED, at 19-80). As these model runs do not reflect a true implementation of the 40% UIF objective without unrequired operational constraints, the State Water Board has no information upon which to decide whether the use of 40% UIF to achieve incremental improvements to fall-run Chinook salmon populations constitutes a waste of water when compared to other beneficial uses that could be protected using the same water.

In any event, the SalSim model results in the SED demonstrate that using 40% UIF to achieve trivial incremental benefits to fall-run Chinook salmon constitutes a waste of water when compared to the other beneficial uses that could be protected using the same water. The metric used in the SED to assess improvements in fall-run Chinook salmon is “total adult salmon production.” (SED, at 19-81.) Production includes annual SJR Basin produced commercial and recreational harvest numbers, annual SJR Basin produced salmon that stray out of basin as adults, and total SJR Basin produced escapement (hatchery and in-river). (SED, at 19-81.) The SalSim results show that the benefits to salmon production of dedicating 40% UIF to instream uses are insignificant. Average annual production of Central Valley fall-run Chinook salmon is 707,598 (for the years 1976 through 2014).[45] The SalSim analysis in the SED shows that dedicating 40% UIF to instream uses (SB40%UIF) will increase salmon production by 1,103 fish above baseline conditions. (SED, at 19-84.) When compared to annual production of 707,598, this increase is a mere 0.15%, or less than a quarter of 1 percent. In other words, dedicating 40% UIF to instream uses will result in 15 additional fish for every 10,000 fish currently produced under baseline conditions each year. Even using the maximum flow shifting model results (SB40%MaxFS) which show the greatest incremental increase in salmon production, the results are still trivial. The anticipated increase in production under maximum flow shifting conditions is 4,139 fish over baseline. (SED, at 19-84.) Compared to the average annual production number for all Central Valley fall-run Chinook salmon of 707,598, the increase under maximum flow shifting is a mere 0.6%, or slightly more than one-half of 1 percent.

In contrast to these small incremental increases in production, the anticipated average reduction in water availability for agricultural purposes under 40% UIF is 293,000 acre feet annually, which is a 14% average annual reduction from baseline. (SED, at Appx. F1, p. F.1-69.) In dry and critically dry years, the average annual reduction in water supply jumps to 30% and 38%, respectively, below baseline water supply. (SED, at Appx. F1, p. F.1-72.) Notably, these calculations are based upon the assumption that the reduced surface water supply will be offset, in part, by groundwater pumping at maximum capacity. (SED, at 11-36 – 11-37.) Specifically, the analysis in the SED assumes that groundwater pumping will be used to meet the entire shortage in water surface supply up until the point that maximum groundwater pumping capacity achieved. (SED, at 11-37.) However, the SED recognizes that groundwater pumping at maximum capacity is not sustainable (SED, at 11-52), and thus the impact to water supply and agriculture in the SED is

[45] http://www.casalmon.org/PDFs/Chinookprod_CompleteDraft2015Reports6.30.16.pdf

significantly understated. Nevertheless, when the average annual reduction in water supply of 14% is compared to the minimal increase in fall-run Chinook salmon of 0.15%, or even 0.6%, it is evident that raising the amount of water dedicated to instream uses from baseline to 40% UIF constitutes a waste of water. While the benefit to fall-run Chinook salmon is nearly imperceptible, the impact to water supply will be significant and will be felt by the agricultural community.

The analysis provided by the SJTA in these comments is different than the State Water Board analysis. For comparison of other beneficial uses, the SJTA analysis is the correct analysis because it examines the 40% UIF and Vernalis base flows without additional operational assumptions that are not required by the objectives.

As demonstrated in the table below, the real impact of the proposed project is significantly greater than reported in the SED. Just as the results from the SED make the case that the objectives will constitute a water of water, the SJTA's analysis makes an even stronger case.

SUMMARY SHEET

WQCP IMPACTS[1]

TOPIC	STATE WATER BOARD ANALYSIS	SJTA Analysis[2]
Economics	Total: $106.2 Million	Total: $12.9 Billion
• Agricultural	• $36 million loss in annual revenues • $6.2 million increase in groundwater pumping costs. • $64 million total loss in economic output. Average annual loss of $55 million within TID and MID service area No Analysis of Bay Area	• Loss in Ag. Output: $2 Billion • Loss in Total Income: $4.78 Billion • Loss in Tax Revenue: $1.18 Billion • Decrease in property value: $ 4.94 Billion • Groundwater pumping cost increase: $10.7 million annually Average annual loss of $401.5 million within TID and MID service area[3]
• Employment	Total lost jobs: 558 • Lost jobs due to increase groundwater pumping costs: 125 • Lost jobs due to loss in agricultural production: 433	Total lost economic output in Bay Area from sequential dry years: $43 billion Total lost jobs in Plan Area: 4,000+ • Animal commodity lost jobs: 1,200 • Food and beverage processing lost jobs: 2,500 Total lost jobs in Bay Area from sequential dry years: 120,063

Municipal & Industrial Supply	None[4]	Potential reduction of 60% of urban water supply to City of Modesto Potential reduction of 60% of urban water supply to the cities of Escalon, Lathrop, Manteca, and Tracey[5]. San Francisco's water supply in sequential dry years would be reduced by 129,884 AF/year. Resulting in 50% decrease in deliveries to RWS.
Groundwater	Mean annual groundwater pumping increase of 105 TAF No Analysis of subsidence impacts	Groundwater pumping increase in sequentially dry years of 1.572 million acre feet within the Plan Area[6] Increase in subsidence impacts
Hydropower	Loss of 4,000 megawatt hour (MWh) Loss of revenue: Not Analyzed	TID and MID hydropower generation reduction total damages $397.4 million Tulloch Dam only: Critically Dry Year: 47,951 MWh loss Lost Revenue: $3.3 million New Melones only: Critically Dry Year: 195,510 MWh loss Lost Revenue: $6 million Reduced hydropower generation annually of 11% on SFPUC facilities. Lost revenue of $2 million in dry years.

Greenhouse gas emissions	Additional 16,948 metric tons of CO_2 annually.	CO_2 Increase due to hydropower offsets on New Melones Dam and Tulloch Dam[7] Critically Dry Year: 68,457 metric tons Sequential Dry Years: 204,745 metric tons (6-year period)[8] Growth displacement in CCSF would release CO_2 the equivalent of 1.3 million cars on the road annually.
Reservoir Storage	New Melones never runs dry	New Melones runs dry 12 out of 95 years[9].
Agricultural	Loss of 23,679 acres of irrigated land within the Plan Area. Extended Plan Area not analyzed	Loss of 132,706 acres of irrigated land within the Plan Area[10]. Potential loss of 293,100 acres of agricultural land in the Bay Area from growth displacement.
Climate Change	No Analysis[11]	Greater focus on critically dry and sequential dry years impacts as climate change will inflict more frequent and intense droughts.
Disadvantaged Communities[12]	No Analysis	Major challenges meeting community water service needs and increased water supply costs[13].
Fish Populations	Increase of 1,103 fish	**Unknown**

[1] All numerical figures and impact results are derived from analysis of LSJR Alternative 3 unless otherwise noted

[2] All numerical figures were obtained from the following documents: San Joaquin Tributary Authority's WQCP/SED comments; Oakdale Irrigation District and South San Joaquin Irrigation District's WQCP/SED comments; Turlock Irrigation District's WQCP/SED comments; Modesto Irrigation District's WQCP/SED comments; and City and County of San Francisco's WQCP/SED comments.

[3] The SED assumes that growers will transfer water to keep "high valued" tree, fruit and vegetable crops in production and let the acres of "lower valued" animal feed decline. This is incorrect for two reasons: 1) many irrigation districts do not allow grower-to-grower water transfers; and 2) dairy and cattle operations are dependent on "lower valued" crops for animal feed. This loss of crop commodity value alone accounts for $166 million annually.

[4] Staff state that the Water Supply Effects model "assumes that municipal water providers would not experience a reduction in surface water supply" (SED, at 9-44; 11-36 [where Staff state that for purpose of modeling groundwater and agricultural impacts, "[v]olumes of water assumed not to be subject to a water shortage (e.g., municipal and industrial water supply, riparian rights) are subtracted from the total diversions for each river to calculate the remaining water."]

[5] SSJID provides 50-70% of the annual water supply to its partner cities with surface water from the Stanislaus River. During drought years the WQCP will radically alter the current sustainable conditions placing increased reliance on already overdrafted groundwater basins.

[6] Staff estimates a 40% UIF will result in an increase of 302 TAF of groundwater pumping annually from a baseline of 221 TAF in dry years. This results in 524 TAF of groundwater pumping in a single dry year and 1.572 MAF in three sequentially dry years. (SED, at Table G.2-5, G-15.) However, Staff fails to analyze if this is sustainable or if this much groundwater is even available.

[7] These figures only show the net increase of CO_2 from Tulloch and New Melones Dams. As other hydropower facilities on the Merced and Tuolumne Rivers will be similarly impacted GHG emissions will increase exponentially.

[8] Tulloch Dam Figures: critically dry year – 47,951 metric tons; sequential dry years 16,105 metric tons – New Melones Dam Figures: critically dry year – 54,974 metric tons; sequential dry years 188,640 metric tons. (*See* Attachments 10 and 11 of OID/SSJID comments on SED.)

[9] SJTA modeling analysis without SWB-assumed carryover, refill, diversion, and flow shifting constraints used in the WSE model for the SED. New Melones is assumed to be at zero storage at the end of September in a year when OID/SSJID diversions under their water rights would have been curtailed to maintain Reclamation's release obligations, including river releases. (Steiner Report, Exhibit A, p. 10.)

[10] The SWRCB assumes the loss of surface water is fully offset by increased groundwater pumping except in a few years such as when hydrological conditions are critical. The SWRCB assumption is not consistent with the experience of Westlands Water District who has been facing volatile surface water supplies since the 1990s. Groundwater pumping in Westlands offsets 50% of the change in surface water supplies, not 100%. As such, significantly more land may be fallowed on average based on 40% UIF requirement.

[11] Staff state that the adaptive management process will appropriately respond and address climate change impacts.

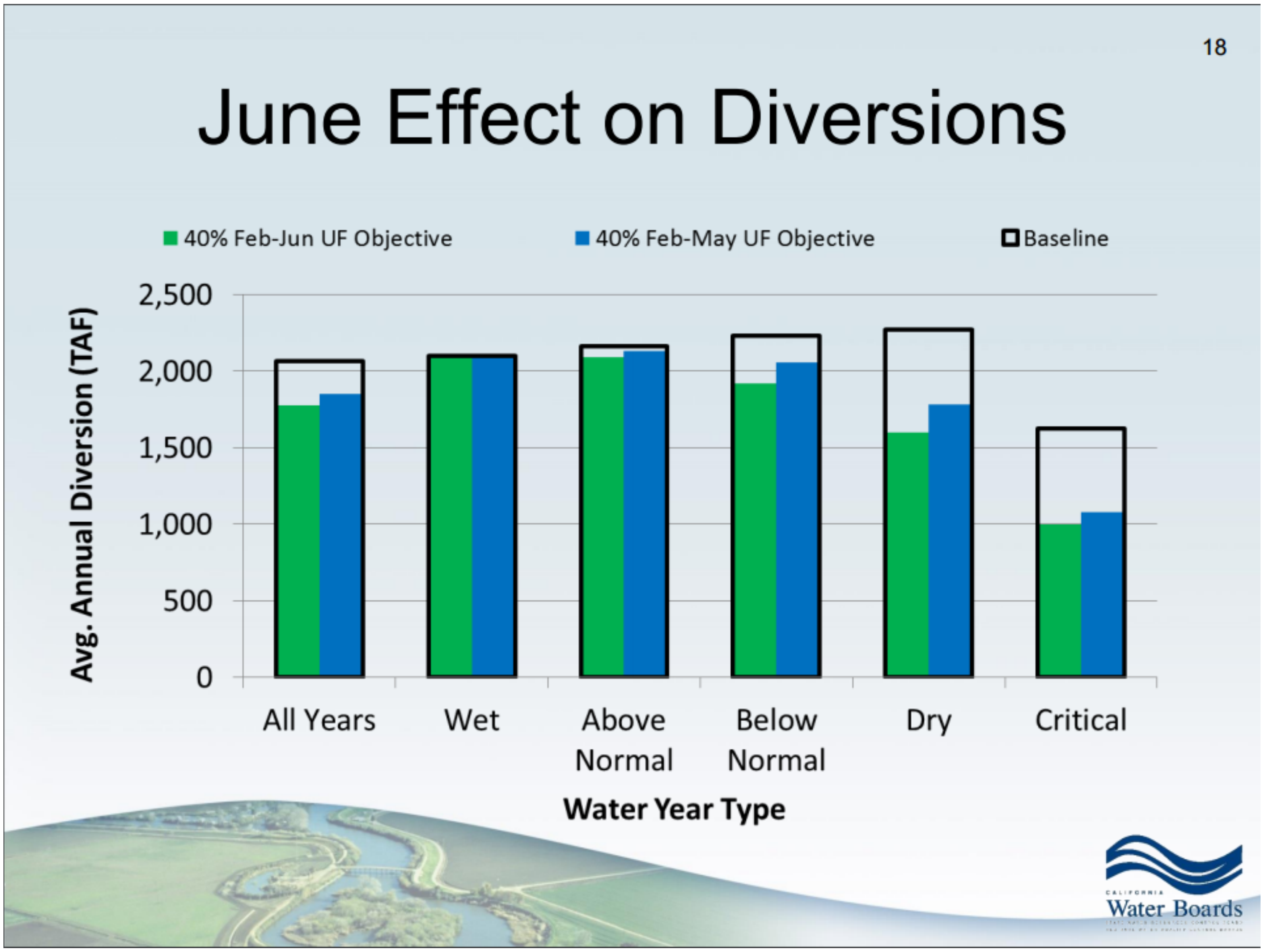
[12] Counties within the Plan Area (e.g. Merced and Stanislaus) are predominantly demarcated disadvantaged and severely disadvantaged communities (*See* https://gis.water.ca.gov/app/dacs/)

[13] The Planada Community Service District (PCDS) in Merced recently dealt with several wells going dry, thus, requiring the need to find emergency funding to put in new wells. A groundwater pumping increases to offset surface water losses the affects seen by PCSD will become more frequent. Additionally, Stanislaus and Merced Counties have some of the highest unemployment rates in the State (9%-18%) the WQCP will increase unemployment significantly.

In the end, the analysis presented by the SJTA and its member agencies demonstrates that the proposed objectives will result in a waste and unreasonable use of water in violation of Article X, Section 2 of the California Constitution.

4. June Flows

As explained in the prior two sections, the State Water Board has an obligation to set water quality objectives that (1) ensure the “reasonable protection of beneficial uses” considering all other demands being made on the waters involved (Water Code, § 13000, 13241), and (2) prevent waste or unreasonable use of water. (Cal. Const., art. X, § 2.) The Tributary Flow Objective and the Vernalis Flow Objective both require the release and/or bypass of water during the February through June period. (SED, at Appx. K, p. 18.) According to the water quality control plan, the purpose of these flows is to support and maintain the natural production of viable native San Joaquin River watershed fish migrating through the Delta. The plan makes this point clear by stating that the flow objectives should be adaptively adjusted to achieve this goal. (SED, at Appx. K, p. 30.) The SED - which measures success by examining the impact of the flow objectives on fall-run Chinook salmon production and their habitat - fails to set forth any data, analysis or facts which would support the establishment of these flow objectives during the month of June. As explained below, the benefit of providing 40% unimpaired flow during June migration is minimal to nonexistent. The SED should have included an analysis of the Tributary Flow Objective running from February through *May*, so that the Board could compare the impacts of such a requirement with the impacts of a February through *June* requirement. In the course of the hearing process, SWB Staff presented the Board with additional information intended to demonstrate the impacts on water supply of requiring flows in June versus not requiring flows in June. The only information provided was the following graph:



SWB Slide No. 18, January 3, 2017 presentation.

Staff did not explain how the impacts reflected in this graphic were calculated. If Staff performed a modeling run where the Tributary Flow Objective was imposed from February-*May*, rather than February-*June*, then all of that information should be made available to the public and to the Board members. As indicated during the January 3, 2017 hearing, "staff agrees that to understand the effects of the proposal you need to understand more than just the long-term averages." (Transcript of Public Hearing before SWRCB, p. 45, lns. 5-7.) The graphic above, which only shows averages for each year type, in insufficient. Staff should provide all of the results from a February-*May* modeling run, including the cumulative distribution charts such as those shown in Table F.1.3-4(a)-(c), and the summary tables provided in Attachment 1 to Appx. F. Only by reviewing the results of a complete modeling for the February-*May* period can the Board determine whether requiring unimpaired flows of 40% during month of June is reasonable, as the Board is required to do under Water Code section 13241. As with all the other modeling runs that the Board should review, the February-*May* run should reflect a true 40% unimpaired flow requirement as directed by the objective, not a modified requirement with carryover storage, reservoir refill criteria, flow shifting and the other modeling constraints devised to mitigate the effects of the project.

The SJTA provides the following information to demonstrate that there is no factual or scientific basis that requiring these flows in the month of June will assist in the migration of fall-run Chinook salmon, and that the objectives are therefore unreasonable considering the other demands made on the waters involved (Water Code, §§ 13000, 13241), and constitute a waste and unreasonable use of water. (Cal. Const., art. X, § 2.)

Central Valley fall-run Chinook salmon exhibit two distinct outmigration strategies (Lindley 2009):[46] (1) ***fry migrants***, which are typically the most abundant, migrate from the tributaries soon after emergence (i.e., January through March) to rear in the Delta; (2) ***smolt migrants*** remain near freshwater spawning areas for several months, migrating primarily from the tributaries during April and May and passing quickly (i.e., approximately seven days) through the Delta (SJRGA 2011).[47]

Generalized timing of juvenile outmigration based on abundance estimates from rotary screw trap sampling in the Stanislaus and Tuolumne Rivers shows that in all but wet and above normal years, at least 99.3% of all juvenile salmon (i.e., fry, parr and smolts) migrate from late January through May, and 99.2% of smolts have migrated by May 31. (See SJTA Attachment 14, p. 3, Figure 1, Tables 1-5).

During years of extremely high flows, such as during spring 1998 and 2006 when San Joaquin River flows at Vernalis were at or near flood monitor stage (approx. 22,000 cfs) or flood stage (approx. 34,000 cfs), smolt outmigration occurred later, with 90% of smolts migrating by June

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[46] Lindley S. T., Grimes C. B., Mohr M. S., Peterson W., Stein J., Anderson J. T., Botsford L. W., D.L. Bottom, C.A. Busack, T.K. Collier, J. Ferguson, J.C. Garza, A.M. Grover, D.G. Hankin, R.G. Kope P.W. Lawson, A. Low, R.B. MacFarlane, K. Moore, M. Palmer-Zwahlen, F.B. Schwing, J. Smith, C. Tracy, R. Webb, B.K. Wells, and T.H. Williams. What Caused the Sacramento River Fall Chinook Stock Collapse? NOAA Technical Memorandum. NOAA-TM-NMFS-SWFSC-447, 2009.

[47]San Joaquin River Group Authority [SJRGA]. 2011. 2010 Technical Report: On implementing and monitoring of the San Joaquin River Agreement and the Vernalis Adaptive Management Plan: Prepared by San Joaquin River Group Authority for California Water Resource Control Board. Available at http://www.sjrg.org

5, 1998, and June 3, 2006 (See SJTA Attachment 14, p. 3, Figure 2). Since the proposed flow objective of 40% unimpaired flow will not reach these flood levels, the empirical data do not suggest that the proportion of smolts migrating during June will increase.

These results are reflected in the SalSim model used by the State Water Board. Under the State Water Board's baseline, the juvenile outmigration numbers for the month of June are as follows:

Juveniles Count					
Case: SBBASE					
Year Type	Month	STANISLAUS CONFLUENCE	TUOLUMNE CONFLUENCE	MERCED CONFLUENCE	SJR AT MOSSDALE
W	Jun-1995	725	-	-	766
W	Jun-1996	-	-	8	148,338
W	Jun-1997	-	-	24,544	26,138
W	Jun-1998	-	-	-	99,076
AN	Jun-1999	-	-	437	-
AN	Jun-2000	-	-	6,724	1,260
D	Jun-2001	-	-	-	80,702
D	Jun-2002	2,604	-	-	4,783
BN	Jun-2003	2,215	-	-	4,056
D	Jun-2004	1,046	-	3,662	42,441
W	Jun-2005	6	32	1,066	61,137
W	Jun-2006	-	-	-	-
C	Jun-2007	1,788	-	-	1,337
C	Jun-2008	17	-	-	2
BN	Jun-2009	382	-	3	-
AN	Jun-2010	12	-	46	5,002
	Ave	550	2	2,281	29,690
	Max	2,604	32	24,544	148,338
	Min	-	-	-	-

SJTA Table 4-1: SalSim juvenile count for June under SWB Baseline[48]

Under the State Water Board's 40% unimpaired flow requirement, the June numbers would be as follows:

[48] See SJTA Attachment 3.

Juveniles Count					
Case: SB40					
Year Type	Month	STANISLAUS CONFLUENCE	TUOLUMNE CONFLUENCE	MERCED CONFLUENCE	SJR AT MOSSDALE
W	Jun-1995	-	-	-	-
W	Jun-1996	-	2,441	96,918	147,601
W	Jun-1997	-	-	158,522	337,019
W	Jun-1998	-	-	-	107,516
AN	Jun-1999	-	-	163,843	44,107
AN	Jun-2000	-	-	54,722	121,287
D	Jun-2001	435	-	16,323	52,491
D	Jun-2002	2,052	-	62,347	51,130
BN	Jun-2003	938	-	305,451	94,393
D	Jun-2004	967	-	119,281	40,967
W	Jun-2005	-	-	-	153,016
W	Jun-2006	-	-	-	-
C	Jun-2007	1,780	-	4,299	248
C	Jun-2008	408	-	9,755	638
BN	Jun-2009	-	-	-	1,143
AN	Jun-2010	1,547	-	-	23,293
	Ave	508	153	61,966	73,428
	Max	2,052	2,441	305,451	337,019
	Min	-	-	-	-

SJTA Table 4-2: SalSim juvenile count for June under SWB 40% UIF[49]

Almost all of the June smolt numbers can be explained by the Department of Fish & Wildlife's operations at the Merced River Hatchery. These are not the "natural" fish the objectives are designed to protect. (SED, at Appx. K, p. 18.) Also, in the last four years the Merced Hatchery has begun releasing almost all of their 1,500,000 smolts at Jersey Point, right next to Antioch. The SalSim model confirms the findings by FishBio that little to no Central Valley fall-run Chinook salmon migrate out in June.

[49] See SJTA Attachment 3.

Comparing the SWB's Baseline run to the 40% UIF run, the results for June are as follows:

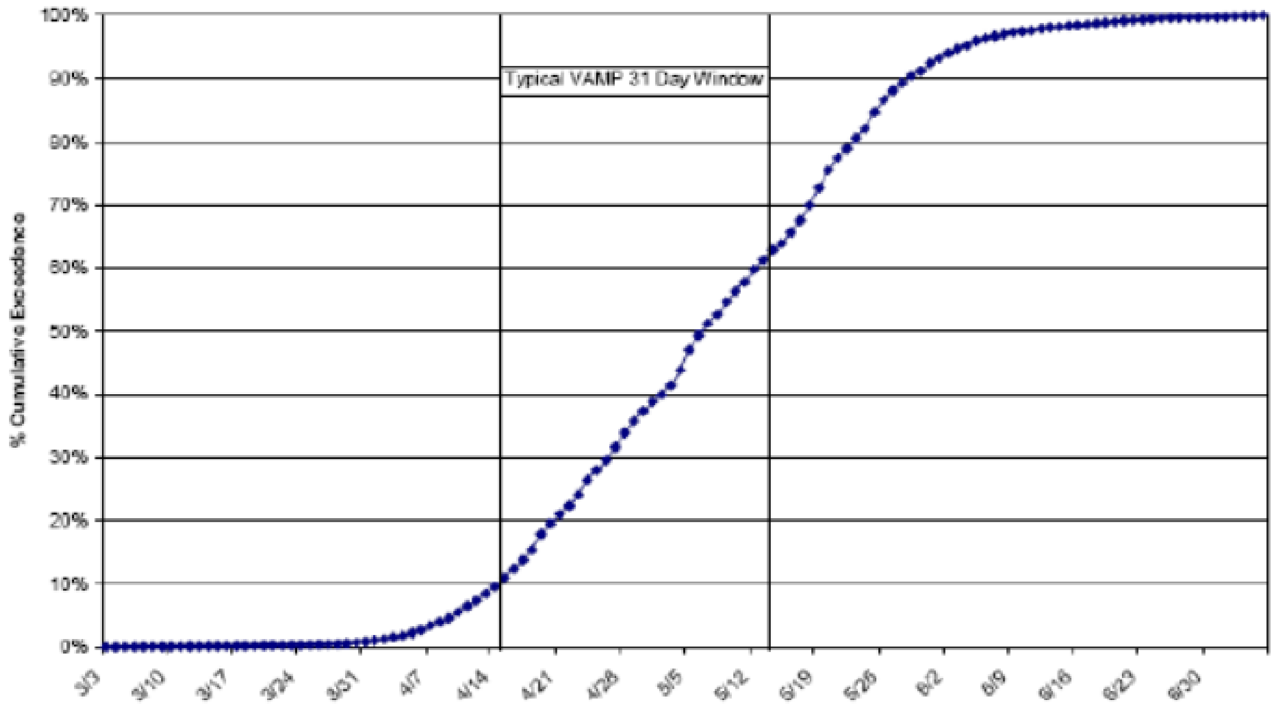
Increment improvement with respect to SBBASE					
SB40 (-) SBBASE					
Year Type	Month	STANISLAUS CONFLUENCE	TUOLUMNE CONFLUENCE	MERCED CONFLUENCE	SJR AT MOSSDALE
W	Jun-1995	(725)	-	-	(766)
W	Jun-1996	-	2,441	96,910	(737)
W	Jun-1997	-	-	133,978	310,881
W	Jun-1998	-	-	-	8,440
AN	Jun-1999	-	-	163,406	44,107
AN	Jun-2000	-	-	47,998	120,027
D	Jun-2001	435	-	16,323	(28,211)
D	Jun-2002	(552)	-	62,347	46,347
BN	Jun-2003	(1,277)	-	305,451	90,337
D	Jun-2004	(79)	-	115,619	(1,474)
W	Jun-2005	(6)	(32)	(1,066)	91,879
W	Jun-2006	-	-	-	-
C	Jun-2007	(8)	-	4,299	(1,089)
C	Jun-2008	391	-	9,755	636
BN	Jun-2009	(382)	-	(3)	1,143
AN	Jun-2010	1,535	-	(46)	18,291
	Ave	(42)	151	59,686	43,738
	Max	1,535	2,441	305,451	310,881
	Min	(1,277)	(32)	(1,066)	(28,211)

SJTA Table 4-3: Comparison of SWB Baseline and SWB 40% UIF[50]

The numbers on the Stanislaus River go *down.* The numbers on the Tuolumne River essentially remain the same. The Merced River Hatchery accounts for the entire increase. All of the facts point to little or no smolt production on the Stanislaus River and Tuolumne River under Baseline, and the numbers remain the same even with 40% unimpaired flow in June.

State Water Board Staff is well-aware of this information. In the recently released scientific basis report for Phase II of the State Water Board's update to the Bay-Delta Plan, the Board included a figure demonstrating that approximately 90% of *smolt* outmigration on the San Joaquin River occurs by June 1.[51]

[50] See SJTA Attachment 3.
[51] State Water Resources Control Board's Working Draft Scientific Basis Report for New and Revised Flow Requirements on the Sacramento River and Tributaries, Eastside Tributaries to the Delta, Delta Outflow, and Interior



SJTA Figure 4-1: Excerpted Figure 3.4-10 of SWRCB's Draft Working Scientific Basis Report for Phase II of the update to the Bay-Delta Plan

As noted above, these are the fish that remained in the freshwater spawning areas after many *fry* migrants had already left. This data confirms the observations reported by FishBio that June outmigrants account for less than 1% of the overall outmigration on the San Joaquin River and its tributaries. (SJTA Attachment 14.)

Furthermore, a recent article (Lehman et al. 2017) published in the Transactions of the American Fisheries Society provides support for the proposition that environmental and physical conditions in the Lower San Joaquin River for outmigrating salmon are extremely poor during June.[52] This study examined the swimming capabilities of hatchery juvenile Chinook salmon under varying environmental conditions, both in a hatchery and field setting. Juvenile Chinook salmon from the Mokelumne River Hatchery were subjected to swimming trials using experimental swim tunnels and a mobile respirometer. The study found that swimming performance tended to decrease

Delta Operations, Figure 3.4-10, p. 3-27; available at http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/docs/20161014_ph2_scireport.pdf

[52] SJTA Attachment 15.

with increased water temperature and increased turbidity, specifically at temperatures over 19°C. The authors noted that this temperature threshold is similar to the temperature at which largemouth bass behavior and feeding is highest, and the reduced swimming performance could make Chinook salmon juveniles especially susceptible to predation. Water temperatures in the San Joaquin River and lower reaches of the tributaries during June are largely driven by ambient air temperatures, and regardless of flow, exceed 19°C during the majority of June. By June, the overwhelming majority of Chinook salmon have already migrated. Combined, this evidence supports focusing management actions earlier in the year (i.e., April/May) when environmental conditions can be managed to benefit smolt survival. (Attachment 15.)

In sum, the scientific evidence demonstrates that - by June 1st - all *fry* migrants will have left the tributaries and lower San Joaquin River, and more than 90% of *smolt* migrants will have also left. The limited number of smolt migrants that may remain after June 1 will experience extremely poor environmental and physical conditions that cannot be improved by increased flow, such as warming water temperatures driven by ambient air temperatures and heightened predation activity by largemouth bass. State Water Board Staff is aware of this information and has even reported on it in the draft scientific basis report for the Phase II updates to the Bay-Delta Plan. Given this information, it is both unreasonable and a waste of water to require agricultural users to bypass/release 40% unimpaired flow during the month of June for the supposed protection of migrating Chinook salmon.

5. The Proposed Project is Unlawful Because it Violates the Rules of Water Right Priority

"California operates under a 'dual' or hybrid system of water rights which recognizes both doctrines of riparian rights and appropriative rights." (*United States v. State Water Resources Control Bd.*, *supra*, 182 Cal.App.3d 82, 101.) "[A]ppropriation rights are subordinate to riparian rights so that in times of shortage riparians are entitled to fulfill their needs before appropriators are entitled to any use of the water." (*Id.* at 101-102.) Between appropriators, "the rule of priority is 'first in time, first in right' [where] [t]he senior appropriator is entitled to fulfill his [or her] needs before a junior appropriator is entitled to use any water." (*Id* at 102.) "Every effort . . . must be made to respect and enforce the rule of priority." (*El Dorado Irr. Dist. v. State Water Resources Control Bd.*, (2006) 142 Cal.App.4th 937, 966.) The preservation of water right priority should be the "*first concern*" of the State Water Board in the exercise of its powers . . . (*El Dorado, supra,* 142 Cal.App.4th at 961, quoting *Meridian, Ltd v. San Francisco* (1939) 13 Cal.2d 424, 450.)

To understand the issue of water right priority in the context of the regulation, one must first understand the fundamental difference between what was required in the 1995 WQCP/D-1641 and what is being presented in this proposed objective. In the 1995 WQCP, a flow objective was set at Vernalis. The flow at Vernalis could be met by accretions, bypass of flow, releases from storage, or some combination of all of the above. By contrast, the proposed flow objectives are solely based on bypassing the first 40% of the unimpaired flow at New Melones, New Don Pedro, and Exchequer. The objectives do not consider storage releases, nor accretions. Rather, the objectives are based solely on the unimpaired flow of the three rivers.

Since proposed flow objectives are based on unimpaired flow, the implementation of such begins with riparians, then the most senior appropriators to most junior appropriator. It is a reverse priority objective. An example will make this point.[53] If the UIF on the river in June is 500 cfs, for seven days, then the bypass downstream of the rim reservoir flow is 200 cfs. If the riparian demand exceeds 200 cfs, then the riparians must proportionally reduce their diversion to meet the flow requirement. If the riparian demand is fully met with the 200 cfs of flow, then senior appropriators can divert. While this example does not depict how the WQCP Objective would be implemented, it does show how the normal process of starting with cutting first is no longer applicable.

Furthermore, as explained below, the proposed objectives violate the rule of priority across the entire Delta watershed, and across the three eastside tributaries.

[53] This example is given with no upstream reservoirs or upstream appropriations.

5.1. The entire Delta watershed must be considered for purposes of water right priority

The area to be protected by the Tributary Flow Objectives, the Vernalis Base Flow Objective, and the Narrative Objective extends across all three tributaries, through the San Joaquin River, and "in a larger area [past Vernalis], including within the Delta." (SED, at Appx. K, p. 28.) Despite the broad geographic area intended to be protected, these objectives (the LSJR flow objectives) only require contributions from the Stanislaus, Tuolumne and Merced Rivers. Specifically, the Tributary Flow Objectives require 30% to 50% unimpaired flow on each of the three tributaries, with compliance points on tributaries themselves. (SED, Appx. K, p. 18.) The Vernalis Base Flow Objective requires flows of 800 to 1,200 cfs, which is to be provided from the Stanislaus, Tuolumne and Merced Rivers at certain percentages whenever the flows from the Tributary Flow Objective are insufficient to meet the base flow. (SED, at Appx. K, p. 29.) The WQCP also states that these objectives will be adaptively implemented to achieve the Narrative Objective. (SED, at Appx. K, p. 30.) Thus, although the objectives are intended to protect beneficial uses across the entire San Joaquin River watershed and through the Delta, the only water users responsible for ensuring those objectives are met are those who divert from the Stanislaus, Tuolumne and Merced Rivers. As demonstrated below, by requiring contributions from water right holders on the Stanislaus, Tuolumne and Merced Rivers, without requiring any contributions from other water right holders within the Delta watershed, the WQCP violates the rule of water right priority.

Both the State Water Board and the courts have long recognized that the rule of water right priority applies to and among all water users within the Delta watershed when flows are required under a water quality control plan for the protection of the Bay Delta. For instance, when the State Water Board adopted Decision 1485, it required CVP and SWP operators to release water from storage or curtail diversions whenever the flow entering the Delta would otherwise be insufficient to meet the water quality standards in the 1978 Delta Plan. (*El Dorado Irrigation Dist. v. State Water Resources Control Bd.* (2006) 142 Cal.App.4th 937, 950, citing Decisions 1485 and 1584.) After the adoption of Decision 1485, USBR and DWR began protesting water right applications in the Delta watershed on the basis that (1) any diversion of water by a new applicant, i.e., a junior appropriator with respect to USBR and DWR, would require USBR and DWR to release more stored water to meet the Delta water quality objectives, and (2) the junior appropriator within the Delta watershed should share in the responsibility for meeting those objectives. (*El Dorado, supra*, 142 Cal.App.4th at 950.) To resolve this issue, the State Water Board adopted standard water right permit Term 91, which prohibits new permittees from diverting water whenever USBR or DWR are releasing water to meet Delta water quality standards. (*Ibid.*) Through Term 91, the Board effectively ensured that the water right priority system was upheld amongst water right holders throughout the Delta by precluding junior appropriators within the Delta watershed from diverting while USBR and DWR (the more senior appropriators) were releasing water to meet Delta water quality objectives. In other words, the Board recognized that water right priority must be analyzed on a Delta-watershed-wide basis whenever a water right holder is releasing or bypassing flows to satisfy Delta water quality objectives.

Similarly, in *El Dorado Irrigation Dist. v. State Water Resources Control Bd.*, the Third District Court of Appeal held that the State Water Board violated the rule of priority by including a Term 91 condition in a water right permit with a priority date of 1927 held by the El Dorado Irrigation District because the Board did not impose Term 91 conditions on other water right holders within the Delta watershed with priorities junior to El Dorado's priority. (*El Dorado, supra*, 142 Cal.App.4th at 964-965, 969.) As relevant here, the court applied the rule of priority across all water users in the Delta watershed.

With respect to the revised WQCP designed to protect beneficial uses in the Bay Delta, the Board's decision to require contributions only from water users on the Stanislaus, Tuolumne and Merced Rivers, without requiring any contributions from other water right holders within the Delta watershed, particularly on the San Joaquin side of the Delta, constitutes a violation of the rule of water right priority.

5.1.1. Water users on the San Joaquin River, upstream of the confluence with the Merced River, are improperly exempted

The WQCP does not call for any contributions from water users on the San Joaquin River, upstream of the confluence with the Merced River. In fact, the upper San Joaquin River is entirely excluded from the Plan Area. (SED, at Figure 2-1b.) As the upper San Joaquin River is part of the Delta watershed, the WQCP violates the rule of water right priority by requiring that senior water right holders on the Stanislaus, Tuolumne or Merced Rivers contribute flows to benefit the Delta before any contributions are made from more junior water right holders on the upper San Joaquin River.

The Friant Dam facilities located on the upper San Joaquin River are operated by USBR. The Friant Division alone comprises more than 30% of the average unimpaired flow in the San Joaquin River basin. (SED, at Table 5-2, p. 5-7 [1,732 TAF/5,665 TAF].) In June, due to the snowmelt run-off characteristic of the upper San Joaquin River, approximately 35% of the average unimpaired flow of the San Joaquin River Basin would come from Friant. (SED, at 5-16, 5-19, 5-24, 5-27.) Apart from the San Joaquin River Exchange Contractors, the water users on the upper San Joaquin River are junior to the direct diversion rights of TID, MID, CCSF, OID and SSJID. In addition, the Kings, Fresno, and Chowchilla Rivers diversions are junior to TID, MID, CCSF, OID and SSJID's direct diversion rights.

The SED acknowledges that USBR settled an 18-year legal dispute involving its operation of Friant Dam on the upper San Joaquin River. (SED, at 2-9.) Pursuant to the settlement agreement, USBR has agreed to release water from Friant Dam for the purpose of restoring flows on the upper San Joaquin River to the confluence with the Merced, a stretch of river which has run dry in many locations due to the operations at Friant. (SED, at 2-9; *NRDC v. Rodgers* (2005) 381 F.Supp.2d 1212, 1216.) Rather than incorporating these flows into its plan, or otherwise establishing a compliance point on the San Joaquin River upstream of the confluence with the Merced, the SED merely notes, "the amount of [water] observed [on the upper San Joaquin River] at the mouth of the Merced River is uncertain." (SED, at 2-9.) While such a statement may have had some persuasive power in 2012 when the SWRCB released its first SED for Phase 1 of its update to the Bay-Delta WQCP, the statement clearly has no such authority now. USBR began releasing flows from Friant Dam for the SJRRP in 2014, and recently petitioned the State Water Board to recapture some of those flows in the lower San Joaquin River. (State Water Board Order WR 2016-0017.) The U.S. Geological Survey operates a sensor on the San Joaquin River, immediately upstream of the confluence with the Merced River (SMN [sensor ID]). The mean daily flow at that location is reported on the California Data Exchange Center ("CDEC") and is readily available. To the extent water is needed in the main stem of San Joaquin River from Merced to Vernalis, contributions could come from Friant and could be easily monitored.[54]

In sum, the failure to require contributions from water users on the upper San Joaquin River constitutes a violation of the rule of priority to the extent that water right holders on the three eastside tributaries hold more senior rights than those on the upper San Joaquin River.

As an aside, it is unclear whether SJRRP flows that happen to reach Vernalis will be counted towards the Vernalis Base Flow Objective under the new WQCP. The plan states that "[w]hen the percentage of *unimpaired flow requirement* is insufficient to meet the minimum base flow requirement [at Vernalis], the Stanislaus River shall provide 29 percent, the Tuolumne River 47 percent and the Merced River 24 percent of the additional total outflow needed to achieve and maintain the required base flow at Vernalis." (SED, at Appx. K, p. 29 [emphasis supplied].) Since the SJRRP flows are not part of the "unimpaired flow requirement," it is unclear whether those flows will be part of the sufficiency calculation for determining whether additional contributions are necessary from the three eastside tributaries. This issue needs clarification.

5.1.2. Westside Diversions along the San Joaquin River downstream of the confluence with the Merced River are improperly exempted

The map depicting the Plan Area excludes diverters on the west side of the lower San Joaquin River downstream of Merced River. (SED, at Figure 2-1a). The failure to include these diverters is problematic for two reasons: (1) the diverters on the west side of the San Joaquin River

[54] For example, the 2017 flow schedule can be found at http://www.restoresjr.net/download/ra-recommendations/rar2017/20170206_RA-Flow-Schedule.pdf.

are junior to the water right holders in the Plan Area, and (2) there is no protection for the flows that are bypassed or released on the three eastside tributaries.

First, the diverters on the west side of the San Joaquin River hold water rights that are junior to those held by TID, MID, CCSF, OID and SSJID. (*Meridian, Ltd. v. San Francisco* (1939) 13 Cal.2d 424.) As junior water right holders, the westside diverters should be required to bypass flows to meet the Vernalis Objective and to achieve the Narrative Objective before any contributions are required from the senior water right holders on the three eastside tributaries. In order to comply with the rule of water right priority, the WQCP must be revised to require contributions from the junior water right holders on the west side of the San Joaquin River before requiring any contributions from the senior water right holders on the eastside tributaries. In addition, the SED should be revised to include an analysis of how those contributions will impact the westside diverters. Currently, there is no analysis in the SED of westside diversion amounts, timing, or water rights. The document should be revised to address these omissions.

Second, the failure to regulate or curtail diversions by junior water right holders on the west side of the San Joaquin River will likely result in upward adjustments to the UIF requirements of the Tributary Flow Objectives. The WQCP calls for adaptive adjustments to the Tributary Flow Objectives in order to "support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta." (SED, at Appx. K, p. 30.) In other words, the Tributary Flow Objectives will be continually adjusted for the ostensible purpose of achieving the Narrative Objective. (SED, at Appx. K, p. 18.) If the flows from the Tributary Flow Objectives are more than sufficient to meet the Vernalis Base Flow Objective, then westside diverters, and any other diverter downstream of the tributary compliance points, will be able to divert the flows bypassed/released by TID, MID, CCSF, OID and SSJID, at least insofar as those diversions will not cause noncompliance with the Vernalis Base Flow Objective.[55] Thus, if achieving the Vernalis Base Flow Objective is not sufficient to achieve the Narrative Objective, and if the Tributary Flow Objectives are supposed to be continually adjusted to achieve the Narrative Objective, then it is highly likely that the unregulated diversions by junior water right holders on the west side of the San Joaquin River will result in the need to increase the unimpaired flow requirements on the tributaries in order to ensure that the Narrative Objective is achieved. This is problematic because the junior water right holders on the west side of the San Joaquin River will be diverting water in such a way that requires even more contributions from senior water right holders on the eastside tributaries, thereby violating the rule of priority.

The program of implementation (POI) suggests that the State Water Board may attempt to regulate these downstream diverters. Specifically, the POI states,

> "The State Water Board will exercise its water right and water quality authority to help ensure that the flows required to meet the Lower San Joaquin River flow objectives are used for their intended purpose and are not diverted for other purposes." (Appx. K Bay-Delta Plan, p. 28)

However, the POI does not specify how the westside diverters will be regulated, nor does it indicate which objective, if any, would be implemented by such regulation, as is required in a WQCP. (Water Code, § 13242.)

Notably, there is an unresolved legal question as to whether flows that are released in compliance with a WQCP objective are automatically protected from diversion by other users, or whether such flows are abandoned and available for diversion by others, such as water users in the Delta, absent protection under Water Code section 1707. This issue was raised in a complaint filed by the State Water Contractors with the SWRCB on June 16, 2015, alleging that diverters in the Delta south of the San Joaquin River are unlawfully diverting releases of SWP stored water. (STJA Attachment 16.) The State Water Board has yet to address this complaint. As the current WQCP

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[55] The SJTA is assuming in this example that the Board will prevent west side diverters from diverting water from the lower San Joaquin River if doing so would cause noncompliance with the Vernalis Base Flow Objective. The supposed method for imposing this restriction on west side diversions is the exercise of the Board's water right and water quality authority "to help ensure that the flows required to meet the LSJR flow objectives are used for their intended purpose and are not diverted for other purposes." (SED, at Appx. K, p. 28.)

raises the same issue, resolution is needed. There are several issues embedded in these fact patterns, all of which will require resolution: (1) is meeting a WQCP objective a beneficial use of water, (2) is water considered abandoned after it meets a WQCP objective, (3) if water is deemed abandoned after it satisfies a WQCP objective, how will it be determined whether the Narrative Objective is satisfied, and who will make such a determination, (4) what will prevent a downstream diverter from appropriating the water once it has met the WQCP objective on the tributaries, (5) if the San Joaquin River flow at Vernalis exceeds the minimum base flow objective, is the water released on the tributaries subject to diversion after it reaches the San Joaquin, (5) does the regulated water right holder bear the "burden" of depletions (natural and by diversion) when meeting the objectives. These are the legal issues that the State Water Board needs to address, but continues to ignore in this Bay-Delta Plan.

5.1.3. CVP and SWP Exports in the South Delta are improperly exempted

Exports by the CVP and SWP pose the same water right priority issues as the westside diversions on the San Joaquin River. The State Water Board did no analysis of the fate of the San Joaquin River flow entering the Delta. The DSM2 model is available, but was not used by the SWB. Dr. Paulsen collaborated with Dan Steiner and used the SJTA 40% UIF run to determine San Joaquin River inflow under the proposed Tributary Flow Objective. Her analysis shows the fate of San Joaquin River inflow once it reaches the Delta in a below normal year (1966), a dry year (1968), and a critically dry year (1988). As shown in Table 5-1 below, when Delta inflow from the San Joaquin River increases under 40% unimpaired flow, there is a corresponding increase in exports by the CVP and SWP. (SJTA Attachment 6, p. 7, 17.)

	DELTA INFLOW – SJR (TAF)[a]		EXPORTS - CVP, SWP, Contra Costa Canal (TAF)[b]		SJR CONTRIBUTION TO DELTA OUTFLOW (TAF)[c]	
	Base	**40%**	**Base**	**40%**	**Base**	**40%**
1966 (BN)	884	1491	723	1014	2	19
1968 (Dry)	816	1223	647	837	3	15
1988 (Critical)	456	843	304	462	0.6	7

[a] San Joaquin River water that enters the Delta between February 1 and June 30.

[b] Amount of San Joaquin River water that entered the Delta between February 1 and June 30 and that was exported or diverted from the Delta during the given water year.

[c] Volume of San Joaquin River water that entered the Delta between February 1 and June 30 that left the Delta as Delta outflow.

SJTA Table 5-1: Summary of Delta Inflow, Exports and Outflow derived from SJTA Attachment 6

The SED recognized that Delta exports would increase by an average of 76,000 acre-feet annually under 40% unimpaired flow. (SED, at 5-78.) However, Dr. Paulsen's analysis demonstrates that the increase could be significantly higher than the number reported in the SED when the WSE modeling constraints used by SWB Staff - such as carryover storage, refill criteria and flow shifting - are eliminated. For instance, exports would increase by 275 TAF in a below normal year such as 1996, by 178 TAF in a dry year such as 1968, and by 152 TAF in a critically dry year such as 1988.

USBR and DWR, as operators of the CVP and SWP, are some of the most junior water right holders in the entire Bay-Delta system. It is a violation of water right priority to require senior water right holders on the three eastside tributaries to reduce diversions for the supposed benefit of fish migrating through the Delta, while simultaneously creating a situation that allows for additional diversions by the junior CVP and SWP operators in the Delta. Moreover, as noted above, only 1.3% of San Joaquin River inflow (from February 1 – June 30) contributes to Delta outflow – even under 40% unimpaired flow. (SJTA Table 2-7.)

In sum, water right priorities are once again turned on their head when the most senior water right holders must bypass water while the most junior water right holders in the Basin continue to divert unabated in higher quantities.

5.1.4. Other South Delta diverters are improperly excluded

According to the SWRCB's data from the joint enforcement proceeding commenced against Byron-Bethany Irrigation District and West Side Irrigation District, which culminated in an order of dismissal in ORDER WR 2016-0015, average diversions in the San Joaquin Delta amount to 65,641 acre feet from February through June. (ENF01951 & ENF01949, Exhibit WR-51, Sheet - Delta Sr Combined 2015-06-15 [selected for San Joaquin Delta diverters only].)

In order to adhere to the water right priority system, the State Water Board must consider what contributions, if any, must be made by south Delta diverters to protect San Joaquin River fish migrating through the Delta. Any diverters in the south Delta who have rights junior to those held by water right holders on the three eastside tributaries must contribute flows first. The creation of a plan which does not even contemplate contributions from south Delta diverters runs afoul of the rules of water right priority.

5.1.5. Water right holders on Calaveras, Mokelumne and Cosumnes Rivers are improperly excluded

It is not clear from the WQCP or the SED how water right holders on the Calaveras, Mokelumne, and Cosumnes Rivers will be addressed. As flows from these rivers contribute to the Delta, this omission should be corrected to ensure that water right holders on these rivers contribute in accordance with their water right priority.

5.2. Riparian water right holders are not analyzed

The SED assumes that riparian rights will not be affected by the WQCP. Specifically, the modeling in the SED assumed that "[r]iparian . . . demands are fully met, because these diverters are considered senior to appropriative ones." (SED, at Appx. F1, p. F.1-38.) This assumption is erroneous. The WQCP's requirement of 30% to 50% for instream uses could affect riparian water right holders if the remaining flow, i.e., 70% to 50%, were insufficient to meet all riparian demand.

In such a scenario, riparian diverters would be collectively curtailed. While it may be unlikely that riparians will be curtailed, the likelihood is unknown because the SWB failed to analyze the issue. This error should be corrected.

5.3. The WQCP provides protection to municipal supply without consideration of water right priority

The WQCP states that the Board will "take actions as necessary to ensure that implementation of the flow objectives does not impact supplies of water for minimum health and safety needs, particularly during drought periods." (SED, at Appx. K, p. 28.) To the extent that this provision of the program of implementation will prioritize municipal beneficial uses over other beneficial uses without respect to water right priority, it is unlawful. "[T]here is no legislative or judicial authority in California for the enforced advancing of the priority of an appropriation for one beneficial purpose over that of a prior appropriation for another beneficial purpose, either in time of water shortage or otherwise, without making due compensation." (Hutchins, *California Law of Water Rights*, p. 174.) The only mechanism by which the State Water Board can assign a higher priority to a later appropriation serving a more preferred beneficial use is through the imposition of permit terms and conditions on the earlier appropriation. (see *Racanelli, supra*, 182 Cal.App.3d at 132 [recognizing the very limited authority of the Board to impose permit conditions that give a higher priority to a more preferred beneficial use even though later in time].) Thus, where a water right is not based on a permit issued by the State Water Board or its predecessor agency, the Board has no authority to prioritize one beneficial use over another in violation of water right priority. (*Young v. State Water Resources Control Bd.* (2013) 219 Cal.App.4th 397, 404 ["the Water Board does not have jurisdiction to regulate riparian and pre-1914 appropriative rights"].) The Board's effort to effectuate such a prioritization in the WQCP constitutes a violation of the rule of water right priority.

5.4. The WQCP violates the rule of water right priority amongst water right holders on the Stanislaus, Tuolumne and Merced Rivers

Apart from violating the rule of priority by excluding all diverters on the San Joaquin River, the WQCP also violates the rule of priority by requiring certain percentage contributions from the

Stanislaus, Tuolumne and Merced Rivers whenever the Tributary Flow Objectives are insufficient to satisfy the Vernalis Base Flow Objective. Specifically, the program of implementation states, "[w]hen the percentage of unimpaired flow requirement is insufficient to meet the minimum base flow requirement, the Stanislaus River shall provide 29 percent, the Tuolumne River 47 percent and the Merced River 24 percent of the additional total outflow needed to achieve and maintain the required base flow at Vernalis." (SED, at Appx. K, p. 29.) These contribution percentages violate the rule of priority because they ignore the fact water right holders on the Stanislaus, Tuolumne and Merced Rivers have different priority levels. The Board cannot require contributions in accordance with these percentages because they are not based on water right priority. The Board should decline to adopt the plan in its current form as it violates the rule of priority.

6. The Proposed Objective is Unlawful Because the State Water Board Cannot Regulate Flow in the San Joaquin River Tributaries Through the Basin Plan Covering the San Francisco Bay Delta.

The State Water Board developed the Bay Delta Plan pursuant to its authorities under the Clean Water Act and the Porter Cologne Act. Under these two authorities, the purpose of a basin plan is to protect "water bodies and the beneficial uses of those water bodies." (*City of Arcadia* (2011) 191 Cal.App.4th 156, 178.) Further, Water Code section 13050 describes a water quality control plan as applying to only those beneficial uses "for the waters within a specified area." (Water Code, § 13050[j].) Thus, water quality control plans are developed to protect specific waters within a defined geographic scope.

The Bay Delta Plan specifically regulates the waters within the San Francisco Bay and the Delta Estuary. (SWRCB 1978 Bay Delta Plan, at I-3 [stating the purpose of the plan was to "protect beneficial uses of Delta water supplies"]; SWRCB 2006 Bay Delta Plan, at 1.) This includes the waters of the San Francisco Bay, the San Pablo Bay, the Suisun Bay, the water bodies of the interior Delta, the Sacramento River from the Delta up to the confluence of the American River, and the lower San Joaquin River from the Delta up to Vernalis. (SWRCB 2006 Bay Delta Plan, at Figure 1.) Since its original adoption in 1978, the State Water Board has revised the Bay Delta Plan several times. Through these revisions, however, the geographic scope and the beneficial uses to be protected have remained the same, consistent with guidance provided by Water Code section 13050. (*See* 1978 Bay Delta Plan, at I-3; 1995 Bay Delta Plan, at Figure 1; 2006 Bay Delta Plan, at Figure 1.)

The proposed project seeks to protect beneficial uses outside the geographic scope of the Bay Delta Plan, and also proposes to completely change the geographic scope of the Bay Delta Plan. The proposed geographic changes are unlawful for several reasons. First, the State Water Board did not notice the changes to the geographic scope and regulated waters. The State Water Board noticed its review of the Bay Delta Plan on February 13, 2009 ("2009 NOP"). The 2009 NOP noticed the State Water Board was beginning its review of the San Joaquin River Flow Objective. The 2009 NOP did not provide notice the State Water Board planned to review the geographic scope of the Bay Delta Plan or otherwise regulate waters outside the Bay Delta Plan. The State Water Board revised the 2009 NOP by issuing a revised Notice of Preparation in 2011 ("2011 NOP"). The 2011 NOP did not notice the State Water Board was reviewing or amending the geographic scope of the Bay Delta Plan, nor did it notice that it would be regulating waters not included in the Bay Delta Plan.

Second, the proposed changes to the geographic scope are significant and the Lower San Joaquin River Flow Objective no longer seeks to regulate the waters in the Bay Delta. The waters regulated in the Bay Delta Plan do not include the San Joaquin River upstream of Vernalis, nor the Stanislaus, Tuolumne, or Merced Rivers. Now, the WQCP proposes to regulate the San Joaquin River from its confluence with the Merced River to Vernalis, and the Stanislaus, Tuolumne, and Merced Rivers. Thus, the geographic scope and regulated waters of the existing Bay Delta Plan are entirely different than the geographic scope and waters of the proposed project. Because the Bay Delta Plan only regulates specific waters, the regulation of waters beyond the geographic scope of the Bay Delta Plan cannot – and should not - be performed through a review of the plan. (Water Code, § 13050.)

Third, the proposed LSJR Flow Objective is no longer tied to a Delta benefit. In the 1978, 1995, and 2006 plans, the water quality objectives were directly tied to the protection of beneficial uses in the Delta. (1978 Bay Delta Plan, at III-1 [protecting "beneficial uses in the Delta and Suisan

Marsh"]; 1995 Bay Delta Plan, at [protecting the "multitude of beneficial uses" served by the "waters of the Bay Delta Estuary"]; 2006 Bay Delta Plan, at 5 [developing a plan to protect the waters of "the Delta, Suisun Bay, and Suisun Marsh"].) The WQCP no longer proposes to protect beneficial uses of the Bay or Delta; instead, the revised regulations proposes to protect beneficial uses in "those portions of the San Joaquin River (SJR) Basin that drain to, divert water from, or otherwise obtain beneficial use (e.g., surface water supplies) from the three eastside tributaries." (SED, at 7-1.) The State Water Board attempts to tie the benefits of the proposed Tributary Flow Objective to a downstream Delta benefit, by including the Narrative Objective which mentions protection of San Joaquin River watershed fish migrating through the Delta. However, both the analysis performed in the SED and information provided by the SJTA demonstrate that little, if any, of the proposed releases will benefit the Delta and Bay at all. This is a complete departure from the previous Bay Delta plans; the Tributary Flow Objective will not protect beneficial uses in the Delta and therefore is not truly an amendment to the Bay-Delta Plan or the former Lower San Joaquin River flow objective therein.

Fourth, the reality is that the Tributary Flow Objective is a very focused and localized plan that is entirely contained in the Central Valley region and is the responsibility of the Central Valley Regional Water Quality Control Board. The Regional Water Quality Control Boards are responsible for developing water quality requirements for the water basins within their respective jurisdictions. (Water Code, § 13240 ["Each regional board shall formulate and adopt water quality control plans for all areas within the region"].) The State Water Board may develop statewide water quality regulations or water quality control plans spanning more than one basin. (*County of Los Angeles v. California State Water Resources Control Board* (2006) 143 Cal.App.4th 985, 1000; Water Code, § 13140.) The Bay Delta Plan is a water quality control plan spanning more than one basin. However, unlike the Bay Delta Plan, the Tributary Flow Objective does not span more than one basin. In fact, the proposed regulation is localized in the three tributaries to the San Joaquin River. For this reason, water quality regulation of the tributaries is the duty of the Regional Board, rather than the State Water Board. (Water Code, § 13240.) It is therefore unlawful for the State Water Board to attempt to reach outside the scope of the Bay Delta Plan and regulate tributary flows outside the Bay Delta area.

The proposed plan is neither a Bay-Delta Plan, nor a basin plan. As the SED points out, the Delta will be dealt with later, namely in Phase II. Similarly, it is not a San Joaquin River basin plan, as the entire San Joaquin River watershed south of Merced is excluded, as is everything on the west side of the San Joaquin River. Essentially, the proposed project is a tributary instream flow determination which should have been developed in an entirely different process, as explained below.

Pursuant to the Sacramento-San Joaquin Delta Reform Act of 2009, the Board was to submit to the legislature "a prioritized schedule and estimate of costs to complete instream flow studies for the Delta and for high priority rivers and streams in the Delta watershed . . ." (Water Code, § 85087.) The State Water Board's initial list of high priority streams in 2010 included the Stanislaus, Tuolumne and Merced Rivers. (SWRCB, Instream Flow Studies for the Protection of Public Trust Resources, A Prioritized Schedule and Estimate of Costs; December 2010).[56] After creating the list of high priority streams, the State Water Board decided to abandon its effort to perform Instream flow/Public Trust proceedings on the three tributaries. Instead, the Board shifted to using the Bay-Delta Plan as a vehicle to get additional flows out of the three tributaries. Unfortunately for the State Water Board, this shift from a Public Trust proceeding to a Basin Plan/Water Quality Plan accounts for much that is wrong with the WQCP objectives.

For these reasons, the Board should not adopt the proposed revisions to the Bay-Delta Plan, and should leave the development of water quality control plans for the San Joaquin River basin to the Regional Water Quality Control Board.

7. The Proposed Objective is Unlawful Because Flow is Not a Water Quality Constituent That Can Be Regulated Through a Water Quality Control Plan.

The Porter Cologne Water Quality Control Act establishes a comprehensive program for water quality control. Water quality control plans are developed pursuant to Porter Cologne

[56] Instream Flow Studies report available at http://www.waterboards.ca.gov/publications_forms/publications/legislative/docs/2011/instream_flow2010.pdf.

authority and consist of three parts: (a) designation of beneficial uses, (b) water quality objectives, and (c) a program of implementation. (Water Code, § 13050[j].) The purpose of water quality objectives is to set the level of water quality constituents or characteristics for the reasonable protection of beneficial uses of water. (Water Code, § 13050[h]. Water quality means chemical, physical, biological, bacteriological, radiological, and other properties and characteristics of water which affect its use. (Water Code, § 13050[g].)

Quantity of water is a descriptive term that reflects the amount of water, but it is not a characteristic of the water itself. Thus, flow is not water quality constituent or characteristic. The recent storm water case out of the United States District Court for the Eastern District of Virginia clarifies the distinction between water quality and water flows. (*Virginia Department of Transportation v. United State Environmental Protection Agency* (2013) 2013 U.S. Dist. LEXIS 981 ("*VDot*").) In the *VDot* matter, the Department of Transportation challenged the EPA's regulation of storm water runoff through the Clean Water Act. Specifically, the Department of Transportation claimed that storm water is not a pollutant that can be regulated by the EPA. The Eastern District Court agreed and prohibited the regulation of storm water as a "surrogate" for water quality, rather than regulating pollutants directly. (*VDot*, at 9.) The Court understood the EPA's storm water regulation was attempting to control water quality with flow, but the Court made clear that the EPA was required to regulate pollutants directly and had no authority to regulate the flow of water in an effort to control water quality. (*Id*.)

Thus, applying the holding in *VDot* to the present matter, the State Water Board cannot regulate flow pursuant to the Clean Water Act because flow is not a water quality constituent. Because flow is not a water quality constituent, it cannot be regulated through a water quality control plan. For these reasons, the Tributary Flow Objective is unlawful and must be set aside.

8. The Proposed Amendments to the WQCP Violate Federal Antidegradation Policy

The Clean Water Act requires that a state's water quality standards contain the following elements: (1) designated uses, (2) methods used and analysis conducted to support water quality standards revisions, (3) numeric or narrative water quality criteria sufficient to protect those designated uses, and (4) **an antidegradation policy**. (See 33 USCS § 1313[c][2][A]; Protection of Environment, 40 C.F.R. §§ 131.6; 131.11[a][1]; 131.11[b][1],[2]; 131.12.) With respect to the antidegradation policy, the EPA's regulations require the state to "develop and adopt a statewide antidegradation policy" as well as "methods for implementing the antidegradation policy." (40 C.F.R. § 131.12[a][d]; *Northwest Envtl. Advocates v. United States EPA* (Or. Dist. Ct. 2003), 268 F.Supp.2d 1255, 1264.) The federal policy requires that "existing instream water users and the level of water quality necessary to protect the existing uses . . . be maintained and protected." (40 C.F.R. § 131.12[a][1].)

The State Water Board has adopted Resolution No. 68-16, entitled "Statement of Policy with Respect to Maintaining High Quality Waters in California." (SWRCB Resolution No. 68-16.) The Board has interpreted this resolution as incorporating the federal policy wherever federal policy applies under federal law. (SED, at 23-3.) By its own terms, the resolution "is to be followed in any of its water right or water quality actions." (*Central Delta Water Agency v. State Water Resources Control Bd.*, (2004) 124 Cal.App.4th 245, 265.) Specifically, the resolution states,

> "[w]henever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies." (SWRCB Resolution No. 68-16, ¶ 1.)

As demonstrated below, the State Water Board has failed to perform the necessary analysis to determine whether the proposed amendments to the WQCP will comport with federal antidegradation requirements and Resolution No. 68-16.

Currently, the 2006 Bay-Delta Plan requires the following minimum monthly average flow rate on the San Joaquin River at Vernalis:

Vernalis Base Flow		
Wet, Above Normal	Feb-Apr. 14 & May 16-June	2,130 or 3,420 cfs
Below Normal, Dry	Feb-Apr. 14 & May 16-June	1,420 or 2,280 cfs
Critical	Feb-Apr. 14 & May 16-June	710 or 1,140
Vernalis Pulse Flow		
Wet	Apr. 15 – May 15	7,330 or 8,620 cfs
Above Normal	Apr. 15 – May 15	5,730 or 7,020 cfs
Below Normal	Apr. 15 – May 15	4,620 or 5,480 cfs
Dry	Apr. 15 – May 15	4,020 or 4,880 cfs
Critical	Apr. 15 – May 15	3,110 or 3,540 cfs
All	October	1,000 cfs

SJTA Table 8-1. Vernalis base and pulse flows as reflected in Table 3 of the 2006 Bay-Delta Plan

Under the proposed amendments to the water quality control plan, these flow requirements would no longer be controlling. Instead, the controlling factors would be an unimpaired flow percentage of 30% to 50% from the three eastside tributaries (on a minimum 7-day running average), with a minimum base flow of 800 to 1,200 cfs at Vernalis, from February through June. (SED, Appx. K, p. 18.) Without providing any analysis as to whether the new flow requirements would result in more or less flow at Vernalis, or whether the new flow requirements would provide better water quality in the lower San Joaquin River or in any of the three eastside tributaries, the SED concludes that the proposed plan amendments "will likely result in water quality improvements in the San Joaquin River (SJR) Watershed and the southern Delta ." (SED, at 23-2.) The only basis for this conclusion appears to be the State Water Board's assertion "the flow objectives may be adjusted" as part of an adaptive management program if monitoring and "other best available scientific information indicates that such changes will be sufficient" to meet the narrative objective, i.e., that the changes will "support and maintain the natural production of viable native SJR Watershed fish populations migrating through the Delta . . .." (SED, at 23-4.) In other words, rather than performing the scientific analysis prior to proposing these changes to the WQCP to ensure that the amendments do not result in a degradation of water quality, the State Water Board has taken the position that the scientific analysis will be performed later, and in real-time, as part of implementing the plan. The failure to perform an antidegradation analysis to ensure that the proposed objectives do not result in a degradation of water quality is a dereliction of duty, and a violation of Resolution No. 68-16. `

Furthermore, the State Water Board's adaptive management plan is so far-reaching that it would amount to an amendment of the proposed objectives. Specifically, the SED states that the initial 40% flow requirement set forth in the objectives might be changed (within the 30% to 50% range); that the flows may not be released on a 7-day running average of unimpaired flow, but instead on an "adaptive schedule" that does not coincide with a 7-day running average of unimpaired flow; and that the flow requirements may be "shifted" outside the February through June period for release later in the year, or in a subsequent year. (SED, at 23-4.) The latter two proposals are fundamental changes to the proposed objectives, which clearly and explicitly require the maintenance of a percentage of unimpaired flow on a minimum 7-day running average from February through June, and which do not require any releases outside of the February through June period. (SED, at Appx. K, p. 18.) While the Board has modeled the proposed objectives as if *some* version of these adaptive adjustments was in place (such as one method of flow shifting), it has not analyzed the broad range of flow scenarios that are permissible under the proposed adaptive adjustments to determine whether implementation of these changes would degrade water quality.

As the SED does not demonstrate that the new objectives will not cause a degradation of water quality, the Board should decline to adopt the WQCP. Moreover, as the plan itself must contain an antidegradation policy under the Clean Water Act (See 33 USCS § 1313[c][2][A]), the

State Water Board should decline to adopt the proposed amendments because they fail to comport with federal law and the requirements for EPA approval.

9. The Proposed Project is Unlawful Because it Violates FERC's Exclusive Jurisdiction.

The SJTA incorporates all of the comments submitted by Modesto Irrigation District and Turlock Irrigation District on the issue of FERC's exclusive jurisdiction.

10. The Proposed Objective is Unlawful Because the State Water Board Failed to Fully Implement the 2006 Water Quality Control Plan Objectives

After adopting water quality objectives, the State Water Board is required to fully implement those objectives; failure to fully implement the objectives amounts to a de facto amendment without complying with the procedural requirements for amending a water quality control plan. (*State Water Resources Control Bd. Cases*, *supra*, 136 Cal.App.4th at 734.) To date, the State Water Board has not fully implemented the SWRCB 2006 Bay-Delta Plan. USBR has repeatedly failed to comply with the flow requirements at Vernalis. In addition, the SWRCB 2006 Bay-Delta Plan includes several non-flow measures in its plan of implementation. These measures include installation of screening facilities on diversions, modification of existing commercial and sport fishing regulations, expansion of the illegal harvest program, improvement of hatchery programs, and expansion of gravel replacement and maintenance. (2006 Bay Delta Plan, at 34-37.) The State Water Board did not include these measures as superfluous to the protection of beneficial uses; instead, the State Water Board characterized the non-flow measures as "necessary to achieve the objectives." (SWRCB 2006 Bay Delta Plan, at 22.) Despite the necessity, these actions were never implemented.

The proposed project seeks to create new flow requirements on the three eastside tributaries for the protection of fish and wildlife beneficial uses, without first determining whether the 2006 Bay-Delta Plan is sufficient to protect those same uses. Before the Board takes the drastic step of altering the 2006 Bay-Delta Plan to include geographic area never before included in the plan, the Board should implement the 2006 Bay-Delta Plan as written and determine whether it is sufficient to protect fish and wildlife beneficial uses. Having never fully implemented the 2006 Bay-Delta Plan, the Board simply cannot know whether the plan was sufficient or not.

The State Water Board cannot continue to ask for increased flow and allow the non-flow measures from the 2006 Bay-Delta Plan to continue to be ignored. Before the State Water Board can change the Lower San Joaquin River Flow Objective, it must first implement the existing non-flow actions. (*State Water Resources Control Bd. Cases*, *supra*, 136 Cal.App.4th at 734.) Only after those actions are implemented, may the State Water Board review the existing flow objectives to determine if more flow is needed protect fish and wildlife.

11. The Proposed Revisions to the Bay-Delta Plan Violate the Clean Water Act.

Section 303 of the Clean Water Act requires each state, subject to approval by the Environmental Protection Agency (EPA), to "institute comprehensive water quality standards" in order "to prevent water quality from falling below acceptable levels." (*Pud No. 1 v. Wash. Dep't of Ecology* (1994) 511 U.S. 700, 704, quoting *EPA v. California ex rel. State Water Resources Control Bd.* (1976) 426 U.S. 200, 205, n. 12; see 33 U.S.C. § 1313.) In establishing water quality standards, the states must consider the "use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other purposes, and [navigation]." (33 U.S.C. § 1313[c][2].)

The State Water Board has taken the position that regulation of water *quantity*, including the regulation of instream flow, is not a water quality standard under the Clean Water Act that is subject to EPA approval or enforcement. (SED, at Appx. K, p. 5; SJTA Attachment 12.) In the event the State Water Board changes its position, or in the event it is determined by a court that the State Water Board's position is incorrect, it is the SJTA's position that, for the various reasons stated above in Sections 2 and 3, the information in the SED is insufficient for the Board to conduct the necessary balancing required under the Clean Water Act for the setting of water quality standards.

12. The Proposed Objectives are Unlawful because they Amount to an Adjudicatory Action without Due Process of Law

The State Water Board is empowered to undertake both adjudicatory and regulatory functions in allocating water rights and protecting water quality. (Water Code, § 174.) Although the State Water Board possesses this dual authority, the two functions have "distinct attributes." (*Racanelli, supra,* 182 Cal.App.3d at 112.)

The development of a water quality control plan is a regulatory function in which the State Water Board acts in a quasi-legislative capacity. (*State Water Resources Control Bd. v. Office of Admin. Law* (1993) 12 Cal.App.4th 697, 701-702 [amendments to the regional water quality control plan were "regulatory"]; (*Ibid.*) The State Water Board's review of the water quality objectives in the Bay Delta Plan is also a quasi-legislative act. (*Ibid.*) ["In performing its regulatory function of ensuring water quality by establishing water quality objectives, the Board acts in a legislative capacity."])

Water quality objectives are not self-effectuating; instead, the State Water Board must act separately to implement the actions delineated in the program of implementation. (Water Code, § 13242 [requiring a program of implementation to achieve the objectives].) Usually, the State Water Board implements the objectives by amending water rights. In contrast to developing water quality objectives, the State Water Board's amendment of water rights is an adjudicatory function. (*Racanelli, supra,* 182 Cal.App.3d at 113 ["in undertaking to allocate water rights, the Board performs an adjudicatory function"], citing *Temescal Water Co. v. Dept. of Public Works* (1995) 44 Cal.2d 90, 100-06.) Because property rights are at issue in an adjudicative water-right proceeding, the State Water Board is required to comply with Government Code section 11425.10, which provides due process protections such as directed notice, an opportunity to be heard, the ability to present and rebut evidence, and the right to cross examine. (Cal. Code Regs., tit. 23, § 648[b].) The same due process requirements are <u>not</u> required when the State Water Board acts in a legislative capacity, such as when the Board develops water quality objectives and amends a water quality control plan. (Gov. Code, § 11353.)

As demonstrated below, the State Water Board's proposals for the Tributary Flow Objective and the Vernalis Flow Objective are framed so narrowly that they amount to an adjudication of the rights of OID, SSJID, TID, MID, and CCSF. Oakdale Irrigation District, South San Joaquin Irrigation District, Turlock Irrigation District, Modesto Irrigation District, and the City and County of San Francisco. By conducting this adjudication through the guise of a quasi-legislative action, i.e., an amendment to the water quality control plan, the State Water Board is violating the due process rights of the SJTA members.

When developing water quality objectives, "the Board is directed to consider not only the availability of unappropriated water (Water Code, § 174) but also *all* competing demands for water in determining what is a reasonable level of water quality protection (Water Code, § 13000)." (*Racanelli, supra*, 182 Cal.App.3d at 118 [emphasis in original].) Similarly, the State Water Board must consider "[w]ater quality conditions that could reasonably be achieved through the *coordinated control of all factors which affect water quality in the area*." (Water Code, § 13241[c][emphasis supplied].) In *Racanelli*, the First District Court of Appeal held that the Board's decision to establish water quality objectives for the Delta based on the amount of water available prior to the construction and operation of the CVP and SWP and facilities (collectively the "Projects"), known as the "without project" standard, violated these rules because the "Board considered only the water use of the Delta parties . . . and the needs of the customers served by the [P]rojects . . . [while] [n]o attention was given to water use by the upstream users." (*Ibid.*) In other words, the standard was set "only at a level which could be enforced against the projects." (*Id.* at 119.) The *Racanelli* Court stated that a "global perspective" of the available water resources was necessary. (*Ibid.* at 119.) The Court observed that the imposition of a "without project" standard upon the Projects themselves "represents one reasonable method" of achieving water quality control in the Delta, but the Court explained that the Board cannot satisfy its water quality planning obligations if it does not consider "other actions which could be taken to achieve Delta water quality, such as remedial actions to curtail excess diversions and pollution by other water users." (*Ibi.d* at 120.)

The State Water Board's Tributary Flow Objective and Vernalis Flow Objective are unlawful for the same reasons that the "without project" standard in *Racanelli* was unlawful, namely, they target a select group of water users and ignore the possible contributions or actions of other water users. The State Water Board's new flow proposal has a narrative objective and two numeric flow objectives. (SED, at ES-4; Appx. K, p. 18.) Both the narrative and numeric objectives purport to cover a broad geographic area that extends far beyond the locale of the three eastside tributaries that are identified as being the contributing resources for achieving those objectives. Specifically, the Narrative Objective states that inflow conditions from the "San Joaquin River watershed to the Delta" should be maintained at sufficient levels to support and maintain the natural production of viable native San Joaquin River watershed fish populations "migrating through the Delta." (SED, at Appx. K, p. 18.) Similarly, the program of implementation states, "[a]lthough the lowest downstream compliance location from the Lower San Joaquin River flow objective is at Vernalis, the objectives are intended to protect migratory Lower San Joaquin River fish in a larger area, including within the Delta . . .." (SED, at Appx. K, p. 28.) Despite the broad geographic scope of the objectives, which covers the entire San Joaquin River watershed through the Delta, the Tributary Flow Objective only requires the maintenance of an unimpaired flow percentage below the rim dams on each of the Stanislaus, Tuolumne and Merced Rivers. (SED, at ES-5; 1-1 – 1-2; Appx. K, p. 18.)[57] Likewise, the SED states that the Vernalis Flow Objective will be satisfied by releases from the Stanislaus, Tuolumne and Merced Rivers: "When the percentage of unimpaired flow requirement is insufficient to meet the minimum base flow requirement, the Stanislaus River shall provide 29 percent, the Tuolumne River 47 percent and the Merced River 24 percent of the additional total outflow to achieve and maintain the required base flow at Vernalis." (SED, at Appx. K, p. 29.)

[57] The "plan area" in the SED is described as the Stanislaus River watershed from New Melones to the confluence of the San Joaquin River, the Tuolumne River watershed from New Don Pedro Reservoir to the confluence of the San Joaquin River, and the Merced River watershed from the Lake McClure to the confluence of the San Joaquin River, as well as the mainstem of the San Joaquin River between its confluence with the Merced River downstream to Vernalis. (SED, at 1-2.)

By only requiring the maintenance of unimpaired flow below the rim dams on each of the three eastside tributaries, and by only requiring contributions from the three eastside tributaries to meet the Vernalis Flow Objective, and by proposing to meet the Narrative Objective by adaptively adjusting the Tributary Flow Objective (SED, at Appx. K, p. 30), the State Water Board's proposed objectives are designed in such a way that they can only be enforced against water users who divert from the Stanislaus, Tuolumne and Merced Rivers, upstream of the compliance points on each of those rivers. The major water users on those rivers include the SJTA member agencies SSJID, OID, TID, MID, and the City and County of San Francisco. (SED, at 2-7, 2-18.) All of the water users upstream of the confluence of the Merced River with the San Joaquin River are notably exempt from this regulation, as are the water users on the westside of the San Joaquin River, and the water users on the Calaveras, Mokelumne and Cosumnes Rivers (SED, at Figure ES-1 [showing the Calaveras, Mokelumne and Cosumnes Rivers in the San Joaquin River Basin]). By exempting these water users and the resources available to them, the State Water Board has improperly ignored numerous water resources that should have been included in developing the objectives designed to protect "the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta." (SED, at Appx. K, p. 18.)

Specifically, on the Upper San Joaquin River, the State Water Board has ignored Eastman Lake behind Buchanan Dam on the Chowchilla River (Storage Capacity: 150,000 acre feet[58]), Hensley Lake behind Hidden Dam on the Fresno River (Storage Capacity: 90,000 acre feet[59]), and Millerton Lake behind Friant Dam on the Upper San Joaquin River (Storage Capacity: 520,500 acre feet[60]). (SED, at Figure 2-3.) The average annual unimpaired flow for the Upper San Joaquin River at Friant Dam is 1,702,000 acre feet, which, standing alone, "represents approximately 28 percent of the unimpaired flow on the SJR at Vernalis." (SED, at 2-9.) That figure of 28 percent does not include the resources on the tributaries further upstream on the Chowchilla and Fresno Rivers. The

[58] Eastman Lake storage: http://cdec.water.ca.gov/cgi-progs/profile?s=BUC&type=res
[59] Hensley storage: http://cdec.water.ca.gov/cgi-progs/profile?s=HID&type=res
[60] Millerton Lake storage: http://cdec.water.ca.gov/cgi-progs/profile?s=MIL&type=res

State Water Board did not consider, nor incorporate these resources, when setting the numeric requirements in the Tributary Flow Objective and the Vernalis Flow Objective.

The State Water Board has also ignored the water users on the lower San Joaquin River that are downstream of the compliance points on each of the three eastside tributaries. These water users include, but are not limited to, the following:

Water User	**Average Annual Demand in Acre Feet**
Westside Irrigation District	19,437
Stevinson Water District	17,533
Patterson Irrigation District	62,932
West Stanislaus Irrigation District	61,617
El Solyo Water District	60,252
Banta-Carbona Irrigation District	14,686
Recl. Dist. 2075 (McMullin)	5,906
Recl. Dist. 2064 (River Junction)	2,610
Byron-Bethany Irrigation Dist.	1,743

SJTA Table 13-1[61]

Due to the location of these water users downstream of the compliance points, none can contribute to meeting the Tributary Flow Objective, and none are directed to contribute to the Vernalis Flow Objective, the latter of which is to be satisfied with flows from the Stanislaus, Tuolumne and Merced Rivers. (SED, at Appx. K, p. 29.) Although the SED indicates that these water users may be subject to conditions requiring them to curtail or cease diversions "when flows

[61] Demand data derived from SWRCB's submissions in ENF01951 & ENF01949, Exhibit WR-51

are required to meet the proposed flow objective," the WQCP does not identify these contributions as objectives, and fails to indicate how such a contribution might be achieved or implemented in the absence of an objective. (SED, at ES-23.)

Similarly, the Plan Area also includes the Southern Delta, and rightfully so, because the San Joaquin River enters and supplies water to the Southern Delta. The WQCP only addresses salinity impacts to lands in the South Delta. There is no requirement that South Delta water users contribute to the flow objectives by curtailing diversions, or taking any other action, in order to achieve the objectives for fish and wildlife beneficial uses, despite the fact that the WQCP explicity states that "the objectives are intended to protect migratory LSJR fish in a larger area, including within the Delta." (SED, at Appx. K, p. 28.)

In summary, the Plan Area includes 806,547 total acres. (SED, at 11-11.) The amount of land in the entire San Joaquin River Hydrologic Region is approximately 3.73 million acres (SED, at 2-5), which leaves approximately 2.92 million acres of land that are not included, but which still fall within the San Joaquin River basin.[62] When the hydrologically connected Kings River basin is added, the amount of land that is within the San Joaquin River basin that is not included in the plan increases even more. In addition, while the WQCP focuses on the seven water right holders identified in the table above, it excludes approximately 4,500 water right holders in the San Joaquin River Basin.

By developing objectives that can only be achieved through the imposition of restrictions on a select group of water users and water right holders, the State Water Board has unlawfully "ignore[d] other actions which could be taken to achieve Delta water quality, such as remedial actions to curtail excess diversions . . . by other water users" and/or flow contributions from other water users within the system. (*Racanelli, supra,* 182 Ca.App.3d at 120.) The necessary "global perspective" which considers all available water resources is severely lacking here. (*Racanelli*,

[62] The map in figure ES-1 does not accurately depict the San Joaquin River Basin. The San Joaquin River Basin also includes the Kings River Basin. (See Comprehensive Study of Sacramento and San Joaquin River Basins by U.S. Army Corps of Eng'rs, 2002, Appx. B, at 11-4,11-5; *Turner v. James Canal Co.*, 155 Cal. 82, 91 [explaining that the Kings River and San Joaquin River are hydrologically connected through the Fresno Slough].)

supra, 182 Cal.App.3d at 119.) The beneficial uses to be served must drive the objectives (Water Code, § 13241), not the ability of the State Water Board to obtain/regulate water right holders. (*Racanelli, supra,* 182 Cal.App.3d at 120 ["the Board compromised its important water quality role by defining its scope too narrowly in terms of enforceable water rights"].) As the objectives do not consider "[w]ater quality conditions that could reasonably be achieved through the **coordinated control of all factors** which affect water quality in the area," the State Water Board's proposed amendments to the water quality control plan are in violation of Water Code section 13241[c]. ([emphasis supplied].)

Moreover, because the objectives area are so geographically limited and can only be implemented against a select number of water right holders, namely the SJTA member agencies who account for nearly all of the water directly diverted or stored from the Stanislaus and Tuolumne Rivers, it amounts to a *de facto* adjudication of the water rights of the SJTA member agencies. The water rights held by the SJTA member agencies are vested property rights that cannot be infringed upon or otherwise taken by governmental action without due process. (*Racanelli*, *supra*, 182 Cal.App.3d at 101; *Ivanhoe Irrigation Dist. v. All Parties* (1957) 47 Cal.2d 597, 623; *U.S. v. Gerlach Live Stock Co.* 339 U.S. 725, 752-54.) The *Racenelli* Court clearly explained that the regulatory function of adjudicating water rights is distinct from the quasi-legislative function of adopting water quality control objectives. (*Racanelli*, *supra*, 182 Cal.App.3d at 112.) By developing an objective which can only be achieved by imposing restrictions on a select group of water users, as was done against the SJTA members here and against the Projects in *Racanelli*, the Board has effectively exercised its adjudicatory authority over water rights. Having done so in the context of a quasi-legislative process, namely the development of a water quality control plan, the State Water Board has subverted numerous due process protections, including the requirements of providing directed notice, the opportunity to be heard, the ability to present and rebut evidence, and the right to cross examine. (Cal. Code Regs., tit. 23, § 648[b].)

For these reasons, the State Water Board should decline to adopt the proposed amendments to the water quality control plan.

13. The Salinity Standard is Flawed Because it Improperly Allocates All Responsibility for Salinity Control at Vernalis to Senior Right Holders on the Stanislaus, Tuolumne and Merced Rivers, Contrary to the Express Findings of D-1641

Appendix K of the Draft 2016 SED states that increased flow from the Stanislaus, Tuolumne and Merced Rivers will assist in achieving the southern Delta salinity objective:

> In addition to the above requirements, the salinity water quality objective for the southern Delta will be implemented through the Lower San Joaquin River flow objectives, which will increase inflow of low salinity water into the southern Delta during February through June and thereafter under adaptive implementation to prevent adverse effects to fisheries. This will assist in achieving the southern Delta water quality objective.
>
> (Draft 2016 SED, Appx. K, at 45.)

San Francisco collected decades of salinity data in the 1930s, 1940s and 1950s on the Tuolumne and lower San Joaquin Rivers in anticipation that increasing diversions and application of irrigation water would result in increased salinity in the San Joaquin River. The Department of Water Resources took over this monitoring effort in the early 1960s. State Water Board Decision 1641 ("D-1641")[63] contains findings regarding the source of salinity in the San Joaquin River that are consistent with this historic data:

> 10.2.1.1 EFFECTS OF UPSTREAM WATER DIVERSION AND USE
>
> The largest diversions of water from the San Joaquin River and its tributaries are by (1) [United States Bureau of Reclamation ("USBR")] at New Melones Reservoir and Millerton Lake; (2) MID and TID at New Don Pedro Reservoir; and (3) [Merced Irrigation District ("Merced ID")] at Lake McClure. Additionally, the diversions into pipelines by the City and County of San Francisco from the Tuolumne River upstream of the Delta deplete Vernalis flows by 240 [TAF]. Taken together, these diversions have significantly reduced the flows in the San Joaquin River. Because of [Central Valley Project ("CVP")] diversions, alone, the flow of the San Joaquin River at Vernalis has decreased by 550 [TAF] per year on average with 345 [TAF] of this decrease occurring from April through September. The water diverted from the upstream tributaries to the lower San Joaquin

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63 *Revised Water Right Decision 1641, In the Matter of: Implementation of Water Quality Objectives for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary; A Petition to Change Points of Diversion of the Central Valley Project and the State Water Project in the Southern Delta; and A Petition to Change Places of Use and Purposes of Use of the Central Valley Project*, December 29, 1999, *Revised in Accordance with Order WR 2000-02*, March 15, 2000, State Water Resources Control Board, *available at* http://www.waterboards.ca.gov/waterrights/board_decisions/adopted_orders/decisions/d1600_d1649/wrd1641_1999dec29.pdf.

River is of high quality. Thus, these diversions result in a substantial reduction in the assimilative capacity of the San Joaquin River.

Despite the reduction in the assimilative capacity of the San Joaquin River that results from upstream diversions, water users in the San Joaquin basin upstream of the Delta are not necessarily responsible for implementation of the southern Delta salinity objectives by virtue of their depletions. Water diverted by the upstream parties is put to beneficial use for purposes such as irrigation, hydropower generation, recreation, and fish and wildlife enhancement. These are reasonable and beneficial uses that contribute to ensuring that the State's water resources are put to beneficial use to the fullest extent of which they are capable. (*See* Cal. Const., art. X, § 2.) It has long been recognized that it is reasonable to expect that upstream development will eventually reduce the amounts of water available downstream. (*Town of Antioch v. Williams Irrig. Dist*. (1922) 188 Cal. 451.) In *Antioch*, the California Supreme Court held that it would not be reasonable for an appropriator to enjoin upstream diversions so that sufficient flow would remain to hold back salt water from the ocean. *The current situation is similar to the Antioch case with respect to the depletion of water, since Antioch indicates that it may not be reasonable to require junior water right holders, solely because of their depletions, to release or bypass extra water to dilute downstream salinity.* In appropriate circumstances, of course, the SWRCB has authority to restrict diversions or require releases to protect water quality from seawater intrusion or loss of assimilative capacity. (*United States v. State Water Resources Control Board* (1986) 182 Cal.App.3d 82, 117 ("Whatever final conclusion is to be drawn from Antioch regarding the nature and extent of common law . . . rights to salinity control, existing constitutional and legislative authorities encompass the [SWRCB's] obligation to protect the quality of Delta waters.").) *In this case, however, it is not necessary, and would not be reasonable, to require that depletions be reduced, since the water quality objectives can and should be attained through regulation of other controllable factors*.

In this case, the depletions in the tributaries and the water right holders incurring the depletions are not the primary cause of salinity problems. Return flow from upstream diversions of water does not contribute significantly to the salt loading in the San Joaquin River. From 1977 through 1997, return flows from the Merced, Tuolumne and Stanislaus rivers contributed four, nine, and six percent, respectively, of the annual salt load of the river. Return flows from the upstream segment of the San Joaquin River also contribute little to the salt in the lower river. ***As discussed below, other factors contribute far more to the salinity concentrations in the southern Delta.***

10.2.1.2 THE EFFECT OF DISCHARGES IN THE CVP SERVICE AREA ON VERNALIS SALINITY

Although water quality problems on the San Joaquin River began with the reduction of flows due to upstream development and the advent of irrigated agriculture, they were exacerbated with construction of the CVP. The CVP consists of 18 federally operated reservoirs and four reservoirs operated jointly with the DWR. The Delta-Mendota Canal and pumping plant first began operating in 1951. The San Luis Dam and the California Aqueduct were completed in 1967. [South Delta Water Agency's] *witness testified that between 1930 and 1950 the average salt load at Vernalis was 750,000 tons* *per year. Between 1951 and 1997, the salt load has averaged more than 950,000 tons per year. Peak loads have exceeded 1.5 million tons per year following extended droughts.* [Central Valley Regional Water Quality Control Board ("Central Valley RWQCB staff")] *testified that from the 1960s onward there has been an increase in salt load and concentrations. The April through August salt load in the 1980s was 62 percent higher than the load in the 1960s and the corresponding annual load increase was 38 percent*.

Central Valley RWQCB staff described geographic sources of salinity based on historical data from 1977 through 1997. The Central Valley RWQCB staff concluded that high salinity at Vernalis is caused by surface and subsurface discharges to the river of highly saline water. *The sources of the discharges are agricultural lands and wetlands. Approximately 35 percent of the salt load comes from the northwest side of the San Joaquin River, and approximately 37 percent of the salt load comes from the Grasslands area. These areas receive approximately 70 percent of their water supply from the CVP, 20 percent from precipitation and 10 percent from groundwater. The* [total dissolved solids ("TDS")] *concentration of agricultural drainage water from the Grasslands area that discharges to the river through Mud Slough is approximately 4,000* [milligrams per liter ("mg/l")]. *In some cases, drainage water is more than ten times the concentration of the Vernalis salinity standard. . . .*

Based on the above discussion, the SWRCB finds that the actions of the CVP are the principal cause of the salinity concentrations exceeding the objectives at Vernalis. *The salinity problem at Vernalis is the result of saline discharges to the river, principally from irrigated agriculture, combined with low flows in the river due to upstream water development. The source of much of the saline discharge to the San Joaquin River is from lands on the west side of the San Joaquin Valley which are irrigated with water provided from the Delta by the CVP, primarily through the Delta-Mendota Canal and the San Luis Unit. The capacity of the lower San Joaquin River to assimilate the agricultural drainage has been significantly reduced through the diversion of high quality flows from the upper San Joaquin River by the CVP at Friant. The USBR, through its activities associated with operating the CVP in the San Joaquin River basin, is responsible for significant deterioration of water quality in the southern Delta…*

(D-1641, at 80-82 [emphasis added] [citations omitted].)

In response to these findings, D-1641 appropriately allocated responsibility to the CVP for meeting the Vernalis salinity standard:

> The USBR's actions have caused reduced water quality of the San Joaquin River at Vernalis. Therefore, this order amends the CVP permits under which the USBR delivers water to the San Joaquin basin to require that the USBR meet the 1995 Bay-Delta Plan salinity objectives at Vernalis.

(*Id*. at 86.)

The contribution of west side lands to San Joaquin River salinity is thus well known to the State Water Board, yet the Draft 2016 SED simply defers action with regard to reducing these discharges, contrary to the conclusion in D-1641 that salinity control "*can and should be attained through regulation of other controllable factors*," *i.e*. prevention of the discharges in the first place. (D-1641, at 81 [emphasis added].) While Appendix K acknowledges ongoing drainage reduction processes such as the San Luis Unit Feature Reevaluation Project and the San Joaquin River Real-time Salinity Management Program, (*see* Draft 2016 SED, Appx. K, at 49-50), there is no acknowledgement that these programs have failed to significantly reduce salinity loading by west side agriculture into the San Joaquin River. Given the considerable resources that have been spent over the years on these programs, it makes no sense to disregard these efforts. The SWB even concludes that if these programs are successful, then additional regulatory measures would be unnecessary

Instead, the Draft 2016 SED effectively shifts the economic burden of salinity reduction to senior rights holders on the three San Joaquin River tributaries by taking their water to solve the problem. The "main objective" of the San Joaquin River Real-time Salinity Management Program is to "control and time the releases of wetland and agricultural drainage to coincide with periods when dilution flow is sufficient to meet the Vernalis salinity objectives." (Draft 2016 SED, Appx. K, at 50.) The implication here is that "the solution to pollution is dilution," *i.e*. increased flows from the three tributaries will be used to avoid solving the drainage problem because higher flows will allow greater discharge of high salinity drain water from wildlife refuges and from west side agricultural land, without answering the basic question of whether it is reasonable to conduct irrigated agriculture on lands that are responsible for over 70-percent of the salt loading in the San Joaquin River without a feasible disposal option. The bottom line is that the State Water Board is not following the process described in D-1641:

> In the absence of an agreement, the SWRCB's approach to allocating responsibility would be to fashion an allocation that it believes mitigates the water right holders' impacts on salinity and flow related impacts on the Bay-Delta Estuary. Such an approach would include consideration of the factors discussed in California Constitution, Article X, section 2, the public trust doctrine, and applicable statutes, in addition to providing a reasonable method of calculating the responsibilities of the water right holders.

(D-1641, at 12-13, fn. 13.)

By not including the west side tributaries of the San Joaquin River in the Draft 2016 SED, the State Water Board cannot accomplish the approach set forth in D-1641 for allocation of responsibility based on relative contributions toward the problem of San Joaquin River salinity.

14. THE SED FAILS TO COMPLY WITH THE REQUIREMENTS OF CEQA AND THE BOARD SHOULD NOT ADOPT IT.

The proposed amendments to the WQCP are a discretionary action of a state agency and therefore subject to environmental review pursuant to the California Environmental Quality Act (CEQA). The Board acknowledges the Proposed Project is required to comply with CEQA. (SED, at ES-1.) The water quality control planning program is a certified regulatory program under which CEQA allows the State Water Board to prepare an SED in place of an environmental impact report. (Cal. Code Regs., tit. 14, § 15251; Cal. Code Regs., tit. 23, § 3775.) Although the environmental review is being performed pursuant to an SED, the review remains "subject to the broad policy goals and substantive standards of CEQA." (*City of Arcadia v. State Water Resources Control Board* (2006) 135 Cal.App.4th 1392, 1422 ("*City of Arcadia*").)

The draft Staff SED is fundamentally flawed and does not comply with CEQA. The following comments set forth the flaws of the SED.

14.1. Standard of Review

The California Environmental Quality Act, Pub. Res. Code, § 21000 *et seq*. ("CEQA"), requires a governmental agency to evaluate the environmental impacts whenever it considers approval of a discretionary project. (*California Sportfishing Protection Alliance v. State Water Resources Control Bd*.) (2008) 160 Cal.App.4th 1625, 1642). The purpose of environmental review is to inform the public and its responsible officials of the environmental consequences of their decisions before they are made. Thus, environmental review protects not only the environment but also informed self-government. (*Napa Citizens for Honest Government v. Napa County Bd. of Supervisors* (2001) 91 Cal.App.4th 342, 355.) An accurate, stable and finite project description is essential for an informative and legally sufficient environmental review. (*County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185, 193.) "[O]nly through an accurate view of the project may the public and interested parties and public agencies balance the proposed project's benefits against its environmental cost, consider appropriate mitigation measures, assess the advantages of terminating the proposal and properly weigh other alternatives." (*City of Santee v. County of San Diego* (1989) 214 Cal.App.3d 1438, 1454.)

Judicial review of CEQA analyses of non-adjudicative decisions extends only to whether there was a prejudicial abuse of discretion: "an agency may abuse its discretion under CEQA either by failing to proceed in the manner CEQA provides or by reaching factual conclusions unsupported by substantial evidence." (*Save Tara v. City of West Hollywood* (2008) 45 Cal.4th 116, 131, *as modified* (Dec. 10, 2008) [*citing* Pub. Res. Code, § 21168.5].)

"[T]he ultimate decision of whether to approve a project, be that decision right or wrong, is a nullity if based upon an EIR [environmental impact report] that does not provide the decision-makers, and the public, with the information about the project that is required by CEQA. The error is prejudicial if the failure to include relevant information precludes informed decision making and informed public participation, thereby thwarting the statutory goals of the EIR process." (*Napa Citizens for Honest Government*, 91 Cal.App.4th at 355–356 (citation omitted) (internal quotation omitted); see also *California Oak Foundation v. City of Santa Clarita* (2005) 133 Cal.App.4th 1219, 1237 [citing *Concerned Citizens of Costa Mesa, Inc. v. 32nd Dist. Agricultural Assn.* (1986) 42 Cal.3d 929, 935].) Similarly, CEQA's purpose to facilitate informed decision making and public participation is contravened when important information is "scattered here and there in EIR appendices," or significant analyses are "buried in an appendix." (*California Oak Foundation*, 133 Cal.App.4th at 1239 (citing Santa *Clarita Organization for Planning the Environment v. County of Los Angeles* (2003) 106 Cal.App.4th 715, 723.) Information that cannot be found or is not readily accessible is not a substitute for a good faith reasoned analysis. (*Id*.)

For purposes of CEQA, "[s]ubstantial evidence shall include facts, reasonable assumptions predicated upon facts, and expert opinion supported by facts." (Cal. Code Regs., tit. 14, § 15384[b].) "Argument, speculation, unsubstantiated opinion or narrative, evidence which is clearly erroneous or inaccurate, or evidence of social or economic impacts which do not contribute to or are not caused by physical impacts on the environment does not constitute substantial evidence." (Cal. Code Regs., tit. 14, § 15384[a].)

"In lieu of the requirement for preparing an EIR or negative declaration, CEQA provides a mechanism for the exemption of certain regulatory programs which themselves require a plan or other written documentation containing environmental information." (*City of Sacramento v. State Water Resources Control Bd*. (1992) 2 Cal.App.4th 960, 973–74, *as modified* (Feb. 14, 1992) (*citing* Pub. Res. Code, § 21080.5(a); *Wildlife Alive v. Chickering* (1976) 18 Cal.3d 190, 196.) The State Water Board's water quality control planning program is a certified regulatory program and thus a substitute environmental document, or "SED," may be prepared in lieu of an EIR. (Draft 2016 SED, at 1-3 (*citing* Pub. Res. Code, § 21080.5(c); Cal. Code Regs., tit. 14, § 15251[g].) An SED, like an EIR, must still comply with CEQA requirements. Specifically, all conclusions must be supported with substantial evidence in the administrative record. (Cal. Code Regs., tit. 23, § 3777[a].) An SED must include: "identification of any significant or potentially significant adverse environmental impacts of the proposed project;" "analysis of reasonable alternatives to the project and mitigation measures to avoid or reduce any significant or potentially significant adverse environmental impacts;" and "environmental analysis of the reasonably foreseeable methods of compliance." (Cal. Code Regs., tit. 23, § 3777[b][2-4]; Cal. Code Regs., tit. 14, § 15187[b]-[c].) The environmental analysis of the reasonably foreseeable methods of compliance "shall take into account a reasonable range of environmental, economic, and technical factors, population and geographic areas, and specific sites" at a program level. (Cal. Code Regs., tit. 23, § 3777[c].)

The SED is also required to comply with the requirements of Public Resources Code Section 21159, that provides an agency "shall perform, at the time of the adoption of a rule or regulation requiring . . . a performance standard . . . an environmental analysis of the reasonably foreseeable methods of compliance." (Pub. Res. Code, § 21159(a).) The required environmental analysis must, at a minimum, include: "[a]n analysis of the reasonably foreseeable environmental impacts of the methods of compliance;" "[a]n analysis of reasonably foreseeable feasible mitigation measures;" and, "[a]n analysis of reasonably foreseeable alternative means of compliance with the rule or regulation." (Pub. Res. Code, § 21159(a)(1-3).) Similar to the requirements prescribed by California Code of Regulations, Title 23, Section 3777 identified above, the environmental analysis of the reasonably foreseeable methods of compliance required by the statute must "take into account a reasonable range of environmental, economic, and technical factors, population and geographic areas, and specific sites" at a program level. (Pub. Res. Code, § 21159(c-d).)

15. ADOPTION OF THE STAFF SED WOULD RESULT IN THE STATE WATER BOARD NOT PROCEEDING IN A MANNER REQUIRED BY LAW.

CEQA requires environmental review of discretionary state actions, including the Proposed Project. In drafting the SED, Staff failed to comply with several of the legal requirements, rendering the SED unlawful and preventing the State Water Board from being able to adopt the Staff draft without proceeding in a manner that would violate the law. The legal deficiencies are set forth in this section below.

15.1. The Notice(s) of Preparation Are Not Lawful

When a lead agency for a project determines that an environmental impact report is required, the agency must send a "notice of preparation" (NOP) to the Office of Planning and Research, and to each responsible and trustee agency, stating that an EIR will be prepared. (Cal. Code Regs., tit.

14, § 15082[a].) The purpose of the NOP is to provide the public and regulated community with notice of the action the State Water Board intends to take. The NOP must include, at a minimum, a description of the project, the location of the project, and the probable environmental effects of the project. (Cal. Code Regs., tit. 14, § 15082[a][1].)

The Board issued two NOPs for the update and implementation of the Water Quality Control Plan, one in 2009 and another in 2011. Neither provides a description of the currently Proposed Project. The NOP dated February 13, 2009 (2009 NOP), described the Proposed Project as a review and update of the flow objectives **on the San Joaquin River**. Critically, the 2009 NOP did not provide notice for a project that would create entirely new numeric flow objectives on **the three eastside tributaries** to the San Joaquin River.

On April 1, 2011, the Board circulated a revised NOP (2011 NOP) in order to "clarify the scope of the State Water Board's current review of the Southern Delta salinity and San Joaquin River flow objectives and the program of implementation for those objectives . . .." (Exh. [2011 NOP], at 3.) The 2011 NOP continued to describe the project as a "review of and potential amendments to . . . the San Joaquin River flow objectives for the protection of fish and wildlife beneficial uses." (Exh. [2011 NOP], at 4 [emphasis supplied].) The 2011 NOP also included a notice of potential new "narrative" objective at the confluence of each of the three eastside tributaries with the San Joaquin River. (2011 NOP, Attachment 2, at 1.) The 2011 NOP did not provide notice the State Water Board planned to create new numeric flow objectives on the three eastside tributaries, which is now being proposed by Staff. (SED, Appx. K.) The 2011 NOP explicitly stated that "the State Water Board is not currently considering any other changes to the Bay-Delta Plan or any specific changes to water rights and other requirements implementing the Bay-Delta Plan." (2011 NOP, Attachment 2, at 3.) The Board also stated that it would "provide **additional notice** regarding review of other aspects of the Bay-Delta Plan and its implementation in the future." (2011 NOP, Attachment 2, at 3 [emphasis supplied].)

The State Water Board is required to circulate a NOP with an accurate description of the project. (Cal. Code Regs., tit. 14, § 15082[a][1].) In violation of this requirement, Staff has now released the Proposed Project which proposes an entirely new project containing, among other things, numeric flow objectives on the three eastside tributaries (SED, Appx. K, at 18), a new narrative flow objective that is different than the narrative flow objective proposed in the NOP (SED, Appx. K, at 18), minimum reservoir carryover storage targets (SED, Appx. K, p. 28), and end-of-drought storage refill requirements. (SED, Appx. F.1, at F.1-32.) The Board never circulated a new or revised NOP with a project description fitting the current proposal in the SED. The failure to issue a new or revised NOP describing the project in its current proposed form is a violation of Section 15082(a)(1) of the California Code of Regulations.

Moreover, the 2012 SED is not a substitute for a proper NOP. The CEQA Guidelines do not allow for a recirculated EIR, or in this case a recirculated SED, to serve as a substitute for a NOP. (See Cal. Code Regs., tit. 14, § 15082[a][1].) The NOP violation is a problem for several reasons. First, it fails to provide proper notice to the regulated community, which is the purpose of the notice requirements. Second, it fails to provide trustee and responsible agencies with the opportunity to comply with their requirements under CEQA. For example, there is a distinct process requiring responsible and trustee agencies to respond to NOPs which is different from the process for responding to draft EIRs or SEDs. (Cal. Code Regs., tit. 14, § 15082[b].) Specifically, after a NOP is circulated, the responsible and trustee agencies have 30 days to provide the lead agency with a response that identifies significant environmental issues and reasonable alternatives and mitigation measures that those agencies "will need to have explored in the draft EIR." (Cal. Code Regs., tit. 14, § 15082[b][1][a].) After the responses are received, the draft EIR or SED that is in preparation "may need to be revised or expanded to conform to [those] responses . . .." (Cal. Code Regs. tit., 14, § 15082[a][4].) In other words, the purpose of the NOP is to allow for input **prior** to the circulation of any Draft EIR or SED. Indeed, a lead agency cannot circulate a draft SED for public review "before the time period for responses to the notice of preparation has expired." (Cal. Code Regs. tit., 14, § 15082[a][4].) By failing to provide a NOP with an accurate project description, the Board unlawfully divested the responsible and trustee agencies of the opportunity to provide input prior to preparation of the SED.

The failure to issue a new or revised NOP has also distorted the impact analysis in the SED, compromising its value as an informative CEQA document. An SED, "must include a description of the physical environmental conditions in the vicinity of the project, **as they exist at the time the notice of preparation [NOP] is published** . . ..” (Cal. Code Regs., tit. 14, § 15125[a] [emphasis supplied].) The environmental setting at the time the NOP is published serves as the “baseline” against which the lead agency compares the project to determine whether an impact is significant. (Cal. Code Regs., tit. 14, § 15125[a].) Since the issuance of the 2011 NOP, numerous conditions have changed in the vicinity of the project. For example, at the time the NOP was circulated, the flow requirements at the Vernalis compliance point on the San Joaquin River were set in accordance with the Vernalis Adaptive Manage Program (VAMP), an experimental flow regime that concluded in 2011. (SED, at 3-13.) Accordingly, the VAMP flows are included as part of the baseline in the SED. (SED, at 3-13.) As the VAMP flows were “generally lower than the Table 3 flows in the 2006 Bay-Delta Plan” which is now in place, the impact of the project as compared to the baseline does not accurately reflect the impact of the project on current conditions.

For the above reasons, Staff failed to properly issue an NOP for the recirculated SED, which means the State Water Board cannot adopt the Staff draft and also proceed in a manner required by law.

15.2. The SED Project Description Is Not Lawful.

An accurate description of the project is a necessary element of environmental review. (*County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185, 192.) The purpose of environmental review is to provide the public with detailed information about the effects a proposed project is likely to have on the environment. (*Laurel Heights Imp. Ass’n of San Francisco, Inc. v. Regents of University of California* (1988) 47 Cal.3d *37*, 391 (“*Laurel Heights*”); Pub. Resources Code, § 21061; Cal. Code Regs., tit. 14, § 15003[b].) CEQA requires a project description sufficient to permit preparation of a meaningful and accurate report of the impacts of the proposed project. (*Laurel Heights*, at 396.)

Most environmental documents dedicate an entire chapter to describing the project purpose and goals. The SED does not include such a chapter. The SED includes a short section in which the proposed project is described in less than a page. Section 1.1 states the proposed project would create a new LSJR Flow Objective for the protection of fish and wildlife beneficial uses and an associated program of implementation. (SED, at 1-1.) Given the complexity of the Proposed Project, this simplified description is not sufficient and fails to properly reflect what Staff is proposing.

Specifically, the project description fails to identify a project horizon. Therefore it is unclear whether the Proposed Project will be in effect for a few months or eternity. This fundamental attribute of the Proposed Project appears to be up in the air. Staff has made several confusing and contradictory comments regarding Project horizon. At one point Staff commented that the Project horizon is likely between 10-20 years. (12/12/16 Workshop, Les Grober, at 60:17-18; 61:7-8.) At a different time, Staff stated that the Project did not have a specific time horizon. (Staff Technical Meeting, 11/18/2016 at 29:24-26.) These responses are both contrary to the statutory requirement to review and amend the Water Quality Control Plan every three years. (Water Code, § 13241.) Thus, it is not clear how long the Propose Project will be in place, which makes environmental review increasingly difficult.

Another example of lacking project description is that no preferred alternative is identified. The Staff SED discloses that Tributary Flow Objective will require a range between 30 to 50 percent of unimpaired flow. However, the SED fails to identify that the Staff preferred alternative is 40 percent of unimpaired flow. Appendix K states that 40 percent unimpaired flow will be implemented unless another percent is selected by the adaptive management teams and/or Executive Director. (SED, at Appx. K, p. 29.) This default language is unclear and does not constitute the identification of a preferred alternative. The identification of a preferred alternative is a key component of environmental review. (CEQA Guidelines, at 15126.6(a)(c)(2).) The SED has not correctly identified a preferred alternative and for that reason is unlawful.

Most critically, the project description fails to disclose several fundamental portions of the Proposed Project that are hidden in the program of implementation. For example, the project description does not disclose that the program of implementation states the State Water Board will require minimum reservoir levels. The project description fails to disclose that the Proposed Project will require the participation in working groups to manage flows on an annual basis and develop biological objectives. Staff does not disclose these components in the project description. Instead, the SED states the program of implementation will be developed by stakeholders in the future. (SED, Appx. K, at 4.) Because the program of implementation is part of the Proposed Project and the SED does not describe the program of implementation sufficiently to allow meaningful environmental review, the project description is deficient. Because the SED does not include a sufficient project description and program of implementation the State Water Board failed to proceed in the manner required by law.

15.3 The SED Employs an Incorrect Baseline.

CEQA requires the SED to designate a proper baseline as the foundation for its environmental analysis. (Cal. Code Regs., tit. 14, § 15125.) A proper baseline must reflect the existing physical conditions and enable the environmental analysis to evaluate the impacts of the proposed project. (*Cherry Valley Pass Acres v. City of Beaumont* (2010) 190 Cal.App.4th 316 ("*Cherry Valley*"); *Neighbors for Smart Rail v. Exposition Metro Line Construction* (2012) 205 Cal.App.4th 552.) The general baseline rule provides that the baseline is usually set at the time the notice of preparation is published or at the time the environmental analysis is commenced. (Cal. Code Regs., tit. 14, § 15125.) The general rule is not rigid; rather, the State Water Board has flexibility is necessary to accommodate and account for changing conditions. (*Cherry Valley*, at 336.)

Selection of a proper baseline is important; without an appropriate baseline, an adequate analysis of an environmental impact cannot be measured. (*Cherry Valley*, at 337.) Further, selecting an improper baseline will skew the environmental analysis. Setting a baseline too late may incorporate some early project impacts into the baseline without sufficiently analyzing these impacts, while setting a baseline too early may attribute non-project-related impacts to the proposed project. (*Id.*) As discussed in greater detail below, the State Water Board failed to set the baseline in a manner required by law. This failure renders the SED's evaluation of environmental impacts arbitrary and capricious.

15.3.1 Baseline is Outdated

Staff selected 2009 as the baseline to which it will compare the impacts of the Proposed Project. Staff's position is that it is required to use the 2009 baseline because the original NOP was released at that time. (12/15/2016 Workshop, at 47:23-48:5.) However, the Proposed Project has changed fundamentally since the 2009 NOP. For example, the compliance points are now on different rivers compared to the 2009 Draft SED, the Proposed Project now includes reservoir operation constraints that were not in the 2009 version, and the Proposed Project also includes participation in groups that will develop annual operations and biological objectives that were not previously included in the 2009 version. Because the Proposed Project differs so fundamentally from the previously proposed project, Staff is required to issue a revised NOP. If Staff had complied with issued an updated NOP it would not be able to claim that its hands are tied and it would be able to appropriately update the baseline as well. Due to both the changes in the Proposed Project, the fact that 2009 is now 8 years ago, and there have been several substantial changes to the physical environment in that time, Staff must also revise the baseline to include a proper, current baseline that is reflective of the existing environment. Without such an adjustment, the baseline includes flows that are no longer required and excludes other requirements that are in place, but not part of the Proposed Project.

15.3.2 VAMP Flows

The SED baseline is incorrect because it includes the Vernalis Adaptive Management Program ("VAMP") flows. The inclusion of VAMP flows misrepresents the allocation of responsibility for San Joaquin River flows, mischaracterizes the existing physical environment, and underestimates the environmental impacts of the proposed alternative.

Under D-1641, the State Water Board allocated responsibility for meeting the San Joaquin River flows to the United States Bureau of Reclamation ("USBR") out of New Melones. The SJTA members have never been responsible for meeting previous flow objectives on the San Joaquin River. Pursuant to the San Joaquin River Agreement ("SJRA"), the SJTA members agreed to release flows through VAMP. During VAMP, the SJTA members were able to provide flow because SJRA revenue funded conservation programs and efficiencies not otherwise funded. The term of the SJRA expired in 2010. D-1641 recognized VAMP flows would expire and recognized this expiration could occur before new objectives were in place. (Decision No. 1641, at 132, 162.) By including VAMP flows in the baseline the SED misrepresents the existing responsibilities of the USBR and SJTA members.

The inclusion of VAMP flows in the baseline also mischaracterizes the existing physical environment. VAMP flows are no longer in place. Although D-1641 controls since VAMP ended, the USBR, which is responsible for satisfying the San Joaquin River Flow Objectives, has been operating under a series of temporary urgency change permits (TUCP) and is operating pursuant to the TUCP mandated flow release schedule. Further, as the February 15, 2017 letter from USBR makes clear, USBR does not plan to comply with D-1641 requirements.

The inclusion of VAMP flows in the baseline results in the SED underestimating environmental impacts of the Proposed Project. First, the SED underestimates the impact of the proposed project's reduction to water delivery. Because the baseline includes VAMP flows, the SED only analyzes the environmental impact of releasing flows in excess of VAMP flow levels. The Irrigation Districts are not currently providing VAMP flows. Therefore, the SED underestimates the impact of the proposed regulation.

Second, the inclusion of VAMP flows in the baseline falsifies operations at New Melones. By including VAMP flows, the SED makes water available from the Merced, Tuolumne and Stanislaus Rivers, masking the impacts of USBR operating New Melones to meet D-1641 requirements. In order to meet D-1641 requirements, New Melones operators would often need to draw down the reservoir to near empty. The SED fails to evaluate the impacts to this extreme operation scenario and analyze whether the proposed regulation would further adversely impact the operation of New Melones under existing conditions.

15.3.3 San Joaquin River Restoration Program

The SED baseline does not include any flows from the San Joaquin River Restoration Program ("SJRRP"). Currently, the SJRRP affects flows, seepage and drainage in the San Joaquin River system. The SJRRP is part of the existing physical environment and therefore should be reflected as part of the baseline.

15.4 The SED Fails to Evaluate Dry Year Impacts.

The Mediterranean climate of California is defined by periods of wet and dry years; the system is boom and bust. Dry year and drought periods are not just likely to occur – they are guaranteed to happen. In dry years, water delivery is often reduced, groundwater use is increased, fields may be fallowed, hydropower generation is reduced, and the economy is adversely impacted. Staff is proposing to reduce water deliveries. These reductions will affect the environment differently depending on the existing hydrology. Staff recognizes the extreme variation in impacts between wet and dry years. In wet years, the Proposed Project would have almost no impact, while in dry years, the same objective would have dramatic and devastating impacts.

The State Water Board is required to analyze the environmental impacts of the Proposed Project. (Cal. Code Regs., tit. 3, § 3777[a][1].) Because the environmental impacts of the Proposed Project vary greatly depending on the hydrologic year type, Staff is required to analyze the impacts of the proposed project in various water year types. It is not sufficient for the State Water Board to average the results and only evaluate the environmental impacts of the averages. This is unlawful because the average does not reflect the widely variable potential impacts. (*San Joaquin Raptor Rescue Center v. County of Merced*, (2007) 149 Ca.App.4th 645, at 665-666 [finding the environmental review of a project with widely variable potential impacts deficient for failing to analyze peak impacts.) In *San Joaquin Raptor*, a mining project disclosed peak project levels, but only analyzed the environmental impacts of the average production. The Court determined this was inadequate because it was reasonably foreseeable that the peak operation may occur and thus the environmental impacts of the peak production must be analyzed.

In fact, CEQA statute prohibits the reliance of averages where more specific data is available. (Cal. Code Regs., tit. 23, § 3777[c].) The data on dry years is readily available to Staff. Staff actually discloses the dry year data in the SED, but fails to analyze impacts in such dry years. (SED, at Appx. F.1, p. 64.)

The lack of dry year analysis is a significant failure. Because the Proposed Project will result in only very minimal or very significant impacts, "average" impacts will very rarely occur. Yet these rarely occurring "average" impacts are the only impacts for which the environmental analysis is performed. Therefore, averaging the impacts does not properly disclose the reasonably foreseeable impacts of the Proposed Project. Because the impacts of the Proposed Project vary so widely between average and dry years and because the dry year data is readily available, it is not adequate to analyze only the average water year type.

Because the law requires Staff analyze dry year impacts, and it failed to do so, the State Water Board cannot adopt the Staff draft and proceed in a manner required by law.

15.5 The SED Fails to Disclose Project Impacts Prior to Mitigation

CEQA requires the lead agency to identify the environmental impacts of the Proposed Project. To the extent these impacts are found to be significant, Staff must consider mitigation. However, CEQA is clear that prior to mitigation, the full impacts of the Proposed Project must be disclosed. Staff fails to identify all Proposed Project impacts prior to incorporating mitigation. (*San Joaquin Raptor Rescue Center v. County of Merced*, (2007) 149 Ca.App.4th 645, at 665-666)

For example, the minimum reservoir levels were developed by Staff to mitigate for temperature impacts from the Proposed Project. When explaining the development of reservoir minimums, Staff explains:

> "[W]ith the increased drawdowns that would occur to meet the flow requirements, that was found to have temperature effects. So this was done to not have those effects by increasing the carryover storage." (12/5/2016 Workshop, Less Grober, at 73:6-9.)

In this situation, where the Proposed Project results in temperature impacts, CEQA requires Staff to first disclose the impacts from the Proposed Project. Staff never disclosed the impacts. Instead, Staff developed mitigation in the form of reservoir minimum requirements and ONLY disclosed the impacts of the Proposed Project with the included mitigation. This is violation of CEQA and causes several fundamental disclosure issues. First, it fails to disclose the full impacts of the Proposed Project to the public. Second, it asks the public or regulated community to believe that the Staff developed the reservoir minimums to mitigate for temperature impacts that were never disclosed without getting to review or analyze the temperature impacts. Third, it further asks the public to have faith that the reservoir minimums actually mitigate the temperature conditions that were allegedly occurring. Fourth, it fails to provide State Water Board members with the information that would provide them with the ability to weigh and balance the benefit of the reservoir minimums against the alleged temperature impacts.

Staff also fails to disclose the agriculture impacts of the Proposed Project without mitigation. Specifically, Staff assumes that an average quantity of 105,000 acre feet of groundwater will be pumped to mitigate the Proposed Project's reduced water deliveries to agriculture. (SED, at Appx. G, p. 15.) Staff explains how it off-set agriculture impacts by mitigating with groundwater:

> "For the purposes of agricultural resources, the full reduction on surface water supply would occur to all agricultural crops. For the purposes of groundwater resources, we link this to the agricultural analysis and that the shortfall expected to occur in the agricultural analysis would result in an increasing groundwater pumping over a subbase scenario and a reduction in groundwater recharge." (12/12/16 Workshop, at 26:4-11.)

This means that Staff includes groundwater mitigation before disclosing the loss to agriculture. Staff failed to evaluate the potential impacts to agriculture without groundwater mitigation. Again, this causes several problems. First, it fails to disclose the full impacts of the Proposed Project to the public. Second, it requires the public to trust that Staff correctly identified the amount of groundwater that will be pumped and that this amount of groundwater would off-set a specific quantity of agriculture impacts. This trust is required because Staff fails to disclose the agriculture impacts without groundwater mitigation, requiring stakeholders to trust that pre-mitigation impacts existed and that mitigation resolved a portion of those impacts. Third, it fails to provide State Water Board members with the information necessary to weigh and balance the benefit of groundwater pumping against the agriculture impacts.

15.6 The SED No-Project Alternative is Unlawful.

The SED analysis of the no-project alternative does not proceed in a manner required by law for several reasons. First, the environmental analysis of the no-project alternative includes operational requirements which would not exist if the State Water Board took no action. Specifically, the no-project alternative assumes Oakdale Irrigation District ("OID") and South San Joaquin Irrigation District ("SSJID") would share the responsibility of the USBR to comply with D-1641. This assumption is unfounded and unsupported; neither OID nor SSJID are responsible for existing D-1641 flows and in addition, both OID and SSJID have water rights that are senior to those of the USBR. Thus, if the State Water Board took no action, OID/SSJID would not experience delivery reductions. If the State Water Board took no action, OID and SSJID would continue delivering water to their respective service areas and the USBR would meet the existing requirements by drawing down New Melones. Therefore, the environmental analysis of the no-project alternative is based on flawed operational assumptions. These flaws prevent Staff from properly analyzing the environmental impacts of deciding not to adopt the Proposed Project.

Third, Staff evaluates the impacts of the no-project alternative by using the WSE Model. The WSE Model makes several assumptions that do not exist and would not exist if the State Water Board took no action. For this reason, the WSE Model skews the no-project analysis and misrepresents the environmental impacts.

Fourth, the environmental analysis of the no-project alternative does not reflect the reality that the no-project alternative is not viable and will result in New Melones Reservoir emptying in dry years. Staff does not understand how New Melones Reservoir is operated. This lack of understanding is demonstrated in Staff' description of the no-project alternative on the Stanislaus River and lack of accounting for the water right priority of OID and SSJID. Staff must understand the operation of the reservoirs it is proposing to regulate. The failure to demonstrate this understanding is a fundamental defect. Had Staff understood New Melones operations, the environmental analysis would reflect that compliance with the existing regulations is not operationally possible, as these requirements would often require New Melones to be emptied. Therefore, Staff's no-project alternative, which assumes OID and SSJID allocate water to meet the existing requirements is faulty and misrepresents environmental impacts.

Fifth, Staff fails to recognize that for the past several years, flows at Vernalis have been controlled by several temporary urgency change permits (TUCP). The no-project alternative should consider whether such TUCP relief will continue to control the flows on the San Joaquin River in the future.

15.7 The SED Phasing Approach is Unlawful.

Historically, the State Water Board has performed its review of the Bay Delta Plan in one comprehensive process. (*See* 2006 Bay Delta Plan; *See* 1995 Bay Delta Plan; *See* 1991 Bay Delta Plan; *See* 1978 Bay Delta Plan.) Although the objectives are complex and multi-faceted, the Bay Delta Plan is a single basin plan that includes water quality objectives whose purpose is to protect the beneficial uses in the Bay Delta Estuary. (*See* 1995 Bay Delta Plan, at 3.) Because the purpose of the water quality objectives is to benefit a Bay Delta watershed, many of the objectives are inextricably interrelated. For example, the San Joaquin River Objectives are affected by and affect the objectives which set reverse flows, export/inflow ratios, and Delta outflows.

The State Water Board split its review of the Bay Delta Plan into phases by reviewing south Delta salinity and San Joaquin River Flow Objectives in a process that is prior to and separate from the remainder of the "comprehensive" review. (SED, Appx. KI, Executive Summary.) This separation is unlawful for several reasons.

First, the Bay Delta Plan is a basin plan covering a single designated area. Separating south Delta and San Joaquin River flows from the remainder of the basin plan review results in a piece-mealed analysis that is non-comprehensive. The San Joaquin River is one of the two main rivers whose confluence makes up the Delta. Separating the flow objectives on the San Joaquin River from the larger "comprehensive" review of the remainder of the Bay Delta Plan makes little sense. The quantity of San Joaquin River flows that will reasonably be required to protect the beneficial uses in the Delta is affected by reverse flows, exports, and other factors being reviewed in the "comprehensive" review. For this reason, evaluating San Joaquin River flows in isolation, without considering the other basin-wide mechanisms that are interrelated, results in a non-comprehensive piecemealed review.

Second, separating the processes will require water users on the San Joaquin River to expend twice the resources to achieve the same result. Because SJTA interests will be subject to all "phases" of the Bay Delta Plan review, it will be required to participate in two different review processes in front of the State Water Board, review at least two different environmental documents, and to the extent the adoption and/or implementation of any revised objectives do not comply with law, the SJTA will have to challenge two different actions adopting objectives and two different implementation plans. This unfairly prejudices the regulated parties in Phase 1.

Third, the piecemealed process is not conducive to properly evaluating the cumulative impacts of the Proposed Project. Staff does not take into consideration the impact of the potential subsequent amendment of objectives in the later “comprehensive” review. As noted above, these subsequent objectives may require different flows from San Joaquin River water users or impact the efficacy of the flows required by amended south Delta salinity and San Joaquin River Flow Objectives. Staff must consider the cumulative environmental impacts from Phase 1 and Phase 2.

Fourth, the California Code of Regulations, title 23, section 3777, requires a single SED be performed for each basin plan amendment. (Cal. Code Regs., tit. 23, § 3777.) Section 3777 specifically states that “Any water quality control plan . . . proposed for [State Water] Board approval or adoption must be accompanied by an SED.” (*Id.*) This code provision does not provide or otherwise allow for multiple SED’s for a single basin plan amendment. For these reasons, the phasing approach to a single basin plan results in the failure of the State Water Board to proceed in a manner required by law.

15.8 The SED Unlawfully Segments Environmental Analysis.

The State Water Board divided its review and update of the Bay-Delta Plan into two phases. Phase 1 of the process consists of “proposed amendment to the Bay-Delta Plan involving the LSJR flow objectives and the southern Delta salinity objectives.” (SED, at ES-2.) Phase II consists of “reviewing and considering updates to other elements of the Bay-Delta Plan, including Delta outflows, Sacramento and tributary inflows (other than the SJR inflows), and ecosystem regime shift.” (SED, at ES-2.) Along with this phasing approach, the State Water Board divided its environmental analysis by phases as well. Therefore, the SED for Phase I and evaluation of Phase I impacts is separate from the evaluation of impacts for later phases. This amounts to impermissible segmentation for several reasons.

First, CEQA prohibits the division of a single project into several projects, as the review of the environmental impacts of a single project must be considered together. (*Laurel Heights,* at

396.) The review of the Bay Delta Plan is one project. Previously the State Water Board has reviewed and revised the Bay Delta Plan as a single project. To split up a single project into several pieces for the purpose of environmental review violates CEQA requirements.

Second, the Bay Delta is system that is interconnected, works together and cannot be separated out into different phases. "Past experience has shown that piecemeal efforts to address the Bay-Delta's problems have failed because those problems are interrelated and because conflicting interest groups and stakeholders can block actions that promote some interests at the expense of others" (In re Bay-Delta, supra, 43 Cal.4th at 1165 [acknowledging that CALFED properly "determined that the four primary project objectives had to be addressed concurrently"].) The regulation of flows in one area affects the Bay Delta system; all changes to the Bay Delta Plan must be considered concurrently to have an accurate understanding of these changes and how they function in the system at the same time.

Third, because the SED analyzes the Proposed Project separately from the other objectives in later phases that the State Water Board intends to propose for the rest of the Bay-Delta Plan, it necessarily limits the number of alternatives and mitigation measures that are available for consideration. Staff confines its analysis to an area characterized (albeit incorrectly) as the "SJR Basin." (SED, ES-5; Figure ES-1.) As such, any alternatives that would have allowed for lesser flow objectives on the San Joaquin River or three eastside tributaries due to flow contributions from the Sacramento River basin to the Bay-Delta Estuary were not considered. Likewise, any mitigation measures that might have called for greater contributions from the Sacramento River basin in order to limit or reduce impacts in the San Joaquin River basin were also not considered, and indeed could not have been considered due to the segmented environmental analysis. Given that the stated purpose of the Proposed Project is to protect "fish populations migrating through the Delta," the significant flow contributions of the Sacramento River to the Bay-Delta should not have been ignored when determining and/or analyzing the possible alternatives for the flow objectives on the San Joaquin River, and the potential mitigations measures for impacts within the San Joaquin River basin. On an even more limited geographic scale, the SED also fails to analyze any alternatives or mitigation measures that would incorporate flows or other contributions from the Upper San

Joaquin River (upstream of Merced), the Mokelumne River and the Consumnes River, all of which are part of the "SJR Basin" identified in the document. (SED, Figure ES-1.) The potential contributions from these areas of the plan should also not have been ignored.

"The purpose of an EIR is to give the public and the government agencies the information needed to make informed decisions, thus protecting 'not only the environment but also informed self-government.'" (*In re Bay-Delta* etc. (2008) 43 Cal.4th at 1162 [*quoting Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal.3d 553, at 564].) "The EIR is the heart of CEQA, and the mitigation and alternatives discussion forms the core of the EIR." (In re Bay-Delta, supra, 43 Cal.4th at 1162.) By ignoring the impacts and contributions of the Sacramento River Basin to the Bay-Delta when setting the Proposed Project, the program SED failed to describe "a range of reasonable alternatives to the project" (CEQA Guidelines, § 15126.6[a]), or "feasible measures which could minimize significant adverse impacts" (CEQA Guidelines, § 15126.4[a][1].) A "single program EIR," or in this case a single program SED, was required for the entire Bay-Delta Plan. (CEQA Guidelines, § 15168.)

15.9 The SED's Programmatic Approach is Unlawful.

Staff states that the environmental effects of the Proposed Project were evaluated on a "programmatic level, which is a broader level than a project-specific analysis." (SED, at 4-11.) The CEQA roadmap outlined in the SED indicates that subsequent "project-specific environmental review" will occur at later date. (SED, at 4-11.) As demonstrated below, the decision to prepare a programmatic level SED on a project that makes specific amendments to two objectives in the Bay-Delta Plan, as opposed to comprehensive review of the entire Bay-Delta Plan, constitutes unlawful segmentation of the environmental review.

The CEQA Guidelines allow for the preparation of a "Programmatic" document when the project is "a series of actions that can be characterized as one large project" and where the actions are related, either (1) geographically, (2) as "logical parts in the chain of contemplated actions," (3) "[i]n connection with issuance of rules, regulations, plans, or other general criteria to govern the conduct of a continuing program," or (4) "[a]s individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects which can be mitigated in similar ways." (Cal. Code Regs., tit. 14 [CEQA Guidelines], § 15168[a] [emphasis supplied].) A "Program EIR" is required whenever a "phased project" is "to be undertaken and where the total undertaking comprises a project with significant environmental effect . . .." (CEQA Guidelines, § 15165.) In such circumstances, the lead agency must prepare "a single program EIR for the ultimate project." (CEQA Guidelines, § 15165.) As relevant here, the entire Bay-Delta Plan constitutes the "one large project" that will be undertaken in phases, and for which "a single program EIR" was required to be prepared. (CEQA Guidelines, §§ 15165, 15168.) Applying these rules to the Proposed Project, if Staff wished to perform a programmatic level environmental review, it could have done so by performing a programmatic review of the State Water Board's entire Bay-Delta Plan review, prior to the evaluation of the specific phases. The review of Phase 1, which consists of specific revisions to two specific water quality objectives is not a "series of actions" that can be characterized as a larger project. Rather, it is one of the specific actions for which a project level analysis is required.

In addition to the fact that the Proposed Project is too specific for Staff to perform a programmatic document, it also lacks the necessary detail and analysis necessary even for a programmatic document. As noted above, Staff purports to analyze the environmental impacts associated with the Proposed Project at a "programmatic level." (SED, at 4-11.) Programmatic documents are used "in conjunction with the process of tiering." (In re Bay-Delta etc. (2008) 43 Cal.4th 1143, 1170.) The "tiering" of environmental review is a one-directional process: from "general matters in broader EIRs (such as on general plans or policy statements)" to "narrower EIRs or ultimately site-specific EIRs" that incorporate the general discussions by reference. (CEQA Guidelines, § 15385.) Tiering can also be used to stage environmental review, but only where certain issues are "not yet ripe." (CEQA Guidelines, § 15385.) A lead agency may defer analysis where accessing "site-specific information may not be feasible" such deferral is allowed "until such time as the lead agency prepares a future environmental document" on a project level. (*In re Bay-Delta*, at 1170.) Thus, the analysis of a potential environmental impact may not be deferred "when it is 'a reasonably foreseeable consequence' of the plan and the agency preparing the plan has 'sufficient reliable data to permit preparation of a meaningful and accurate report on the impact' of the factor in question." (*Los Angeles Unified School Dist. v. City of Los Angeles* (1997) 58 Cal.App. 4th 1019, 1028.)

In violation of the rules requiring analysis of all reasonably foreseeable consequences, Staff fails to consider several foreseeable impact. For example, Staff does not consider the impacts that will result to junior water right diverters on the west side of the San Joaquin River, downstream of the rim dams. Staff recognizes the "reduction in availability of surface water could affect water users who obtain their water from diversions anywhere within the plan area and extended plan area – anywhere within the Stanislaus, Tuolumne, and Merced River Watersheds." (SED, at ES-23.) Staff further states, "implementation would generally follow the water right priority system [and] [t]his could result in adding conditions to existing water rights or taking other water right actions that would require some water right holders to not divert water when flows are required to meet the proposed flow objective." (SED, at ES-23.) Despite acknowledging this impact, Staff fails to analyze the environmental results.

"A program EIR should contain a sufficient degree of analysis, in the light of what is reasonably feasible, to provide decision makers with information that enables them to make a decision which intelligently takes account of environmental consequences." (*North Coast Rivers Alliance v. Kawamura* (2015) 243 Cal.App.4th 647.) The failure to consider the impact to downstream diverters renders the SED deficient, even from a programmatic level.

15.10 The Failure to Consider a Range of Reasonable Alternatives is Unlawful.

Staff must consider a reasonable range of alternatives which could feasibly attain the basic objectives of the Proposed Project. (Pub. Resources Code, § 15126(d); *Friends of the Eel River v. Sonoma County Water Agency* (2003) 108 Cal.App.4th 859, 873 ("*Friends of Eel River*").) It is well-established that environmental review is not required to analyze every conceivable alternative. (*Preservation Action Counsel v. City of San Jose* (2006) 141 Cal.App.4th 1336.) However, Staff is required to analyze a reasonable range of potentially feasible alternatives that will foster informed decision making and public participation. (*Id*.) Further, Staff is required to provide sufficient information "from which one could reach an intelligent decision as to the environmental consequences and relative merits of the available alternatives." (*San Joaquin Raptor*, at 738; [*quoting Friends of Eel River*, at 873]; *Wildlife Reserve Center v. County of Stanislaus*, (1994 27 Cal.App.4th 713.)

Staff failed to properly consider a reasonable range of alternatives in compliance with CEQA. Instead, Staff considered only unimpaired flow regulations. Because Staff failed to consider other flow and non-flow alternatives that could feasibly attain the basic objectives of the Proposed Project, the discussion of alternatives does not foster informed decision-making and if the State Water Board adopts the Staff draft it will not proceed in the manner required by law. (*Friends of Eel River*, at 874.)

15.10.1 The Staff Alternative Is Unlawfully Narrow

The purpose of the Proposed Project is to provide reasonable protection to fish and wildlife. There are a number of factors or stressors that affect native fish, including, but not limited to, ocean harvest, ocean conditions, hatchery practices, predation, temperature, dissolved oxygen, nutrients, toxics, turbidity, availability of food, and habitat. Taking these factors into account, there are literally hundreds of actions Staff could have considered as feasible alternative actions. For example, Staff could have considered pulse flows to create fish habitat, limitations to ocean harvest, optimization of hatchery practices, or other functional flow regimes.

Staff failed to consider any of these alternatives. Instead, Staff evaluated only a single alternative: regulation of unimpaired flow. Staff claims that by considering varying percentages of unimpaired flow it satisfied the requirement to evaluate a range of reasonable alternatives. This is not the case; the varying unimpaired flows ranges are simply gradations of the same alternative, they are not separate alternatives.

15.10.2 Staff Failed to Consider Other Reasonable Flow Alternatives.

Staff failed to evaluate other reasonable flow alternatives. For example, Staff could have analyzed an objective based on unimpaired flow in months different than the February to June period. The SJTA provided the Staff with significant information regarding the lack of fish benefit and disproportionate cost burden related to increasing flows in June. This information makes the alternative of flow requirements for February through May a reasonable alternative that should have been analyzed in the SED. Instead of analyzing the non-June alternative, Staff developed a post-hoc rationalized position that it did not need to consider a non-June flow alternative. Specifically, Staff created and presented slides in the Phase 1 workshops that attempted to combat the high cost and low return issues with June flows. (1/3/2017 Staff Presentation, at Slide 14.)

This slide selects a single year to support the assertion that salmon remain in the Tributaries until June. Staff's cherry picking data is not effective; as small passage in a single year does not combat more comprehensive data that reflects there are only small remnant populations that remain in the Tributaries in June. Further, this single data point does not replace the need to evaluate a non-June flow alternative to better understand the costs/benefits of other alternatives. Staff did not analyze a February through May alternative. Therefore, it is not known whether this alternative would provide similar fish benefits for a significantly reduced cost. For this reason, the SED did not consider a range of reasonable alternatives.

Similar to June, February is a month that has low fish benefit and higher water costs. Staff failed to consider an alternative that did not include February.

Staff also failed to consider flow alternatives other than percentages of unimpaired instream flow. For example, several stakeholders suggested pulse flows may provide more benefit to fish and wildlife as compared to a constant level of unimpaired flow because such pulse flows may provide floodplain habitat, assistance in outmigration, and/or increased turbidity. (SED, at 3-22 to 3-24.) Based on this information, Staff should have analyzed a regulation that would require pulse flows for floodplain habitat, outmigration, or other benefits. This would have provided the water cost and fishery benefits analysis required by CEQA. The SED did not analyze the environmental impacts of a pulse flow objective or a tributary-specific flow objective. For this reason, the SED did not consider a range of reasonable alternatives, and the State Water Board did not proceed in the manner required by law.

Staff also could have considered an alternative that tailored specific flow regimes for each tributary based upon different flow functionality goals. For example, specific functions such as spawning, outmigration, and cold-water habitat could be matched up with specific tributaries and a flow regime on each tributary could have been developed implementing a specific functional flow goal. This type of functional flow regime is reasonable and should have been considered in the range of reasonable alternatives. Because it does not analyze reasonable alternatives, the State Water Board cannot adopt the Staff draft and proceed in a manner required by law.

15.10.3 The SED Failed to Consider Reasonable Non-Flow Alternatives.

The purpose of the Proposed Project is to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta. (SED, Appx. K, p. 18.) Because it is feasible that the support and maintenance of fish could be achieved through a variety of non-flow actions, Staff should have analyzed some non-flow measures.

For example, studies indicate predation is the dominant stressor to salmon smolts in the San Joaquin River tributary systems – allowing less than five percent salmon smolt survival to the main stem of the San Joaquin River. (VAMP 2011 Report; 2013 FERC Tuolumne River Predation Report.) An alternative that addresses the stressor causing approximately 95 percent mortality is not only reasonable, but necessary. Predation rates are so high, it is likely that no flow regime could be crafted to support and maintain salmon. (SED, Appx. C, at 3-28.) In this situation, flow alternatives may be rendered "infeasible" because without addressing predation, a flow-only alternative will not achieve the basic objectives of the Proposed Project.

Further, predation programs have minimal water costs and provide a substantial and measurable benefit to native fish species, which would result in less significant environmental impacts compared with any of the flow alternatives evaluated by Staff. Thus, the omission of a predation alternative amounts to an omission of relevant, feasible alternative. Because Staff failed to include a predation alternative, the SED has subverted the purposes of CEQA and is legally inadequate. (*Friends of Eel River*, at 783.)

Staff failed to analyze objectives which amend ocean harvest, increase floodplain habitat, develop spawning habitat, and other non-flow measures. Because the SED does not include this analysis, the State Water Board cannot adopt the Staff draft and proceed in the manner required by law.

An alternative considering hatchery practices is also a feasible alternative that Staff failed to consider. The overwhelming majority of salmon are not natural, but hatchery fish. Therefore, changes to hatchery practices is the most effective way to influence salmon populations. This is reflected by the recent changes to hatchery practices by moving the location of hatchery releases past Chipps Island, the survival and salmon returns have increased significantly. (www.rmpc.org.)

15.10.4 Staff Failed to Explain the Infeasibility of Alternatives it Decided Not to Consider.

Staff acknowledges the SED must identify all alternatives the State Water Board considered but did not analyze due to infeasibility. (SED, at 3-8 to 3-10; CEQA Guidelines § 15126.6, § 21002.1.) Further, Staff is required to explain the reasons it determined analysis of the alternatives was infeasible. (*City of Del Mar v. City of San Diego,* (1982) 133 Cal.App.3d 401; *California Native Plant Society v. City of Santa Cruz,* (2009) 177 Cal.App.4th 957.) Pursuant to these requirements, Staff includes Section 3.3.9 which discloses approximately fifteen alternatives that stakeholders suggested the State Water Board analyze. Although these alternatives are disclosed, Staff fails to explain the basis for its determination that they are not feasible.

For example, Staff concedes that stakeholders suggested the State Water Board consider an alternative that would measure the protection of fish and wildlife based on environmental condition metrics. (*Id*., at 3-9.) Staff did not explain why this alternative was not feasible. In fact, Staff stated it "anticipated that environmental condition metrics will be considered during the development of monitoring or special studies programs." (*Id*.) Staff's anticipation that an alternative will be otherwise "considered" is not a reason that it is infeasible to fully analyze in the SED. Further, Staff's anticipation that an alternative will be "considered" when developing monitoring programs does not replace or otherwise satisfy analysis that would be performed if environmental condition metrics were an alternative in the SED. For these reasons, Staff fails to properly disclose and analyze reasonable alternatives.

Staff did not adequately explain its refusal to consider the "upstream inclusion" alternative. (SED, at 3-34.) The suggested alternative would require Staff evaluate the impacts of requiring San Joaquin River water users upstream of the Merced River to contribute flows to comply with the Proposed Project. Staff does not state it is infeasible for the State Water Board to consider the "upstream inclusion" alternative. Instead, Staff stated that it would be considering the "need" for "additional flows" from the upper San Joaquin River Basin to "contribute to the narrative LSJR flow objective" "during the next review of the Bay Delta Plan." (*Id*.) Therefore, in this circumstance, Staff admitted it plans to evaluate the proposed alternative at a later date. Staff does not provide a reason or other defense as to why the analysis is not included in the current SED. For this reason, Staff failed to properly explain why it is not legally obligated to consider the "upstream inclusion" alternative.

Staff did not adequately explain its refusal to consider the "south Delta and lower San Joaquin River" alternative. (SED, at 3-24.) The suggested alternative would require Staff evaluate the impacts of ensuring flows are not rediverted by south Delta and downstream San Joaquin River diversions. Staff states this alternative is addressed through the following language: "The State Water Board will exercise its water right and water quality authority to help ensure that the flows required to meet the LSJR flow objectives are sued for their intended purpose and are not diverted for other purposes." (SED, at 3-34.) This language is vague and unclear. If this language represents Staff's intent to implement the Tributary Flow Objective by amending the water right holders between the Tributary compliance point and the Delta to ensure that such water right holders do not divert flow released to meet the water quality objective, Staff must consider the impacts of such an approach. It has not identified or evaluated such impacts. Staff must either consider this approach as an alternative or include it as part of the proposed objective; either way Staff has failed to identify and evaluate the impacts as required by law.

15.11 Staff Failed to Consider Reasonably Foreseeable Methods of Compliance is Unlawful.

Section 3777 requires the SED analyze the reasonably foreseeable methods of compliance. (Cal. Code Regs., tit. 23, § 3777[b][(4].) Specifically, this section requires the methods of compliance analysis include "***at a minimum all***" of the following:

> (A) An identification of the reasonably foreseeable methods of compliance with the project;
>
> (B) An analysis of any reasonably foreseeable significant adverse environmental impacts associated with those methods of compliance;

(C) An analysis of reasonably foreseeable alternative methods of compliance that would have less significant adverse environmental impacts; and

(D) An analysis of reasonably foreseeable mitigation measures that would minimize any unavoidable significant adverse environmental impacts of the reasonably foreseeable methods of compliance.

(Cal. Code Regs., tit. 23, § 3777[b][4].)

Staff does not comply with the requirements of section 3777. Instead, Staff assumes a single method of compliance and analyzes only this single method. This single method includes specific WSE Model parameters, such as minimum reservoir storage, flow shifting, and reservoir refill requirements. Staff did not analyze compliance with the Proposed Project without the WSE Model parameters. Because compliance with the required percent of unimpaired flow without including all of the WSE Model parameters is a reasonable foreseeable method of compliance, Staff was required to analyze this method of compliance.

15.11.1 Staff Fails to Disclose the Method of Compliance Upon Which the Environmental Analysis is Based.

Staff's discussion regarding the assumptions that drive the WSE Model is deficient. For example, Staff includes a section in which it purports to disclose the WSE Parameters and explain the approach to the WSE Model. (SED, at F.1-13-40.) However, this section is incomplete as Staff fails to include several WSE Model parameters in its discussion of the modeling. For example, flow shifting and minimum allocation fractions are both WSE Model parameters that were not disclosed, but were discovered by reverse engineering the WSE Model. This violates the most fundamental requirements of CEQA, which require Staff disclose sufficient information to facilitate environmental analysis. Staff must revise the SED and identify the method of compliance assumed for the purpose of its environmental analysis.

15.11.2 The SED Analysis is Based on a Single Method of Compliance which is Unreasonable and Unenforceable.

All of Staff's environmental analysis of the Proposed Project is based on the WSE Model. Although Staff has taken the position that the Proposed Project could be implemented in various ways, and the WSE parameters represent only one way to implement, Staff only analyzed the environmental impacts of implementing the Proposed Project with WSE Model parameters. As fully described earlier, the WSE Model is based on a series of parameters. Not only did Staff fail to explain these parameters, but, in violation of CEQA, many of these assumptions are not reasonable and/or not within the authority of the State Water Board to implement. For example, it is not reasonable to assume water delivery would be sacrificed in order to maintain reservoir levels. Reservoirs are water storage tools. Staff assumes that in response to water shortages, reservoir levels will be held static. This is not a reasonable assumption. Instead, it is reasonable to assume that in times of shortage reservoir operations would be used more aggressively, i.e. empty and fill more often. It is not reasonable to assume that in times of shortage (or in response to regulatory shortages) reservoirs would not be exercised aggressively, but instead water delivery would be decreased in order to avoid reservoir fluctuation or to maintain reservoir levels.

Staff assumes the Proposed Project will reduce water deliveries evenly throughout the region. (See SED, Appx. F.1.) It is not reasonable to assume water delivery would be reduced evenly across the region regardless of water right priority. The rules of water right priority require junior water users be curtailed completely before senior water right holders are affected. (*El Dorado Irr. Dist. v. State Water Resources Control Bd.* (2006) 142 Cal.App.4th 937, 963-964.) Therefore, the assumption that the proposed reductions would affect all water right holders similarly is unreasonable. It is reasonable to assume that the rule of water right priority would apply and result in the proposed regulations having greatly different impact on junior water right holders compared to senior water right holders.

15.12 Staff Failed to Obtain Information in a Manner Required By Law.

The State Water Board is required to include all information, comments, or proposed findings relevant to the proposed project or the State Water Board's compliance with CEQA. (Pub. Resources Code, § 21167.6.) Staff originally noticed it planned to prepare an environmental document to review of the San Joaquin River flow and south Delta salinity requirements on February 13, 2009. In this 2009 NOP, Staff set up a schedule to hold several workshops for the purpose of collecting information required to perform the environmental review. These workshops were subsequently cancelled; Staff did not provide a reason for the cancellation. Despite repeated requests and recommendations from stakeholders, Staff failed to hold a single informational workshop or otherwise provide a forum to collect sufficient information upon which a defensible environmental analysis could be conducted.

In addition, Staff did not hold a single scoping meeting in the area affected by the proposed project. Nor did the State Water Board work with local public agencies and water districts prior to the release of the recirculated Staff SED.

The SJTA members provided the State Water Board with information in response to the 2012 SED Draft. Staff did not include information submitted by stakeholders in the Phase 1 process. Staff did not address the information in any fashion. Staff never acknowledged the information and did not reject it as prejudicial or incorrect. Nor did Staff incorporate the information into its analysis. Instead, Staff completely ignored the information provided by the regulated community.

Staff developed a scientific basis report for Phase 1 which considered the basis for setting flows at Vernalis. Staff included this report as an appendix to the SED. The report was not revised or otherwise recalibrated to address the fundamental change to the Proposed Project which moved the Vernalis compliance points to the Tributaries.

In contrast to the Phase 1 process, the Phase 2 process has developed information and science in a deliberate and appropriate manner. On or about January 24, 2012, Staff provided the public with notice that it planned to develop an environmental document to analyze the impacts of the remaining objectives in the Bay Delta Plan. In order to collect sufficient information to conduct that environmental review, Staff set up a series of workshops. Staff hired an independent facilitator and held workshops over a period of three months. The independent facilitator then drafted a report summarizing the workshops. In 2013, Staff developed a draft scientific basis report and released the report for public comment. In 2014, the Delta Science Program held a series of workshops on flows and stressors. In 2016, the State Water Board held workshops on the modeling tools it was using for phase 2. Also in 2016, the State Water Board released the scientific report, which it had peer reviewed by the Independent Science Board. The peer reviewed report was released on [Dated} xx, 2016.

Due to the lack of process and the SED's failure to analyze information in the administrative record, if the State Water Board were to adopt the Staff draft it would not proceed in a manner required by law.

15.13 The Failure to Identify and Consult with Local Agencies as Responsible Agencies is Unlawful.

CEQA defines a "responsible agency" as "a public agency, other than the lead agency, which has responsibility for carrying out or approving a project." (Pub. Resources Code, § 21069; *See also* Cal. Code Regs., tit. 14, § 15381.) Pursuant to this definition, the Irrigation Districts qualify as responsible agencies because they will be primarily responsible for carrying out the Proposed Project. (*See* SED, Appx. K, at 2-3 [noting that each LSJR tributary will be responsible for 35 percent unimpaired flow].)

As the lead agency, the State Water Board is required to consult with responsible agencies prior to determining whether the lead agency may perform a negative declaration or will be required to perform a more rigorous environmental review. (Pub. Resources Code, § 21080.3(a).) The lead agency must also solicit comments from responsible agencies regarding the choice and content of environmental documents. (Pub. Resources Code, §§ 21080.4(a) [requiring solicitation of comments on "the scope and content of the environmental information that is germane to the statutory responsibilities of that responsible agency" when the lead agency determines an environmental impact report is required for the proposed project]; 21104(a) [requiring consultation with, and solicitation of comments from, responsible agencies prior to completing an environmental document]; *See also* Cal. Code Regs., tit. 14, §§ 15082[a], 15086.)

Staff did not comply with these consultation requirements. Staff failed to consult with the Irrigation Districts prior to the release of the Phase 1 SED regarding the extent or content of environmental review. Quite the opposite, Staff put all communication and information provided by the Irrigation Districts into a folder titled "Unsolicited Comments." (www.waterboards.ca.gov/waterrights/water-issues/programs/bay-delta/bay-delta-plan/waterquality-control-planning/index.shtml.) Thus, Staff openly concedes it did not solicit the participation and comments of responsible agencies. Staff failed to proceed in the manner required by law; the lack of consultation and communication with responsible agencies is a blatant violation of CEQA requirements.

15.14 The SED Failure to Properly Consider Mitigation Measures is Unlawful.

The State Water Board is precluded from approving a proposed project with significant environmental effects if "there are feasible alternatives or mitigation measures" that could substantially lessen or avoid those effects. (Cal. Code Regs., tit. 23, § 3777[b][3]; Pub. Resources Code, § 21002; *Citizens for Quality Growth v. City of Mount Shasta* (1988) 198 Cal.App.3d 433, 439 ("*Mount Shasta*"); *Mountain Lion Foundation v. Fish & Game Commission* (1997) 16 Cal.4th 105, 134.) For each significant impact, Staff is required to identify specific mitigation measures. Where several potential mitigation measures are available, each should be discussed separately, and the reasons for choosing one over the other should be stated. (*Id*.) If the inclusion of a mitigation measure would itself create new significant effects, these too, must be discussed, though in less detail than that required for those caused by the project itself. (*Sacramento Old City Assn. v. City Council* (1991) 229 Cal.App.3d 1011, 1027 ("*SOCA*"); *Mount Shasta*, at 439; Cal. Code Regs., tit. 23, § 3777[b][3]; Pub. Resources Code, § 21002.) Staff has not provided the requisite mitigation analysis.

15.14.1 The SED Summarily Dismisses Feasible Flow Mitigation.

In considering mitigation measures, Staff summarily dismisses the consideration of flow as a mitigation measure. (SED, 5-93.) Specifically, Staff states that because other alternatives consider various percentages of unimpaired flow, Staff cannot "independently apply" additional flow as mitigation because it would be "inconsistent with the terms" of the alternative. (*Id.*) This rationale is unsupported.

First, Staff does not state that it is not feasible to consider additional flow, only that it would be inconsistent with the alternative. This is not a sufficient reason for failing to consider additional flow. Second, the statement that other alternatives consider additional flow is only true in terms of percentages of unimpaired flow. There are several flow measures that Staff did not consider including, but not limited to, pulse flows, highly variable flow regimes, outmigration flows, and flow regimes by water year type. Because Staff fails to properly evaluate different flows as mitigation measures, if the State Water Board adopts the Staff draft, it will not proceed in a manner required by law.

15.14.2 Staff Fails to Consider Feasible Non-Flow Mitigation Measures.

Staff does not properly consider non-flow mitigation measures. Staff fails to properly analyze potential mitigation measures for increased prey vulnerability. For instance, Staff fails to evaluate a predator suppression program as a mitigation measure. By failing to consider predator suppression, the State Water Board cannot adopt the Staff draft and proceed in a manner required by law.

15.14.3 Staff Fails to Properly Mitigate Temperature Impacts.

During the December 5, 2016 Workshop, Staff acknowledge that the Proposed Project results in temperature impacts. Staff fails to disclose the temperature impacts in the SED. Instead, Staff attempts to mitigate the temperature impacts by building in constraints into the Proposed Project, such as minimum storage requirements. As noted earlier, this is a violation of CEQA. Staff was required to disclose any temperature impacts from the Proposed Project. Only after this disclosure is Staff allowed to consider mitigation for such impacts. Because Staff failed to disclose the temperature impacts, Staff also failed to appropriately develop mitigation for such impacts. Due to this failure to comply with CEQA, the State Water Board cannot adopt the Staff draft and proceed in a manner required by law.

15.15 The Failure to Adequately Analyze the Environmental Impacts of Climate Change is Unlawful.

Staff fails to analyze how climate change will affect the Proposed Project and the environment. Staff includes a section that generally describes the anticipated impacts of climate change. In this section, Staff describes that higher, warmer flows are likely, flood events will increase, and snow pack will be reduced. (SED, at 14-52.) However, when it comes time to analyze how these changes will affect the Proposed Project or the environment, Staff provides no analysis. Staff simply states that the adaptive management process will appropriately respond and address climate change impacts. This lack of analysis is a problem for several reasons. First, it fails to identify the impacts of climate change of the Proposed Project; so it is unclear whether climate change will require more or less flow under the Proposed Project. For instance, Staff does not consider whether flooding will become more frequent or severe as a result of the increased flow from the proposed project, combined with rising sea levels and earlier snowmelts caused by climate change. Nor does Staff analyze impacts of the proposed project and climate change to reservoir storage or aquatic resources. Second, the failure to identify impacts also gives rise to the failure to determine whether significant impacts will occur and whether mitigation is necessary. Third, the analysis simply assumes any impacts that arise will be taken care of by adaptive management. The failure to identify, disclose and analyze the impacts is a fundamental violation of CEQA requirements. CEQA does not allow lead agencies to simply promise to address problems if they arise; rather the entire point of CEQA is to identify and evaluate potential future impacts. Staff's failure to properly disclose and analyze climate change is particularly egregious because of the State Water Board's recent adoption of its Climate Change Resolution, which commits the State Water Board to properly analyzing climate change impacts for any project it undertakes. Because Staff does not analyze climate change impacts of the proposed project, the State Water Board cannot adopt the Staff draft and proceed in the manner required by law.

15.16 Failure to Evaluate Impacts Outside the Plan Area is Unlawful

Staff failed to consider environmental impacts outside the Plan Area. Specifically, Staff failed to consider both impacts to upstream water right holders and facilities and downstream water right holders and facilities. Staff defines the area outside the Plan Area that may be affected by the Proposed Project as the "extended plan area." Staff's explains "impacts in the extended plan area are addressed in the SED as appropriate." (SED, at 4-7.) This approach results in a significantly deficient analysis. Staff simply takes the position that impacts in the extended plan area are not worth environmental analysis. For example, Staff states "given the small volume of water held in non-hydropower post-1914 rights for consumptive use in the extended plan area compared to the volume held in non-hydropower post-1914 water rights used below the rim dams, most of the effect of implementing LSJR alternatives would occur at, or downstream of, the major rim dams in the three tributaries stream water users and downstream water users from the Plan Area." (SED, at 4-7.)

Staff's failure to analyze impacts in the extended plan area is incorrect and unlawful for several reasons.

First, Staff's premise that the projected size of impacts is not worth evaluating the impacts is unsupported and puts the cart before the horse. Only after Staff has evaluated the impacts of the Proposed Project on the extended plan area should it provide comment or conclusion regarding such impacts. Staff failed to evaluate the impacts to the extended plan area and cannot hide behind its unsupported conclusion that such impacts are not worth evaluating.

Second, the assumption that the impacts will be small is not true. There are junior water right holders and water facilities upstream of the Plan Area that will be devastated by the Proposed Project. For example, on both the Tuolumne and Stanislaus Rivers there are reservoir facilities and water right holders that are junior to downstream senior water right holders. The Proposed Project will require these junior water right holders to cease all diversions before senior water right holders begin to contribute flows to the Proposed Project. This means that an impact of the Proposed Project may result in facilities like New Spicer Reservoir being emptied and all water use in the region served by that facility would be reduced to extreme near-zero delivery levels. Certainly the volume of water from this impact would be less than emptying New Melones Reservoir. However, the devastation to the facility and the community dependent on that water supply is significant and must be analyzed in the SED.

Third, Staff's assumption that upstream impacts will be small is contradicted by the fact that Hetch Hetchy and the CCSF system is in the extended plan area. Staff recognizes that it cannot simply ignore the Hetch Hetchy system as an upstream facility with minor impacts and performs a special analyses of potential impacts. (See SED, Appx. L.) However, there are fundamental flaws in this analysis. Primarily, Staff incorrectly assumed that CCSF water supply would be augmented by transfers from Turlock and Modesto Irrigation Districts. (12/12/17 Workshop, at 194.) This assumption was made despite CCSF informing Staff that is not a viable assumption and not how the system would operate. In addition, addition, Staff's analysis did not actually consider impacts to CCSF. Instead, the assumption of transfer allowed Staff to largely avoid analyzing any impacts to CCSF, but rather just assumed those impacts would be shouldered by Turlock and Modesto Irrigation Districts shorting agriculture. (12/12/17 Workshop, at 216 [explaining that the analysis assigned the full shortage to agriculture and that was how Staff accounted for CCSF impacts.].) Because the entire CCSF analysis is premised on not analyzing impacts to CCSF, but incorrectly assigning them to the irrigation districts, this analysis is unsupported and unlawful.

Fourth, Staff's treatment of the extended plan area as one geographic unit is not supported. The areas upstream of the Plan Area and downstream of the Plan Area are different and the Projected Project would impacts these areas differently. The Proposed Project's potential impacts to upstream water users is discussed above. However, downstream water users may also be impacted by the Proposed Project. Staff recognizes that in order to protect released flow from the diversion by junior water users downstream that some action must be taken. (SED, at ES-23.) Staff failed to analyze the impacts of cutting off junior water users during times when senior water right holders were releasing water required by the Proposed Project. This lack of analysis is a significant and unlawful omission.

Fifth, the SED includes a chart of summarized significance determinations for the extended plan area. (SED, at 18-6.) This chart indicates that Staff has made determinations of impact in each chapter of the SED. This chart is misleading because it indicates that Staff performed analyses and made a determination. Staff did not perform the requisite analysis and these determinations are not based on supported analyses. To the contrary, these determinations are based on unsupported conclusions, no analysis, and bold and dismissive statements. Staff must evaluate the impacts of the Proposed Project on the extended plan area.

15.17 Statements of Overriding Consideration Are Unlawful.

If the State Water Board is to approve a project that has significant and unavoidable impacts, it must first adopt a statement of overriding considerations. CEQA requires a statement of overriding considerations to be supported with substantial evidence that a project will confer benefits. (*Woodward Park Homeowners Ass'n, Inc. v. City of Fresno* (2007) 150 Cal.App.4th 683, 718.) General benefits are not sufficient; the State Water Board is required to perform a good-faith balancing and find the proposed project outweighs significant and unavoidable impacts. (*Id.*) In other words, the State Water Board must explicitly find the fish and wildlife benefit outweighs the significant impacts to groundwater, agriculture, water supply, service providers, and the economy. Because Staff has not identified the Proposed Project's benefits to fish and wildlife, the State Water Board cannot support such a determination. Without information to support a statement of overriding consideration, the State Water Board will not be able to proceed in a manner required by law.

15.18 The Failure to Evaluate the Proposed Changes to the October Flow Requirements is Unlawful.

The program of implementation suggests Staff intends the Proposed Project to change the responsibility for meeting the October flow objective. (SED, Appx. K, at 34.) However, Staff makes no mention of this reallocation in the environmental analysis. Changing the allocation of responsibility for meeting the October flow objective is not without consequence; it has the potential to impact water supply effects, aesthetics, hydrology, groundwater pumping, and fish and wildlife. A CEQA document "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." (*Laurel Heights*, at 404-405.) Without analyzing the environmental effects of changing the responsibility to meet the October flow objective, the SED is deficient. If the State Water Board adopts the Staff draft it will not proceed in the manner required by law.

16.0 THE SED IS NOT SUPPORTED BY SUBSTANTIAL EVIDENCE.

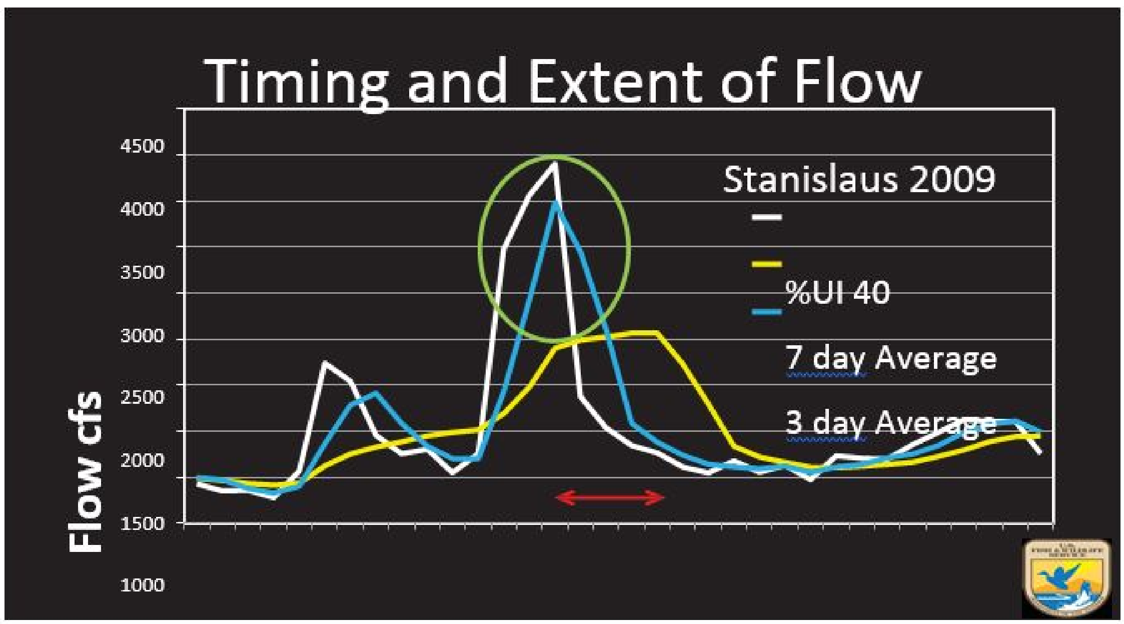
Staff must support its conclusions, findings, or determinations with substantial evidence. (*Uphold Our Heritage v. Town of Woodside* (2007) 147 Cal.App.4th 587, 595-596; *See* Pub. Resources Code, § 21168.) Substantial evidence requires "enough relevant information and reasonable inferences from [the information in the administrative record] that a fair argument can be made to support a conclusion." (*Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) 124 Cal.App.4th 1184, 1198 [*quoting Association of Irritated Residents v. County of Madera* (2003) 107 Cal.App.4th 1383, 139]).) Substantial evidence shall include facts, reasonable assumptions predicated upon facts, and expert opinions supported by facts. In contrast, argument, speculation, unsubstantiated opinion or narrative, or evidence which is clearly inaccurate or erroneous does not amount to substantial evidence. (Pub. Resources Code, § 21082.2(c).) Staff fails to support much of the analysis in the SED with by substantial evidence, including the sections described below.

16.1 The Water Supply Effects Model is Not Supported by Substantial Evidence.

The WSE Model is the model that is supposed to estimate the water supply impacts from the proposed project objective. However, the WSE Model does not model the Proposed Project, but, rather, models a specific set of constraints that are not included in the Proposed Project. The Proposed Project is comprised of the Tributary Flow Objective, which requires a range (30-50 percent) of unimpaired flow at the compliance points on each of the Stanislaus, Tuolumne, and Merced Rivers. The WSE Model makes several significant operational assumptions that are not part of the Proposed Project. These assumptions or "parameters" control the WSE Model and its results. Each of the WSE Model parameters includes fundamental flaws.

16.1.1 Monthly Average Parameter

The WSE Model uses a 30-day average to model the impacts of the proposed unimpaired flow objective. The use of the 30-day average does not reflect the Proposed Project because the Tributary Flow Objective requires implementation on a 7-day running average. (SED, Appx. K, at 18.) Running the model on a 30-day average smooths variances in hydrology that would occur on a 7-day average. In other words, the thirty day run would not reflect the hydrology and impacts of the Proposed Project's highs and lows that would occur in sending down unimpaired flow on a weekly average. This smoothing effect is reflected in the slide presented by the United States Fish and Wildlife Service (USFWS) at the January 3, 2017 hearing for Phase 1:



The above slide shows the impact of using different time period over which to average the unimpaired flow. The slide above shows the daily unimpaired flow, the 3-day average and the 7-day average. The 7-day average reflects some hydrologic variation, but smooths the impacts of the hydrological event. The 30-day average is not shown on this graph, but is even more extreme and creates a flat line that only minimally reflects specific hydrologic events. This is because 30-day average would only reflect the average of all flow events and daily flows over the 30-day period, without reflecting the varied nature of actual unimpaired flows. This kind of smoothing has significant impacts when estimating environmental impacts. As the USFWS service presenter noted, using a longer running average fundamentally changes the hydrology and often "decouples" the benefits of unimpaired flow from the potential fish benefits such as higher flows, turbidity, cued migration and others. (January 3, 2017 Phase 1 Hearing, at 2:36:30.) This slide resonated with the State Water Board members, specifically member Steve Moore. In response to the issue of averaging flows and in response to the slide above, Mr. Moore stated: "I appreciate this, this gets to the heart and soul of why I am doing this job . . . to better engineer biology . . . and this is a key point. Not only are you missing benefits when the natural cues are happening . . . but there is a bunch of water that will not get the benefit because we have averaged based on an operational constraint that we are imagining . . .we are imagining that we have to stay with a 7 day approach. We can do better." (January 3, 2017 Phase 1 Hearing, at 2:37:15.)

This comment and concern were not reflected by Staff. In direct contradiction to Mr. Moore's statements and concerns, Staff used a 30 day running average to evaluate the impact of the Proposed Project, despite the availability of models that could run daily averages. When questioned regarding the use of the 30 day average, Staff affirmed its approach:

> Bill Paris: Did I understand you guys right, you haven't modeled the proposal? Is that correct? The proposal is not based on monthly and you are presenting monthly. Have you modeled it in a less than monthly time-step? And if so can we see that data and information?
>
> Les Grober: No we only modeled it at the monthly time-step. Because this intended to be a, uh, budget of water, if you will. Really this is getting back to the adaptive implementation, but, it's not, we didn't do a daily model for showing this.
>
> Bill Paris: Is there a daily model available?
>
> Les Grober: Not that we have run. Except what we have run for temperature modeling.
>
> Will Anderson: The temperature model takes the monthly and it runs it on a daily time-step. So there is some smoothing there, but it is essentially the monthly averages.

Les Grober: So, again, this is speaks to that this is not intended to optimizing, it shows what it could be if you look at it very broadly, programmatically. So, for the temperature, of course you would see some other variation potentially depending on how this is operated. If you had rigid adherence with the 7-day running average, you would expect to see somewhat different results. But we have looked at the monthly, a very course monthly and then the course dis-aggregation of monthly into daily for the temperature effects.

Bill Paris: Sure, but uh, I guess I would flip that around and say from the impact perspective, modeling what you are going to require the regulated community to comply with would be a more accurate depiction of what those impacts might be.

Les Grober: Are you suggesting that it would result in a different quantity of water at a 7-day average than on a monthly?

Bill Paris: Yeah.

Les Grober: Ok. You can provide that comment.

Chris Shutes: Chris Shutes in response to Mr. Paris. For the, uh, Don Pedro relicensing, Dan Steiner built a dandy daily model . . .

Les Grober: Again, and I would, we are happy to receive comments on this as part of the hearing, and the written comments, so I appreciate all of the comments, but bringing it back to this is a programmatic analysis and any such comments would have to demonstrate what, what different result one would be expecting to achieve and how it would be . .. I can imagine it would be in the details it would be different but, why, what, why running this on a monthly time-step is insufficient to demonstrate what can be achieved broadly in terms of temperature improvements and broadly in terms of uh the water supply effects.

(12/5/2016 Workshop, at 3:31:30.)

This dialogue above differs so drastically from the dialogue between Mr. Moore and USFWS. State Water Board members are on record dedicated to understanding the impacts of the

Proposed Project on a daily average. In stark contrast, Staff takes the position that precision is not only not necessary, but that stakeholders would need to prove to Staff why the imprecise approach Staff is us using is not sufficient before a more precise analysis would be implemented. It is clear that Staff and the State Water Board members are not on the same page with regard to the WSE Model 30-day running average. The State Water Board members are correct to be concerned about the averaging of hydrologic events; the stated purpose of the unimpaired flow approach is based on mimicking the natural hydrograph. The WSE Model run of a 30-day average does not evaluate the Proposed Project and does not reflect the impacts of the unimpaired flow objective. For this reason, the WSE Model is not supported by substantial evidence.

16.1.2 Reservoir Minimum Carryover Parameter

The WSE Model assumes the minimum reservoir carryover storage parameters of New Exchequer at 300,000 and New Melones at 700,000, and New Don Pedro Reservoir at 800,000. (SED, at F.1-34-38.) There are several problems with this parameter. First, the parameter is not part of the Proposed Project. Minimum reservoir levels are not listed as objectives. And although minimum reservoir levels are referenced in the plan of implementation, the reference only states that the State Water Board will implement some mitigation measure to reduce temperature impacts and reservoir minimums is one such tool. For these reasons, minimum reservoir storage is an implementation option, but is not part of the Proposed Project.

Second, it is not clear how Staff developed the minimum reservoir storage levels. When asked about the development of the minimum reservoir levels, Staff provided several reasons the minimum levels were developed. For example, Staff stated, "The reason for selecting the carryover storage that we did was to minimize those temperature effects that were incurred by drawing the reservoir down further." (12/5/16 Workshop, Les Grober, at 2:23:56- 2:24:08.) Staff also stated that reservoir storage is in place to increase reliability of water supplies. (12/5/16 Workshop, Dan Worth, at 2:28:00- 2:29:09 ["There is reliability to having carryover storage, to where if you draw it all the way down and then have increased requirements in a successive year then that would be . . uh . . have less available for consumptive use in the following year as well."].) Staff also stated that reservoir minimum requirements were necessary to prevent reservoirs from going dry. Specifically, Staff stated if the Proposed Project were implemented without a minimum reservoir requirement, "the first thing that you see is that if you keep everything else the same, the reservoir runs dry. So we had to make assumptions that we have described and disclosed about reservoir operations that prevent those things like running reservoirs dry or temperature impacts . . . it prevents those from occurring. "(12/5/16 Workshop, Les Grober, at 3:02:05 – 3:02:27.) However, providing the general reasons for developing minimum reservoir requirements does not actually disclose how Staff developed the specific numeric minimum storage levels. When pressed further on the development of reservoir levels, Staff backed away from the minimum reservoir levels, stating: "The reason for not including it as an explicit amount or explicit requirement is . . . because we haven't optimized it, so we don't want to presume and establish any fixed number that wouldn't be a better number." (12/5/16 Workshop Les Grober, at 2:31:50-2:32:10.) This explanation makes no sense, because, of course, Staff did select "explicit amounts" and the inclusion of "explicit amounts" in the modeling control much of the analysis in the SED. Thus, the lack of disclosure in the SED and Staff's inability to explain the development of minimum reservoir levels reflects that Staff did not have a specific method for developing the minimum reservoir storage requirements, but rather, based the requirements on general estimates vaguely related to avoiding temperature and water supply impacts. The SED is required to be supported by substantial evidence. The development and reliance upon minimum reservoir levels is not supported by substantial evidence.

Third, it is not clear whether the minimum reservoir requirements are required or whether they are non-binding targets. Some Staff members suggest that the minimum reservoir levels are guidelines or targets. (12/5/16 Workshop, Will Anderson, at 2:07:40 – ["End of September storage guideline, which is not a hard and firm . . . requirement, it is a guideline."].) However, other Staff state more definitively that the reservoir levels are requirements. For example, Staff stated that the program of implementation includes carryover storage requirements. (12/5/16 Workshop, Les Grober, at 2:31:35 – 2:31:46 ["We do have in the program of implementation that there would be some carryover requirements included."].) Regardless of the inconsistent characterization by Staff, the WSE Model assumes the minimum reservoir levels are met. Fourth, it is not clear how Staff plans to implement the minimum reservoir level requirement. The Tributary Flow Objective does not include minimum reservoir levels. (SED, Appx. K.) The method through which Staff assumes that such minimum level requirements will be implemented is not clear. Staff states that it will implement minimum reservoir requirements through a "water rights proceeding." (SED, at 5-64.) However, Staff does not identify the authority through which Staff will rely upon to implement the minimum reservoir requirements. The Irrigation Districts take the position that no such authority exists. Without disclosure of the authority under which the State Water Board is able to implement the proposed minimum reservoir requirements, it appears that the WSE Model relies on an unenforceable assumption that minimum reservoir levels will be achieved.

Fifth, the WSE Model relies upon the minimum storage requirements, which are "necessary for the analysis" to work. (12/5/16 Workshop, Will Anderson, at 2:24:45 – 2:25:10.) As Staff explained, there is "a need for storage rules or targets to keep the reservoirs spilling cold water in particularly the summer time period and the fall." (2:51:05 – 2:51:22.) Without the rules, the temperature impacts of the Proposed Project would increase the number of days that temperature targets are not met. Such a result would not provide the alleged protection to fish and wildlife, which is the purpose of the Proposed Project.

Sixth, Staff never analyzed the results of the Proposed Project without the minimum reservoir requirements. Because the minimums are not part of the objectives, but rather are just a WSE Model parameter, and Staff did not run the model without that parameter, this means that Staff has not analyzed the impacts of the Proposed Project. Further, Staff has struggled with the transparency and disclosure of the results of running the WSE Model without the assumed minimum reservoir requirements. At the same workshop, one Staff member stated Staff has run a no-reservoir-minimum, stating, "The work that was done there pre-dates me a little bit and we just went back since last Tuesday and we have seen the interest in that and we have a re-run that . . . so yes, it was done." (12/5/16 Workshop, Will Anderson 2:33:30 - .) While other Staff, at a later Workshop, stated the opposite, that the Staff has not yet run a no-reservoir-minimum. In responding to a question on modeling without reservoir restraints: "We were unable to get those sensitivity runs, so we are not going to be presenting them today." (12/12/2016 Workshop, 80:13-.)

Seventh, the proposed reservoir minimums are year round and thus appear to attempt to regulate outside the February through June regulatory period. Regulation of flows or reservoir operations outside this time period has not been noticed by the State Water Board. In order to properly effectuate a regulation outside the regulatory period, the State Water Board would need to re-notice the process and include the reservoir storage regulation in such a notice.

16.1.3 Restricted Storage Release Parameter

The WSE Model also limits the amount of water that can be drawn from storage that is more restrictive than the minimum storage level requirement. This parameter controls the amount of water released from storage and limits water right holders' release, limiting releases to only 50 percent of the water available for release, i.e. the amount above the minimum reservoir requirement. For example, if reservoir storage is at 1,200,000 in New Don Pedro, the storage release parameter would prohibit Turlock and Modesto Irrigation Districts from releasing the 400,000 acre feet available from storage. Instead, the storage release parameter would restrict the Irrigation Districts to releasing 200,000 from storage, leaving year end storage at 1,000,000, which is 200,000 over the minimum storage level. Staff explains:

"The model constrains the percentage of the available storage (after holding back for minimum end-of-September storage) that is available for diversion over the irrigation season. This limits the amount of storage that can be withdrawn to reduce potential effects on river temperatures by protecting carryover storage and the coldwater pool in the reservoirs leading into a drought sequence." (SED, at F.-31-32.)

There are several problems with the restricted storage release parameter. First, the restricted storage release parameter is not part of the Proposed Project. As previously noted, reservoir constraints are not a proposed objective. Further, unlike the minimum reservoir storage that is mentioned in the plan of implementation, the restricted storage release parameter is not found anywhere in the program of implementation. This operational restriction is simply not mentioned in Appendix K at all and it is only briefly explained as a model parameter in the SED.

Second, similar to the minimum reservoir requirement, it is unclear whether the State Water Board has the authority to implement the restricted storage release parameter. The State Water

Board has not demonstrated how it will restrict water right holders and dam operators from releasing water above that allowed by the storage release parameter.

Third, the restricted storage release parameter controls the release of water from storage outside the period of noticed regulation. This parameter appears to control reservoir storage all year. Regulation of flows or reservoir operations outside this the noticed February through June time period has not been noticed by the State Water Board. In order to properly effectuate a regulation outside the regulatory period, the State Water Board would need to re-notice the process and include the reservoir storage regulation in such a notice. For the numerous reasons noted above, the storage release parameter is not supported by substantial evidence.

16.1.4 Reservoir Refill Parameter

The reservoir refill parameter limits the delivery of water in above normal and wet years. During these years, the WSE Model requires increased diversion of water to storage. The SED explains the refill limitations as follows:

> When reservoir levels are very low (typically after a drought sequence), the model limits the amount of inflow that can be allocated for diversion in a subsequent wet year(s). By reducing the amount of inflow that can be diverted in such years, reservoirs and associated coldwater pools recover more quickly after a drought. Without such a requirement, reservoirs otherwise would remain lower for longer after a drought, causing associated temperature impacts. (SED, at F.1-31.)

Staff further explained the refill limitations as a tool that will "also constrain diversions in order to give a boost to the reservoir level so that it can meet carryover guidelines in the future, that comes into play when there is a very low reservoir level and there is a lot of inflow, it will then um be a constraint a maximum allocation for that year." (12/5/16 Workshop, Will Anderson, at 2:08:24.)

Staff discloses the refill requirement is a "user specified parameter between 0 and 1 that reduces diversion in an effort to help refill the major reservoirs at the end of a drought. This parameter is activated if: 1) storage in the major reservoir at the end of the previous October was less than minimum reservoir requirement plus 10 percent and 2) inflow to the major reservoir over the growing season will be greater than an inflow trigger set by the user. This diversion cut will continue over the entire irrigation year (March–February) unless the reservoir reaches the flood curve at which point the cut will end for the rest of the year." (SED, at F.1-39.) Similar to the minimum reservoir level requirements, the refill limitations cause several problems.

First, the refill limitations are not proposed as water quality objectives in Appendix K. Nor are the refill limitations discussed in the program of implementation. Thus, the refill limitation does not appear to be a part of the Proposed Project. Even though it is not part of the Proposed Project, Staff only analyzed the environmental impacts of the Proposed Project with the inclusion of the refill limitation. Therefore, Staff does not know or did not disclose the impacts without the limitation.

Second, neither the SED nor Staff disclosed the actual refill limitations. The SED explains the concept of refill requirements. However, the actual calculation or quantity that the WSE Model requires or assumes is not disclosed. This lack of transparency is common in the SED and it requires the regulated community to reverse engineer the WSE Model to understand how Staff ran the model.

Third, neither the SED nor Staff explained how the refill limitations were developed. These explanations fail to identify the "user specified parameter" employed by the WSE Model. Further, the explanations fail to identify the "inflow target" used by Staff. However, generally, from viewing WSE Model results, it seems that the refill requirement usually applies to require diversion to storage in wetter years that follow drought or dry year periods.

Fourth, the refill parameter regulates diversions outside February through June period. Regulation of flows or reservoir operations outside this the noticed February through June time period has not been noticed by the State Water Board. In order to properly effectuate a regulation outside the regulatory period, the State Water Board would need to re-notice the process and include the reservoir storage regulation in such a notice. For these reasons, the refill parameter is not supported by substantial evidence.

16.1.5 Flow Shifting Parameter

The WSE Model assumes that some of the unimpaired flow required during the February to June period will be placed in storage and released in later fall months. Staff assumes that "some" flow shifting will occur, but does not disclose exactly how much or the extent to which flow shifting exists. The flow shifting parameter that is built into the WSE Model is a significantly flawed for several reasons. First, it does not reflect the Proposed Project. The Tributary Flow Objective requires 30 to 50 percent of unimpaired flow to be met at the Tributary compliance points flows from February through June. The Tributary Flow Objective does not include required storage, delays in release of stored water, or otherwise shifting flows from the Proposed Project.

Second, it requires flows outside the February – June period. Flows outside the February to June period have not been noticed in the present matter. To include flows that are required outside the regulated period of February to June violates the notice requirements.

Third, Staff has failed to disclose how it developed the parameters for flow shifting. Staff discloses that the WSE Model includes flow shifting in the model runs for proposed flow requirements of 35 percent unimpaired flow and any other higher proposed flows. However, Staff does not explain how much flow is shifted, when the flow is shifted, and/or any other information regarding how the determination to shift flow was developed. Staff was asked to explain how the flow shifting parameter was developed. Staff failed to provide an explanation. (12/5/16 Workshop, Will Anderson, at 2:57:20 – 2:58:00 "Um, I am not able to, um, step through, ugh, I don't believe it's going to be satisfying and I can't step through the development of that, um, simply to say that these are parameters are inherent and important and critical for, uh, describing for our description of the system operation.") When pressed further regarding the flow shifting parameters, Staff disclosed that the flow shifting was derived through "trial and error to find a certain . . . flow target . . .that essentially would reduce the amount of time that the temperature criteria would be not met and reduce that so that the project effects would not cause a negative impact." (12/5/16 Workshop, Will Anderson, at 5:31:20 – 5:32:30.) Staff did not provide evidence or explanation of the "trial and error" process to the public. Further, in the SED, the WSE Model is explained and "all" the WSE Parameters are allegedly disclosed. However, Staff failed to disclose that flow shifting is part of the WSE Model runs for all runs over 35 percent of unimpaired flow. Thus, Staff failed to disclose how flow shifting is included in the WSE Model.

Fourth, Staff failed to evaluate the impacts of the Proposed Project without flow shifting. Staff conceded that for proposed regulations of flow that were 35 percent unimpaired flow or higher, Staff did not run the WSE Model without flow shifting. In other words, Staff only analyzed the impacts of a project that required flow releases outside the regulatory period. Staff failed to perform or disclose any analysis of impacts for flows that were limited to the February through June period. (12/5/16 Workshop, Les Grober, at 3:35:05 ["There was no run done with no flow shifting."].)

Fifth, the flow shifting parameter assumes that flow shifting will always be possible and fails to consider the limitation of flood release requirements. The flow shifting parameter assumes that unimpaired flows during the February through June period can be held in storage and released in the River during fall months. In the WSE Model, the flow shifting parameter shifts flows in every wet and above normal year. (12/5/2016 Workshop, at 151-152.) However, the flow shifting parameter does not consider that during required flood control release periods, flows are required to be released and cannot be held to be released at a later date. Staff did not consider that flood release limitations; such limitations never constrained flow shifting. Further, in response to a question asking Staff whether the flood release constraints were considered, Staff responded, "that is an interesting. . uh, please make that comment, because if I am hearing correctly there is a concern with that . . .and you're saying there would be limited opportunity to flow shift." (12/5/16 Workshop, Les Grober, at 5:41:05 – 5:44:00.) The failure to consider flood release limitations results in additional water supply impacts that were not evaluated. The effect of assuming shifted water remained in the reservoir even though the water had to be released due to flood control requirements, would double the required instream flow requirement. Water would be released for flood flows and then released again in the fall due to flow shifting.

Sixth, it is unclear how the shifting of flows into the fall period affects the existing October flow requirements. The existing Bay Delta Plan includes fall pulse flows, which Phase 1 does not officially propose to amend. (SED, Appx. K.) The flow shifting parameter built into the WSE Model pushes flows from the spring into the late summer and fall periods. When asked whether the flow shifted into the fall period is assumed to contribute to meeting the fall flow objectives, Staff responded "Um, lets, um I want to get back to you on that just to give you the correct, make sure we are on the same page on that. So the flow shifting meets a minimum flow target which, in the case of the base case um, well the flow shifting in uh, lets get back to you on that.") (12/5/16 Workshop, Will Anderson, at 5:09:23 – 5:11:00.) Clearly Staff had not considered the impact of shifting flow into fall on the fall flow objectives.

Seventh, Staff assumes the State Water Board has the authority to implement the flow shifting parameter. This is an assumption that is not supported and is incorrect. In order to implement the flow shifting parameter, the State Water Board would need to require that water be diverted to storage, require the water be held in storage, and then require the later release of the water in late summer or fall months. In order to accomplish these operational controls, the State Water Board would basically need to take over the reservoirs and run them according to the WSE Model. The State Water Board has no such authority.

16.1.6 Base Flow Parameter

The Proposed Project requires a base flow of 800-1200 cubic feet per second at Vernalis. (SED, Appx. K, at 18.) However, the WSE Model does not include the base flow when modeling the Proposed Project. Rather, the minimum flows used by the WSE Model are the existing FERC flows on the Merced and Tuolumne Rivers and the Appendix 2E flows on the Stanislaus River. This is a problem for several reasons. First, the base flows are the one parameter that is included in the Proposed Project and disclosed by Staff. For this reason, the failure to include the base flows in the modeling is both ironic and not supported by substantial evidence. Second, the base flows are the only remaining Vernalis compliance point requirement. Without including the base flows in the modeling, there is no longer any Vernalis compliance point requirement. This is a significant problem, as the Flow Criteria Report bases it science on Vernalis flows, not Tributary flows. In addition, without the Vernalis flow requirement, the Proposed Project is no longer directly with the Bay Delta and becomes a regional basin planning effort. Third, in place of the base flows in the Proposed Project, Staff includes the existing flow requirements on the three Tributaries. The use of these existing flows is not supported by substantial evidence because (a) the flows are not part of the Proposed Project; (b) the State Water Board has no authority over these flows; (c) all of these existing flows are currently being reviewed through reconsultation or the FERC relicensing process; (d) the flow requirements do not require the release of unimpaired flow, but often require the release of water from reservoirs; and (e) the flow requirements on located on the Tributaries, rather than Vernalis.

16.1.7 Minimum Allocation Fraction Parameter

The WSE Model includes a minimum delivery amount that prevents the allocation of water from hitting zero. The Proposed Project would never reduce the delivery of water to the Irrigation Districts to zero, because even if the requirement were 40 percent of the unimpaired flow, sixty percent of even a small amount of water is a small quantity of water that would be allocated to water right holders. However, the WSE Model includes several other components, including flow shifting, minimum reservoir requirements, and refill restrictions, which further reduce water deliveries and make it possible that allocation may hit zero in certain dry years. In order to avoid the impact of zero water deliveries, Staff developed the minimum allocation fraction, which provides the delivery of a minimum quantity of water in years which a zero allocation would occur. Staff explains the minimum allocation fraction in terms of relaxing the reservoir carryover requirements:

> "Minimum Diversion Level (Minimum End-of-September Relaxation): Diversions can override the end-of September storage guideline and draw additional water from storage in the event the available surface water for diversion is less than a specified minimum level. This in effect is a relaxation in certain years to the end-of-September storage guideline. The minimum level constraint was set after trial and error to ensure there were no significant temperature impacts." (SED, at F.1-31.)

The minimum allocation fraction parameter has several fundamental flaws. First, it is not part of the Proposed Project. The Proposed Project includes minimum Vernalis flows, but does nto include a minimum delivery allocation. Rather, the Proposed Project would have a built-in minimum delivery at 60 percent of the unimpaired flow.

Second, it is unclear how the minimum allocation fraction was developed. Staff explained that the minimum allocation fractions were developed "empirically." (12/5/16 Workshop, Will Anderson, at 2:08:20.) Neither the SED nor Staff disclose the "minimum level" of diversion for each Tributary that triggers the minimum allocation fraction. Further, other than describing the process as “empirical” or “trial and error”, Staff fails to explain how it developed the minimum level of diversions. Without this information, the regulated community is not able to understand the considerations or determinations made by Staff. The failure to disclose any supporting evidence results in the lack of substantial supporting evidence for the minimum allocation fraction.

Third, the minimum allocation fraction parameter is not disclosed by Staff. Staff did not disclose the parameter in the SED when explaining the WSE Model parameters. In order to find the minimum allocation fraction, it was necessary to deconstruct the WSE Model and find that Staff included floors or minimum allocations in years that would otherwise delivery little to no water. This failure to identify and disclose the parameter violates CEQA and the spirit of transparency that CEQA is in place to promote.

16.1.8 WSE Model Parameters Are Not Supported by Substantial Evidence.

As described above, the modeling assumptions that form the basis of the WSE Model are not supported by substantial evidence and do not reflect the Proposed Project. This is a fundamental defect with regard to CEQA. CEQA requires the lead agency to identify and evaluate the environmental impacts of the Proposed Project. The WSE Model does not identify impacts of the proposed project, but rather includes several mitigating factors or assumptions that are built into the WSE Model. For this reason, if the State Water Board adopts the Staff draft it would not proceed in a manner required by law. The fundamental flaws with the parameters in the WSE Model result Staff’s analysis not being supported by substantial evidence.

16.2 Evaluation of the Impacts to Agriculture Are Not Supported by Substantial Evidence.

Staff uses the SWAP Model to evaluate the impacts of the Proposed Project on the agricultural sector. There are several problems with the SWAP Model which result in the agriculture analysis not being supported by substantial evidence. In addition, there are problems with the Staff’s analysis of the data coming out of the SWAP Model which make the evaluation of the agriculture impacts not supportable.

16.2.1 The SWAP Model is Fundamentally Flawed and Not Supported by Substantial Evidence

Staff describes the SWAP Model generally as follows:

SWAP model is an agricultural production model that simulates the decisions of farmers at a regional level based on principles of economic optimization. The model assumes that farmers maximize profit (revenue minus costs) subject to resource, technical, and market constraints. The model selects those crops, water supplies, and irrigation technology that maximize profit subject to these equations and constraints. The model accounts for land and water availability constraints given a set of factors for production prices, and calibrates to observed yearly values of land, labor, water and supplies use for each region.

(SED, at G-42.) In general, the SWAP model takes the water supply deficits projected by the WSE Model and estimates how many acres of certain crops may be taken out of production. There are several fundamental problems with the SWAP Model which result in the analysis not being supported by substantial evidence.

First, the SWAP Model is driven by results from the WSE Model. (SED, at 4-5.) Therefore the defects of the WSE Model infect the SWAP model. These defects alone result in the SWAP model failing to be supported by substantial evidence.

Second, the SWAP Model is limited to only two outcomes – cropping or no cropping. The SWAP Model assumes that cropping decisions will be based entirely on commodity pricing and nothing else. In other words, the SWAP Model assumes that farmers will either plant a crop or fallow fields. The SWAP Model does not consider the options of conserving water, altering cropping but continue farming, or continuing to farm fewer acres of the same crop. Staff specifically states that it is too speculative to try to guess what actions farmers may take in response to the Proposed Project. However, the SWAP Model is exactly such speculation; it simply assumes farmers will make one of the two limited decisions. This assumption is not reasonable because it is so simplified and overly strict. It would have been more reasonable to assume that some fallowing by lower crops would occur, but that some conservation, some crop rotation and some other actions may also occur.

Third, the SWAP Model's assumption that all decisions will be market based fails to include all market factors, but rather only looks at commodity pricing. For example, the SWAP Model assumes that pasture and alfalfa would be completely fallowed prior to the fallowing of a crop with a higher commodity value. However, this analysis is based only on commodity pricing; i.e. how much pasture and alfalfa will sell for in the market. However, the SWAP Model only considers the commodity price of alfalfa and pasture, the SWAP Model fails to take into consideration that the alfalfa and pasture crops support a secondary and very lucrative cattle and dairy sectors. This failure is despite the fact that Staff acknowledges that pasture and alfalfa may be grown to support the dairy and cattle industries. (SED, at 11-59.) In addition, the Staff also concedes that the dairy and cattle industries values far exceed those of even the most expensive farming crops. The failure to consider the support of this secondary commodity is a failure of the market comparison, especially since the SWAP Model does not evaluate or distinguish how much of the pasture and alfalfa crops are sold in the market as opposed to grown by dairy and cattle operations. The fact that alfalfa and pasture support the lucrative diary and cattle operations makes it much more likely that these crops will continue to be grown. The SWAP Model is literally built on the presumption that alfalfa and pasture will no longer be grown. Thus, the SWAP Model's refusal to recognize any other information besides commodity pricing is the reason it fails to correctly estimate environmental impacts and is not supported by substantial evidence.

Staff recognizes that the SWAP Model is flawed. Staff states that "SWAP could be over predicting fallowing from feed crops in particular alfalfa and pasture." (SED, at 11-58.) Staff states that because of the powerful commodity pricing of the dairy sector, if dairies need more water in dry years, other crops "such as field and grain and even higher net value crops in the spectrum may decrease in production." (SED, at 11-59.) Staff also acknowledges that because the cattle sector relies directly on pasture and because pasture often is gown on "land with soils, slopes, or other characteristics" that may not support other crops, "it is likely these areas would be maintained as pasture." (SED, at 11-59.) Therefore, even the qualitative analysis included in the SED recognizes that the SWAP Model's assumption that all pasture and alfalfa will be fallowed in favor of maintaining higher commodity crops is not supported by substantial evidence. The fact that Staff and the SED are so directly internally inconsistent prevents the opposite conclusions from being supported by substantial evidence.

Fourth, the SWAP Model assumption that all low value crops will be fallowed incorrectly assumes that intra-district water transfers are allowed and can be facilitated. In each of the six DAU's used by the SWAP model, the Irrigation Districts are the primary water right holders. Individual farmers rarely hold water rights separate and apart from the Irrigation Districts. Therefore, water deliveries are managed and controlled by the Irrigation Districts that hold the water rights, own, manage, maintain, and operate the water conveyance facilities. There are several districts that do not allow intra-district water transfers. Other districts do not prohibit transfers, but there is no system in place to facilitate the transfer or trading of water. Irrigation Districts deliver water to customers based on inches of water allocation per acre. When water shortages are required, the Irrigation Districts reduce the quantity of water delivered equally to each acre of land served. The SWAP Model is premised on the assumption that water can be easily transferred between farmers. This assumption is not supported and often not correct.

Fifth, the SWAP Model assumes that the transfer of water between farmers growing low and high value crops will occur automatically, without any cost, administration, or time for such transfers to be put in place. As noted above, the Irrigation Districts are not set up to facilitate intra-district water transfers. Even if the transfer of water were not prohibited, there would be significant costs and administration of such a transfer. For example, in order to facilitate the transfer, the high value crop farmers would need to (1) identify other farmers that were willing to sell their allocation of water; (2) negotiate the price of purchasing the allocation; (3) draft a contract regarding the sale of the allocation; (4) negotiate terms of the transfer of the allocation; (5) provide contract to Irrigation District and request change of delivery based on the contract. In response to this, the Irrigation District must assess whether the existing facilities are able to accommodate the request. For example, if all lands served by lateral A transfer water to lands served by lateral B, lateral B may not have the capacity to serve the additional water that would have otherwise been delivered by both lateral A and B. In addition, if lateral A no longer carries water during the irrigation season, the Irrigation District may need to perform certain maintenance and upkeep of an empty lateral that would not be required of a lateral that was carrying water. Thus, there are significant administrative costs, negotiations, and evaluations that are required prior to transferring intra-district water. The SWAP Model does not consider these costs in determining whether a transfer would occur; for example, the SWAP Model does not off-set any potential profit by accounting for these administrative costs. Further, the SWAP Model does not consider these challenges as potential factors that would question or reduce the assumption that all low-value crop farmers would fallow in favor of high value crops. In reality, the significant administrative factors, including cost and time to facilitate such a transfer would likely prohibit the movement of water.

Sixth, Staff fails to provide much of the data and inputs that drive the SWAP Model. For example, the commodity pricing and yield production that are fundamental parts of the SWAP Model are not provided. (12/12/2016 Workshop, 112:16-23 to 113:1.)

["UNIDENTIFIED SPEAKER: And also, while I have the microphone, where in the SED or in the spreadsheets that you have attached can I find the information on the SWAP input specifically yielded and the prices that were used for the various crops?

TIM NELSON: I don't believe -- those are parameters that are part of SWAP itself and not part of the input spreadsheets.

UNIDENTIFIED SPEAKER: Right. Is it possible to get those? LES GROBER: It seems that it should be, yes."].)

For example, without understanding and evaluating the pricing and yield data, it is not possible to assess whether the model correctly values crops and correctly determines which crops will be fallowed, the quantity of acres fallowed, or any other output of the SWAP Model. In response to a request for the public disclosure of this fundamental information, Staff promised to provide the information, but never fulfilled that promise. Without disclosing this information to the public and including the information in the record, the SWAP Model cannot be supported by substantial evidence.

Seventh, the SWAP Model fails to account for the impacts of multi-year fallowing. Rather, the SWAP Model looks at each year in isolation, as if it is the first and only year that the crop would be fallowed. This causes a significant problem when it comes to the evaluation of permanent crops. The SWAP Model estimates that approximately 731 acres of permanent tree crops will be fallowed in average years. (SED, at G-49 to G-54.) Staff does not estimate the fallowing of permanent tree crops in dry years. However, because the results of the Proposed Project do not affect crops in wet and above normal years, it can be generally assumed that dry year impacts are at least double the average impact disclosed by Staff. Thus, in dry years, the acreage of fallowed permanent crops is likely to be approximately 1500 acres. The SWAP Model fails to evaluate the impacts of fallowing permanent crops for an extended period of time. However, the reality is that after a few years of not applying water, permanent crops die. The SWAP Model does not consider the impact of fallowing permanent crops over several years; the SWAP Model does not consider that a crop may die and not be able to come back into production. Instead, the SWAP Model only considers whether a crop is taken out of production and assumes the crop will be back in production when water is available. The failure to consider loss of permanent crops is a significant flaw in the SWAP Model. The capital investment in permanent crops is a significant cost factor in the agriculture industry. At approximately $25,000 per acre, capital losses will be approximately $37.5 million, (capital cost per acre x 1500 acres) in losses from permanent crops in consecutive below normal, dry and/or critical water years. The failure to consider this cost, and/or estimate when this cost would be incurred (i.e. when the permanent crop would be lost from required fallowing) is a significant flaw in a model whose purpose is to determine cropping patterns from water shortage.

16.2.2 Average Year Analysis is Not Supported by Substantial Evidence

Staff's analysis of agriculture impacts only considers the impacts of average years. This is significantly misleading because the impacts of the Proposed Project are rarely, if ever, average. Instead, the Proposed Project has little, if any, impacts in wet years and devastating impacts in dry and below normal water years. Thus, the true environmental impact is extreme, periods of no change are followed by periods of wreckage. For example, the SED contains several exceedance graphs which provide the picture of how the Proposed Project will affect agriculture. Figure 11-15b shows the Proposed Project projected impact on pasture. In about 60 percent of the years pasture is not reduced at all. Then there are two years that indicate pasture will be reduced about 10 to 20 percent. After the short minimum reduction, pasture is reduced to zero for the remaining years. Thus, the visual of the Figure 11-15b exceedance plot reflects that the Proposed Project is extreme and there is no "average" year; it is either no impact or complete devastation. For this reason, evaluating the averages of the two extreme impacts does not reflect the actual environmental impact of the Proposed Project and is not supported by substantial evidence. Instead, Staff must evaluate the dry year impacts of the Tributary Flow Objective, while disclosing that these impacts occur in only 30 to 50 percent of years.

16.2.3 Failure to Evaluate the Secondary Dairy Impact

The Staff fails to evaluate the impact to the cattle and dairy sector of the agriculture industry. This is not a small error. The dairy and cattle sectors are the largest agriculture commodities. The dairy sector alone is significantly higher than most other agriculture commodities, even the lucrative nut crops. For example, Staff discloses that the gross revenue of dairy is $2.21 billion dollars per year. (SED, at 11-59.) Compared to almonds at $884 million, alfalfa at $50 million, and oranges at $8 million, the dairy and cattle sectors are clearly a large piece of the agriculture portfolio. Staff provides several anecdotal comments recognizing the relationship between alfalfa and pasture crops and the cattle and dairy sector. (SED, at 11-58 to 11-59.) Further, Staff discusses generally how the cattle and dairy sectors may be affected. (SED, at 11-58 to 11-59.) However, Staff never analyzes how the Proposed Project will affect the cattle and dairy sectors. Staff fails to evaluate water demand for the cattle and dairy sectors and does not analyze how the reduced water supply would affect cattle and dairy operations. This analysis may not fit perfectly into the SWAP Model, however, the failure to evaluate the impacts on two of the largest agriculture sectors renders the impacts analysis deficient and unsupported by substantial evidence. Staff must revise the SED to properly identify impacts to the cattle and dairy sectors, analyze how these impacts will change the cattle and dairy operations and environments, disclose whether such impacts are significant, and develop mitigation to the extent significant impacts exist.

16.2.4 Groundwater Mitigation is Not Supported By Substantial Evidence

Staff's evaluation of agriculture impacts is premised on the assumption that groundwater pumping will remain at 2009 pumping levels. (SED, at 11-37.) Specifically, Staff assumes that, on average, 105,000 acre feet of groundwater will continue to be pumped. Thus, the analysis of impacts to agriculture is off-set or reduced by the amount of groundwater pumping that occurred in 2009. Staff does not explain why 2009 groundwater pumping levels are used. Although 2009 may represent the baseline that Staff has chosen, using the baseline number for groundwater pumping is not appropriate. It is not appropriate because the purpose of the SED is to evaluate how the Proposed Project affects the baseline. Using the baseline groundwater pumping does not attempt to evaluate how the Proposed Project affects groundwater pumping. To the contrary, using the baseline seems to reflect Staff's assumption the Proposed Project will have no impact on groundwater pumping.

Staff's use of the 2009 pumping data fails to recognize the Sustainable Groundwater Management Act (SGMA) is now in place. Thus, Staff's use of the 2009 baseline groundwater pumping quantities ignores the impact of both the Proposed Project and SGMA. This is not reasonable; just using a baseline number defeats the purpose of projecting potential future impacts.

16.2.5 Staff's Overestimation of Low Value Crops is Not Supported by Substantial Evidence

Staff and the SWAP Model overestimate the quantity of low-value crops. The data Staff uses to determine the number of low-value crops is approximately 8 years old. In the past 8 years there has been a significant change from lower value crops to higher value permanent crops. (12/12/2016 Workshop, at 109-110.) Therefore, the quantity of low value crops that Staff and the SWAP Model assume can be fallowed prior to impacting higher-value crops may no longer be in production. Using data that is almost a decade old in such a dynamic system is not reasonable and does not reflect the reality of the changes on the ground.

16.2.6 The Thresholds of Significance Are Not Supported by Substantial Evidence

Staff's thresholds of significance selected to evaluate the impacts to agriculture are deficient. The SED includes four thresholds of significance to measure and evaluate the impacts of the Tributary Flow Objective on agriculture:

- AG1: Conversion of designated farmland to non-agricultural use
- AG2: Other changes that convert farmland to non-agricultural use
- AG3: Conflicts with existing zoning or Williamson Act contract
- AG4: Conflicts with existing land use plans or policies

Staff spends the vast majority of time and effort analyzing AG1. There are several fundamental flaws with AG1 that result in this analysis inadequately evaluating Project impacts to agriculture. First, AG1 limits its evaluation of impacts to certain specialized classes of agriculture. AG1 only considers the conversion of prime, unique and farmland of statewide importance. Not all agricultural land falls into these specialized categories. In fact, Staff discloses that the total acreage of designated farmland is 527,793 acres, while non-designated farmland amounts to 107,490. (SED, at Table 11-2.) Therefore, non-designated farmland is approximately 17 percent of the Plan Area's total farming acreage. This acreage is not considered by AG1 or in any other portion of the SED. It is unclear whether Staff assumes this 17 percent of agriculture is completely fallowed or whether this 17 percent is impacted similarly to the designated categories of agriculture. Either way, Staff simply fails to analyze 17 percent of the agriculture in the region. This exclusion of 17 percent of agriculture lands is in addition to Staff's failure to evaluate the impact of the Proposed Project on cattle and dairy sectors. Together, these carve outs result in Staff analyzing only a portion of the agriculture portfolio; Staff does not evaluate the full agriculture picture. This failure to identify and evaluate the impacts of the Proposed Project on 17 percent of the agriculture industry is not acceptable and prevents the analysis from being supported by substantial evidence.

Second, AG1 analyzes the "conversion" of agriculture to non-agriculture uses. Staff does not fully explain how it determines when agriculture would convert to non-agriculture uses. Staff generally explains that the "reduction in water supply is used as a proxy for the conversion of irrigated land to nonagricultural lands." (SED, at 11-47.) This statement seems to indicate that Staff assumes that when water is not available, conversion would result. However, later Staff concedes that "it is unknown whether the reduction in irrigation water would result in direct conversion." (SED, at 11-52.) Thus, Staff's threshold of significance based on conversion is confusing, unclear, and not supported by substantial evidence.

Third, AG1 fails to consider the water supply demand of the non-agriculture use. Staff appears to assume that after the conversion from agriculture use to non-agriculture use will extinguish any water demand for the land. The failure to analyze potential new land uses after conversion is a fundamental short-fall of the analysis, whose purpose is to identify and evaluate the changes to the environment. Simply stating agriculture lands will be converted and not evaluating what environmental impact that conversion will entail is deficient and not supported by substantial evidence.

AG2 also has significant deficiencies. First, it is unclear what the threshold of significance is measuring. The actual threshold reads as follows: "Involve other changes in the existing environment which, due to their location or nature, could result in a conversion of farmland to nonagricultural uses." This description is not clear. The analysis in this section discusses two issues: seepage impacts and impacts of importing feed for cattle and dairy. The seepage discussion is a few sentences that summarily conclude that on one river (Stanislaus) flows are already so high that the Proposed Project would not increase flood impacts. From this, Staff concludes: "Therefore, it is reasonable to assume that a substantial reduction in agricultural production, and thus acreage, would not occur in the LSJR area of potential effects as a result of seepage when compared to baseline." (SED, at 11-58.) This conclusion is unsupported. Staff seems to be translating conclusions regarding flood impacts into evidence of the existence of seepage. This translation is not supported. No baseline seepage information is disclosed, despite the reference thereto. (*Id.*) This kind of unsupported conclusion is not allowed by CEQA and it is not supported by any evidence.

The section on importing feed is longer, but similarly conclusory and frustrating. Staff concedes that the fallowing of pasture and alfalfa may impact the cattle and dairy sectors. (SED, at

11-58.) Staff then dismisses its own concern by stating (1) these sectors will be able to import feed and (2) some local feed is likely to be available because the SWAP Model likely overestimated the amount of pasture and alfalfa that will be fallowed. (SED, at 11-58 to 11-60.) This section is filled with conclusory statements that fail to provide any analysis. For example, in this section, Staff makes a half-hearted attempt to explore the increased cost of importing feed, by stating: "Due to additional transportation costs, feed costs could go up; however, the increase in the cost of feed is not known because it depends on where dairies source feed from and the competition for the feed from other users." (SED, at 11-58.) This type of analysis is not helpful and not supported by substantial evidence.

AG3 considers whether the Proposed Project would result in lands conflicting with Williamson Act contracts. Williamson Act contracts restrict enrolled parcels of land to agricultural or related open space use. The minimum term for Williamson Act contracts is ten years. However, since the contract term automatically renews on each anniversary date of the contract, the actual term is essentially indefinite. Staff does not identify the baseline quantity of acreage that is under Williamson Act contract. (SED, at 11-61.) Despite the lack of knowledge regarding Williamson Act contracts, Staff concludes that the Proposed Project would not result in any conflict with Williamson Act requirements because "there is enough annual crop acreage for rotation if the plantings of annual crops such as corn and gran were rotated in years with reduced irrigation supply such that all the lands would be irrigated at least once every other year or fallowed in other years." (SED, at 11-61.) The conclusion and the sentence make no sense. The conclusion that no agricultural land will be taken out of production contradicts the conclusions from AG1, which confirm that there will be thousands of acres taken out of agricultural production. The conclusion is not supported by evidence; there is no evidence of what "enough annual crop acreage" means, there is no evidence of what is meant by "reduced irrigation supply", there is no evidence of what is meant by "all lands." The analysis in AG3 is incorrect, contradictory, and supported by no evidence.

AG4 considers whether the Proposed Project conflicts with any land use policy related to agriculture. The analysis for all this section is located in a single paragraph, analyzing all Project alternatives at the same time. In that paragraph, Staff fails to identify any land use policy related to agriculture. Not one policy, protection, or substantive reference to any agriculture land use guidance is provided. Without first identifying the applicable policies, Staff cannot support the conclusion that the Proposed Project is consistent with such policies. For this reason, the analysis is not supported by substantial evidence.

16.3 The Evaluation of the Impacts to Aquatic Resources is Not Supported by Substantial Evidence.

16.3.1 Fish Species Evaluated and Indicator Species

Staff is required to evaluate how the Proposed Project will impact the environment, which includes aquatic resources and fish species. Although the Proposed Project claims only to protect native fish species, the SED requires Staff evaluate how the Proposed Project will affect all species. Staff fails to provide such analysis. Staff identifies 17 fish species in the Plan Area and briefly discusses the existing status of each of these 17 species. (SED, at 7-9 to 7-29.) The discussion of each of these species generally discloses whether they are a special-status species (or not), whether the species is native or non-native, and identifies the typical habitat for each species. (Id.)

However, after the general description of each species, Staff fails to analyze how the Proposed Project will affect each of the species. Instead, Staff selects “indicator species” and limits the analysis of impacts from the Proposed Project to these representative species. Staff identifies the Central Valley Fall-Run Chinook Salmon and Central Valley Steelhead as indicator species to represent anadromous fish, rainbow trout to represent coldwater reservoir fish, and largemouth bass to represent warmwater reservoir fish. (SED, at 7-3.) Staff explains that “Indicator species were selected based on their sensitivity to expected changes in environmental conditions in the plan area and their utility in evaluating broader ecosystem and community-level responses to environmental change.” (Id.) However, Staff fails to support this conclusion with any citation or scientific information that would support the concept that selecting an indicator species is appropriate and would appropriately reflect the impacts from the Proposed Project on a broader level.

In fact, Staff does not actually analyze the impacts of the Proposed Project on the named indicator species. Instead, Staff focuses almost exclusively on Central Valley Fall-Run Chinook

Salmon and Central Valley Steelhead. For example, for eight of the twelve thresholds of significance, the Staff analyses considered only impacts to Chinook Salmon and Steelhead. Further, the analyses of these two species were often collapsed and the analysis relied only on an analyses of Chinook Salmon. (SED, at 7-102 ["Where appropriate, the Chinook salmon and steelhead analyses are combined."].) The analysis of the Proposed Project impacts on only one or two of the seventeen fish species does not comply with CEQA requirements. CEQA requires Staff analyze how the Proposed Project will impact aquatic resources; evaluating only one or two fish species fails to analyze how the Proposed Project will impact fish species. Without this information the public cannot be aware of the potential impacts and decision-makers cannot make an informed decision with regard to approving the Project.

16.3.2 Thresholds of Significance

Staff selected twelve thresholds of significance upon which to analyze the environmental impacts of the Proposed Project. The twelve categories only analyze three different environmental impacts: (1) changes from reservoir levels (thresholds 1, 2, 4); (2) changes from floodplain habitat (thresholds 3, 8, 9); and (3) changes from temperature (thresholds 10, 11, 5). Thus, although it appears that Staff analyzed twelve separate impacts, the analysis is repetitive and only reflects the above three impacts. Further, each of these categories is compromised and fails to comply with CEQA's requirement to identify and analyze the environmental impacts of the Proposed Project.

16.3.2.1 Impacts from Reservoir Level Change

Based on the thresholds of significance that measure impacts based on changes to reservoir levels, the Staff concludes that no significant impacts will result from the Proposed Project. This conclusion is based on Staff's assumption that the Proposed Project will not change reservoir levels. These conclusions are a problem for several reasons. First, if reservoir stability is required by the Proposed Project, it seems disingenuous to dedicate three thresholds of significance to evaluate the impacts from changing reservoir levels. Pretending to evaluate impacts when Staff knows no such impacts will occur due to the way Staff defined the Proposed Project cannot seriously be considered as legitimate environmental analysis.

Second, the assumption that reservoir levels will not fluctuate, despite the proposed increased flow requirements, is not a supported assumption. As previously discussed above, the minimum reservoir requirements are not proposed as part of the Proposed Project. Rather, the minimum reservoir requirements are imbedded in the WSE Modeling. Staff did not perform any analyses based on modeling that did not include minimum reservoir levels. Thus, the environmental analysis assumes that minimum reservoir levels will be met and are part of the Proposed Project. However, it is not clear how Staff proposes to implement such requirements will be imposed on reservoir operators. Staff fails to disclose either the mechanism or the authority under which such requirements will be imposed. Therefore, the assumption that such requirements will be imposed is unsupported. For this reason it is not reasonable to assume that reservoir levels will remain unchanged by the Proposed Project.

16.3.2.2 Impacts from Floodplain Habitat

The thresholds of significance that stem from floodplain habitat are also flawed. First, Staff's estimate of the amount of improved floodplain habitat is deficient and incorrect. Staff estimates improved floodplain differently for each of the Stanislaus, Tuolumne, Merced, and San Joaquin Rivers. For the Stanislaus, Staff relies on the USFWS model, which estimates initiation of floodplain by reach of the River. Each reach of the River has a different floodplain inundation threshold, ranging between 1,000 and 1,500 cubic feet per second (cfs). Staff makes the general assumption that floodplain inundation for the Stanislaus initiates at 1,000 cfs, which falsely increases the quantity of improved floodplain habitat from the Proposed Project. By setting the floodplain inundation threshold at the lowest point (1,000 cfs) Staff shows there are 43 instances of inundation improvements of 10 percent or greater. (SED, at 19-63.) However, setting the inundation threshold at the more common and higher inundation threshold of 1,500 cfs, the instances of inundation improvements greater than 10 percent are reduced to only 19.

On the Tuolumne, Staff relies on a version of floodplain modeling developed by USFWS in the FERC process. This model looks at only a specific reach of the River, from River mile 52 to River mile 21.5. Unfortunately, this evaluation omits the lower 20 miles of the River. This omission is curious because the modeling for this section of the River was completed and is part of the public

FERC package available to the public and Staff. The lower 20 miles includes different, often higher, floodplain thresholds and may have reduced the amount of improved floodplain from the Proposed Project.

On the Merced no floodplain model or relationship has been developed. For this reason, Staff estimated floodplain inundation by calculating water surface area and comparing the estimated surface area with flows. Staff estimated the floodplain inundation threshold on the Merced above River mile 27 would be 1,000 cfs. Staff did not consider inundation levels on the lower portion of the River. Staff did not provide a reason for such omission. The estimate on the Merced River is fairly crude and limited to only a portion of the River; the actual floodplain inundation that will result from the Proposed Project is not clear and cannot be determined from the information provided by Staff.

Second, Staff's floodplain analysis is deficient because it does not consider the reality of floodplain limitations in the Plan Area. Most of the citations are from floodplain studies in the lowland bypass areas. (SED, at 19-89 - 19-99.) The Plan Area consists of incised channels at the bottom of steep mountainous terrain, leveed waterways, and urban development close to natural channels. Staff failed to consider these types of on-the-ground limitations. Instead, Staff's floodplain analysis considered any and all out of bank flows as usable floodplain habitat. This assumption is unsupported and contradicted by site-specific floodplain analyses. On the Tuolumne, a recent floodplain hydraulic study evaluated usable habitat and determined that the fraction of usable – compared to total- floodplain habitat can be as low as 30 percent. (HDR and Stillwater Sciences, 2016.) This same study also found that increases in floodplain inundation are off-set by losses in habitat associated with increased channel velocities and depths. Because Staff failed to consider the limitations and off-setting of floodplain habitat, Staff's estimates are based on calculations, but are not helpful in understanding the environmental impact of the Proposed Project on the ground. The simplified assumption that more flow equals more floodplain does not support the conclusion that the Proposed Project will result in improved floodplain habitat.

Third, Staff's evaluation of floodplain analysis is deficient because it fails to evaluate the most important attributes of floodplain habitat – duration, depth, velocity, cover, connectivity, and water temperature. Without evaluating these factors, it is impossible to know whether usable floodplain habitat is created or not. Staff assumes that any water outside the capacity of the channel results in floodplain habitat. This grossly overstates the Proposed Project's actual improvement to floodplain habitat. Without understanding the attributes above, it is unclear whether the Proposed Project's out of channel flows create usable floodplain habitat or result in stranding or mass killing of fish due to lack of connectivity, temperature, depth, and/or other factors.

Fourth, Staff's estimate of floodplain is not consistent with the Proposed Project. The Proposed Project requires the release of flows on a 7-day running average. The Staff estimated floodplain improvement based on a 30-day average. Staff's approach results in only twelve floodplain inundation estimates per year and all daily inputs for each month to be the same. In contrast, the Proposed Project's 7-day average will result in 52 different floodplain inundation estimates per year. The difference between twelve and fifty-two floodplain estimates demonstrates how vastly different the monthly floodplain estimates may be compared to the actual operation of the Proposed Project. Because the modeled estimates are so different from how the Proposed Project will be implemented, the environmental analysis based on the monthly modeling does not actually reflect the floodplain habitat that will result from the Proposed Project.

Fifth, Staff's estimate of acre-days is misleading. Staff estimates acre-days by taking the monthly floodplain output and dividing by 30. Thus, the acre-day calculation is the same for every day of each month, making it really an acre-month estimate, rather than an acre-day estimate.

Sixth, Staff's analysis determining the relationship between improved floodplain habitat and fish benefit is deficient. Staff makes several unsupported assumptions. For example, Staff determines that a 10 percent increase in floodplain habitat will have a significant benefit. (SED , at 19-56.) Staff fails to identify what will benefit – whether the benefit is to salmon population, rearing, or other metric is not clear. Further, Staff is contradictory about the role of the 10 percent metric. Staff states:

> "A 10% change in the frequency of floodplain flows, in combination with professional judgment, is used to determine a significant benefit or impact. Ten percent was selected because it accounts for a reasonable range of potential error associated with the assumptions used in the various analytical and modeling techniques." (SED, at 19-56.)

This explanation makes no sense, in addition to being grammatically incorrect. The first sentence appears Staff is suggesting that professional judgment of an unnamed party plus a 10 percent floodplain improvement were used to determine significant benefit. It is unclear which party is supposed to use the 10 percent and the unidentified professional judgment to make the determination of significance. To make things even more confusing, the second sentence suggests that the 10 percent only covers a range of error. This means, by definition, a 10 percent improvement could mean no benefit at all. If the range of error is 10 percent, Staff certainly cannot assume that the same 10 percent will result in significant benefits.

Staff states that generally, floodplain habitat has a positive effect on the growth of salmonids. (SED, at 19-53.) This positive effect is due to improvement of food resources on in floodplains. The support for this conclusion is based on studies of lowland bypass habitat and may not apply to the incised conditions of the Plan Area. Further, Staff has not identified food resource shortages as a factor limiting salmonid survival. Improving food resources may be helpful if there is a shortage, but it would have diminishing returns if the Plan Area already offers adequate food resources.

16.3.3 Temperature Improvements

Staff’s temperature thresholds of significance are also deficient and do not properly identify and evaluate the impacts of the Proposed Project on aquatic species. First, the method by which Staff measures temperature improvements is deficient. Staff measures temperature improvement by the change in number of days in which the United States Environmental Protection Agency (USEPA) temperature criteria will be met. This measurement is fraught with problems. First, the USEPA temperature criteria do not apply in the Plan Area. Instead, the USEPA criteria were developed in the Pacific Northwest region where water temperatures are much colder. Staff has not attempted to explain or provide support for its use of non-applicable criteria. Second, it is unclear why Staff did not simply reflect temperature improvements by showing the improved temperature of the water in degrees. The likely reason fails to analyze the impact of the Proposed Project in specific degree improvement is that the improvements are minimal. For example, using the threshold of number of days meeting the USEPA criteria, Staff is able to show that the 40 percent unimpaired flow requirement in the Proposed Project would result in a 12 percent improvement in meeting the USEPA criteria at the confluence of the Stanislaus and San Joaquin Rivers. (SED, at Table 19-3.) However, expressing the same improvement in degrees would show that the improvement only lowered the temperature by 1.2 degrees for 3.75 days. (See SED, at Table 19-4; 12% of 31 days in October is 3.75 days.)

Third, Staff only modeled the temperature improvements of the Proposed Project with mitigation of minimum reservoir levels. Staff concedes that sending down the proposed 40 percent of unimpaired flow without minimum reservoir storage has a negative impact on water temperature (CITE). Staff failed to disclose the results of the Proposed Project without minimum reservoir levels. Instead, Staff decided that minimum reservoir levels must be implemented to ensure the negative temperature impacts of the Proposed Project were avoided. (CITE) This approach violates the most basic tenants of CEQA, which require the impacts of the Proposed Project be disclosed and, only after such disclosure should mitigation be developed. (CITE)

Fourth, Staff misrepresents the resulting temperature improvements from the Proposed Project in several ways. First, the WSE Model, which generates the estimated temperature changes is run on a 30 day or monthly average. Similar to the floodplain results, this means that Staff only has twelve different temperature data points for each year. However, Staff divides these monthly temperature impacts by 30 and attempts to represent that it generated daily temperature results. (12/5/16 Workshop, at 114.) This misrepresentation is especially egregious because the Proposed Project requires implementation at a 7-day average, which would have different impacts than those modeled by staff. Thus, the temperature modeling does not reflect the temperature impacts that the Proposed Project will have. Second, Staff attempts to represent that the temperature improvements are a result of increased flows. (SED, 19-47 ["This temperature evaluation indicates that increasing flows during the February through June time period can provide significant temperature benefits to juvenile fall-run Chinook salmon and steelhead."].) However, Staff later conceded the exact opposite was true – increasing the flow requirements actually had a negative effect on temperature, which Staff then had to mitigate by increasing minimum reservoir storage levels. Staff specifically stated:

> "with the increased drawdowns that would occur to meet the flow requirements, that was found to have temperature effects. So this was done to not have those effects by increasing the carryover storage." (12/5/16 Workshop, Les Grober, at 73.)

Thus, the statement in the SED that increased flows would result in temperature improvements is not correct. But, rather, the opposite is true – increased flow releases would empty reservoirs and cold water pool reserves, which increases temperature impacts. (12/5/16 Workshop, Les Grober, at 78 [stating more clearly that "there would be some reservoir carryover requirements included to offset any temperature effects."].)

Fifth, Staff does not explain how the improvement in temperature will change the environment. In other words, Staff does not support its conclusion that temperature improvements will result in fishery benefits. Staff determines that a ten percent increase in days in which the EPA temperature criteria is met is a significant benefit. (SED, at 19-18.) Staff employs the same confusing and unclear language used in the floodplain section and states: "A 10% change in the amount of time that USEPA criteria is met, in combination with professional judgment, is used to determine a significant benefit or impact." (SED, at 19-18.) Again, Staff adds to the confusion of this sentence with a second sentence stating that "Ten percent was selected because it accounts for a reasonable range of potential error associated with the assumptions used in the various analytical and modeling techniques." (Id.) Staff cannot use the 10 percent both for margin of error and for indication of a significant benefit; the two concepts are mutually exclusive.

Most critically, Staff is unable to offer a direct link between temperature improvements and change in aquatic environment; i.e. fish improvements. The only method by which Staff attempts to equate temperature improvements into fish benefit is through SalSim. However, SalSim estimated a very small, almost statistically insignificant change in the environment, estimating only 1103 more fish into production. Production is the total number of fish in the system, which means the Proposed Project increases the total production of fish by less than xxx percent. Staff's position is that SalSim is flawed and this number is not correct. (CITE) However, Staff has no other mechanism or other estimate that links the estimated temperature improvement to a change in the aquatic resources environment.

16.4 The Evaluation of Groundwater Impacts is Not Supported by Substantial Evidence.

Staff's analysis of groundwater impacts in the 2016 SED was significantly different from the 2012 analysis. Although that may not seem surprising due to the passage of SGMA and changing role of the State Water Board with regard to groundwater, none of the changes were SGMA related.

In 2012, staff assumed all surface water shortages from the proposed project would be offset by groundwater pumping. (2012 SED, at 9-26.) Staff set a threshold of significance at five percent (5%) or more increase in groundwater pumping. (Id.) Staff disclosed it estimated the 40 percent flow objective would result in an increase in groundwater pumping of approximately 269,000 acre feet in an average year across all four subbasins. (Id., at 9-23.) Staff determined the State Water Board was unable to mitigate for these impacts, since the State Water Board had little jurisdiction over groundwater resources.

16.4.1 Change in Assumption Regarding Reliance on Groundwater Pumping is Unsupported

In the 2012 SED analysis, Staff assumed that any decrease in surface water deliveries would be made up by pumping groundwater. (SWRCB 2012 SED, at 9-26.) This assumption resulted in the SED estimating that groundwater pumping would increase by approximately 269,000 acre feet. In the 2016 SED, Staff no longer assumes that all surface water decreases will result in groundwater pumping increases on a one to one basis. Instead, Staff assumes the same amount of groundwater pumped in 2009 will again be pumped after the Proposed Project is implemented. Staff does not address the difference in the assumptions between the 2012 and the recirculated version.

16.4.2 Staff Fails to Disclose Estimate of 2009 Pumping

Staff fails to disclose the bases for assumptions regarding increased groundwater pumping are based on 2009 maximum estimates. Staff indicates these numbers are presented in the Irrigation Districts Agriculture Water Management Plans (AWMP). (SED, at G-14.) However, the 2009 maximum groundwater pumping is not based on the existing maximum capacity of facilities in 2009. (Id., at G-15.) Rather, the total maximum capacity in 2009 indicates that as much as 626,000 acre feet could be pumped in 2009. (Id.) Similarly, the SED includes different estimates for pumping depending on the year type. The estimated 2009 pumping capacity in an average year is 364,000 acre feet, while in a dry year, the estimated pumping capacity is 524,000 acre feet. (Id.) Therefore, the term "capacity" is a misnomer and misleading.

The SED explains that these numbers are the "likely increase in groundwater pumping." (Id.) However, the SED fails to explain how the State Water Board determined these to be the "likely" numbers. The SED does not explain how the State Water Board calculated the 2009 maximum pumping estimates. The numbers provided by the State Water Board at G-15 clearly indicate the State Water Board understands there is capacity to replace all decreases in surface water with groundwater pumping. This was the 2012 assumption – i.e. that all surface water decreases would be made up with groundwater pumping. In 2009 the existing facilities could have supported the same assumption of total replacement that the State Water Board made in 2012. However, the State Water Board did make that assumption, but instead selected an amount that was less full replacement and somewhat based on pumping that existing in 2009. The State Water Board failed to explain the change in analysis. The State Water Board's failure to explain its change in assumptions and failure to disclose the reasoning behind the new assumptions that some, but not all, of the decreased in surface water would be replaced by groundwater pumping result in a failure to explain, disclose or support the SED groundwater analysis.

16.4.3 Thresholds of Significance Are Deficient and Not Supported by Substantial Evidence

Staff established only two thresholds of significance to evaluate the environmental impacts of the Proposed Project on groundwater pumping. One of the two thresholds analyzes the decrease in groundwater balance. This threshold is deficient for several reasons, the main reason being that it does not properly reflect the environmental impacts of the Proposed Project.

Staff considers a groundwater impact significant if the groundwater balance decreases by more than one inch. The groundwater balance is the net contribution of each irrigation district to the basin calculated by adding the off-stream reservoirs seepage, conveyance losses, and deep percolation from irrigation lands and subtracting irrigation district groundwater pumping. (G-30; 9-46.) Staff determines the net change in the groundwater balance between the baseline and the Proposed Project. This change (i.e. decrease) in the groundwater balance is then divided by the acreage in the basin to determine whether there is one or more inches in groundwater balance depletion.

This threshold of significance does not properly reflect environmental impacts for several reasons. First, spreading the impact over the entire subbasin acreage is misleading and not reflective of environmental impacts. For example, Staff determined that the reduction in groundwater balance for Oakdale and South San Joaquin Irrigation Districts does not have a significant environmental impact on the Eastern San Joaquin subbasin. (SED, at 9-62.) This conclusion is driven by the fact that the Eastern San Joaquin subbasin is, by far, the largest of the subbasins at 707,000 acres. Because of this large subbasin acreage, Staff concludes that there is no environmental impact to the Eastern San Joaquin subbasin because the Proposed Project only reduces the groundwater balance by .6 of an inch. (SED, at 9-58.) However, the existing or baseline balance in inches is only 1.1 inches in total, because the subbasin is so large at 707,000 acres. Therefore, in order to reflect a significant impact, the existing 1.1 inches would have had to have been reduced by 90 percent or more. As set forth in the SED, the 40 percent unimpaired flow of the Proposed Project will reduce the groundwater balance in the Eastern San Joaquin subbasin by <u>more than fifty (50) percent</u>. (9-58.) However, this reduction of groundwater balance by <u>more than half</u> is not considered a significant environmental impact because it does not amount to more than an inch reduction. Staff discloses that the groundwater balance will be reduced by 82 percent in the Merced subbasin, 27 percent in the Turlock subbasin, and 19 percent in the Modesto subbasin. These are considered significant impacts, while the 54 percent reduction in the Eastern San Joaquin subbasin is not a significant impact. These numbers establish that using a threshold of one inch does not reflect the actual impact to the subbasin, but instead, masks the existence of significant environmental impacts. For this reason, this threshold should not be accepted as a reasonable method to determine environmental impacts and the SED is not supported by substantial evidence.

Second, inches of groundwater balance is not an accepted standard or groundwater threshold used by groundwater professionals. The inches of groundwater balance reduction is not found in any [add groundwater plans, studies, etc.]. It is unclear how Staff selected this threshold. Further, Staff offers no explanation regarding scientific support, validity or other technical based support for the selection of this threshold.

It is not clear why Staff did not express or analyze impacts in reduction in groundwater elevation, which is a fairly standard and accepted measure of groundwater impacts.

16.4.3.1 Subsidence Threshold of Significance is Deficient

Staff's second threshold of significance is the potential subsidence of lands. (SED, at 9-47.) However, Staff does not undertake a true analysis of potential subsidence. Instead, Staff assumes that subsidence is significant only in areas "where subsidence has previously occurred." (SED, at 9-47.) The assumption that subsidence will only be significant where is has previously occurred is unexplained and unsupported. Staff fails to explain why this assumption is valid. Instead, Staff concludes that only the El Nido portion of the Merced subbasin has reported subsidence. Staff states: "Despite reports of periods of declining groundwater levels, subsidence has not been reported for the other three subbasins of interest." (9-47.) Staff's conclusions are not cited; it is not disclosed or understood which reports Staff has relied upon for concluding that the other subbasins have not reported any subsidence. Further, when evaluating whether the Proposed Project will result in subsidence, Staff states that outside the Merced subbasin, " subsidence in other subbasins is less likely to occur given there is little evidence that soils in these subbasins are subject to inelastic compaction." (SED, at 9-68.) Staff fails to provide citation, reference or other support for the conclusion regarding the remaining subbasins being exempt from compaction and subsidence. (Id.) The basis upon which the State Water Board concludes that soils in the other basins are not subject to inelastic compaction is not clear. Staff does not provide any soil analysis; it is unclear if any such analysis was performed. Staff does not provide any evaluation of subsidence and appears to be an unsupported assumption. Staff's subsidence threshold are not supported by substantial evidence; Staff simply makes conclusions regarding subsidence and offers no real evaluation or analysis.

16.4.4 Failure to Analyze SGMA Undesirable Results.

Since the 2012 SED was released, the Sustainable Groundwater Management Act (SGMA) was passed in 2014. SGMA provides the State Water Board with enforcement authority over basins that are not managed to sustainable levels by 2040. SGMA defines sustainability as the avoidance of six undesirable results: (1) reduction in groundwater storage; (2) lowered groundwater elevations; (3) degraded water quality; (4) seawater intrusion; (5) land subsidence; and (6) depletions of interconnected surface water. (Water Code section 10721(m).) Staff failed to evaluate the environmental impacts with regard to SGMA compliance and chose deficient thresholds of significance.

SGMA requires that high and medium priority groundwater basins be managed to achieve sustainability. SGMA allows each basin to establish its own definitions of sustainability, however, SGMA requires that such sustainability be based on the avoidance of six undesirable results. These six undesirable results include: decrease in groundwater storage, elevation, subsidence, degradation of water quality, intrusion of seawater, and depletion of interconnected surface waters. Staff fails to evaluate the six factors that SGMA identifies as the metrics upon which groundwater sustainability is defined. Instead of evaluating these six factors, Staff states: "since the groundwater protections that will be afforded by SGMA cannot be determined at this time with precision, this chapter evaluates the potential impacts on groundwater levels from LSJR alternatives without including SGMA as an ameliorating factor, which means that the estimates of impacts are likely more conservative (i.e. worse) than would occur in the groundwater basins over time." (SED, at 9-3.) Simply because Staff cannot determine the "precise" implementation of SGMA, does not mean that it may ignore SGMA and the reasonably foreseeable impacts from the implementation of SGMA. (CEQA Guidelines, § 15145l *Berkeley Keep Jets Over The Bay Committee v. Board of Port Commissioners*, (2001) 91 Cal.App.4th 1344, 1370.) Rather, SGMA provides specific guidelines for evaluating sustainability, which requires Staff to, at the very least, evaluate the impact of the Proposed Project on the six factors that define sustainability under SGMA.

First, Staff should have evaluated the impacts of the proposed project Objective on groundwater storage. Staff includes a brief discussion of each groundwater basin in the impacted Plan Area. (SED, at 9-24 to 9-31.) This description fails to include any disclosure of groundwater storage for any of the basins in the Plan Area. (Id.) Specifically, Staff fails to discuss the groundwater storage available in each basin, the amount of drawdown or elevation change, the ability to recharge each basin, the quantity of groundwater storage lost due to compaction, or any other technical issue related to groundwater storage. Further, the ability to store groundwater and recover stored groundwater is vitally important to each groundwater basin's ability to achieve sustainability. Staff fails to identify these issues in each basin. In addition, Staff failed to analyze the potential impacts of the Proposed Project on the issue of groundwater storage. The SED is deficient because it simply does not attempt to evaluate how the Proposed Project will affect groundwater storage.

Second, Staff should have evaluated the impacts of the Proposed Project on groundwater elevations. As noted above, Staff performs an indirect analysis of groundwater elevation impacts. Specifically, Staff estimates the decrease in groundwater balance by measuring each Irrigation District's groundwater balance and dividing by the acres in each corresponding basin. The metric of inches of groundwater balance per acre is compared before and after each proposed alternative. As noted above, this groundwater balance inches metric is not an accepted measurement; it is not used by any other groundwater analysis; it is not accepted as valid by any groundwater experts. It is not clear why Staff chose to use such a complicated measurement, when the measurement of groundwater elevation is often used, is accepted as technical practice and can be more readily understood and compared to other basins. Further, Staff offers an approximate conversion of each inch of groundwater balance equating to about 10 inches of groundwater elevation. (SED, at 9-46 – 9-47.) Staff fails to explain how it analyzed the impacts of the Proposed Project on the groundwater elevation of each basin.

Third, Staff should have evaluated the impacts of the Proposed Project on seawater intrusion. This evaluation would likely be limited and not extensive. The Plan Area is not influenced by coastal conditions and seawater intrusion is not likely to result from the Proposed Project. There are existing sea water intrusion maps that indicate the existence, direction and extent of sea water intrusion. Staff should have disclosed the existing information along with hydrogeologic information from the Plan Area subbasins and provided a brief analysis about whether seawater intrusion applied to the subbasins affected by the Proposed Project.

Fourth, Staff should have evaluated the impacts of the Proposed Project on subsidence. As mentioned above, Staff did not perform a proper analysis of subsidence. Staff assumed that no significant subsidence would occur in areas where subsidence had not yet occurred. (SED, at 9-47.)

This obscenely simplistic conclusion contradicts the subsidence information provided in the background section and fails to satisfy the evaluation required by CEQA.

In the background section of the groundwater chapter, Staff recognized that subsidence is a major issue in the San Joaquin Valley. (SED, at 9-17.) The SED acknowledges that the "extensive withdrawal of groundwater from the unconsolidated deposits has cause[d] widespread land subsidence in the San Joaquin Valley (USGS 1986). Long-term groundwater level declines can result in a vast one-time release of "water of compaction" from compacting silt and clay layers in the aquifer system, which causes land subsidence (USGS 1999). Land subsidence in the region due to groundwater pumping began in the mid-1920's (USGS 1975; USGS 1991; USGS 1999.)" (SED, at 9-17.) With the understanding that subsidence has been an issue in the region and that the Plan Area continues to have decreasing groundwater levels (SED, at 9-13), it is contradictory for the SED to then conclude that only a small portion of one of the basins in the Plan Area could potentially experience subsidence impacts.

CEQA requires Staff identify all reasonably foreseeable impacts that could result from the Proposed Project. (*Laurel Heights*, at 404-410.) To recognize that the San Joaquin Valley has a history of subsidence and that groundwater levels are falling, but fail to identify and evaluate potential impacts from subsidence is irresponsible and certainly not compliant with CEQA requirements.

Further, the failure to evaluate the impacts on subsidence ignores the best available science. There are several models that evaluate subsidence and are able to estimate subsidence impacts from groundwater depletion. Staff should have analyzed subsidence with one of these tools. Further, DWR has released *Best Management Practices* and Staff could have used these or other similar practices to evaluate subsidence. The cursory set of conclusions that are included in the existing subsidence chapter do not amount to sufficient analysis under CEQA or SGMA requirements.

Fifth, Staff should have evaluated the impacts of the Tributary Flow Objective on water quality. Staff fails to identify the existing groundwater quality in each of the groundwater basins in the Plan Area. Staff states that the groundwater quality varies substantially throughout the basins of the Plan Area. (SED, at 9-19.) Staff states generally that elevated salinity levels exist, especially in the western portion of the Valley. (SED, at 9-20.) Nitrates are not found in high concentrations, but exist increasingly due to groundwater pumping and irrigated agriculture. (Id.) These highly generalized statements do not disclose the water quality in each basin, which Staff must do to comply with CEQA. In its analysis, the also concedes that the Proposed Project could degrade groundwater quality. (SED,at 9-63.) However, instead of identifying and analyzing potential groundwater quality impacts, Staff simply states the analysis is speculative. (SED, at 9-63.) This statement is odd, provided Staff was able to conclude that the impacts could result in degradation. Staff states:

"Specifically, determining the changes to groundwater quality is speculative as it is dependent upon many factors including, but not limited to, the location of groundwater pumping, the amount of groundwater pumped, the frequency at which pumping would occur, location of contaminants, the type of contaminants (e.g. water soluble or not), proximity of contamination to aquifers, hydrogeological characteristics of the aquifer, individual well construction, well depth, groundwater levels, and localized conditions such as proximity to unused or abandoned wells." (SED, at 9-63.)

Staff is able to correctly identify the components and information necessary to properly analyze groundwater quality impacts. Simply because it would be a large amount of work does not mean that the analysis is speculative. The analysis is not speculative; CEQA requires Staff analyze the environmental impacts of the Proposed Project. To the extent such evaluation must be caveated or otherwise rely on reasonable assumptions, it does not mean that such evaluation is so speculative it cannot be performed. (CEQA Guidelines, § 15145l *Berkeley Keep Jets Over The Bay Committee v. Board of Port Commissioners*, (2001) 91 Cal.App.4th 1344, 1370.)

Finally, Staff should have evaluated the impacts of the Proposed Project on depletion of interconnected surface water supplies. Staff fails to identify which groundwater aquifers are interconnected to surface water. Staff states that the Proposed Project would increase water in the channels that could recharge groundwater basins. (SED, at 9-62.) Staff continues on to state that such recharge is not likely, as recharge from the existing River channels is insubstantial. (Id.) Staff also notes that if groundwater levels decrease "over time, the aquifer may eventually no longer intersect with portions of the rivers." (9-62.) These statements are general, contradictory, and unsupported. The statements are general: Staff fails to look at any specific river (Stanislaus, Tuolumne, Merced or San Joaquin) and determine whether or not it is interconnected to surface water at any specific point. Further, Staff fails to analyze whether the Proposed Project would affect the interconnected relationships that may exist. The statements are contradictory: on one hand Staff takes the position that increased water in the channel will benefit interconnected groundwater, but on the other hand Staff recognizes that groundwater levels may decrease and not have any interconnection with surface water at all. The reader is left to wonder which one of these environmental impacts Staff believes is reasonably foreseeable.

16.4.5 The SED Does Not Accurately Describe the Groundwater Baseline Conditions.

Staff fails to accurately describe the baseline groundwater conditions. Staff identifies the four groundwater basins that underlie the Plan Area. (SED, at 9-1.) Staff discloses the acres overlying each basin and includes a chart that denotes which aquifer characteristics (such as formations and deposits) exist within each basin. Staff also provides general information regarding water balance and groundwater movement that is text book language and not specific to any basin. However, Staff fails to describe the actual baseline for each groundwater basin. For example, Staff does not provide a contour map showing the hydrogeolic features of each basin. Staff does not explain how water moves vertically or horizontally within each basin. Staff does not estimate or summarize the estimated recharge for each basin. Staff does not identify which basins have specific groundwater quantity or quality challenges or the origins or cause of any such challenges. Further, Staff does not address movement of water between the basins or address the different depths within each basin. Staff explains that its analysis includes several "simplifying assumptions" which include the assumption that the four connected basins are separate pools of water and that each basin has no separation between shallow and deeper aquifers. (SED, at 9-44.) These assumptions simply misstate the characteristics, challenges and specific attributes of each groundwater basin. Staff must accurately describe each groundwater basin potentially affected by the proposed project and identify the regional reliance on each groundwater basin in the description of the groundwater baseline.

16.4.6 Failure to Analyze if Groundwater Pumping is Reasonable

Staff estimates that, in an average year, the 40 percent unimpaired flow requirement will result in an increase of approximately 105,000 acre feet of groundwater pumping per year. (SED, at G-15.) This same alternative would increase groundwater pumping by 302,000 acre feet in dry years. (Id.) Staff fails to analyze whether there would be groundwater available to support the increased pumping. Staff never undertakes even a superficial analysis of whether such water may be available in the future. The assumption that groundwater will be available to sustain increased pumping is not reasonable. For example, if there are three dry years in a row, Staff assumes that the groundwater basins will be able to support a drawdown of 1.572 million acre feet of groundwater pumping in that three year period. The total quantity of storage in the four basins is xxxx. For this reason, it is not reasonable for Staff to assume that the amount of groundwater Staff relies upon will be available will actually be available. If Staff must revise the SED to include an analysis of whether the amount of groundwater Staff assumes will be pumped is available.

16.4.7 Failure to Analyze Whether Groundwater Pumping is Sustainable

Since the 2012 SED release, SGMA was passed and has become law. SGMA requires the sustainable management of groundwater. Because local groundwater sustainability agencies are required to develop groundwater sustainability plans that define sustainability for each basin, Staff concludes that evaluating whether the proposed project will be sustainable is speculative. (SED, at 9-3.) The statement that the SED is exempt from analyzing sustainability due to speculation is incorrect.

First, Staff provides its own definition of sustainability. Staff states that "declining groundwater levels over a period of time indicate that groundwater use within a subbasin is unsustainable." (SED, at 9-24.) In addition, Staff stated that in the Eastern San Joaquin basin groundwater levels have declined over the past 40 years and that such sustained decline is "unsustainable." (SED, at 9-24.) Therefore, it appears that the Staff has established its own definitions of sustainability and has begun to apply the definitions to the conditions in the basins. Per Staff's definition, the decline of groundwater levels equates to sustainability. Staff has access to historical groundwater elevation changes. In addition, Staff has predicted the impact of the Proposed Project on groundwater use, which it could use to estimate elevation changes. For this reason, the conclusion that the evaluation of sustainability is speculative is not correct or supported. Staff must evaluate whether the Proposed Project will be sustainable.

Second, even without Staff's definition, sustainability under SGMA is not speculative. To the contrary, SGMA provides that sustainability must be based on the avoidance of six undesirable results. Therefore, SGMA provides the roadmap to how sustainability must be defined. For this reason, sustainability under SGMA is not speculative, but rather, defined by six specific metrics. It is not speculative to evaluate the six factors that define sustainability under SGMA. This analysis is not speculative and if performed will allow Staff to estimate whether the Proposed Project will result in groundwater sustainability.

16.4.8 Failure to Evaluate Environmental Impacts Outside the Irrigation District Service Areas

Staff only evaluates impacts in the service areas of the Irrigation Districts. (SED, at 9-45 to 9-47.) Staff evaluated groundwater pumping of the Irrigation Districts. (Id., at 9-45.) In addition, Staff evaluated the impacts to Irrigation District groundwater pumping. (Id., at 9-46.) However, Staff failed to evaluate the impact of the Proposed Project on the area outside the Irrigation District service area. Instead, Staff makes the assumption that the impacts to the Irrigation Districts will impact those inside and outside the Irrigation District service areas in the same manner. This assumption is unexplained and undisclosed. Only after reading the document several times does it become clear that Staff failed to analyze how the Proposed Project will impact areas outside the Irrigation District service areas. Staff must revise the SED to include an analysis of how the Proposed Project will impact areas outside the Irrigation District service areas.

16.4.9 Failure to Analyze Basin Characteristics

Staff fails to consider the attributes of the subbasins in its analysis of the impacts of the Proposed Project. Specifically, Staff failed to evaluate how water moves and flows in and between the subbasins. Rather, Staff acknowledged that it considered each subbasin “to be four separate pools of water.” (SED, at 9-44.) Staff went on to concede that “in reality, water can move slowly between subbasins.” (Id.) However, Staff explained that the “simplifying assumptions”, such as the subbasins being separate pools, are “acceptable because the purpose of the analysis is to estimate the general magnitude of the average effect” of the Proposed Project. (Id.) However, making assumptions that do not reflect the reality of how the subbains work will not provide a correct estimate of the general magnitude of how the systems work. Instead, proceeding on fundamental and knowing mischaracterizations of how groundwater flows in the subbasins will only provide an incorrect analysis; regardless of whether the analysis is general or specific, it will be incorrect.

In addition, Staff failed to evaluate the geomorphology, depth, substrates, and other technical attributes of each subbasin. Staff concedes it assumed there was no “separation between shallow and deep aquifers.” (SED, at 9-44.) Staff explained that the failure to evaluate varying depths and substrates was appropriate because it assumed groundwater pumping would increase and it would increase in “both shallow and deep wells.” (Id.) Staff also failed to analyze the different substrate materials and/or permeability between aquifer sections. (Id.) Staff acknowledged this failure, but stated that such precision was unnecessary because Staff assumed that “water pumped from a deeper confined section of the aquifer would eventually be replaced by water from above or from surrounding basins.” (Id.) This assumption is unsupported, as Staff failed to evaluate how water moves from surrounding basins and also failed to evaluate how water would move between from higher to lower depths.

16.4.10 Failure to Analyze and Rely upon the Best Available Science

There are several local and regional groundwater modeling tools that are publicly available that Staff failed to use to analyze the groundwater impacts of the Proposed Project.

16.5 The Evaluation of the Impacts to Hydropower Not Supported by Substantial Evidence

Staff’s evaluation of the Proposed Project’s impact on hydropower is based entirely on results from the WSE Model. (SED, at 14-30.) As more fully set forth above, the WSE Model assumes any reduction from the proposed project will be taken in water deliveries and therefore reservoir storage will remain unaffected. Also as explained more fully above, this assumption is incorrect, unrealistic, and completely without support. One of the absurdities that results from this unsupported assumption is that the SED concludes the proposed project has almost no hydropower impact. Because the hydropower analysis is based entirely on faulty assumptions that reservoir storage will remain unchanged, it is deficient and unsupported by substantial evidence.

Apart from the fundamental defect of incorrectly assuming hydropower will not be affected, the hydropower analysis has other deficiencies as well.

First, it fails to properly analyze the impact from shifting the seasonal timing of water releases from reservoirs. Appendix J concedes the Proposed Project will decrease hydropower generation during the months of July and August because of reduction in reservoir releases during those months. (SED, at 14-32.) Likewise, the Proposed Project will increase hydropower generation during the months of May and June due to increased reservoir releases. (*Id*.) However, Staff only evaluates annual hydropower impacts and therefore fails to analyze the impact of shifting hydropower generation from summer to spring.

During summer months, energy demands peak, supply is low and transmission is constrained. This combination makes summer energy more valuable and costly. Spring demand is lower, supply is higher, and transmission is less constrained compared to summer. Thus, the proposed transfer of summer hydropower generation to spring hydropower generation is not without impact. It has the potential to result in increased costs, increased supply problems, and increased capacity issues. Because Staff fails to analyze these impacts, it is not supported by substantial evidence.

Second, Staff fails to consider the cost of replacement energy. The spring season is a high production period for wind and Pacific Northwest hydropower generation which drives down the value and price of energy. The summer months are high demand months with low supply, which drive energy costs up. Thus, the proposed project's shift of hydropower generation from summer to spring will require stakeholders to purchase energy in summer months when it is most expensive. Because Staff fails to consider this cost and the environmental impact therefrom, it is not supported by substantial evidence. Fourth, Staff incorrectly assumes regional economic effects due to hydropower loss are "virtually imperceptible" when compared to annual statewide electricity production. (SED, at 18-22.) To the contrary, the proposed project will impact the local regions that depend on the hydropower that would be reduced by the Proposed Project. The region includes hydropower sources that supply only regional customers and do not contribute to the statewide grid. Therefore, the impacts of the proposed project will be much more substantial and concentrated to the project area. Staff misleadingly dilutes the regional effects by spreading the effects statewide, when in fact those effects will be localized. Because Staff fails to analyze the regional hydropower impacts, the analysis is not supported by substantial evidence.

16.6 The Analysis of Flood Risk is Not Supported by Substantial Evidence.

Staff finds the proposed project will have a less than significant impact on flooding and flood risk. (SED, at 6-25 to 6-26.) Staff's flooding risk analysis, however, is inadequate. Staff's analysis is inadequate for two primary reasons.

First, Staff's evaluation of the proposed project's impact on flood risk is based entirely on results from the WSE Model. (SED, at 6-20.) As more fully set forth above, the WSE Model assumes any reduction from the proposed project will be taken in water deliveries and therefore reservoir storage will remain unaffected. Also, as explained more fully above, this assumption is incorrect, unrealistic, and completely without support. For instance, Staff states, "The same flood control curves and daily operations would be used for actual operations of the three reservoirs under the LSJR alternatives as under the baseline." (*Id*., at 6-22.) In other words, Staff did not evaluate the impacts of the proposed project on flood control, it simply assumed reservoir storage levels would remain unchanged and there was no analysis to perform.

Second, because Staff relies on the faulty operational assumption of the WSE Model, it fails to evaluate the flood risks that will occur if the proposed project results in increased reservoir fluctuation. For example, the proposed project may increase reservoir fluctuation and alleviate flood risk by increasing the frequency that reservoir levels are low or close to empty. Staff does not disclose or analyze this potential impact.

Third, the SED lacks transparency regarding flood control relief from the proposed project. The SED seems to indicate that Staff has yet to identify the level at which the proposed requirements would cease to apply due to flood control requirements by stating:

> "[T]he percent of unimpaired flow requirement, as specified by a particular LSJR alternative, would cease to apply during high flows or flooding to preserve public health and safety. The State Water Board would coordinate with federal, state and local agencies to determine when it is appropriate to waive the requirements."

(SED, at 6-20.) This statement, however, is misleading. The WSE Model includes a specific flood control maximum for each tributary. (SED, Appx. F, at 1-17 [capping flows on the Tuolumne River at 3,500 cfs, the Stanislaus River at 2,500 cfs and the Merced River at 2,000 cfs].) Therefore, the SED is internally inconsistent and misleading; the flood analysis fails to disclose that flood control limits have already been selected and instead states that such limits will be determined at a later date after coordination with appropriate agencies. In reality, however, the WSE Model has already included specific flood control limits for each tributary. These limits were not specifically disclosed and Staff fails to analyze whether the selected limits are sufficient or overly protective of flood risk. For these reasons, Staff's flood risk analysis is not supported by substantial evidence.

16.7 The Analysis of Air Quality is Not Supported by Substantial Evidence.

Staff does not analyze the impacts to air quality that may be caused by the proposed amendments to the water quality control plan, despite the fact that the San Joaquin Valley is designated as an area of "serious" "nonattainment" for the particulate matter standards under the Clean Air Act.

16.7.1 The San Joaquin Valley is an area of Serious Nonattainment

Pursuant to Section 109 of the Clean Air Act, the United States Environmental Protection Agency ("USEPA") has established national ambient air quality standards ("NAAQS") for certain air pollutants. (42 USC § 7409.) As relevant here, in 1997 the EPA established a new standard for particulate matter (PM) for particles with an aerodynamic diameter less than or equal to 2.5 micrometers ($PM_{2.5}$), known as the 1997 $PM_{2.5}$ standards. (62 Fed. Reg. 38652.) The purpose of the revised standard was to provide "increased protection against a wide range of PM-related health effects," including premature death, respiratory symptoms and disease (such as asthma), decreased lung function, and alterations in lung tissue and structure. (68 Fed. Reg. 38652.) The EPA set annual and 24-hour standards for $PM_{2.5}$ (50 C.F.R. § 50.7.)

The EPA has designated the San Joaquin Valley area (which includes all or parts of San Joaquin, Stanislaus, Merced, Madera, Fresno, Tulare, Kings and the valley portion of Kern Counties) as "serious" "nonattainment" for both the annual and 24-hour 1997 $PM_{2.5}$ standards (40 C.F.R. 81.305.) This area covers more than 23,000 square miles and is home to more than four million people, in addition to being the nation's leading agricultural region. (See Notice of Proposed Rulemaking: Findings of Failure to Attain the 1997 $PM_{2.5}$ Standards; California; San Joaquin Valley, p. 6.) As a result of this designation, the California Air Resources Board (CARB) became obligated to submit a "Serious area plan" for the San Joaquin Valley with "provisions to assure that the best available control measures for the control of direct $PM_{2.5}$ and $PM_{2.5}$ precursors [will] be implemented" and a "demonstration . . . that the plan provides for attainment as expeditiously as practicable but no later than December 31, 2015." (Notice of Proposed Rulemaking, p. 8.)

CARB submitted its Serious area plan to the USEPA in two parts on June 25, 2015, and August 13, 2015, along with a request to extend the attainment date by three years for the 24-hour $PM_{2.5}$ standard, and by five years for the annual $PM_{2.5}$ standard. (Notice of Proposed Rulemaking, p. 9.) The EPA initially proposed to approve most of the San Joaquin Valley's Serious area plan, and to grant the requested attainment date extensions. (Notice of Proposed Rulemaking, p. 9.) However, after receiving adverse comments on its proposal, the USEPA revised its proposal and determined that it could not extend the attainment date beyond December 31, 2015. Accordingly, USEPA reviewed the relevant data on San Joaquin Valley air quality for PM to determine if the standards for annual and 24-hour $PM_{2.5}$ had been attained from the 2013 to 2015 period. Upon a review of that information, USEPA proposed to determine "that the San Joaquin Valley failed to attain the 1997 annual and 24-hour $PM_{2.5}$ standards by the December 31, 2015 attainment date." (Notice of Proposed Rulemaking, p. 20.)

If the USEPA adopts its proposed determination that the San Joaquin Valley failed to attain the requisite standards by the applicable attainment date, California must submit a revised state implementation plan (SIP) by December 31, 2016, that demonstrates "expeditious attainment of standards within the time period . . . and that provides for annual reduction in the emissions of $PM_{2.5}$ or a $PM_{2.5}$ plan precursor pollutant within the area of not less than five percent until attainment." (Notice of Proposed Rulemaking, p. 21-22.)

16.7.2 Large Scale Fallowing can result in fugitive dust and particulate matter emissions

Both the State Water Board and the California Air Resources Board have previously acknowledged that abandoning, fallowing or otherwise reducing vegetation cover on fields can create dust and particulate matter problems. For instance, in Revised Water Right Order 2002-0016, involving a joint application for the long term transfer of water from Imperial Irrigation District (IID) to San Diego County Water Authority (SDCWA)[64], the State Water Board determined that "there is a potential for significant unavoidable impacts associated with fallowing." (WRO 2002-0016, at 70.) The Board explained, "fallowed lands may be subject to wind erosion, creating fugitive dust impacts unless actions are taken to reduce these effects." (WRO 2002-0016, at 70.) In approving the long-term transfer of water from IID to SDCWA, the Board required IID to implement mitigation measures and best management practices, such as conservation crop sequencing and wind erosion protection measures, application of soil stabilization chemicals to fallowed land, re-application of drain water to allow growth of protective vegetation, or reuse of irrigation return flows to irrigate windbreaks across stretches of land. (WRO 2002-16, at 70.) The Board also required IID to comply with all applicable requirements in the final updated SIP for the Imperial Valley. (WRO 2002-16, at 70.)

The Air Resources Board has also acknowledged the potential for PM emissions resulting from land fallowing. CARB previously sponsored a report from the Biology Department at San Diego State University to explore dust suppression methods in the Antelope Valley in response to increased air quality problems caused by the abandonment of farms in the area. The report notes

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[64] *In the Matter of Imperial Irrigation District's (IID) and San Diego County Water Authority's (SDCWA) Amended Joint Petition for Approval of a Long-Term Transfer of Conserved Water from IID to SDCWA and to Change the Point of Diversion, Place of Use, and Purpose of Use*; Revised Water Right Order 2002-0016.

that the loss of farming and other human disturbances led to high levels of PM in the towns of Lancaster and Palmdale. (Research into the Development of Biological Methods of Dust Suppression in the Antelope Valley, 2006 Final Report, at 1.)

16.7.3 The SED fails to analyze the impacts of fallowing on air quality in the San Joaquin Valley

Staff estimates the Proposed Project will result in an average loss of approximately 24,000 acres of farmland in the San Joaquin Valley. (SED, at 11-51, Figure 11-17.) In dry years, approximately 100,000 acres would be fallowed under the new plan as compared to the no action alternative. (SED, Figure 11-9 to 11-14.) Despite the vast amount of fallowing that is predicted to occur as a result of the proposed changes to the water quality control plan, Staff fails to evaluate any of the potential impacts to air quality in the San Joaquin Valley.

Public Resource Code section 21080.4 requires that the lead agency, in this case the State Water Board, send a notice of preparation to, among others, "those public agencies having jurisdiction by law over the natural resources affected by the project. . .." The Notice of Preparation circulated by the State Water Board indicates that the SED will evaluate potential environmental effects on air quality,[65] but the Board did not send the notice of preparation to the Air Resources Board. Furthermore, an EIR, or in this case an SED, must identify and describe all "significant" environmental effects of the project, including short-term and long-term effects, as well as all mitigation measures to minimize the significant environmental effects. (Public Resources Code, § 21100(b); Cal. Code Regs., tit. 14, § 15126.2.) If an environmental effect is found to be "not significant," the document must nevertheless include a statement explaining the reasons for that determination. (Public Resources Code, § 21100(c); Cal Code Regs., tit. 14, § 15128.) While Staff identifies and provides brief analysis of *some* effects of fallowing, including the potential for increased distribution and abundance of invasive plants (SED, at 18-42), it fails to address any

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[65] Notice of Preparation and of Scoping Meeting for Environmental Documentation for the Update and Implementation of the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary: South Delta Salinity and San Joaquin River Flows, page 10, available at http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/bay_delta_plan/environmental_review/docs/nop2009feb13.pdf

impacts to air quality caused by the widespread fallowing that will occur if the amendments to the water quality control plan are implemented. Given the State Water Board's prior acknowledgement and determination that fallowing can cause significant and unavoidable impacts to air quality, and the already perilous condition of air quality in the San Joaquin Valley, Staff's analysis is fatally deficient for failing to address the potential impacts to air quality that could be caused by wide-spread fallowing of currently productive farmland. (See e.g. *County of Sanitation Dist. No. 2 v. County of Kern*, (2005) 127 Cal.App.4th 1544, 1594-1598 [where the County adopted an ordinance that would affect 23,594 acres of farmland by restricting the application of Class B biosolids on agricultural lands, the County was required to prepare an EIR before adopting the ordinance; the court observed that the County "failed to study the impact of dust on air quality and, as a result, there exists a plausible inference" that the ordinance could cause the addition of 150 pounds per day of PM-10 to the air as a result of soil loss caused by wind erosion on fallowed fields].)

17.0 The Cumulative Impact Analysis is Not Supported by Substantial Evidence.

Staff is required to analyze past, present, and future projects whose "individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." (Cal. Code Regs., tit. 14, § 15355.) A cumulative impact from multiple projects is "the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonable foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time." (Cal. Code Regs., tit. 14, § 15355 [b].) Staff's cumulative analysis is deficient and lacking in substantial evidence for several reasons.

First, Staff's cumulative analysis is often cursory, without any evaluation of the relationship between the Proposed Project and the future project or the cumulative potential impacts. For example, Staff discloses that Waterfix is a future potential project which could, together with the Proposed Project, result in cumulative impacts. However, the analysis does not explain or estimate the nature of the potential impacts. In addition, Staff fails to disclose that the Proposed Project would actually provide water to the WaterFix project proponents. Staff is required to disclose and analyze how the Proposed Project along with WaterFix would affect the environment. Certainly disclosing how the Proposed Project relates to WaterFix is an integral part of that requirement. Staff failed to evaluate how the Proposed Project and WaterFix are related and also failed to evaluate how the two projects together will impact the environment. For these reasons, Staff's cumulative analysis is not sufficient and not supported by substantial evidence.

Second, Staff fails to evaluate how the Proposed Project is related to or affected by the Phase 2 review of the Bay Delta Plan. (SED, at 17-19.) Staff briefly describes the Phase 2 phase of the Bay Delta Plan review and discloses this project may change the flows in the Delta and export/inflow ratios. Staff also offers that these flow alterations may impact salinity conditions of Delta waters. (Id.) However, Staff offers no further discussion or evaluation of how the flow changes will impact the environment. Provided the entire purpose of the Proposed Project is to provide flow to protect beneficial uses and Staff discloses the Phase 2 project will impact the same Bay-Delta flow component, Staff must provide more analysis than simply "this project will alter flows." The existing analysis is deficient and for this reason the cumulative analysis portion of the SED is not supported by substantial evidence.

Third, Staff's analysis of water transfers is deficient. Staff states generally that water transfers would occur with or without the Proposed Project and that most transfers may require additional approvals. (SED, at 17-20.) Although these may be true, it does not lessen or reduce the need for Staff to consider the cumulative impacts of transfers. Further, Staff fails to disclose the water transfer in which it proposes will occur due to the Proposed Project – the transfer of water to the City and County of San Francisco from water right holders on the Tuolumne. Given Staff's reliance on this hypothetical transfer in the analysis of the impacts of the Proposed Project, Staff is required to identify that transfer here and evaluate its cumulative impacts. The section in which Staff attempts to evaluate the cumulative impacts of water transfers is also flawed. (Id.) This section makes unsupported sweeping assumptions, such as: "Because any increases in flows resulting from the transfers would be well within normal channel capacities, water transfers are typically not expected to result in a change to levee stability, flooding potential, or sediment and erosion potential." (Id.) It is not clear why Staff makes such assertion and Staff does not provide support for these assertions; certainly such unsupported conclusions are not sufficient to evade environmental review of cumulative impacts.

18.0 CONCLUSION.

The proposed revisions to the Bay-Delta plan set forth in Appendix K are unlawful for the various reasons set forth above, and the Board should decline to adopt them. In addition, the SED must be revised and recirculated.

An environmental document must be recirculated when significant new information is added after its release to the public. (Pub. Resources Code, § 15088.5(a).) Significant new information includes:

- a new significant environmental impact would result from the project or from a new mitigation measure proposed to be implemented;
- a substantial increase in the severity of an environmental impact would result unless mitigation measures area adopted that reduce the impact to a level of insignificance;
- a feasible project alternative or mitigation measure considerably different from others previously analyzed; and
- the draft document was so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded.

(Pub. Resources Code, § 15088.5(a)(1)-(4).)

As the substance of these comments make clear, the revisions necessary to the SED will include increased severity of environmental impact, considerably different project alternatives, and considerably different mitigation measures. For these reasons, the SED will need to be revised and recirculated.

As currently drafted, the SED is fundamentally inadequate. As mentioned elsewhere in these comments, the SED does not analyze the environmental impacts stemming from the Narrative Objective, the program of implementation, methods of compliance, mitigation measures, or a reasonable range of alternatives. The environmental analysis included in the SED is deficient; it is filled with errors, unsupported assumptions, conjecture, internal inconsistencies, and promises to develop appropriate analysis at a later date. Perhaps most importantly, these deficiencies are so fundamental that the SED does not allow for meaningful review of the environmental impacts. For these reasons, Staff is required to redraft and recirculate the SED.

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CDFW Unpublished Mossdale data to FishBio 2008-2016

ATTACHMENT 1

DATE	24-Hour Estimate	DATE	24-Hour Estimate	DATE	24-Hour Estimate	DATE	24-Hour Estimate
4/4/2016	0	3/30/2015	501	3/31/2014	0	4/2/2013	9838
4/5/2016	0	3/31/2015	120	4/1/2014	110	4/3/2013	9905
4/6/2016	301	4/1/2015	234	4/2/2014	84	4/4/2013	8175
4/7/2016	878	4/2/2015	109	4/3/2014	112	4/5/2013	11702
4/8/2016	325	4/3/2015	208	4/4/2014	112	4/6/2013	4931
4/9/2016	446	4/4/2015	100	4/5/2014	224	4/7/2013	8404
4/10/2016	419	4/5/2015	77	4/6/2014	519	4/8/2013	7270
4/11/2016	0	4/6/2015	0	4/7/2014	223	4/9/2013	9713
4/12/2016	903	4/7/2015	0	4/8/2014	1516	4/10/2013	8112
4/13/2016	338	4/8/2015	56	4/9/2014	2202	4/11/2013	6289
4/14/2016	124	4/9/2015	112	4/10/2014	4214	4/12/2013	9175
4/15/2016	324	4/10/2015	111	4/11/2014	2855	4/13/2013	19740
4/16/2016	239	4/11/2015	221	4/12/2014	1678	4/14/2013	13561
4/17/2016	1030	4/12/2015	1622	4/13/2014	2202	4/15/2013	12531
4/18/2016	3061	4/13/2015	123	4/14/2014	1906	4/16/2013	12797
4/19/2016	497	4/14/2015	6034	4/15/2014	2367	4/17/2013	22634
4/20/2016	2237	4/15/2015	1887	4/16/2014	9349	4/18/2013	26205
4/21/2016	1100	4/16/2015	1265	4/17/2014	12431	4/19/2013	39002
4/22/2016	4289	4/17/2015	126	4/18/2014	20691	4/20/2013	68843
4/23/2016	508	4/18/2015	0	4/19/2014	14225	4/21/2013	50918
4/24/2016	1282	4/19/2015	90	4/20/2014	9323	4/22/2013	68121
4/25/2016	174	4/20/2015	119	4/21/2014	344	4/23/2013	27706
4/26/2016	158	4/21/2015	114	4/22/2014	2030	4/24/2013	36049
4/27/2016	892	4/22/2015	58	4/23/2014	1148	4/25/2013	39417
4/28/2016	699	4/23/2015	0	4/24/2014	840	4/26/2013	8952
4/29/2016	2538	4/24/2015	0	4/25/2014	1376	4/27/2013	4852
4/30/2016	825	4/25/2015	0	4/26/2014	2626	4/28/2013	4280
5/1/2016	1238	4/26/2015	0	4/27/2014	1782	4/29/2013	2709
5/2/2016	974	4/27/2015	0	4/28/2014	1570	4/30/2013	605
5/3/2016	616	4/28/2015	0	4/29/2014	1556	5/1/2013	3845
5/4/2016	697	4/29/2015	0	4/30/2014	3315	5/2/2013	5367
5/5/2016	684	4/30/2015	0	5/1/2014	2206	5/3/2013	6701
5/6/2016	515	5/1/2015	0	5/2/2014	7929	5/4/2013	5313
5/7/2016	0	5/2/2015	0	5/3/2014	5473	5/5/2013	9857
5/8/2016	282	5/3/2015	0	5/4/2014	10799	5/6/2013	10957
5/9/2016	155	5/4/2015	0	5/5/2014	14482	5/7/2013	16457
5/10/2016	457	5/5/2015	0	5/6/2014	15310	5/8/2013	17349
5/11/2016	487	5/6/2015	0	5/7/2014	9784	5/9/2013	26717
5/12/2016	852	5/7/2015	0	5/8/2014	3832	5/10/2013	15266
5/13/2016	485	5/8/2015	0	5/9/2014	5513	5/11/2013	42227
5/14/2016	158	5/9/2015	0	5/10/2014	16003	5/12/2013	16889
5/15/2016	270	5/10/2015	0	5/11/2014	7434	5/13/2013	4608
5/16/2016	296	5/11/2015	0	5/12/2014	3075	5/14/2013	5453
5/17/2016	140	5/12/2015	0	5/13/2014	5144	5/15/2013	18692

5/18/2016	396	5/13/2015	0	5/14/2014	3129	5/16/2013	13663
5/19/2016	519	5/14/2015	0	5/15/2014	1804	5/17/2013	51045
5/20/2016	630	5/15/2015	0	5/16/2014	2494	5/18/2013	36520
5/21/2016	878	5/16/2015	0	5/17/2014	4623	5/19/2013	38848
5/22/2016	719	5/17/2015	0	5/18/2014	9333	5/20/2013	58191
5/23/2016	377	5/18/2015	0	5/19/2014	17430	5/21/2013	9637
5/24/2016	990	5/19/2015	0	5/20/2014	12786	5/22/2013	19514
5/25/2016	577	5/20/2015	0	5/21/2014	8074	5/23/2013	5921
5/26/2016	709	5/21/2015	0	5/22/2014	1434	5/24/2013	4306
5/27/2016	233	5/22/2015	0	5/23/2014	647	5/25/2013	2569
5/28/2016	352	5/23/2015	0	5/24/2014	747	5/26/2013	2105
5/29/2016	176	5/24/2015	0	5/25/2014	374	5/27/2013	2105
5/30/2016	176	5/25/2015	0	5/26/2014	374	5/28/2013	1641
5/31/2016	117	5/26/2015	0	5/27/2014	0	5/29/2013	1222
6/1/2016	117	5/27/2015	0	5/28/2014	187	5/30/2013	802
6/2/2016	0	5/28/2015	0	5/29/2014	99	5/31/2013	1130
6/3/2016	0	5/29/2015	0	5/30/2014	0	6/1/2013	113
6/4/2016	0	5/30/2015	0	5/31/2014	0	6/2/2013	56
6/5/2016	0	5/31/2015	0	6/1/2014	0	6/3/2013	0
6/6/2016	0	6/1/2015	0	6/2/2014	0	6/4/2013	18978
6/7/2016	0	6/2/2015	0	6/3/2014	0	6/5/2013	4745
6/8/2016	0	6/3/2015	0	6/4/2014	0	6/6/2013	0
6/9/2016	0	6/4/2015	0	6/5/2014	0	6/7/2013	0
6/10/2016	0	6/5/2015	0	6/6/2014	0	6/8/2013	0
6/11/2016	0	6/6/2015	0	6/7/2014	0	6/9/2013	0
6/12/2016	0	6/7/2015	0	6/8/2014	0	6/10/2013	0
6/13/2016	0	6/8/2015	0	6/9/2014	0	6/11/2013	0
6/14/2016	0	6/9/2015	0	6/10/2014	0	6/12/2013	0
6/15/2016	0	6/10/2015	0	6/11/2014	0	6/13/2013	0
6/16/2016	0	6/11/2015	0	6/12/2014	0	6/14/2013	0
6/17/2016	0	6/12/2015	0	6/13/2014	0	6/15/2013	0
6/18/2016	0	6/13/2015	0	6/14/2014	0	6/16/2013	0
6/19/2016	0	6/14/2015	0	6/15/2014	0	6/17/2013	0
6/20/2016	0	6/15/2015	0	6/16/2014	0	6/18/2013	0
6/21/2016	0	6/16/2015	0	6/17/2014	0	6/19/2013	0
6/22/2016	0	6/17/2015	0	6/18/2014	0	6/20/2013	0
6/23/2016	0	6/18/2015	0	6/19/2014	0	6/21/2013	0
6/24/2016	0	6/19/2015	0	6/20/2014	0	6/22/2013	0
6/25/2016	0	6/20/2015	0	6/21/2014	0	6/23/2013	0
6/26/2016	0	6/21/2015	0	6/22/2014	0	6/24/2013	0
6/27/2016	0	6/22/2015	0	6/23/2014	0	6/25/2013	53
6/28/2016	0	6/23/2015	0	6/24/2014	0	6/26/2013	106
6/29/2016	0	6/24/2015	0	6/25/2014	0	6/27/2013	53
6/30/2016	0	6/25/2015	0	6/26/2014	0	6/28/2013	0
7/1/2016	0	6/26/2015	0	6/27/2014	0		

DATE	24-Hour Estimate	DATE	24-Hour Estimate	DATE	24-Hour Estimate	DATE	24-Hour Estimate
4/2/2012	20828	4/4/2011	7721	3/29/2010	916	3/30/2009	1364
4/3/2012	10692	4/5/2011	5990	3/30/2010	686	3/31/2009	1223
4/4/2012	12256	4/6/2011	3428	3/31/2010	512	4/1/2009	1094
4/5/2012	12599	4/7/2011	0	4/1/2010	146	4/2/2009	364
4/6/2012	4906	4/8/2011	0	4/2/2010	300	4/3/2009	2071
4/7/2012	6036	4/9/2011	5382	4/3/2010	848	4/4/2009	2193
4/8/2012	5059	4/10/2011	2532	4/4/2010	1435	4/5/2009	2193
4/9/2012	4959	4/11/2011	4748	4/5/2010	1511	4/6/2009	1464
4/10/2012	4334	4/12/2011	0	4/6/2010	386	4/7/2009	4873
4/11/2012	4264	4/13/2011	2324	4/7/2010	1075	4/8/2009	1368
4/12/2012	1482	4/14/2011	0	4/8/2010	655	4/9/2009	1779
4/13/2012	6282	4/15/2011	4549	4/9/2010	1750	4/10/2009	904
4/14/2012	2805	4/16/2011	0	4/10/2010	830	4/11/2009	1332
4/15/2012	14705	4/17/2011	7374	4/11/2010	717	4/12/2009	2039
4/16/2012	19347	4/18/2011	15305	4/12/2010	197	4/13/2009	2123
4/17/2012	30386	4/19/2011	9643	4/13/2010	198	4/14/2009	524
4/18/2012	22625	4/20/2011	11711	4/14/2010	1266	4/15/2009	2612
4/19/2012	25933	4/21/2011	2319	4/15/2010	3387	4/16/2009	2348
4/20/2012	14833	4/22/2011	19578	4/16/2010	1281	4/17/2009	1307
4/21/2012	14423	4/23/2011	3486	4/17/2010	1333	4/18/2009	2390
4/22/1012	9581	4/24/2011	7969	4/18/2010	221	4/19/2009	3618
4/23/2012	4371	4/25/2011	6007	4/19/2010	443	4/20/2009	1893
4/24/2012	4699	4/26/2011	2806	4/20/2010	225	4/21/2009	4011
4/25/2012	5227	4/27/2011	8042	4/21/2010	402	4/22/2009	297
4/26/2012	1408	4/28/2011	14385	4/22/2010	469	4/23/2009	876
4/27/2012	10431	4/29/2011	8970	4/23/2010	470	4/24/2009	1768
4/28/2012	16673	4/30/2011	4177	4/24/2010	3685	4/25/2009	1037
4/29/2012	12671	5/1/2011	11291	4/25/2010	9851	4/26/2009	1558
4/30/2012	12263	5/2/2011	15351	4/26/2010	3949	4/27/2009	1203
5/1/2012	11316	5/3/2011	16665	4/27/2010	1913	4/28/2009	299
5/2/2012	17956	5/4/2011	27405	4/28/2010	1256	4/29/2009	594
5/3/2012	28906	5/5/2011	44405	4/29/2010	1628	4/30/2009	1764
5/4/2012	19341	5/6/2011	33198	4/30/2010	227	5/1/2009	745
5/5/2012	12885	5/7/2011	31770	5/1/2010	1250	5/2/2009	903
5/6/2012	9331	5/8/2011	28698	5/2/2010	1125	5/3/2009	1354
5/7/2012	909	5/9/2011	26825	5/3/2010	2019	5/4/2009	1103
5/8/2012	4190	5/10/2011	22996	5/4/2010	218	5/5/2009	0
5/9/2012	5599	5/11/2011	9829	5/5/2010	1037	5/6/2009	9279
5/10/2012	8839	5/12/2011	56561	5/6/2010	1910	5/7/2009	11606
5/11/2012	8460	5/13/2011	72822	5/7/2010	0	5/8/2009	4854
5/12/2012	11241	5/14/2011	59196	5/8/2010	722	5/9/2009	5609
5/13/2012	16404	5/15/2011	47403	5/9/2010	978	5/10/2009	8347
5/14/2012	33246	5/16/2011	9664	5/10/2010	0	5/11/2009	4035
5/15/2012	12670	5/17/2011	6001	5/11/2010	0	5/12/2009	1940

5/16/2012	20499	5/18/2011	5409	5/12/2010	116	5/13/2009	5834
5/17/2012	14315	5/19/2011	23844	5/13/2010	236	5/14/2009	6222
5/18/2012	15544	5/20/2011	22347	5/14/2010	226	5/15/2009	4123
5/19/2012	9553	5/21/2011	20523	5/15/2010	765	5/16/2009	3269
5/20/2012	13113	5/22/2011	42500	5/16/2010	1957	5/17/2009	4857
5/21/2012	7722	5/23/2011	22547	5/17/2010	640	5/18/2009	1624
5/22/2012	19634	5/24/2011	15709	5/18/2010	0	5/19/2009	1105
5/23/2012	10208	5/25/2011	14984	5/19/2010	1700	5/20/2009	1243
5/24/2012	8349	5/26/2011	17949	5/20/2010	4096	5/21/2009	1076
5/25/2012	5128	5/27/2011	10693	5/21/2010	2063	5/22/2009	1967
5/26/2012	3068	5/28/2011	15720	5/22/2010	2922	5/23/2009	941
5/27/2012	10472	5/29/2011	15720	5/23/2010	2583	5/24/2009	1411
5/28/2012	20844	5/30/2011	15618	5/24/2010	2948	5/25/2009	1411
5/29/2012	12846	5/31/2011	18621	5/25/2010	1116	5/26/2009	580
5/30/2012	10211	6/1/2011	50929	5/26/2010	1823	5/27/2009	142
5/31/2012	4342	6/2/2011	74775	5/27/2010	226	5/28/2009	139
6/1/2012	2811	6/3/2011	94704	5/28/2010	3004	5/29/2009	0
6/2/2012	1803	6/4/2011	20469	5/29/2010	1215	5/30/2009	69
6/3/2012	2186	6/5/2011	41855	5/30/2010	1632	5/31/2009	51
6/4/2012	2134	6/6/2011	15433	5/31/2010	927	6/1/2009	0
6/5/2012	1997	6/7/2011	36815	6/1/2010	0	6/2/2009	137
6/6/2012	1901	6/8/2011	44187	6/2/2010	0	6/3/2009	0
6/7/2012	2069	6/9/2011	13690	6/3/2010	259	6/4/2009	0
6/8/2012	1403	6/10/2011	45945	6/4/2010	1034	6/5/2009	128
6/9/2012	380	6/11/2011	78554	6/5/2010	259	6/6/2009	130
6/10/2012	573	6/12/2011	43298	6/6/2010	259	6/7/2009	199
6/11/2012	128	6/13/2011	33631	6/7/2010	0	6/8/2009	132
6/12/2012	382	6/14/2011	15060	6/8/2010	311	6/9/2009	66
6/13/2012	127	6/15/2011	19452	6/9/2010	0	6/10/2009	0
6/14/2012	0	6/16/2011	2658	6/10/2010	165	6/11/2009	0
6/15/2012	0	6/17/2011	26459	6/11/2010	208	6/12/2009	0
6/16/2012	0	6/18/2011	20553	6/12/2010	165	6/13/2009	0
6/17/2012	0	6/19/2011	15205	6/13/2010	165	6/14/2009	0
6/18/2012	0	6/20/2011	10251	6/14/2010	450	6/15/2009	0
6/19/2012	67	6/21/2011	10054	6/15/2010	214	6/16/2009	0
6/20/2012	134	6/22/2011	9857	6/16/2010	0	6/17/2009	0
6/21/2012	67	6/23/2011	7371	6/17/2010	162	6/18/2009	0
6/22/2012	0	6/24/2011	4886	6/18/2010	200	6/19/2009	0
6/23/2012	210	6/25/2011	3792	6/19/2010	50	6/20/2009	0
6/24/2012	210	6/26/2011	3792	6/20/2010	50	6/21/2009	0
6/25/2012	421	6/27/2011	2697	6/21/2010	0	6/22/2009	0
6/26/2012	210	6/28/2011	2113	6/22/2010	0	6/23/2009	0
6/27/2012	0	6/29/2011	1528	6/23/2010	0	6/24/2009	0
6/28/2012	0	6/30/2011	15692	6/24/2010	185	6/25/2009	0
6/29/2012	0	7/1/2011	29856	6/25/2010	185	6/26/2009	136
				6/26/2010	185	6/27/2009	0
				6/27/2010	185	6/28/2009	0

6/28/2010	357	6/29/2009	0
6/29/2010	369		
6/30/2010	381		

DATE	24-Hour Estimate
4/1/2008	0
4/2/2008	308
4/3/2008	611
4/4/2008	1048
4/5/2008	1259
4/6/2008	1259
4/7/2008	1190
4/8/2008	1327
4/9/2008	290
4/10/2008	721
4/11/2008	1009
4/12/2008	856
4/13/2008	856
4/14/2008	899
4/15/2008	793
4/16/2008	1934
4/17/2008	610
4/18/2008	1231
4/19/2008	3202
4/20/2008	3202
4/21/2008	495
4/22/2008	10471
4/23/2008	3472
4/24/2008	5663
4/25/2008	540
4/26/2008	6114
4/27/2008	6114
4/28/2008	12138
4/29/2008	6115
4/30/2008	9087
5/1/2008	15529
5/2/2008	11938
5/3/2008	9379
5/4/2008	9379
5/5/2008	5981
5/6/2008	4069
5/7/2008	715
5/8/2008	1265
5/9/2008	1820
5/10/2008	3523
5/11/2008	3523
5/12/2008	1681
5/13/2008	9325
5/14/2008	4704

5/15/2008	5408
5/16/2008	52784
5/17/2008	24888
5/18/2008	24888
5/19/2008	35532
5/20/2008	5830
5/21/2008	14350
5/22/2008	1654
5/23/2008	3567
5/24/2008	6036
5/25/2008	6036
5/26/2008	6036
5/27/2008	12207
5/28/2008	6717
5/29/2008	5612
5/30/2008	2362
5/31/2008	2327
6/1/2008	2327
6/2/2008	940
6/3/2008	395
6/4/2008	1288
6/5/2008	0
6/6/2008	504
6/7/2008	377
6/8/2008	377
6/9/2008	249
6/10/2008	0
6/11/2008	0
6/12/2008	0
6/13/2008	0
6/14/2008	0
6/15/2008	0
6/16/2008	0
6/17/2008	0
6/18/2008	0
6/19/2008	0
6/20/2008	0
6/21/2008	0
6/22/2008	0
6/23/2008	0
6/24/2008	0
6/25/2008	0
6/26/2008	30
6/27/2008	119
6/28/2008	30
6/29/2008	30
6/30/2008	0

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ATTACHMENT 2

Fall

Table #. The monthly and annual absolute abundance estimates and their 95% confidence limits (CL) of unmarked juvenile fall-run Chinook salmon emigrating from the Sacramento - San Joaquin De

		Month												
Field Season	Abundance Estimate	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Field Season Total
	Upper CL										12981100	8435625	3364129	24,780,853
	Mean										11282280	7331665	2923870	21,537,814
1976	Lower CL										9976648	6483215	2585507	19,045,371
	Upper CL	---	---	272195.4	137162.5	---	---	---	---	---	14467526	7116810	---	21,993,694
	Mean	---	---	236573.5	119212.3	---	---	---	---	---	12574179	6185442	---	19,115,406
1977	Lower CL	---	---	209196.3	105416.5	---	---	---	---	---	11119044	5469637	---	16,903,294
	Upper CL	---	---	---	---	---	---	---	---	5617867	13220429	10895016	---	29,733,312
	Mean	---	---	---	---	---	---	---	---	4882664	11490288	9469199	---	25,842,151
1978	Lower CL	---	---	---	---	---	---	---	---	4317622	10160585	8373384	---	22,851,591
	Upper CL	---	---	---	---	---	---	---	---	3005107	16422138	8649012	1657854	29,734,110
	Mean	---	---	---	---	---	---	---	---	2611832	14272993	7517127	1440893	25,842,845
1979	Lower CL	---	---	---	---	---	---	---	---	2309580	12621264	6647214	1274147	22,852,205
	Upper CL	---	---	---	---	---	412138.6	240574.5	102731	205844.3	5650203	7981856	---	14,593,347
	Mean	---	---	---	---	---	358202.5	209090.8	89286.69	178905.7	4910768	6937280	---	12,683,534
1980	Lower CL	---	---	---	---	---	316749.9	184893.9	78954.07	158202	4342474	6134470	---	11,215,744
	Upper CL	---	---	279540	843269.7	108438.2	---	---	---	4139983	10386073	3625130	0	19,382,434
	Mean	---	---	242957	732912.1	94247.07	---	---	---	3598189	9026860	3150714	0	16,845,879
1981	Lower CL	---	---	214841	648096.5	83340.41	---	---	---	3181792	7982235	2786100	0	14,896,405
	Upper CL	---	---	---	---	---	---	---	---	741292.9	19735760	13860051	---	34,337,104
	Mean	---	---	---	---	---	---	---	---	644280.9	17152966	12046203	---	29,843,450
1982	Lower CL	---	---	---	---	---	---	---	---	569722	15167955	10652168	---	26,389,844
	Upper CL	---	---	---	---	---	---	---	---	2478626	20109003	17184724	3388695	43,161,048
	Mean	---	---	---	---	---	---	---	---	2154251	17477363	14935780	2945221	37,512,616
1983	Lower CL	---	---	---	---	---	---	---	---	1904952	15454812	13207351	2604388	33,171,503
	Upper CL	---	---	---	---	---	---	---	---	123987.6	7478261	1502117	1370708	10,475,074
	Mean	---	---	---	---	---	---	---	---	107761.5	6499591	1305537	1191325	9,104,214
1984	Lower CL	---	---	---	---	---	---	---	---	95290.9	5747432	1154455	1053460	8,050,638
	Upper CL	---	---	---	---	---	---	---	---	1276048	9172674	1591213	---	12,039,936
	Mean	---	---	---	---	---	---	---	---	1109054	7972258	1382973	---	10,464,285
1985	Lower CL	---	---	---	---	---	---	---	---	980709.4	7049676	1222930	---	9,253,315
	Upper CL	---	---	---	---	---	---	---	---	2816817	12329524	1752234	---	16,898,575
	Mean	---	---	---	---	---	---	---	---	2448184	10715975	1522921	---	14,687,080
1986	Lower CL	---	---	---	---	---	---	---	---	2164870	9475878	1346683	---	12,987,431
	Upper CL	---	---	---	---	---	---	---	---	4260918	7565981	313031.9	---	12,139,931
	Mean	---	---	---	---	---	---	---	---	3703297	6575830	272065.9	---	10,551,194
1987	Lower CL	---	---	---	---	---	---	---	---	3274737	5814849	240581.3	---	9,330,166
	Upper CL	---	---	---	---	---	---	---	---	916076.6	10179041	313602.8	105166.4	11,513,887
	Mean	---	---	---	---	---	---	---	---	796190.8	8846923	272562	91403.4	10,007,079
1988	Lower CL	---	---	---	---	---	---	---	---	704052.4	7823121	241020	80825.83	8,849,019
	Upper CL	---	---	---	---	---	---	---	---	7270552	12689522	1873219	---	21,833,292
	Mean	---	---	---	---	---	---	---	---	6319064	11028860	1628073	---	18,975,997
1989	Lower CL	---	---	---	---	---	---	---	---	5587796	9752555	1439666	---	16,780,017
	Upper CL	---	---	---	---	---	---	---	---	3643587	12474521	2727823	---	18,845,931
	Mean	---	---	---	---	---	---	---	---	3166755	10841996	2370836	---	16,379,588
1990	Lower CL	---	---	---	---	---	---	---	---	2800285	9587316	2096474	---	14,484,075
	Upper CL	---	---	---	---	---	---	---	---	1453573	10648724	2151223	---	14,253,520
	Mean	---	---	---	---	---	---	---	---	1263346	9255139	1869695	---	12,388,180
1991	Lower CL	---	---	---	---	---	---	---	---	1117146	8184097	1653326	---	10,954,569
	Upper CL	---	---	---	---	---	---	---	---	17494090	5004523	505267.8	---	23,003,881
	Mean	---	---	---	---	---	---	---	---	15204660	4349588	439144	---	19,993,392
1992	Lower CL	---	---	---	---	---	---	---	---	13445115	3846236	388324.5	---	17,679,675
	Upper CL	---	---	---	---	---	---	---	---	4355692	12878766	4465222	626908.6	22,326,589
	Mean	---	---	---	---	---	---	---	---	3785668	11193338	3880864	544865.8	19,404,736
1993	Lower CL	---	---	---	---	---	---	---	---	3347575	9897999	3431755	481811.7	17,159,141
	Upper CL	---	---	---	36483.65	1627.55	0	3109.998	6265.692	4663207	2666362	245953.7	---	7,623,009
	Mean	---	---	---	31709.08	1414.555	0	2702.997	5445.709	4052939	2317419	213766	---	6,625,396
1994	Lower CL	---	---	---	28039.57	1250.857	0	2390.195	4815.509	3583916	2049238	189028.1	---	5,858,678
	Upper CL	---	---	46920.39	32197.57	0	666268.5	369889.2	543163.3	3675294	13920237	4428572	338869.5	24,021,411
	Mean	---	---	40779.98	27983.92	0	579074.7	321482.3	472080.2	3194313	12098513	3849010	294522.1	20,877,759
1995	Lower CL	---	---	36060.75	24745.5	0	512061.8	284279	417449.2	2824654	10698423	3403587	260438.8	18,461,699
	Upper CL	40664.34	28037.47	160517.1	19676.29	17121.83	109029.6	3782456	360896	4068282	12672174	2642245	0	23,901,099
	Mean	35342.65	24368.24	139510.5	17101.28	14881.12	94761.02	3287451	313666	3535871	11013783	2296458	0	20,773,193
1996	Lower CL	31252.65	21548.25	123365.7	15122.25	13159.01	83794.89	2907013	277367.3	3126685	9739223	2030702	0	18,369,234
	Upper CL	135547.8	---	0	9369.664	9494.359	72723.11	2495.182	3468.174	1915954	1604221	374403.1	100692.7	4,228,369
	Mean	117808.8	---	0	8143.468	8251.844	63205.93	2168.641	3014.298	1665216	1394278	325405.5	87515.13	3,675,008
1997	Lower CL	104175.5	---	0	7201.072	7296.907	55891.48	1917.677	2665.472	1472510	1232927	287748.2	77387.52	3,249,721
	Upper CL	38727.94	16396.91	3240.187	0	1596.872	391582.5	473813.7	1104557	7354942	12903335	3968053	---	26,256,245
	Mean	33659.67	14251.07	2816.147	0	1387.891	340336.6	411806.3	960005	6392410	11214692	3448759	---	22,820,123
1998	Lower CL	29764.43	12601.88	2490.251	0	1227.279	300951.5	364150.4	848909.3	5652654	9916882	3049654	---	20,179,285
	Upper CL	---	50549.25	92947.06	0	0	30895.48	637277	316712.7	2928209	8129190	2673477	56088.75	14,915,347
	Mean	---	43933.93	80783.2	0	0	26852.23	553877.3	275264.9	2544998	7065333	2323603	48748.48	12,963,394
1999	Lower CL	---	38849.72	71434.64	0	0	23744.78	489780.4	243410.1	2250480	6247704	2054706	43107.11	11,463,217
	Upper CL	0	21652.04	224355	12297.68	0	1950.328	117825.6	57408.48	8005865	4675866	547690.7	121127.8	13,786,038
	Mean	0	18818.47	194993.9	10688.3	0	1695.091	102405.9	49895.51	6958147	4063941	476015.1	105276	11,981,877
2000	Lower CL	0	16640.72	172428.4	9451.407	0	1498.928	90555.08	44121.39	6152922	3593645	420928.7	93093.01	10,595,285
	Upper CL	18913.65	48683.61	42917.51	15846.68	0	0	2226.005	42206.5	3827934	5459508	419913.9	76217.62	9,954,367
	Mean	16438.44	42312.45	37300.95	13772.84	0	0	1934.69	36682.99	3326977	4745029	364960.3	66243.11	8,651,652

2001	Lower CL	14536.12	37415.88	32984.33	12178.99	0	0	1710.8	32437.88	2941965	4195915	322725.6	58577.19	7,650,447
	Upper CL	20332.17	3618.629	4728.412	0	0	0	0	0	1553500	4118416	469519.2	115010.3	6,285,125
	Mean	17671.32	3145.063	4109.61	0	0	0	0	0	1350196	3579444	408073.8	99959.01	5,462,599
2002	Lower CL	15626.33	2781.104	3634.03	0	0	0	0	0	1193946	3165216	360849.8	88391.34	4,830,445
	Upper CL	0	3995.187	0	2075.558	0	0	0	9464.16	7450112	7546251	825889.6	46763.02	15,884,551
	Mean	0	3472.342	0	1803.933	0	0	0	8225.597	6475125	6558682	717806.5	40643.2	13,805,759
2003	Lower CL	0	3070.508	0	1595.174	0	0	0	7273.698	5725797	5799685	634739	35939.8	12,208,101
	Upper CL	19211.5	3392.464	0	0	0	0	0	85609.14	7025166	6183746	609208.3	61563.54	13,987,897
	Mean	16697.31	2948.497	0	0	0	0	0	74405.58	6105791	5374487	529482	53506.8	12,157,318
2004	Lower CL	14765.03	2607.285	0	0	0	0	0	65795.06	5399204	4752530	468208.2	47314.77	10,750,424
	Upper CL	15670.27	7155.016	3947.994	0	0	0	0	30536.43	6021474	8656586	3287832	172041.4	18,195,243
	Mean	13619.52	6218.648	3431.325	0	0	0	0	26540.16	5233451	7523710	2857557	149526.6	15,814,054
2005	Lower CL	12043.41	5499.001	3034.238	0	0	0	0	23468.83	4627815	6653035	2526869	132222.8	13,983,987
	Upper CL	19211.5	6784.929	0	0	0	0	0	8716.901	628982.8	11768217	3199412	175304.3	15,806,630
	Mean	16697.31	5896.994	0	0	0	0	0	7576.131	546668.6	10228126	2780709	152362.5	13,738,036
2006	Lower CL	14765.03	5214.57	0	0	0	0	0	6699.39	483405.9	9044485	2458914	134730.5	12,148,215
	Upper CL	29845.39	19758.62	3128.026	0	0	0	0	0	2137933	2303311	---	---	4,493,976
	Mean	25939.56	17172.84	2718.665	0	0	0	0	0	1858144	2001879	---	---	3,905,855
2007	Lower CL	22937.73	15185.52	2404.05	0	0	0	0	0	1643112	1770214	---	---	3,453,853
	Upper CL	---	---	3132.846	0	0	0	0	0	164384.2	1491414	207440	11065.13	1,877,436
	Mean	---	---	2722.854	0	0	0	0	0	142871.5	1296235	180292.6	9617.048	1,631,739
2008	Lower CL	---	---	2407.755	0	0	0	0	0	126337.8	1146229	159428.4	8504.124	1,442,907
	Upper CL	5170.291	0	4569.027	5247.012	0	0	0	0	923014.5	2763281	162944.3	51589.09	3,915,815
	Mean	4493.662	0	3971.084	4560.342	0	0	0	0	802220.7	2401654	141620	44837.69	3,403,357
2009	Lower CL	3973.637	0	3511.534	4032.601	0	0	0	0	709384.5	2123724	125231.1	39648.89	3,009,507
	Upper CL	0	0	0	3171.039	0	0	0	2908.751	3706304	3465309	665607.6	56033.54	7,899,334
	Mean	0	0	0	2756.049	0	0	0	2528.087	3221265	3011808	578500.3	48700.5	6,865,558
2010	Lower CL	0	0	0	2437.107	0	0	0	2235.526	2848487	2663270	511553.9	43064.68	6,071,048
	Upper CL	6785.872	3199.397	3271.467	0	0	0	0	3128.026	1265337	7683246	2364182	159876.9	11,489,027
	Mean	5897.814	2780.696	2843.335	0	0	0	0	2718.665	1099744	6677749	2054785	138954	9,985,473
2011	Lower CL	5215.295	2458.903	2514.292	0	0	0	0	2404.05	972477.1	5904973	1816997	122873.7	8,829,913
	Upper CL	20777.4	6347.192	15442.15	0	0	0	0	5421.912	1898762	3478947	654172.9	41253.68	6,121,124
	Mean	18058.29	5516.543	13421.26	0	0	0	0	4712.353	1650274	3023661	568562.1	35854.86	5,320,060
2012	Lower CL	15968.51	4878.146	11868.1	0	0	0	0	4167.021	1459297	2673751	502765.8	31705.59	4,704,401
	Upper CL	15491.18	5045.204	0	0	4959.066	0	0	0	784024.6	3813734	180591.8	11786.77	4,815,633
	Mean	13463.87	4384.944	0	0	4310.079	0	0	0	681420.3	3314636	156957.9	10244.25	4,185,417
2013	Lower CL	11905.77	3877.5	0	0	3811.299	0	0	0	602563.6	2931052	138794.1	9058.74	3,701,064
	Upper CL	3136.471	0	0	0	0	0	0	100872.8	1295608	1960925	8843.278	0	3,369,386
	Mean	2726.005	0	0	0	0	0	0	87671.69	1126054	1704301	7685.969	0	2,928,438
2014	Lower CL	2410.54	0	0	0	0	0	0	77525.96	995742.1	1507072	6796.518	0	2,589,548
	Upper CL	3128.026	0	2912.918	0	3392.936	0	6387.666	16200.93	771916.1	479468.3	4372.51	0	1,287,779
	Mean	2718.665	0	2531.708	0	2948.907	0	5551.721	14080.74	670896.5	416720.9	3800.285	0	1,119,249
2015	Lower CL	2404.05	0	2238.729	0	2607.647	0	4909.253	12451.26	593257.6	368496.3	3360.5	0	989,725
	Upper CL	21,812	12,479	50,599	46,533	6,375	73,243	245,046	121,751	3,470,165	8,528,438	3,150,859	465,721	16,193,020
	Mean	18,957	10,846	43,977	40,443	5,541	63,658	212,977	105,817	3,016,029	7,412,332	2,738,510	404,773	14,073,860
Average	Lower CL	16,764	9,590	38,888	35,763	4,900	56,291	188,330	93,572	2,667,002	6,554,547	2,421,598	357,931	12,445,175

Lower CL	---	---	---	---	---	---	---	---	---	9976648	6483215	2585507
Lower CL	---	---	209196.3	105416.5	---	---	---	---	---	11119044	5469637	---
Lower CL	---	---	---	---	---	---	---	---	4317622	10160585	8373384	---
Lower CL	---	---	---	---	---	---	---	---	2309580	12621264	6647214	1274147
Lower CL	---	---	---	---	---	316749.9	184893.9	78954.07	158202	4342474	6134470	---
Lower CL	---	---	214841	648096.5	83340.41	---	---	---	3181792	7982235	2786100	0
Lower CL	---	---	---	---	---	---	---	---	569722	15167955	10652168	---
Lower CL	---	---	---	---	---	---	---	---	1904952	15454812	13207351	2604388
Lower CL	---	---	---	---	---	---	---	---	95290.9	5747432	1154455	1053460
Lower CL	---	---	---	---	---	---	---	---	980709.4	7049676	1222930	---
Lower CL	---	---	---	---	---	---	---	---	2164870	9475878	1346683	---
Lower CL	---	---	---	---	---	---	---	---	3274737	5814849	240581.3	---
Lower CL	---	---	---	---	---	---	---	---	704052.4	7823121	241020	80825.83
Lower CL	---	---	---	---	---	---	---	---	5587796	9752555	1439666	---
Lower CL	---	---	---	---	---	---	---	---	2800285	9587316	2096474	---
Lower CL	---	---	---	---	---	---	---	---	1117146	8184097	1653326	---
Lower CL	---	---	---	---	---	---	---	---	13445115	3846236	388324.5	---
Lower CL	---	---	---	---	---	---	---	---	3347575	9897999	3431755	481811.7
Lower CL	---	---	---	28039.57	1250.857	0	2390.195	4815.509	3583916	2049238	189028.1	---
Lower CL	---	---	36060.75	24745.5	0	512061.8	284279	417449.2	2824654	10698423	3403587	260438.8
Lower CL	31252.65	21548.25	123365.7	15122.25	13159.01	83794.89	2907013	277367.3	3126685	9739223	2030702	0
Lower CL	104175.5	---	0	7201.072	7296.907	55891.48	1917.677	2665.472	1472510	1232927	287748.2	77387.52
Lower CL	29764.43	12601.88	2490.251	0	1227.279	300951.5	364150.4	848909.3	5652654	9916882	3049654	---
Lower CL	---	38849.72	71434.64	0	0	23744.78	489780.4	243410.1	2250480	6247704	2054706	43107.11
Lower CL	0	16640.72	172428.4	9451.407	0	1498.928	90555.08	44121.39	6152922	3593645	420928.7	93093.01
Lower CL	14536.12	37415.88	32984.33	12178.99	0	0	1710.8	32437.88	2941965	4195915	322725.6	58577.19
Lower CL	15626.33	2781.104	3634.03	0	0	0	0	0	1193946	3165216	360849.8	88391.34
Lower CL	0	3070.508	0	1595.174	0	0	0	7273.698	5725797	5799685	634739	35939.8
Lower CL	14765.03	2607.285	0	0	0	0	0	65795.06	5399204	4752530	468208.2	47314.77
Lower CL	12043.41	5499.001	3034.238	0	0	0	0	23468.83	4627815	6653035	2526869	132222.8
Lower CL	14765.03	5214.57	0	0	0	0	0	6699.39	483405.9	9044485	2458914	134730.5

Lower CL	22937.73	15185.52	2404.05	0	0	0	0	0	1643112	1770214	---	---
Lower CL	---	---	2407.755	0	0	0	0	0	126337.8	1146229	159428.4	8504.124
Lower CL	3973.637	0	3511.534	4032.601	0	0	0	0	709384.5	2123724	125231.1	39648.89
Lower CL	0	0	0	2437.107	0	0	0	2235.526	2848487	2663270	511553.9	43064.68
Lower CL	5215.295	2458.903	2514.292	0	0	0	0	2404.05	972477.1	5904973	1816997	122873.7
Lower CL	15968.51	4878.146	11868.1	0	0	0	0	4167.021	1459297	2673751	502765.8	31705.59
Lower CL	11905.77	3877.5	0	0	3811.299	0	0	0	602563.6	2931052	138794.1	9058.74
Lower CL	2410.54	0	0	0	0	0	0	77525.96	995742.1	1507072	6796.518	0
Lower CL	2404.05	0	2238.729	0	2607.647	0	4909.253	12451.26	593257.6	368496.3	3360.5	0
Mean	---	---	---	---	---	---	---	---	---	11282280	7331665	2923870
Mean	---	---	236573.5	119212.3	---	---	---	---	---	12574179	6185442	---
Mean	---	---	---	---	---	---	---	---	4882664	11490288	9469199	---
Mean	---	---	---	---	---	---	---	---	2611832	14272993	7517127	1440893
Mean	---	---	---	---	---	358202.5	209090.8	89286.69	178905.7	4910768	6937280	---
Mean	---	---	242957	732912.1	94247.07	---	---	---	3598189	9026860	3150714	0
Mean	---	---	---	---	---	---	---	---	644280.9	17152966	12046203	---
Mean	---	---	---	---	---	---	---	---	2154251	17477363	14935780	2945221
Mean	---	---	---	---	---	---	---	---	107761.5	6499591	1305537	1191325
Mean	---	---	---	---	---	---	---	---	1109054	7972258	1382973	---
Mean	---	---	---	---	---	---	---	---	2448184	10715975	1522921	---
Mean	---	---	---	---	---	---	---	---	3703297	6575830	272065.9	---
Mean	---	---	---	---	---	---	---	---	796190.8	8846923	272562	91403.4
Mean	---	---	---	---	---	---	---	---	6319064	11028860	1628073	---
Mean	---	---	---	---	---	---	---	---	3166755	10841996	2370836	---
Mean	---	---	---	---	---	---	---	---	1263346	9255139	1869695	---
Mean	---	---	---	---	---	---	---	---	15204660	4349588	439144	---
Mean	---	---	---	---	---	---	---	---	3785668	11193338	3880864	544865.8
Mean	---	---	---	31709.08	1414.555	0	2702.997	5445.709	4052939	2317419	213766	---
Mean	---	---	40779.98	27983.92	0	579074.7	321482.3	472080.2	3194313	12098513	3849010	294522.1
Mean	35342.65	24368.24	139510.5	17101.28	14881.12	94761.02	3287451	313666	3535871	11013783	2296458	0
Mean	117808.8	---	0	8143.468	8251.844	63205.93	2168.641	3014.298	1665216	1394278	325405.5	87515.13
Mean	33659.67	14251.07	2816.147	0	1387.891	340336.6	411806.3	960005	6392410	11214692	3448759	---
Mean	---	43933.93	80783.2	0	0	26852.23	553877.3	275264.9	2544998	7065333	2323603	48748.48
Mean	0	18818.47	194993.9	10688.3	0	1695.091	102405.9	49895.51	6958147	4063941	476015.1	105276
Mean	16438.44	42312.45	37300.95	13772.84	0	0	1934.69	36682.99	3326977	4745029	364960.3	66243.11
Mean	17671.32	3145.063	4109.61	0	0	0	0	0	1350196	3579444	408073.8	99959.01
Mean	0	3472.342	0	1803.933	0	0	0	8225.597	6475125	6558682	717806.5	40643.2
Mean	16697.31	2948.497	0	0	0	0	0	74405.58	6105791	5374487	529482	53506.8
Mean	13619.52	6218.648	3431.325	0	0	0	0	26540.16	5233451	7523710	2857557	149526.6
Mean	16697.31	5896.994	0	0	0	0	0	7576.131	546668.6	10228126	2780709	152362.5
Mean	25939.56	17172.84	2718.665	0	0	0	0	0	1858144	2001879	---	---
Mean	---	---	2722.854	0	0	0	0	0	142871.5	1296235	180292.6	9617.048
Mean	4493.662	0	3971.084	4560.342	0	0	0	0	802220.7	2401654	141620	44837.69
Mean	0	0	0	2756.049	0	0	0	2528.087	3221265	3011808	578500.3	48700.5
Mean	5897.814	2780.696	2843.335	0	0	0	0	2718.665	1099744	6677749	2054785	138954
Mean	18058.29	5516.543	13421.26	0	0	0	0	4712.353	1650274	3023661	568562.1	35854.86
Mean	13463.87	4384.944	0	0	4310.079	0	0	0	681420.3	3314636	156957.9	10244.25
Mean	2726.005	0	0	0	0	0	0	87671.69	1126054	1704301	7685.969	0
Mean	2718.665	0	2531.708	0	2948.907	0	5551.721	14080.74	670896.5	416720.9	3800.285	0
Upper CL	---	---	---	---	---	---	---	---	---	12981100	8435625	3364129
Upper CL	---	---	272195.4	137162.5	---	---	---	---	---	14467526	7116810	---
Upper CL	---	---	---	---	---	---	---	---	5617867	13220429	10895016	---
Upper CL	---	---	---	---	---	---	---	---	3005107	16422138	8649012	1657854
Upper CL	---	---	---	---	---	412138.6	240574.5	102731	205844.3	5650203	7981856	---
Upper CL	---	---	279540	843269.7	108438.2	---	---	---	4139983	10386073	3625130	0
Upper CL	---	---	---	---	---	---	---	---	741292.9	19735760	13860051	---
Upper CL	---	---	---	---	---	---	---	---	2478626	20109003	17184724	3388695
Upper CL	---	---	---	---	---	---	---	---	123987.6	7478261	1502117	1370708
Upper CL	---	---	---	---	---	---	---	---	1276048	9172674	1591213	---
Upper CL	---	---	---	---	---	---	---	---	2816817	12329524	1752234	---
Upper CL	---	---	---	---	---	---	---	---	4260918	7565981	313031.9	---
Upper CL	---	---	---	---	---	---	---	---	916076.6	10179041	313602.8	105166.4
Upper CL	---	---	---	---	---	---	---	---	7270552	12689522	1873219	---
Upper CL	---	---	---	---	---	---	---	---	3643587	12474521	2727823	---
Upper CL	---	---	---	---	---	---	---	---	1453573	10648724	2151223	---
Upper CL	---	---	---	---	---	---	---	---	17494090	5004523	505267.8	---
Upper CL	---	---	---	---	---	---	---	---	4355692	12878766	4465222	626908.6
Upper CL	---	---	---	36483.65	1627.55	0	3109.998	6265.692	4663207	2666362	245953.7	---
Upper CL	---	---	46920.39	32197.57	0	666268.5	369889.2	543163.3	3675294	13920237	4428572	338869.5
Upper CL	40664.34	28037.47	160517.1	19676.29	17121.83	109029.6	3782456	360896	4068282	12672174	2642245	0
Upper CL	135547.8	---	0	9369.664	9494.359	72723.11	2495.182	3468.174	1915954	1604221	374403.1	100692.7
Upper CL	38727.94	16396.91	3240.187	0	1596.872	391582.5	473813.7	1104557	7354942	12903335	3968053	---
Upper CL	---	50549.25	92947.06	0	0	30895.48	637277	316712.7	2928209	8129190	2673477	56088.75
Upper CL	0	21652.04	224355	12297.68	0	1950.328	117825.6	57408.48	8005865	4675866	547690.7	121127.8
Upper CL	18913.65	48683.61	42917.51	15846.68	0	0	2226.005	42206.5	3827934	5459508	419913.9	76217.62
Upper CL	20332.17	3618.629	4728.412	0	0	0	0	0	1553500	4118416	469519.2	115010.3
Upper CL	0	3995.187	0	2075.558	0	0	0	9464.16	7450112	7546251	825889.6	46763.02
Upper CL	19211.5	3392.464	0	0	0	0	0	85609.14	7025166	6183746	609208.3	61563.54
Upper CL	15670.27	7155.016	3947.994	0	0	0	0	30536.43	6021474	8656586	3287832	172041.4
Upper CL	19211.5	6784.929	0	0	0	0	0	8716.901	628982.8	11768217	3199412	175304.3
Upper CL	29845.39	19758.62	3128.026	0	0	0	0	0	2137933	2303311	---	---

Upper CL	---	---	3132.846	0	0	0	0	0	164384.2	1491414	207440	11065.13
Upper CL	5170.291	0	4569.027	5247.012	0	0	0	0	923014.5	2763281	162944.3	51589.09
Upper CL	0	0	0	3171.039	0	0	0	2908.751	3706304	3465309	665607.6	56033.54
Upper CL	6785.872	3199.397	3271.467	0	0	0	0	3128.026	1265337	7683246	2364182	159876.9
Upper CL	20777.4	6347.192	15442.15	0	0	0	0	5421.912	1898762	3478947	654172.9	41253.68
Upper CL	15491.18	5045.204	0	0	4959.066	0	0	0	784024.6	3813734	180591.8	11786.77
Upper CL	3136.471	0	0	0	0	0	0	100872.8	1295608	1960925	8843.278	0
Upper CL	3128.026	0	2912.918	0	3392.936	0	6387.666	16200.93	771916.1	479468.3	4372.51	0

AD CONSULTANTS’ REPORT

ATTACHMENT 3

AD Consultants

Memo

Subject: **SJR Basin Water Temperature and Fish Production Modeling**
From: **Avry Dotan**
To: **San Joaquin Tributaries Authority**
Date: **March 15, 2017**

1. General

The State Water Resources Control Board (SWRCB) has issued a draft Substitute Environmental Document (SED) in support of potential changes to the water quality control plan for the Bay-Delta, San Joaquin River Flows and Southern Delta Water Quality. Elements of the SED included revised operations plan for the Rim Reservoirs, i.e., New Melones, New Don Pedro and Lake McClure, resulting in a new flow regime in the Stanislaus, Tuolumne and Merced rivers and main-stem San Joaquin River. The SED also included an analysis of the effect of the plan on fish production, specifically, fall-run Chinook salmon.

In response to the SED, the San Joaquin Tributaries Authority (SJTA) retained the services of AD Consultants to provide technical support in running computer models for the purpose of evaluating the effect of the plan on water temperature and fish production, using somewhat different assumptions than those used in the SED analysis. Two cases were analyzed: BASE case and 40%UF (Unimpaired Flow) case.

The assumptions associated with these cases are described in a memo by Dan Steiner.

The purpose of this memo is to provide an overview of the water temperature and fish production modeling that were conducted for the two cases.

2. Work Flow

Both the SWRCB and SJTA have utilized the same computer models for the purpose of analyzing water temperature conditions and fish population estimates. The models are: The SJR Basin-wide Water Temperature Model (aka, HEC-5Q) and, Life History Fall Run Chinook Model for the SJR and its salmon bearing tributaries (aka SalSim). However, the reservoirs operations part of the analysis was carried out using different models:

- The SWRCB used a combination of CALSIM II and WSE
- The SJTA used spreadsheet models developed by Dan Steiner (Ops Models)

The differences in the results obtaining from the different models are discussed in the memo by Dan Steiner and are not the subject of this memo.

The work assigned to AD Consultants was to use output from the Ops Models and generate results for water temperature, using HEC-5Q, and for fish production, using SalSim.

It is important to note that the SWRCB ran the HEC-5Q model by itself while AD Consultants ran the SalSim model for the SWRCB. It is also important to note that both the HEC-5Q and SalSim used for the SED and for the SJTA studies are the same versions that were released to the public in June 2013.

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The work flow diagram of the modeling for SJTA studies is provided in Figure 1 below. As mentioned above, the sequence and modeling tools employed are the same as those used by the SWRCB, except for the Ops Models.

Modeling Sequence:
Reservoir Operations, Temperature Response and Fish Production

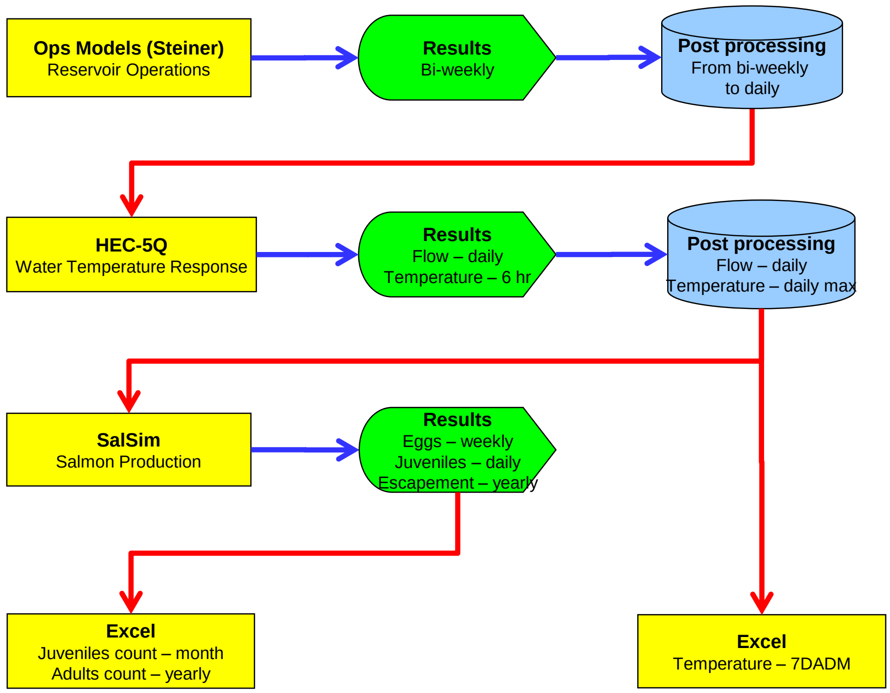


Figure 1 – SJRT Modeling Work Flow

3. Modeling Results

a. Water Temperature

Output from the Ops Models is releases and reservoir storages on a bi-weekly time step. This output was converted into daily data, assuming constant value between time steps.

The HEC-5Q was then run by specifying releases from the reservoirs that match the Ops Models output.

Two cases were run with the HEC-5Q Model and compared:

1) Baseline Case – BASE (SJTA)
2) 40% UF Case – 40FJ (SJTA)

The level of the resolution of the HEC-5Q output is 6-hours. The assumption is that the maximum daily temperatures occur at 18:00 hour (6:00 PM). Then, by post processing the daily maximums, the 7-Day-Average-Daily-Maximums (7DADM) were calculated.

Results for the 7DADM by month and by river at key locations are provided in a series of tables below. The information is presented in the same format as in the SED with a reference to the corresponding tables in the SED.

Table 19-4 (Revised)
HEC-5Q run for the Base Case and 40% UF Case
Based on Dan Steiner operational data, Nov-2016
Period: 1970-2003

Stanislaus Average 7DADM	Confluence (RM0)		1/4 River (RM13.3)		1/2 River (RM28.2)		3/4 River (RM 43.7)		Below Goodwin (RM 58.5)	
	Base (F)	40%UF (F)	Base (F)	40%UF (F)	Base (F)	40%UF (F)	Base (F)	40%UF (F)	Base (F)	40%UF (F)
Sep	69.8	0.9	69.0	1.0	67.5	1.2	63.6	1.3	56.6	1.5
Oct	62.1	1.0	61.6	1.1	60.5	1.2	58.8	1.4	56.5	1.6
Nov	56.7	0.6	56.6	0.7	56.3	0.8	55.9	1.0	55.2	1.4
Dec	50.9	0.2	51.1	0.3	51.2	0.3	51.7	0.5	52.3	0.6
Jan	49.8	0.0	49.9	0.1	49.7	0.1	49.5	0.1	48.9	0.1
Feb	52.5	-0.7	52.3	-0.7	51.7	-0.7	50.5	-0.5	48.7	0.0
Mar	56.3	-1.2	55.9	-1.2	54.9	-1.3	53.1	-1.0	50.4	-0.4
Apr	58.8	-1.1	58.2	-1.0	56.8	-1.0	54.6	-0.7	51.4	-0.2
May	61.6	-1.5	60.8	-1.4	59.2	-1.3	56.5	-0.8	52.5	0.0
Jun	67.2	-1.8	66.4	-1.8	64.4	-1.6	60.4	-0.9	53.7	0.4
Jul	73.2	0.1	72.3	0.2	70.3	0.4	65.0	0.6	54.9	0.9
Aug	73.2	0.7	72.3	0.7	70.3	0.9	65.1	1.1	55.9	1.3

Table 19-7 (Revised)
HEC-5Q run for the Base Case and 40% UF Case
Based on Dan Steiner operational data, Dec-2016
Period: 1970-2003

Toulumne Average 7DADM	Confluence (RM 0)		1/4 River (RM 13.2)		1/2 River (RM 28.1)		3/4 River (RM 38.3)		Below La Grange (RM	
	Base (F)	40%UF (F)	Base (F)	40%UF (F)	Base (F)	40%UF (F)	Base (F)	40%UF (F)	Base (F)	40%UF (F)
Sep	75.2	0.4	74.6	0.5	70.7	0.7	68.5	0.8	54.7	1.0
Oct	67.7	0.3	66.8	0.3	63.8	0.6	62.1	0.7	55.2	1.0
Nov	57.9	0.2	57.1	0.2	57.6	0.6	57.3	0.8	54.8	1.3
Dec	50.3	0.1	49.6	0.1	52.7	0.5	53.4	0.6	53.0	0.9
Jan	49.9	0.0	49.3	-0.1	51.6	0.3	51.9	0.3	50.5	0.2
Feb	53.9	-0.7	53.0	-0.6	53.1	-0.9	52.6	-0.9	49.3	-0.1
Mar	58.0	-1.7	56.7	-1.7	55.2	-2.1	53.9	-2.0	49.0	-0.2
Apr	60.9	-2.5	59.2	-2.5	56.3	-2.1	54.5	-1.8	49.1	-0.2
May	66.2	-5.7	64.1	-6.1	59.7	-4.2	57.2	-3.5	49.7	0.0
Jun	72.9	-7.5	71.5	-8.7	68.2	-8.8	66.4	-9.3	50.9	0.2
Jul	77.8	-0.8	76.7	-0.6	73.0	-0.7	70.8	-0.5	52.0	1.1
Aug	79.2	0.3	78.6	0.3	74.4	0.4	72.0	0.5	53.5	1.1

Table 19-10 (Revised)
HEC-5Q run for the Base Case and 40% UF Case
Based on Dan Steiner operational data, Dec-2016
Period: 1970-2003

Merced Average 7DADM	Confluence (RM 2.5)		1/4 River (RM 13.5)		1/2 River (RM 27)		3/4 River (RM 37.8)		Below Crocker Huffman (RM	
	Base (F)	40%UF (F)	Base (F)	40%UF (F)	Base (F)	40%UF (F)	Base (F)	40%UF (F)	Base (F)	40%UF (F)
Sep	72.2	1.0	72.9	1.5	71.2	1.7	70.8	2.1	59.4	2.9
Oct	65.8	1.1	65.6	1.4	64.6	1.8	64.3	2.1	58.7	3.1
Nov	58.1	0.9	57.7	1.2	58.2	1.4	58.8	1.6	56.6	2.1
Dec	51.4	0.4	50.7	0.4	51.9	0.5	52.9	0.5	52.0	0.6
Jan	49.9	0.0	48.9	-0.1	49.9	-0.1	50.6	-0.1	48.9	-0.3
Feb	53.1	-0.3	52.2	-0.4	52.4	-0.4	52.7	-0.5	49.6	-0.6
Mar	58.3	-1.2	57.5	-1.3	56.8	-1.2	56.6	-1.3	51.7	-0.8
Apr	64.3	-4.2	63.6	-4.6	62.1	-4.0	61.5	-3.9	53.4	-1.7
May	67.2	-4.5	66.4	-5.1	64.5	-4.2	63.3	-3.9	53.8	-0.9
Jun	71.0	-3.3	70.3	-3.9	68.1	-3.2	66.5	-2.9	54.9	0.5
Jul	74.7	0.3	74.5	0.5	72.0	0.8	70.3	1.2	56.7	2.1
Aug	73.4	2.2	73.3	2.8	71.1	2.9	69.8	3.2	57.7	2.8

Table 19-13 (Revised)
HEC-5Q run for the Base Case and 40% UF Case
Based on Dan Steiner operational data, Dec-2016
Period: 1970-2003

SJR Average 7DADM	Vernalis (RM 69.31)		Above Stanislaus Confluence (RM		Above Tuolumne Confluence (RM		Above Merced Confluence (RM 116.001)	
	Base (F)	40%UF (F)	Base (F)	40%UF (F)	Base (F)	40%UF (F)	Base (F)	40%UF (F)
Sep	72.2	0.7	73.4	0.4	74.0	0.4	76.5	0.0
Oct	64.7	0.7	66.4	0.3	66.8	0.3	68.6	0.0
Nov	56.8	0.4	57.2	0.2	57.8	0.3	59.2	0.0
Dec	49.7	0.1	49.7	0.1	50.6	0.1	52.6	0.0
Jan	49.1	0.0	49.2	0.0	49.9	0.0	51.9	0.0
Feb	53.0	-0.1	53.4	-0.1	54.5	0.0	55.4	0.0
Mar	57.7	-0.4	58.4	-0.4	60.6	-0.3	60.9	0.0
Apr	61.5	-1.0	62.8	-1.5	66.3	-1.6	66.7	0.0
May	66.0	-2.5	68.1	-3.8	70.9	-2.1	72.0	0.0
Jun	70.9	-2.7	72.8	-4.0	75.1	-1.6	77.4	0.0
Jul	75.5	-0.1	76.6	-0.3	78.2	0.0	81.6	0.0
Aug	75.3	0.8	76.2	0.8	76.5	1.1	81.4	0.0

b. Fish Production

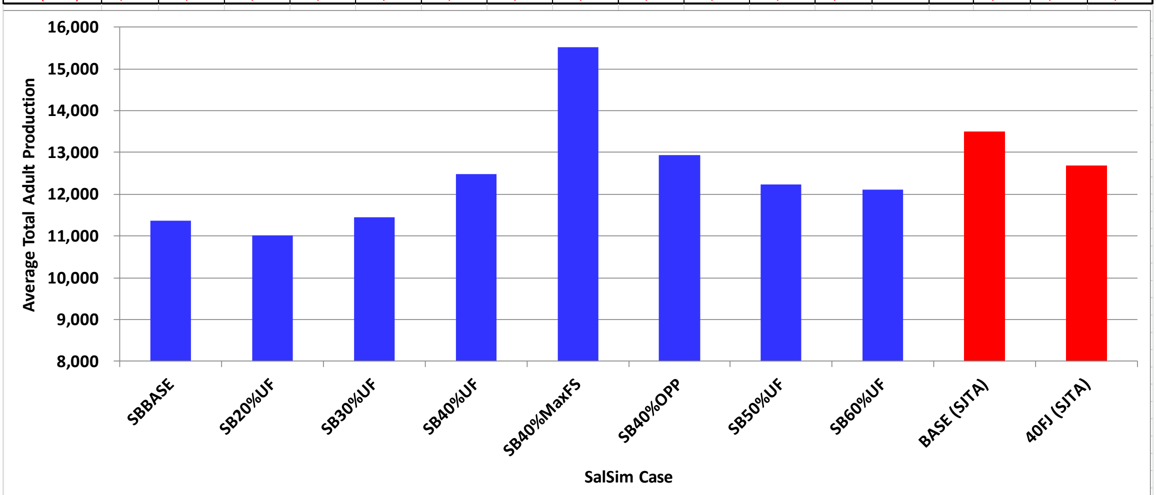
Output from the HEC-5Q becomes the input to SalSim. The SWRCB provided all the input files that were used to perform the SalSim runs for the SED in response to a Public Records Act Request by the SJTA. The results from the HEC-5Q for the SJTA cases were post-processed in the necessary format to match the data structure in the SalSim input files.

The SalSim model was run for two cases:

1) Baseline Case – BASE (SJTA)
2) 40% UF Case – 40FJ (SJTA)

Summary of the Adults Production by Year for the two cases were generated and then added (in red) to the SED results, as shown in the table below.

	Total Adults Production by Year																
SalSim Case	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Average
SBBASE	5,365	10,250	14,328	28,745	8,433	21,001	33,753	17,892	14,289	11,075	6,613	1,129	461	161	3,812	4,665	11,373
SB20%UF	5,696	10,571	14,407	25,499	8,685	19,983	30,996	16,007	14,507	11,349	6,850	1,173	680	169	4,008	5,755	11,021
SB30%UF	6,334	10,460	14,843	26,121	9,357	20,253	33,125	16,984	15,289	11,983	7,436	1,278	952	185	2,587	5,922	11,444
SB40%UF	7,213	10,484	15,170	30,888	9,872	22,289	38,824	19,996	15,801	12,613	8,072	1,392	579	216	2,594	3,611	12,476
SB40%MaxFS	6,843	10,540	15,474	38,226	10,704	26,833	56,691	24,875	18,557	17,604	11,252	1,332	693	194	2,499	5,870	15,512
SB40%OPP	7,212	11,664	14,106	31,598	10,122	25,432	36,359	20,923	16,689	13,248	8,198	1,479	489	323	2,696	6,399	12,934
SB50%UF	7,462	10,791	14,632	29,908	8,959	22,803	36,206	19,362	15,411	13,252	8,486	1,517	671	219	2,681	3,460	12,239
SB60%UF	7,229	11,162	14,441	28,770	7,473	23,601	35,632	18,404	14,633	14,258	9,158	1,575	723	204	2,834	3,677	12,111
BASE (SJTA)	5,966	10,313	13,848	37,450	8,580	24,764	39,997	22,624	14,369	11,081	6,693	2,354	2,222	634	6,571	8,376	13,490
40FJ (SJTA)	6,016	10,990	14,038	26,280	9,500	22,369	33,601	18,625	16,938	13,980	9,107	2,708	698	799	7,888	9,344	12,680



In addition, SJTA was interested in the number of juveniles produced from each river and the number arriving to Mossdale, by month, as calculated by the SWRCB for the following cases in the SED:

1) SBBASE
2) SB40%UF
3) SB40%MaxFS
4) SB40%OPP

Because of the large amount of data involved, a specialized spreadsheet, one for each case, was developed, where the user can interactively select a month of interest and the table of results is automatically created.

It should be clarified that the juvenile numbers were taken directly from the SalSim output files provided by the SWRCB as part of the Public Records Act Request (PRAR).

Below is an example:

Select Month (1=Jan, etc.) =>>		6			
		STANISLAUS	TUOLUMNE	MERCED	SJR
		STANISLAUS CONFLUENCE	TUOLUMNE CONFLUENCE	MERCED CONFLUENCE	SJR AT MOSSDALE
		ALL JUVENILES	ALL JUVENILES	ALL JUVENILES	ALL JUVENILES
		SBBASE FISH	SBBASE FISH	SBBASE FISH	SBBASE FISH

Once you select a month (numeric), all the tables in all the tabs will automatically show results for that particular month.

To save the tables in PDF, go to the individual tabs, select "Save As" in File, select PDF in "Save as Type", type the File name, and Save.

Juveniles Count

Case: SBBASE

Year Type	Month	STANISLAUS CONFLUENCE	TUOLUMNE CONFLUENCE	MERCED CONFLUENCE	SJR AT MOSSDALE
W	Jun-1995	725	-	-	766
W	Jun-1996	-	-	8	148,338
W	Jun-1997	-	-	24,544	26,138
W	Jun-1998	-	-	-	99,076
AN	Jun-1999	-	-	437	-
AN	Jun-2000	-	-	6,724	1,260
D	Jun-2001	-	-	-	80,702
D	Jun-2002	2,604	-	-	4,783
BN	Jun-2003	2,215	-	-	4,056
D	Jun-2004	1,046	-	3,662	42,441
W	Jun-2005	6	32	1,066	61,137
W	Jun-2006	-	-	-	-
C	Jun-2007	1,788	-	-	1,337
C	Jun-2008	17	-	-	2
BN	Jun-2009	382	-	3	-
AN	Jun-2010	12	-	46	5,002
	Ave	550	2	2,281	29,690
	Max	2,604	32	24,544	148,338
	Min	-	-	-	-

A summary of the results for the months of January through June under SBBASE and SB40 is set forth in Exhibit A to this memo.

4. Supplemental Information

Per the SJTA request, AD Consultants has also developed a document in the form of PowerPoint presentation describing several principles in modeling the water temperature in the San Joaquin River and its tributaries. Please see Exhibit B to this memo.

Exhibit A

Summary of SalSim juvenile results: SWB Base v. SWB 40% UIF

January

Juveniles Count					
Case: SBBASE					
Year Type	**Month**	**STANISLAUS CONFLUENCE**	**TUOLUMNE CONFLUENCE**	**MERCED CONFLUENCE**	**SJR AT MOSSDALE**
W	Jan-1995	-	-	34,629	-
W	Jan-1996	-	-	-	-
W	Jan-1997	-	-	-	-
W	Jan-1998	3	100,249	-	-
AN	Jan-1999	37,458	71	-	4,606
AN	Jan-2000	-	14,809	-	145
D	Jan-2001	-	31,402	-	456
D	Jan-2002	-	-	-	-
BN	Jan-2003	-	-	-	-
D	Jan-2004	-	2	-	-
W	Jan-2005	-	-	-	-
W	Jan-2006	-	-	-	-
C	Jan-2007	16,910	-	-	-
C	Jan-2008	-	-	-	-
BN	Jan-2009	-	-	-	-
AN	Jan-2010	-	-	-	-
	Ave	3,398	9,158	2,164	325
	Max	37,458	100,249	34,629	4,606
	Min	-	-	-	-

Juveniles Count					
Case: SB40					
Year Type	**Month**	**STANISLAUS CONFLUENCE**	**TUOLUMNE CONFLUENCE**	**MERCED CONFLUENCE**	**SJR AT MOSSDALE**
W	Jan-1995	-	-	38,342	-
W	Jan-1996	-	-	-	-
W	Jan-1997	-	-	-	-
W	Jan-1998	4	36,213	-	56
AN	Jan-1999	33,324	38	-	3,387
AN	Jan-2000	-	4,057	-	3
D	Jan-2001	-	29,542	-	254
D	Jan-2002	-	-	-	-
BN	Jan-2003	-	-	-	-
D	Jan-2004	-	-	-	-
W	Jan-2005	-	-	-	-
W	Jan-2006	-	2,056	301	-
C	Jan-2007	3,024	-	-	-
C	Jan-2008	-	-	-	-
BN	Jan-2009	-	-	-	-
AN	Jan-2010	-	-	-	-
	Ave	2,272	4,494	2,415	231
	Max	33,324	36,213	38,342	3,387
	Min	-	-	-	-

Increment improvement with respect to SBBASE					
SB40 (-) SBBASE					
Year Type	**Month**	**STANISLAUS CONFLUENCE**	**TUOLUMNE CONFLUENCE**	**MERCED CONFLUENCE**	**SJR AT MOSSDALE**
W	Jan-1995	-	-	3,713	-
W	Jan-1996	-	-	-	-
W	Jan-1997	-	-	-	-
W	Jan-1998	1	(64,036)	-	56
AN	Jan-1999	(4,134)	(33)	-	(1,219)
AN	Jan-2000	-	(10,752)	-	(142)
D	Jan-2001	-	(1,860)	-	(202)
D	Jan-2002	-	-	-	-
BN	Jan-2003	-	-	-	-
D	Jan-2004	-	(2)	-	-
W	Jan-2005	-	-	-	-
W	Jan-2006	-	2,056	301	-
C	Jan-2007	(13,886)	-	-	-
C	Jan-2008	-	-	-	-
BN	Jan-2009	-	-	-	-
AN	Jan-2010	-	-	-	-
	Ave	(1,126)	(4,664)	251	(94)
	Max	1	2,056	3,713	56
	Min	(13,886)	(64,036)	-	(1,219)

February

Juveniles Count					
Case: SBBASE					
Year Type	Month	STANISLAUS CONFLUENCE	TUOLUMNE CONFLUENCE	MERCED CONFLUENCE	SJR AT MOSSDALE
W	Feb-1995	-	-	10,887	94,887
W	Feb-1996	-	-	-	-
W	Feb-1997	5,371	-	-	4,315
W	Feb-1998	5,741	1,090	-	107,040
AN	Feb-1999	243,043	-	1,571	269,961
AN	Feb-2000	98	12,507	12,611	27,324
D	Feb-2001	1,984	91,899	54,115	30,492
D	Feb-2002	10	3	405	-
BN	Feb-2003	66	-	-	-
D	Feb-2004	341	159	-	-
W	Feb-2005	-	43	4,075	-
W	Feb-2006	562	-	112,237	1,683
C	Feb-2007	85,435	834	7,278	35,532
C	Feb-2008	8	-	-	-
BN	Feb-2009	2	-	-	-
AN	Feb-2010	504	-	989	-
	Ave	21,448	6,658	12,761	35,702
	Max	243,043	91,899	112,237	269,961
	Min	-	-	-	-

Juveniles Count					
Case: SB40					
Year Type	Month	STANISLAUS CONFLUENCE	TUOLUMNE CONFLUENCE	MERCED CONFLUENCE	SJR AT MOSSDALE
W	Feb-1995	11,514	1,874	128,681	117,963
W	Feb-1996	5,669	-	-	1,346
W	Feb-1997	4,320	-	-	3,323
W	Feb-1998	6,901	279,809	-	245,139
AN	Feb-1999	235,155	11	424	260,117
AN	Feb-2000	1,340	54,165	5,227	31,246
D	Feb-2001	1,955	98,853	14,220	28,846
D	Feb-2002	7	28	212	-
BN	Feb-2003	36	10	-	2
D	Feb-2004	610	2,348	2	-
W	Feb-2005	221	5,920	29,897	63
W	Feb-2006	646	-	126,718	8,854
C	Feb-2007	27,466	741	3,374	2,992
C	Feb-2008	10	-	103	-
BN	Feb-2009	2	170	105	-
AN	Feb-2010	551	-	1,199	-
	Ave	18,525	27,746	19,385	43,743
	Max	235,155	279,809	128,681	260,117
	Min	2	-	-	-

Increment improvement with respect to SBBASE					
SB40 (-) SBBASE					
Year Type	**Month**	**STANISLAUS CONFLUENCE**	**TUOLUMNE CONFLUENCE**	**MERCED CONFLUENCE**	**SJR AT MOSSDALE**
W	Feb-1995	11,514	1,874	117,794	23,076
W	Feb-1996	5,669	-	-	1,346
W	Feb-1997	(1,051)	-	-	(992)
W	Feb-1998	1,160	278,719	-	138,099
AN	Feb-1999	(7,888)	11	(1,147)	(9,844)
AN	Feb-2000	1,242	41,658	(7,384)	3,922
D	Feb-2001	(29)	6,954	(39,895)	(1,646)
D	Feb-2002	(3)	25	(193)	-
BN	Feb-2003	(30)	10	-	2
D	Feb-2004	269	2,189	2	-
W	Feb-2005	221	5,877	25,822	63
W	Feb-2006	84	-	14,481	7,171
C	Feb-2007	(57,969)	(93)	(3,904)	(32,540)
C	Feb-2008	2	-	103	-
BN	Feb-2009	-	170	105	-
AN	Feb-2010	47	-	210	-
	Ave	(2,923)	21,087	6,625	8,041
	Max	11,514	278,719	117,794	138,099
	Min	(57,969)	(93)	(39,895)	(32,540)

March

Juveniles Count					
Case: SBBASE					
Year Type	Month	STANISLAUS CONFLUENCE	TUOLUMNE CONFLUENCE	MERCED CONFLUENCE	SJR AT MOSSDALE
W	Mar-1995	1,400	-	1,479	95,615
W	Mar-1996	215	-	7,379	57
W	Mar-1997	323,744	7,174	2,432,930	271,104
W	Mar-1998	52,199	-	-	39,718
AN	Mar-1999	255,990	-	5,441	232,018
AN	Mar-2000	7,903	-	26,730	6,854
D	Mar-2001	7,709	89,003	141,905	128,904
D	Mar-2002	19,473	2	611	4,098
BN	Mar-2003	19,208	-	31	4,232
D	Mar-2004	4,619	93	1,016	327
W	Mar-2005	3,506	-	251,416	45,762
W	Mar-2006	26,348	-	14,788	144,299
C	Mar-2007	68,620	1,689	19,568	7,041
C	Mar-2008	47	-	521	8
BN	Mar-2009	2,560	-	845	8
AN	Mar-2010	3,851	51	27,363	1,787
	Ave	49,837	6,126	183,251	61,365
	Max	323,744	89,003	2,432,930	271,104
	Min	47	-	-	8

Juveniles Count					
Case: SB40					
Year Type	Month	STANISLAUS CONFLUENCE	TUOLUMNE CONFLUENCE	MERCED CONFLUENCE	SJR AT MOSSDALE
W	Mar-1995	81,199	33	40,528	320,043
W	Mar-1996	67,332	-	4,794	58,870
W	Mar-1997	446,384	7,369	1,243,884	362,743
W	Mar-1998	69,946	-	-	141,598
AN	Mar-1999	278,332	-	2,963	250,789
AN	Mar-2000	20,575	23,676	14,787	68,826
D	Mar-2001	13,450	105,052	133,838	143,462
D	Mar-2002	12,717	6,750	3,186	4,284
BN	Mar-2003	9,632	3,465	1,148	1,496
D	Mar-2004	10,280	44,083	79,192	11,249
W	Mar-2005	18,142	104,396	452,702	227,862
W	Mar-2006	25,071	-	33,195	171,753
C	Mar-2007	46,714	1,481	96,056	25,512
C	Mar-2008	1,422	762	1,373	16
BN	Mar-2009	2,649	434	6,329	190
AN	Mar-2010	10,353	46	30,002	4,535
	Ave	69,637	18,597	133,999	112,077
	Max	446,384	105,052	1,243,884	362,743
	Min	1,422	-	-	16

Increment improvement with respect to SBBASE					
SB40 (-) SBBASE					
Year Type	**Month**	**STANISLAUS CONFLUENCE**	**TUOLUMNE CONFLUENCE**	**MERCED CONFLUENCE**	**SJR AT MOSSDALE**
W	Mar-1995	79,799	33	39,049	224,428
W	Mar-1996	67,117	-	(2,585)	58,813
W	Mar-1997	122,640	195	(1,189,046)	91,639
W	Mar-1998	17,747	-	-	101,880
AN	Mar-1999	22,342	-	(2,478)	18,771
AN	Mar-2000	12,672	23,676	(11,943)	61,972
D	Mar-2001	5,741	16,049	(8,067)	14,558
D	Mar-2002	(6,756)	6,748	2,575	186
BN	Mar-2003	(9,576)	3,465	1,117	(2,736)
D	Mar-2004	5,661	43,990	78,176	10,922
W	Mar-2005	14,636	104,396	201,286	182,100
W	Mar-2006	(1,277)	-	18,407	27,454
C	Mar-2007	(21,906)	(208)	76,488	18,471
C	Mar-2008	1,375	762	852	8
BN	Mar-2009	89	434	5,484	182
AN	Mar-2010	6,502	(5)	2,639	2,748
	Ave	19,800	12,471	(49,253)	50,712
	Max	122,640	104,396	201,286	224,428
	Min	(21,906)	(208)	(1,189,046)	(2,736)

April

Juveniles Count					
Case: SBBASE					
Year Type	Month	STANISLAUS CONFLUENCE	TUOLUMNE CONFLUENCE	MERCED CONFLUENCE	SJR AT MOSSDALE
W	Apr-1995	1,607	-	97,429	36,282
W	Apr-1996	2,300	3,054	-	7,600
W	Apr-1997	122,556	795,894	234,659	1,824,655
W	Apr-1998	35,286	-	439,183	436,370
AN	Apr-1999	18,596	3,185	58,135	79,356
AN	Apr-2000	2,702	192,585	245,596	361,514
D	Apr-2001	1,717	26,230	6,146	55,211
D	Apr-2002	17,753	-	285,648	26,006
BN	Apr-2003	13,606	-	136,890	25,032
D	Apr-2004	3,720	13	152,989	4,131
W	Apr-2005	2,378	-	143,425	137,273
W	Apr-2006	18,514	-	-	24,610
C	Apr-2007	58,980	433	-	45,967
C	Apr-2008	72	-	32	41
BN	Apr-2009	2,165	-	41	2,539
AN	Apr-2010	1,138	-	8,152	3,216
	Ave	18,943	63,837	113,020	191,863
	Max	122,556	795,894	439,183	1,824,655
	Min	72	-	-	41

Juveniles Count					
Case: SB40					
Year Type	Month	STANISLAUS CONFLUENCE	TUOLUMNE CONFLUENCE	MERCED CONFLUENCE	SJR AT MOSSDALE
W	Apr-1995	27,669	-	311,817	96,731
W	Apr-1996	24,287	2,846	473	40,332
W	Apr-1997	133,592	1,940,648	228,170	2,528,204
W	Apr-1998	50,577	-	208,330	206,197
AN	Apr-1999	21,837	3,101	66,365	88,895
AN	Apr-2000	10,496	-	242,332	210,312
D	Apr-2001	8,103	44,328	180,604	82,253
D	Apr-2002	13,121	2,699	288,165	152,753
BN	Apr-2003	9,308	2,563	183,532	19,098
D	Apr-2004	6,811	3,181	320,542	31,931
W	Apr-2005	11,175	-	185,161	310,424
W	Apr-2006	22,970	-	-	28,155
C	Apr-2007	42,850	112	208,831	48,218
C	Apr-2008	2,716	17	1,404	2,551
BN	Apr-2009	1,959	-	3,798	3,508
AN	Apr-2010	7,683	17	20,526	11,469
	Ave	24,697	124,970	153,128	241,314
	Max	133,592	1,940,648	320,542	2,528,204
	Min	1,959	-	-	2,551

Increment improvement with respect to SBBASE					
SB40 (-) SBBASE					
Year Type	Month	STANISLAUS CONFLUENCE	TUOLUMNE CONFLUENCE	MERCED CONFLUENCE	SJR AT MOSSDALE
W	Apr-1995	26,062	-	214,388	60,449
W	Apr-1996	21,987	(208)	473	32,732
W	Apr-1997	11,036	1,144,754	(6,489)	703,549
W	Apr-1998	15,291	-	(230,853)	(230,173)
AN	Apr-1999	3,241	(84)	8,230	9,539
AN	Apr-2000	7,794	(192,585)	(3,264)	(151,202)
D	Apr-2001	6,386	18,098	174,458	27,042
D	Apr-2002	(4,632)	2,699	2,517	126,747
BN	Apr-2003	(4,298)	2,563	46,642	(5,934)
D	Apr-2004	3,091	3,168	167,553	27,800
W	Apr-2005	8,797	-	41,736	173,151
W	Apr-2006	4,456	-	-	3,545
C	Apr-2007	(16,130)	(321)	208,831	2,251
C	Apr-2008	2,644	17	1,372	2,510
BN	Apr-2009	(206)	-	3,757	969
AN	Apr-2010	6,545	17	12,374	8,253
	Ave	5,754	61,132	40,108	49,452
	Max	26,062	1,144,754	214,388	703,549
	Min	(16,130)	(192,585)	(230,853)	(230,173)

May

Juveniles Count Case: SBBASE					
Year Type	Month	STANISLAUS CONFLUENCE	TUOLUMNE CONFLUENCE	MERCED CONFLUENCE	SJR AT MOSSDALE
W	May-1995	1,060	-	211	124,146
W	May-1996	1,318	4,277	196,549	8,889
W	May-1997	11,538	84,203	178,291	1,099,152
W	May-1998	20,966	-	206,252	250,076
AN	May-1999	-	-	116,698	34,129
AN	May-2000	1,508	-	110,973	279,296
D	May-2001	108	-	711	386,014
D	May-2002	8,884	-	26,818	456,161
BN	May-2003	8,005	-	169,628	286,769
D	May-2004	1,985	-	192,698	77,220
W	May-2005	421	-	144,979	405,128
W	May-2006	6,323	-	-	8,180
C	May-2007	30,591	279	-	46,426
C	May-2008	3	-	-	24
BN	May-2009	1,412	-	34	2,079
AN	May-2010	84	-	221	15,216
	Ave	5,888	5,547	84,004	217,432
	Max	30,591	84,203	206,252	1,099,152
	Min	-	-	-	24

Juveniles Count Case: SB40					
Year Type	Month	STANISLAUS CONFLUENCE	TUOLUMNE CONFLUENCE	MERCED CONFLUENCE	SJR AT MOSSDALE
W	May-1995	7,115	-	-	316,304
W	May-1996	2,604	-	194,132	6,204
W	May-1997	17,005	14,015	315,448	602,121
W	May-1998	17,408	-	223,824	269,892
AN	May-1999	-	80	166,007	38,376
AN	May-2000	1,197	-	273,409	228,708
D	May-2001	3,665	-	222,667	515,438
D	May-2002	5,403	-	316,142	362,371
BN	May-2003	6,232	-	472,872	290,491
D	May-2004	2,487	-	418,052	184,757
W	May-2005	4,379	-	31,514	505,327
W	May-2006	1,603	-	-	3,798
C	May-2007	30,052	-	240,347	35,168
C	May-2008	504	-	68,286	2,631
BN	May-2009	1,917	-	-	6,226
AN	May-2010	3,648	-	1,090	25,574
	Ave	6,576	881	183,987	212,087
	Max	30,052	14,015	472,872	602,121
	Min	-	-	-	2,631

Increment improvement with respect to SBBASE					
SB40 (-) SBBASE					
Year Type	**Month**	**STANISLAUS CONFLUENCE**	**TUOLUMNE CONFLUENCE**	**MERCED CONFLUENCE**	**SJR AT MOSSDALE**
W	May-1995	6,055	-	(211)	192,158
W	May-1996	1,286	(4,277)	(2,417)	(2,685)
W	May-1997	5,467	(70,188)	137,157	(497,031)
W	May-1998	(3,558)	-	17,572	19,816
AN	May-1999	-	80	49,309	4,247
AN	May-2000	(311)	-	162,436	(50,588)
D	May-2001	3,557	-	221,956	129,424
D	May-2002	(3,481)	-	289,324	(93,790)
BN	May-2003	(1,773)	-	303,244	3,722
D	May-2004	502	-	225,354	107,537
W	May-2005	3,958	-	(113,465)	100,199
W	May-2006	(4,720)	-	-	(4,382)
C	May-2007	(539)	(279)	240,347	(11,258)
C	May-2008	501	-	68,286	2,607
BN	May-2009	505	-	(34)	4,147
AN	May-2010	3,564	-	869	10,358
	Ave	688	(4,667)	99,983	(5,345)
	Max	6,055	80	303,244	192,158
	Min	(4,720)	(70,188)	(113,465)	(497,031)

June

Juveniles Count					
Case: SBBASE					
Year Type	Month	STANISLAUS CONFLUENCE	TUOLUMNE CONFLUENCE	MERCED CONFLUENCE	SJR AT MOSSDALE
W	Jun-1995	725	-	-	766
W	Jun-1996	-	-	8	148,338
W	Jun-1997	-	-	24,544	26,138
W	Jun-1998	-	-	-	99,076
AN	Jun-1999	-	-	437	-
AN	Jun-2000	-	-	6,724	1,260
D	Jun-2001	-	-	-	80,702
D	Jun-2002	2,604	-	-	4,783
BN	Jun-2003	2,215	-	-	4,056
D	Jun-2004	1,046	-	3,662	42,441
W	Jun-2005	6	32	1,066	61,137
W	Jun-2006	-	-	-	-
C	Jun-2007	1,788	-	-	1,337
C	Jun-2008	17	-	-	2
BN	Jun-2009	382	-	3	-
AN	Jun-2010	12	-	46	5,002
	Ave	550	2	2,281	29,690
	Max	2,604	32	24,544	148,338
	Min	-	-	-	-

Juveniles Count					
Case: SB40					
Year Type	Month	STANISLAUS CONFLUENCE	TUOLUMNE CONFLUENCE	MERCED CONFLUENCE	SJR AT MOSSDALE
W	Jun-1995	-	-	-	-
W	Jun-1996	-	2,441	96,918	147,601
W	Jun-1997	-	-	158,522	337,019
W	Jun-1998	-	-	-	107,516
AN	Jun-1999	-	-	163,843	44,107
AN	Jun-2000	-	-	54,722	121,287
D	Jun-2001	435	-	16,323	52,491
D	Jun-2002	2,052	-	62,347	51,130
BN	Jun-2003	938	-	305,451	94,393
D	Jun-2004	967	-	119,281	40,967
W	Jun-2005	-	-	-	153,016
W	Jun-2006	-	-	-	-
C	Jun-2007	1,780	-	4,299	248
C	Jun-2008	408	-	9,755	638
BN	Jun-2009	-	-	-	1,143
AN	Jun-2010	1,547	-	-	23,293
	Ave	508	153	61,966	73,428
	Max	2,052	2,441	305,451	337,019
	Min	-	-	-	-

Increment improvement with respect to SBBASE					
SB40 (-) SBBASE					
Year Type	Month	STANISLAUS CONFLUENCE	TUOLUMNE CONFLUENCE	MERCED CONFLUENCE	SJR AT MOSSDALE
W	Jun-1995	(725)	-	-	(766)
W	Jun-1996	-	2,441	96,910	(737)
W	Jun-1997	-	-	133,978	310,881
W	Jun-1998	-	-	-	8,440
AN	Jun-1999	-	-	163,406	44,107
AN	Jun-2000	-	-	47,998	120,027
D	Jun-2001	435	-	16,323	(28,211)
D	Jun-2002	(552)	-	62,347	46,347
BN	Jun-2003	(1,277)	-	305,451	90,337
D	Jun-2004	(79)	-	115,619	(1,474)
W	Jun-2005	(6)	(32)	(1,066)	91,879
W	Jun-2006	-	-	-	-
C	Jun-2007	(8)	-	4,299	(1,089)
C	Jun-2008	391	-	9,755	636
BN	Jun-2009	(382)	-	(3)	1,143
AN	Jun-2010	1,535	-	(46)	18,291
	Ave	(42)	151	59,686	43,738
	Max	1,535	2,441	305,451	310,881
	Min	(1,277)	(32)	(1,066)	(28,211)

Average Abundance at Mossdale			
	Base	40% UIF	Difference
Jan	325	231	-94
Feb	35,702	43,743	8,041
Mar	61,365	112,077	50,712
Apr	191,863	241,314	49,451
May	217,432	212,087	-5,345
Jun	29,690	73,428	43,738
Total	536,377	682,880	146,503

Exhibit B

Water Temperature Modeling Principles

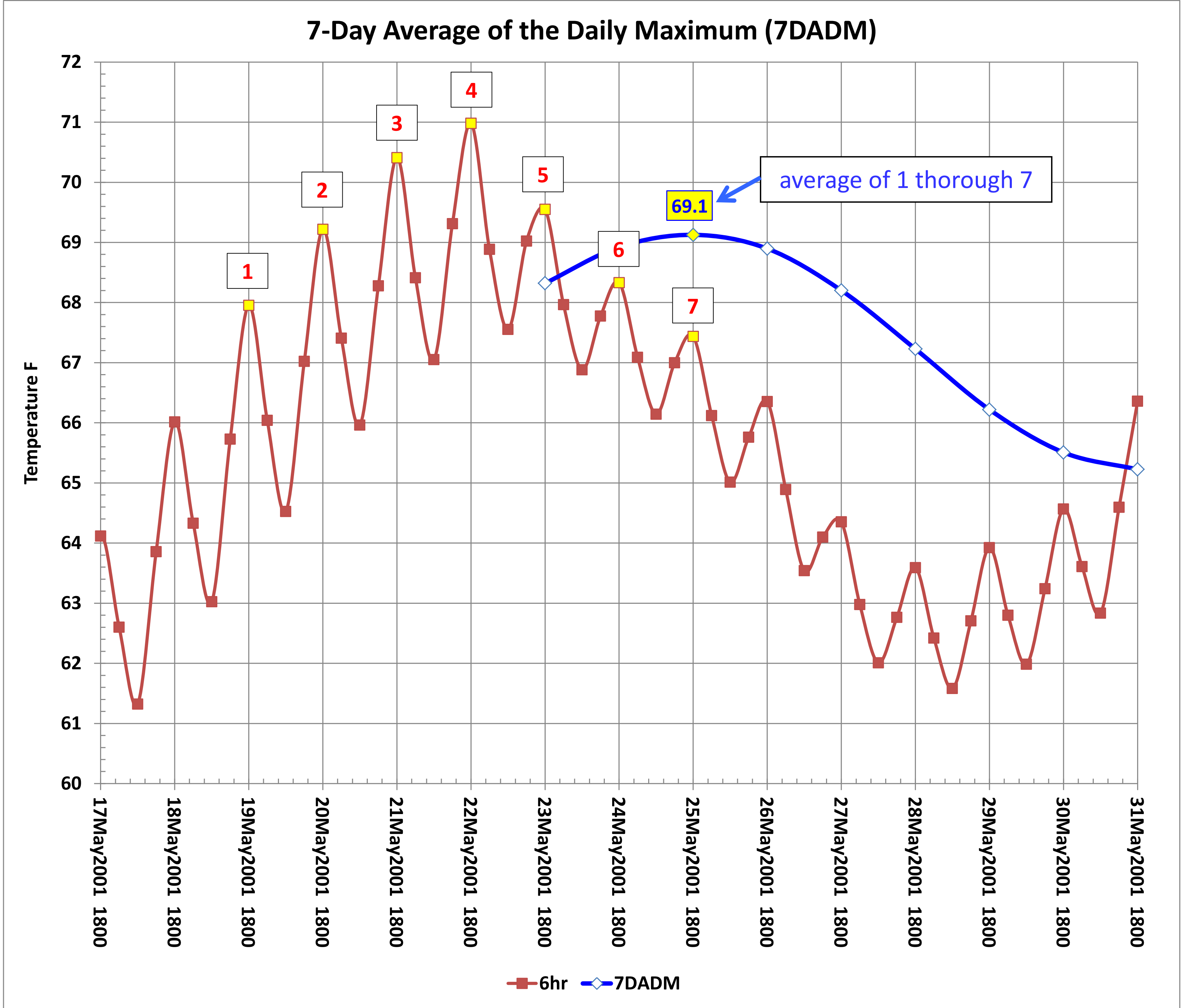
by Avry Dotan, AD Consultants

The purpose of this presentation is to explain several principles in modeling the water temperature in the San Joaquin River and its tributaries, using the San Joaquin River Basin-wide Water Temperature Model (aka HEC-5Q).

Understanding those principles would hopefully assist in the evaluation and interpretation of modeling results produced in connection with the San Joaquin River/Southern Delta Water Quality Control Plan, 2017.

7-Day Average of Daily Maximum (7DADM)

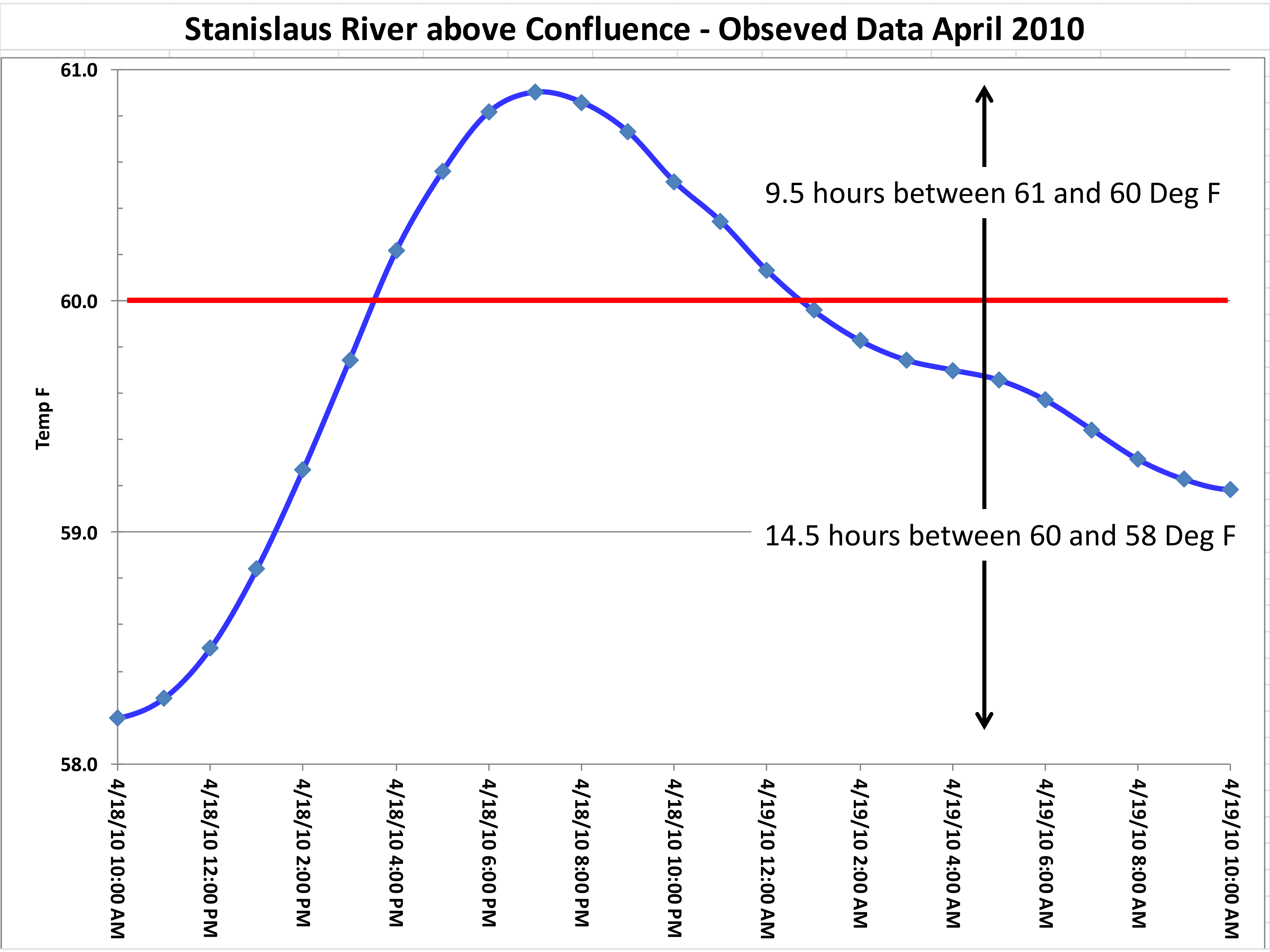
The HEC-5Q model utilizes a sub-daily time step (6-hour intervals) in order represent daily maximum and minimum temperatures. The assumption is that minimum temperature occurs at 0600 hour (6 AM) and maximum temperature occurs at 1800 hour (6 PM).
The 7DADM is the arithmetic average of seven consecutive measures of daily maximum temperatures. Usually, the 7DADM for any individual day is calculated by averaging that day's daily maximum temperature with the daily maximum temperatures of the three days prior and the three days after that date. Occasionally, to simplify the computation process, the 7DADM is also computed as the moving running average, i.e., by averaging that day's daily maximum temperature with the daily maximum temperatures of the prior six consecutive days, as shown in the following chart. Regardless how the 7DADM is calculated, it is important to note that the 7DADM does not reflect the entire range of temperature conditions in the river throughout the 7-day period, but rather the most acute conditions. These acute conditions are short in duration, as will be shown in the charts to follow.



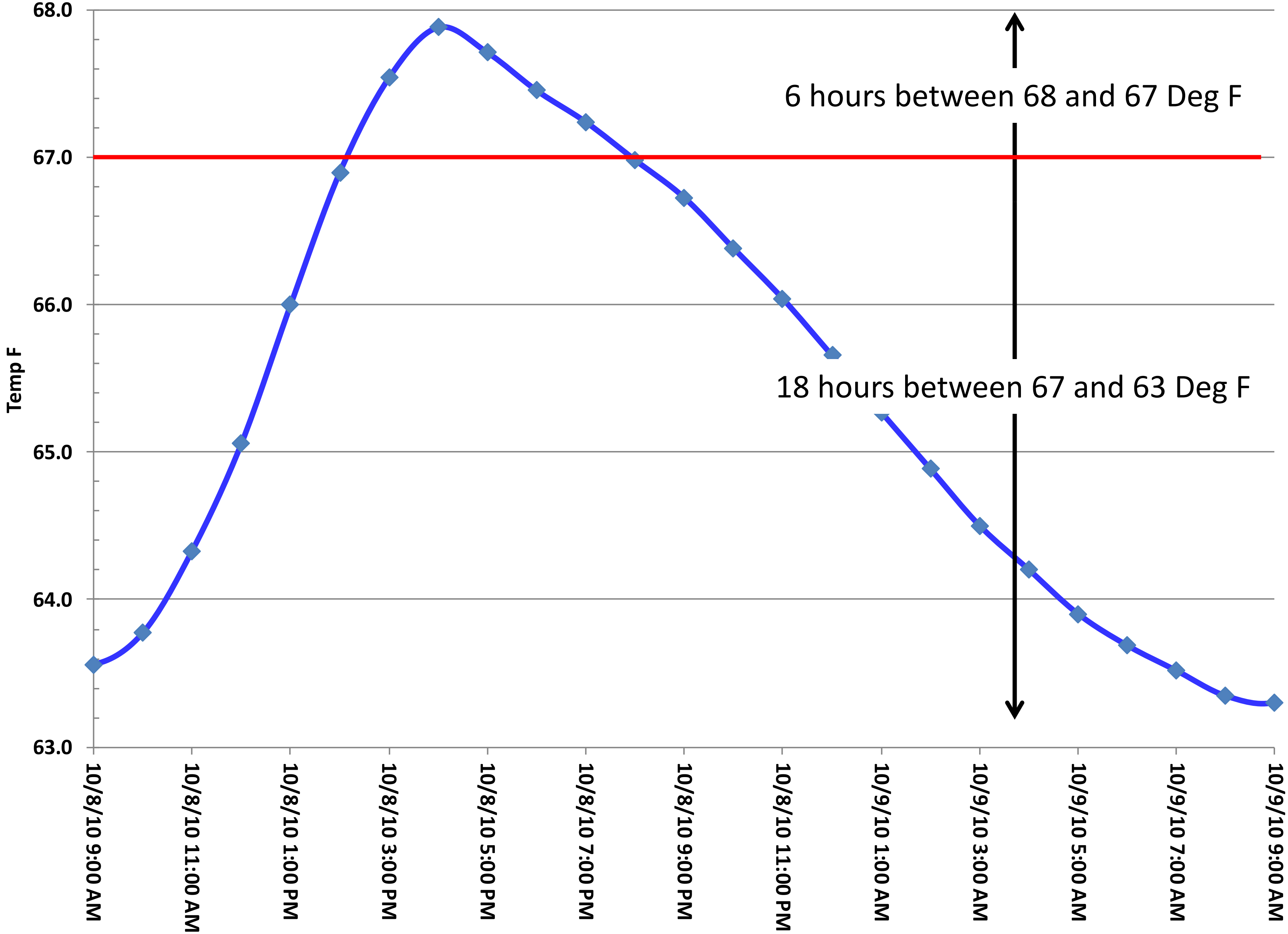
7-Day Average of the Daily Maximum (7DADM)
Temperature F
72
71
70
69
68
67
66
65
64
63
62
61
60
1
2
3
4
5
6
7
69.1
average of 1 thorough 7
17May2001 1800
18May2001 1800
19May2001 1800
20May2001 1800
21May2001 1800
22May2001 1800
23May2001 1800
24May2001 1800
25May2001 1800
26May2001 1800
27May2001 1800
28May2001 1800
29May2001 1800
30May2001 1800
31May2001 1800
6hr
7DADM

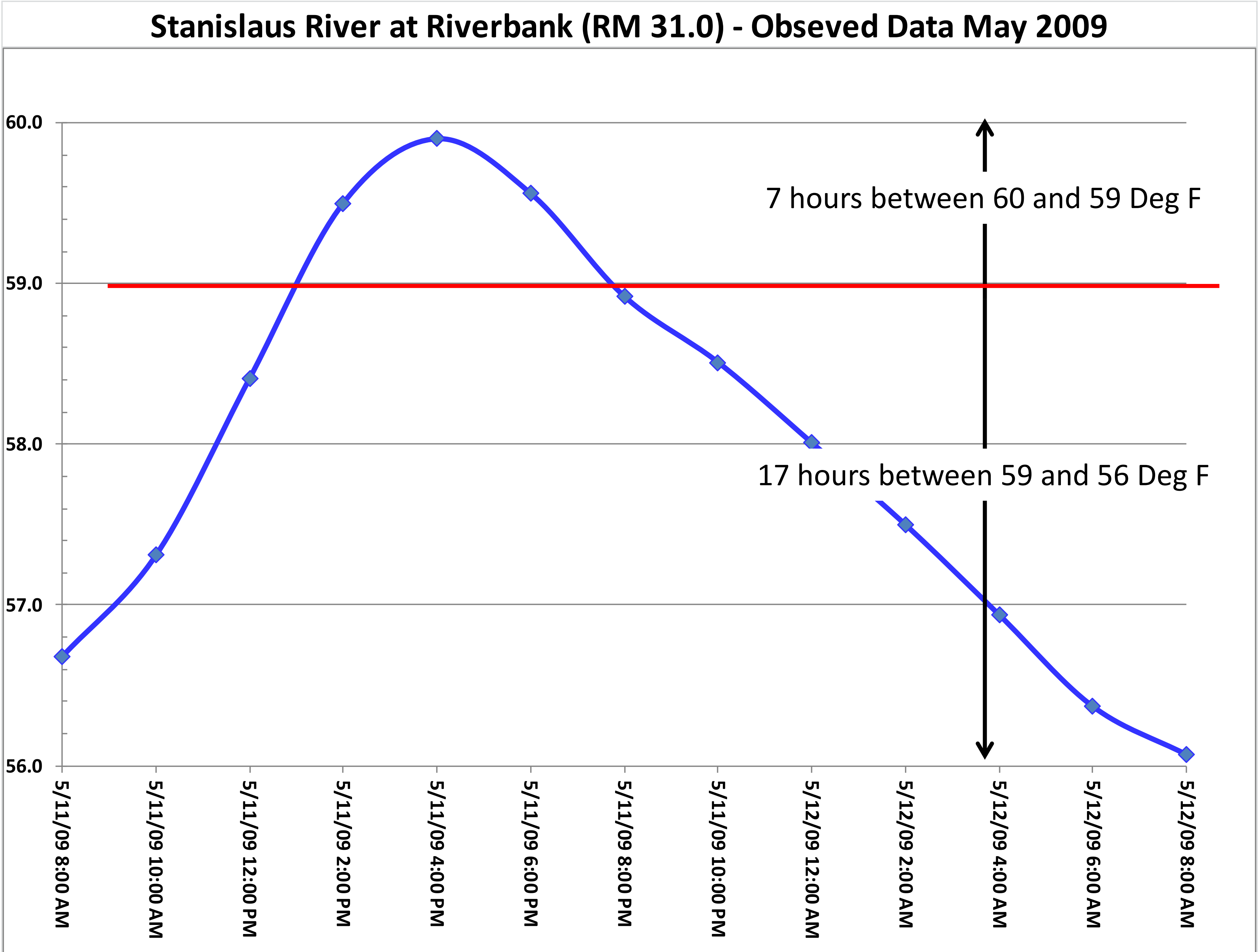
Diurnal Temperature Variation

Diurnal temperature variation is the variation between a high temperature and a low temperature that occurs during the same day. The following charts show the diurnal temperature variations at three locations and times in the Stanislaus River. The charts show that acute conditions (e.g., the temperatures within 1 Deg. F of the maximum temperature) are short in duration relative to the rest of the time in the day and that most of the time the temperatures are lower by more than 1 Deg. F of the maximum temperature (sometime as much as 5 Deg. F, as observed at the confluence in October 2010).


Stanislaus River above Confluence - Obseved Data April 2010
Temp F
61.0
60.0
59.0
58.0
9.5 hours between 61 and 60 Deg F
14.5 hours between 60 and 58 Deg F
4/18/10 10:00 AM
4/18/10 12:00 PM
4/18/10 2:00 PM
4/18/10 4:00 PM
4/18/10 6:00 PM
4/18/10 8:00 PM
4/18/10 10:00 PM
4/19/10 12:00 AM
4/19/10 2:00 AM
4/19/10 4:00 AM
4/19/10 6:00 AM
4/19/10 8:00 AM
4/19/10 10:00 AM

Stanislaus River above Confluence - Obseved Data October 2010





Stanislaus River at Riverbank (RM 31.0) - Obseved Data May 2009
60.0
59.0
58.0
57.0
56.0
7 hours between 60 and 59 Deg F
17 hours between 59 and 56 Deg F
5/11/09 8:00 AM
5/11/09 10:00 AM
5/11/09 12:00 PM
5/11/09 2:00 PM
5/11/09 4:00 PM
5/11/09 6:00 PM
5/11/09 8:00 PM
5/11/09 10:00 PM
5/12/09 12:00 AM
5/12/09 2:00 AM
5/12/09 4:00 AM
5/12/09 6:00 AM
5/12/09 8:00 AM

Temperature Duration Curve

A common way to present the duration and magnitude of hydrological conditions in rivers, is by using duration curves. Normally, the duration curve is a plot that shows the percentage of time flow in a stream is likely to equal or exceed (or be lower) some specified value of interest.

The duration curve is computed by sorting all the values in the data set from largest to the smallest and then assigning for each value its probability (exceedance) based on its ranking within the data set.

In the context of water temperature, one should exercise caution in using 7DADM duration curve as it might be misleading. 7DADM does not provide the full insight to the thermal conditions in river as it does not include diurnal temperature variation, only daily maximums.

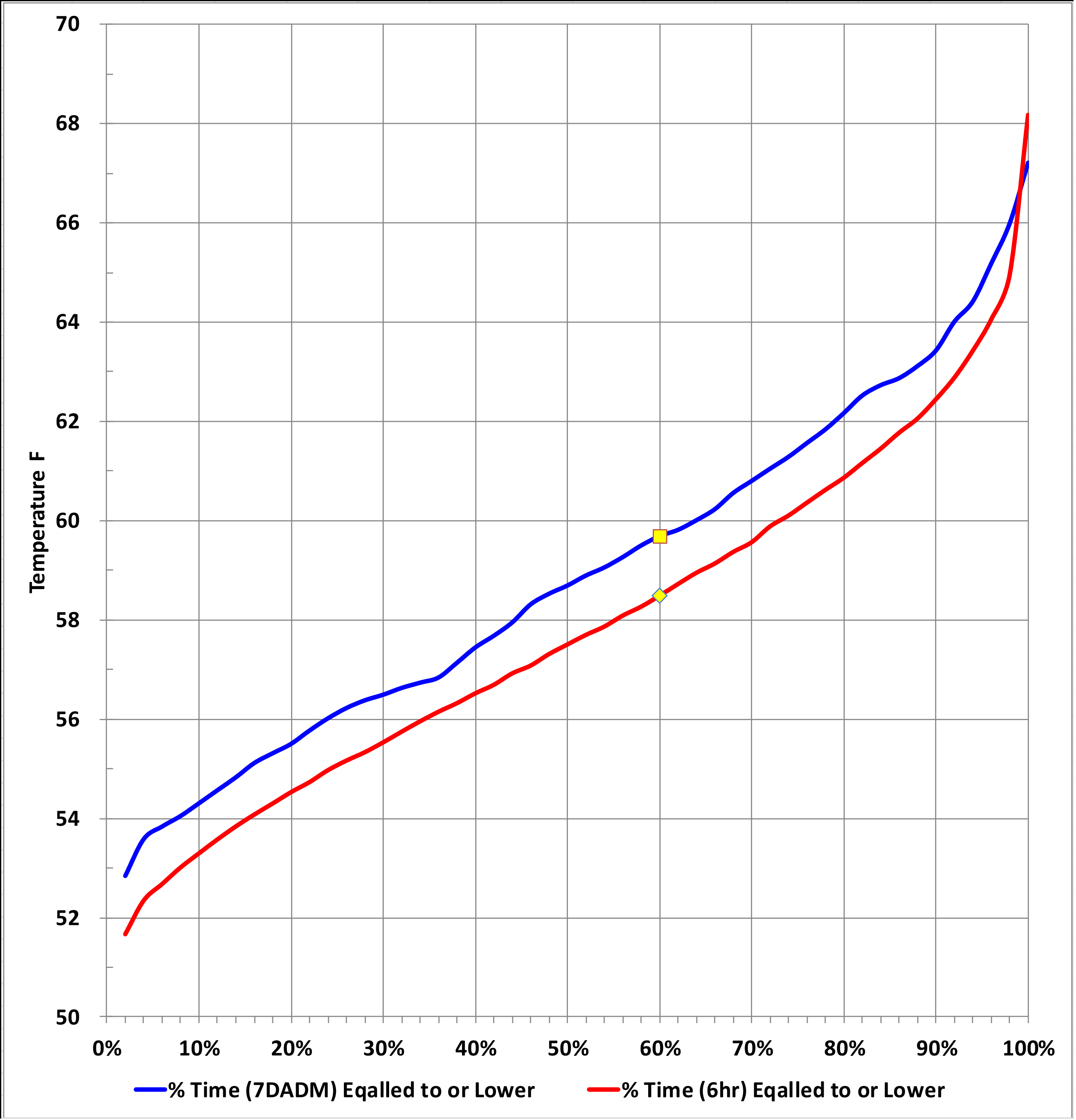
The following chart illustrates that in a way of example:

Two durations curves were developed, one based on 7DADM and one based on temperatures computed at 6-hour time step.

The chart shows that at 60% exceedance level, the water temperature is 58.5 F based on 6-hour time step while it is 59.7 F based on 7DADM. In other words, the 6-hour time step shows cooler temperature than the 7DADM which is more indicative of the actual temperature conditions, statistically speaking.

% Time Eqalled to or Lower	Temp at 6Hr	7DADM	Diff.
2%	51.7	52.8	-1.2
4%	52.3	53.6	-1.2
6%	52.7	53.8	-1.2
8%	53.0	54.0	-1.0
10%	53.3	54.3	-1.0
12%	53.6	54.6	-1.0
14%	53.8	54.8	-1.0
16%	54.1	55.1	-1.0
18%	54.3	55.3	-1.0
20%	54.5	55.5	-1.0
22%	54.7	55.8	-1.0
24%	55.0	56.0	-1.0
26%	55.2	56.2	-1.1
28%	55.3	56.4	-1.0
30%	55.5	56.5	-1.0
32%	55.7	56.6	-0.9
34%	56.0	56.7	-0.8
36%	56.1	56.8	-0.7
38%	56.3	57.1	-0.8
40%	56.5	57.4	-0.9
42%	56.7	57.7	-1.0
44%	56.9	57.9	-1.0
46%	57.1	58.3	-1.2
48%	57.3	58.5	-1.2
50%	57.5	58.7	-1.2
52%	57.7	58.9	-1.2
54%	57.9	59.1	-1.2
56%	58.1	59.3	-1.2
58%	58.3	59.5	-1.2
60%	58.5	59.7	-1.2
62%	58.7	59.8	-1.1
64%	58.9	60.0	-1.1
66%	59.1	60.2	-1.1
68%	59.4	60.6	-1.2
70%	59.6	60.8	-1.2
72%	59.9	61.0	-1.2
74%	60.1	61.3	-1.2
76%	60.4	61.6	-1.2
78%	60.6	61.8	-1.2
80%	60.9	62.2	-1.3
82%	61.2	62.5	-1.4
84%	61.5	62.7	-1.3
86%	61.8	62.9	-1.1
88%	62.1	63.1	-1.1
90%	62.4	63.4	-1.0
92%	62.9	64.0	-1.1
94%	63.4	64.4	-1.0
96%	64.1	65.2	-1.1
98%	65.0	66.0	-1.0
100%	68.2	67.2	1.0

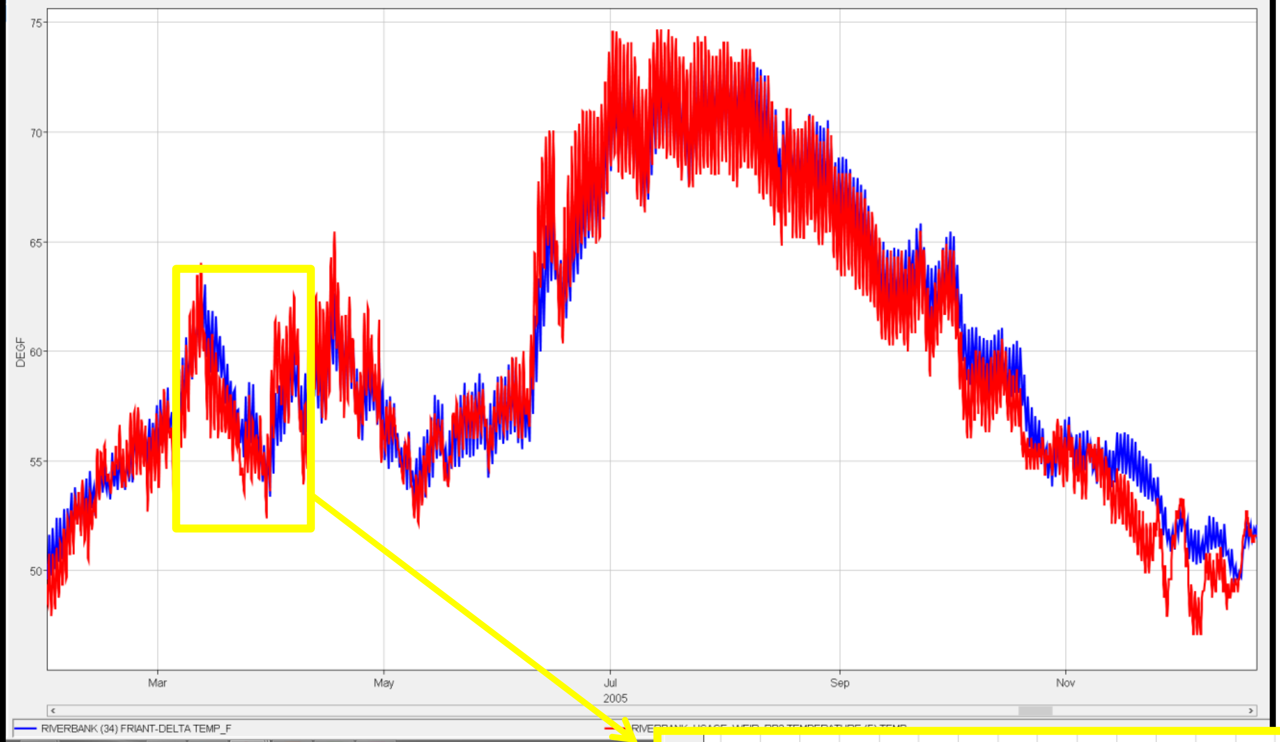
Water Temperature in the Stanislaus River in Apr at RM 0.000



Model Calibration

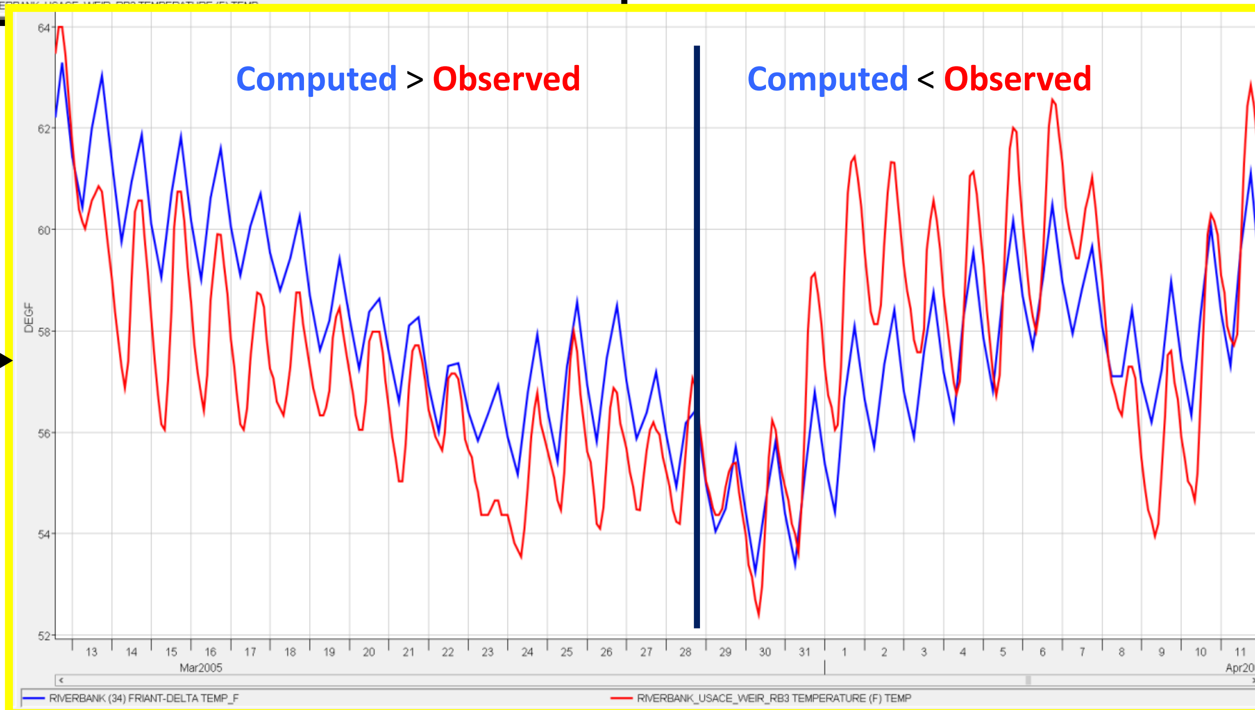
Calibration of the stream reaches in the model was done by comparing computed and observed time series temperatures both graphically and statistically.
The model generally does an excellent job of reproducing the thermal regime in streams. However, this does not mean that there is a perfect match between computed and observed, as shown in the following example:

Example:
Water Temperature at Riverbank, May 2009



Model calibration shows a good fit between computed and observed, thus capturing well the temperature trend at this location for this time frame

However, a closer look reviles discrepancies between computed and observed, some in the order of 1-3 Deg. F. These discrepancies could be positive (computed > observed) or negative (computed < observed)



Model Calibration - Margin of Error

The measures by which we determine how well the model is calibrated, are:

- **Coefficient of Determination (R^2)**

  R^2 is a standardized measure of degree of predictedness or fit. $R^2 = 1$ means a perfect match between computed and observed. The closer R^2 to 1, the more fitted the data is. Usually, R^2 greater than 0.9 means a very good match.

- **Root-Mean-Square Error (RMSE)**

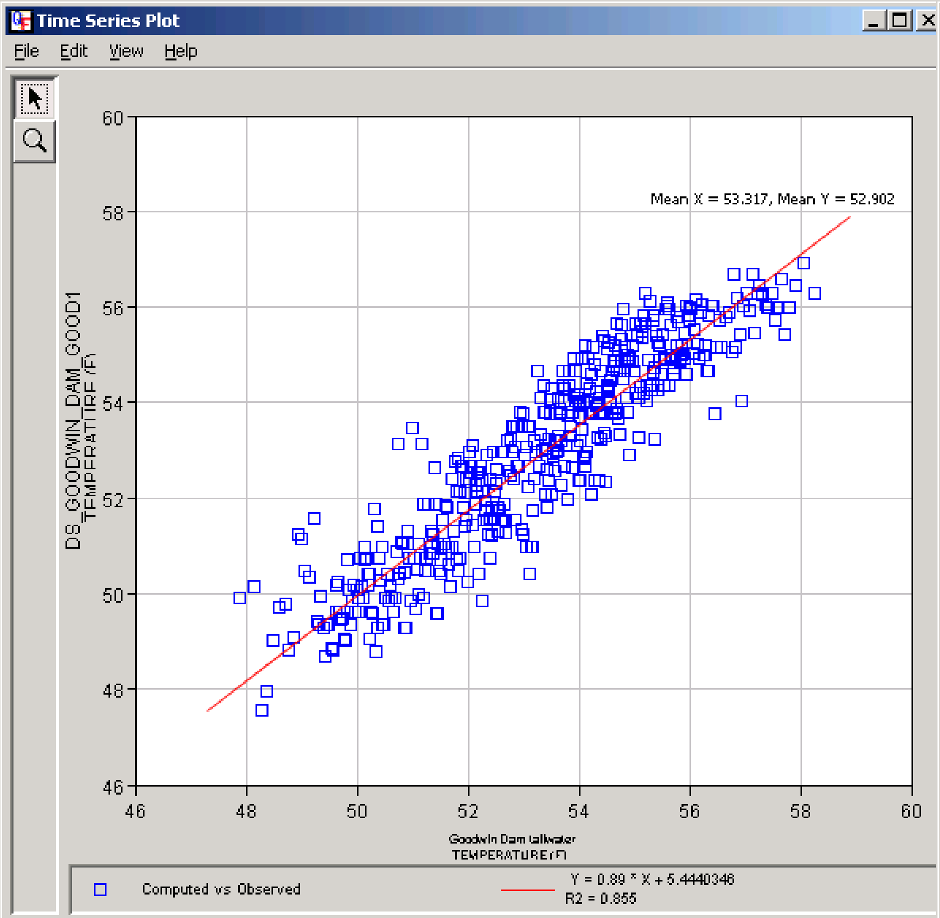
  RMSE tells us how concentrated the data is around the line of best fit. The larger the RMSE the more scatter the data is with respect to the line of best fit. RMSE is a term that is embedded in R^2.

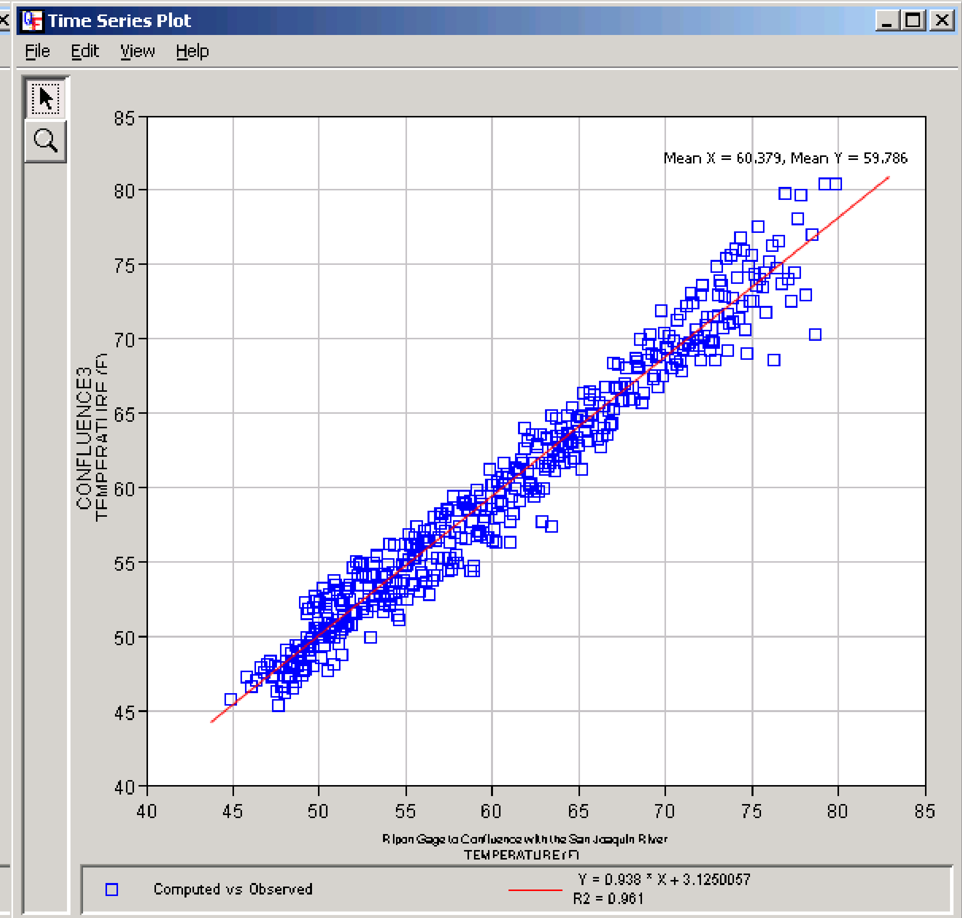
- **Model Bias**

  Model bias defined as the difference between the average computed and observed temperatures. The higher the bias in absolute terms the more skewed the model is. Positive Bias designates that computed tends to show higher temperatures than the observed and negative Bias is the opposite.

The following charts show the calibration results for two locations: Below Goodwin Dam and the Confluence.

Model Calibration - Computed vs. Observed





Below Goodwin Dam

Average computed =	53.32
Average observed =	52.90
Bias =	0.41
RMSE =	0.94
R^2 =	0.855

Confluence

Average computed =	60.38
Average observed =	59.79
Bias =	0.59
RMSE =	1.85
R^2 =	0.961

Model Calibration - Computed vs. Observed

Other locations in the Stanislaus River*

Location	River Mile	Water Temperature (degrees F)		
		Avg. Observed	Avg. Computed	Coefficient of Determination (R^2)
Below Goodwin	58	52.90	53.32	0.855
Knights Ferry	54	53.33	53.72	0.907
Orange Blossom	46	55.29	55.28	0.936
Oakdale Rec.	40	55.88	55.96	0.948
Riverbank	31	57.64	58.07	0.955
Ripon	15	60.49	60.40	0.961
Confluence	0	59.79	60.38	0.961

* Source: San Joaquin River Basin Water Temperature Modeling and Analysis, AD Consultants et al 2009.pdf

Model Implementation

The model generally does an excellent job of reproducing the thermal regime in streams. Results show Coefficient of Determination (R^2) to be around 0.93 for the Stanislaus, 0.91 for the Tuolumne, 0.93 for the Merced, and 0.98 for the Main-stem SJR at most locations. The model bias defined as the difference between the average computed and observed temperatures was 0.26, 0.67, 0.32 and 0.31 degrees Fahrenheit for the four rivers, respectively. This means that the model is a little bit biased towards higher temperatures.

In conclusion, it should be noted that inaccuracies in model prediction are carried into all the alternatives studied with the model. Therefore, the power of this modeling tool should not be viewed in terms of its capability to perfectly predict the temperatures but rather for comparing alternatives.

FishBio

Stanislaus off-channel Report 2014

ATTACHMENT 4

San Joaquin Tributaries Authority
Comments on the Draft Substitute Environmental Document

TO: Tim O'Laughlin
FROM: FISHBIO
DATE: July 13, 2014
SUBJECT: **2014 Stanislaus River Off-Channel Habitat Assessment**

From April 14 to May 15, 2014, Goodwin Dam releases were increased to between 2,400 and 2,700 cubic feet per second (cfs). During this period, FISHBIO conducted surveys to evaluate the amount and characteristics of off-channel habitat that could potentially support juvenile salmonid rearing under these flow conditions and timeframe and to document the use of these off channel habitats by juvenile Chinook salmon. This survey is meant to accompany the 2013 Stanislaus River Off-Channel Habitat Assessment study which found that 40 of 52 off-channel areas had the potential to function as juvenile salmonid rearing habitat, however, no juvenile chinook salmon were observed at any of the sampled off-channel areas in 2013.

The goals of this study were to: (1) identify and photo-document the number and distribution of off-channel habitat areas within the Stanislaus River that become inundated under Goodwin flow releases of 2,400 - 2,700 cfs, (2) determine the presence or absence of juvenile salmon and other fish species in representative off-channel areas downstream of Knights Ferry Bridge, (3) determine whether physical and water quality characteristics in representative off-channel areas were suitable for juvenile salmonid rearing, and (4) evaluate the precision of the NewFields 3,000 cfs model layer and collect point-specific depth data that could potentially be used to calibrate the model output.

This memo is accompanied by a storybook containing photos and site descriptions of all identified off-channel areas along the Stanislaus River, from the confluence to Knights Ferry Bridge at river mile (RM) 56.0.

Key points

- At flows between 2,400 and 2,700 cfs, shallow off-channel habitats are very limited in quality and size along the Stanislaus River.
- Water temperatures were generally about 0.5°F warmer (range: -1 to 3°F) in off-channel habitats than in the adjacent mainstem river. Overall water temperatures were generally low (53.7 - 60.2°F) and did not show any spatial or temporal patterns.
- No Chinook salmon were documented in any of the off-channel habitats sampled below Oakdale (river mile 42.4), despite large numbers of juvenile salmon in the system. This finding is consistent with findings by Moyle et al. (2007), who reported prevalence of non-native species on floodplains and very limited habitat use by Chinook salmon after April.
- Overall, side-channels (located in upper reaches above Oakdale) appeared to have the greatest usage by salmonids. Recent restoration areas including Honolulu Bar, the

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Russian Rapids side-channel complex, and Lancaster Road restoration area provided habitat for the vast majority of observed juvenile Chinook salmon (199 of 265).
- Juvenile Sacramento sucker, juvenile pikeminnow, threespine stickleback and western mosquitofish use off-channel habitat during this period, with large numbers of larval fish (presumably belonging to these species) observed in most sampled units.
- Given that the majority of juvenile salmon that remain in the system after April are smolts, and considering evidence that larger migrating juveniles typically use mid-channel, higher velocity areas for migration (Kemp et al. 2005; Svendsen et al. 2007), it is likely that these salmon do not utilize the floodplain habitat for extended rearing, but instead migrate rapidly through the lower reaches of the Stanislaus.
- No adult or juvenile splittail were observed during sampling.

Introduction

Background

From April 14 to May 15, 2014, Goodwin Dam releases were increased to between 2,400 and 2,700 cubic feet per second (cfs) (Figure 1). During this period, FISHBIO conducted surveys to evaluate the amount and characteristics of off-channel habitat that could potentially support juvenile salmonid rearing under these flow conditions and timeframe. This was the second consecutive year of floodplain sampling however study methods in 2014 were slightly different than those during the 2013 study. The primary difference was an increase in identified floodplain areas as a result of using the 3,000 cfs model layer from NewFields report (2013), which showed many potential floodplain areas that were missed during the 2013 reconnaissance mapping of inundated areas. Additionally, fish sampling methods were modified in 2014. Both snorkel surveys and seining were used to document fish presence/absence in the reach above Oakdale in 2014 which was not sampled for fish in 2013.

Pulse flows on the Stanislaus River are implemented for a number of reasons. One motive for the increased flows is the creation of salmonid rearing habitat on temporary off-channel floodplains. Historically, the Stanislaus River flooded annually in the lower reaches of the stream below Oakdale. Heavy mining and dredging operations, along with levee construction and bank stabilization for agricultural purposes have left very little usable floodplain habitat currently available during regulated flows from Goodwin Dam. Shallow, warm-water floodplains, once a defining characteristic of the Central Valley, provide refuge from high flows, high biotic diversity and abundant food sources, which have been shown to be ideal conditions for growth of juvenile salmonids (Jeffres 2008, Katz et al. 2013, Sommer et al. 2001). Sommer et al. (2001) found that fish which entered the Yolo Bypass floodplain had growth rates up to 35% greater than the growth rates of fish that stayed in the main channel of the Sacramento River. Size of fish at ocean entry has been shown in numerous studies to increase survival upon ocean entry (Unwin 1997). Access to off-channel areas may also serve as refugia from predatory fish.

Methods

Unit Identification - Desktop

Sampling units were identified using ArcGIS v. 10.1. Inundated areas were identified by plotting the 500 cfs Stanislaus River layer and the 3,000 cfs model layer from NewFields (2013). Relatively large inundated areas were marked for later examination in the field. A total of 161 potential locations were identified during the desktop assessment from the confluence to RM 56.0 at Knights Ferry Bridge (Figure 7-9). River miles were calculated (to tenths of a mile scale) using ArcGIS software and the 500 cfs Stanislaus River layer (note: river miles in this report are calculated using our own methods and do not necessarily correspond to USGS river miles).

Unit Identification and Verification – Field

Marked sampling units were located in the field using both the marked point and the inundation layers provided by NewFields. Additional areas were occasionally added when the areas were judged to have potential for salmonid usage or were able to be sampled effectively. Eleven units were examined that were not identified during the desktop assessment; four of these units were identified in the reconnaissance surveys from 2013 and seven units were added that were judged to have potential based upon observations made in the field.

The precision of the 3,000 cfs model layer was assessed by visiting all the identified sites and determining whether the site was connected to the main channel and whether features (e.g., depressions, islands) on the layer were consistent in the field. Because discharge during 2014 did not reach 3,000 cfs, we could not assess the accuracy of the predicted inundation of the 3,000 cfs layer quantitatively (Figure 1). However, we expected that the differences between predicted water levels of the 3,000 cfs model layer and observed water levels at 2,400 – 2,700 cfs during 2014 would be minor. Therefore, the evaluation of the model layer should be considered as a qualitative assessment instead of quantitative due to the differences in flows between years.

Physical Habitat, Water Quality, Site Descriptions

Based on the NewFields 3,000 cfs model layer and observations made in the field, representative sites were selected to collect physical habitat and water quality data (depth, water velocity, substrate, cover, dissolved oxygen, and water temperature) to ascertain whether physical conditions could support juvenile salmonid rearing in off-channel habitats. Representative sites were selected based upon accessibility and qualitative judgments of habitat suitability. Physical habitat measurements were collected at 15 sites upstream of Oakdale (44% of all upstream off-channel areas), and fish sampling occurred at 11 of these locations. Downstream of Oakdale, (RM 42.4) environmental data was collected at 27 sites (19.6% of all downstream off-channel areas), and fish sampling occurred at 13 of these locations. Fish sampling was not possible at all locations due to dense vegetation, access issues and/or safety concerns, but was conducted when possible and when off-channel areas were deemed to have potential for juvenile salmonid rearing.

All of the predicted off-channel habitats were classified as one of seven general habitat types. Due to unit complexity, habitat types were sometimes used in combination. Descriptions of each habitat type are detailed below.

- Backwater – Backwater habitats were generally deep, often had good connectivity to the main channel, and occasionally had large sunlit areas. Oxbows were grouped into backwater habitats. Many were deep enough to be present during periods of lower flows. Typically, no current was observed in backwater areas and only one connection was observed.
- Flooded margins – Margin habitats were generally narrow bands of thick vegetation, had good connectivity to the main channel, but had little open water or exposure to sunlight. Due to the proximity to the main channel, margin habitats typically had low to moderate water velocities throughout.
- Side channel – Side channel habitats were often well connected to the main channel, with moderate to high water velocities. In the upper Stanislaus River, several side channels were restored to function at a variety of flows (e.g. Honolulu Bar and Lancaster Road Restoration Area). Side channels often had well defined and identifiable upstream and downstream connections to the main channel.
- Flooded point bar – Flooded point bars had similar characteristics to flooded margin habitats (well connected, dense vegetation, etc.) but were differentiated from margins due to their location. They were located on the inside bend of the river where a point bar forms due to depositional processes.
- Meander cutoff – Meander cutoffs were similar to flooded point bars, but were differentiated based on the location. The flooded point bar was defined as occurring at the immediate point of an inside bend of the river, while meander cutoffs occurred further from that point. As a result they were often much larger in size than either flooded margins or point bars.
- Anthropogenic – These particular units were heavily influenced or manipulated by land use practices. Particular examples included a series of backyards near Oakdale (RM 41.8), the Horseshoe Bend campground (RM 52.5), or small areas where vegetation was controlled to allow access to the river (various locations).
- Dry – Some areas were classified as dry, likely due to low discharge.

At each accessible site, physical parameters were measured at selected intervals based upon observations made in the field. Due to the variation in size and shape of off-channel habitats, standard distances between points were not established; instead, distances between points were adjusted according to the size and shape of the accessible inundated habitat. For each site, between 2 and 15 sample points were spaced evenly throughout the floodplain to adequately capture variation in physical parameters that may be influenced by the distance between sampling points and the main channel (e.g., dissolved oxygen [DO], current velocity [feet per second; fps], and temperature). Physical parameter measurements were then averaged for each site to obtain mean values for each event and each site. After the first day methods were slightly altered due to the time constraints of examining all sites.

Fish Sampling

A combination of methods was used depending on site location and site characteristics. Backpack electrofishing was chosen as the most effective sampling method to document juvenile salmonid presence and usage of inundated off-channel habitats. Electrofishing was used at each sampled off-channel area downstream of RM 42.4 (Highway 120 Bridge in Oakdale) due to conditions of our National Marine Fisheries Service (NMFS) 4(d) sampling permit. Since electrofishing was not permitted above RM 42.4, snorkel surveys were used to document fish presence. Where possible, seining was conducted in addition to snorkeling, but only two sites had favorable habitat characteristics that allowed seines to be used.

Electrofishing (13 sites)

Backpack electrofishing was chosen as the most effective sampling method to document juvenile salmonids and other fish species in shallow water areas, often covered with dense vegetation. Care was taken to minimize disturbance of each site prior to and during electrofishing activities. Water depth was the most limiting factor to backpack electrofishing, and restricted sampling to areas less than about 3.5 feet deep. As assessing fish presence and habitat use (rather than determining fish abundance) were objectives for this study, electrofishing was conducted in likely fish holding areas and was limited to a single pass at each site. Captured fish were temporarily held in buckets until electrofishing of the site was completed, then identified to species, counted, measured, allowed to recover, and subsequently released. Additional fish observed—but not captured—in a sampling unit were noted and identified to species/life stage whenever possible.

Snorkeling (11 sites)

Snorkel surveys were conducted in units above Oakdale (RM 42.4) that were too dense or complex to seine effectively. The inundated unit was snorkeled and when possible, the main channel margin was snorkeled as well to document Chinook salmon presence near the site. One to two divers entered the water and surveyed all accessible areas of the unit. Fish were identified to species and life stage when possible. General habitat characteristics at the observation point were also made.

Seining (2 sites)

Seining was conducted when conditions allowed (i.e., little to no vegetation or complex habitats). However, due to the complexity and dense vegetation at most of the sites above RM 40, only two sites were sampled using the seine. The beach seine that was used for the survey was 30 feet long and five feet deep. All fish captured in the seine were identified to species and measured (fork length and total length).

Results

There were a total of 172 off-channel habitat areas (including dry units) identified on the lower Stanislaus River, downstream of Knights Ferry, under Goodwin Dam releases of between 2,400 and 2.700 cfs (Figure 7-9). A total of 161 off-channel habitat areas were identified using the Newfields 3,000 cfs model layer. Additionally, there were four sites that were not identified using the NewFields model but were identified during reconnaissance mapping in 2013, and seven sites that were added based upon observations made in the field during 2014. Sizes of inundated areas measured in GIS were generally small (mean = 8,146 m^2 [2.0 acres], median = 5,491 m^2 [1.4 acres], min = 511 m^2 [0.1 acres], max = 820,522 m^2 [20.3 acres]; Table 1). Physical habitat measurements were collected at 42 sites and fish sampling was conducted at 24 of those sites.

Summary of Physical Habitat and Water Quality

The 172 locations where shallow off-channel areas were identified in the Stanislaus River were generally heavily vegetated and were well connected to the main channel. Just over half (88 of 172) of these areas were comprised of narrow bands of flooded margin habitat where riparian encroachment, resulting in very dense vegetation, was common. Another 32 locations were classified as backwaters and 21 locations were classified as side-channels. Other habitats that were identified, while infrequent, were described as flooded point bars, meander cutoffs or anthropogenic (Table 1). Despite the relatively small size of the identified off-channel habitats, 36 of the 42 sites (approximately 86%) where physical habitat data was collected were identified as having the potential to function as juvenile salmonid rearing habitat based on a combination of physical and water quality conditions (i.e., water depth, connectivity to main channel, water temperature and DO). Despite probable habitat suitability, salmonids were only seen at 7 of 24 sampled locations, with 3 of those locations being recent restoration sites.

Substrate and vegetation type were only qualitatively assessed and in general were similar to the 2013 Stanislaus floodplain study. Substrate in off-channel areas consisted of silt or soil, and cover in off-channel areas was predominantly made up of non-woody plants, such as grasses and nettles. However, some sites were dominated by woody vegetation, such as trees and shrubs, while others were largely devoid of any cover.

During sampling, average water temperatures in off-channel areas were generally warmer compared to surface water mid-channel (in the sun) (Table 2, Figure 6). In some instances, water temperatures in off-channel areas were cooler compared to mid-channel; these measurements were generally recorded in shaded areas or areas with good connectivity and high flow. Temperature differences of greater than 3°F between the main channel and some inundated areas were recorded, but these high temperatures were associated with backwater areas having slow or no current. There was no correlation between temperature differences in off-channel areas and river mile or sampling day. There was a marked difference in average temperatures of each habitat type. In sampled backwaters the average temperature difference between off-channel areas and the adjacent main channel was 1.09°F, while the average temperature differences at sampled margins and side channels was 0.26° F and 0.18° F, respectively. For this study, temperature differences provided more useful information than instantaneous temperatures (due to influence of sampling time) but overall, water temperatures were generally low (53.7 - 60.2°F; Figure 3) due to ambient air temperatures and releases from Goodwin Dam. Temperatures in this range do not promote optimal growth rates in juvenile salmonids but they are within tolerable limits for rearing. The minimal differences in temperature between most off-channel areas and the corresponding mid-channel were indicative of the lack of suitable floodplain at 2,400 to 2,700 cfs.

Dissolved oxygen concentrations of inundated areas varied greatly (between 0.6 mg/L and 11.4 mg/L), but were generally suitable for fish whenever there was water exchange between an inundated area and the main river channel (Table 2, Figure 2). Dissolved oxygen concentrations were low in the backwater areas with minimal connectivity where water temperatures were occasionally over 3°F higher than in the main channel. The average DO concentration in all sampled backwaters was 7.7 mg/L. The average DO concentration in both side channels and margin habitat (9.2 mg/L) was similar to the mid-channel average of 10.3 mg/L. All sites with an observed average DO greater than 7.0 mg/L were considered suitable for salmonid rearing based on cold water habitat designations in the Water Quality Control Plan (CVRWQCB 1998). The six sites that had an average DO less than 7.0 mg/L were generally shallow with little or no connectivity to the main channel and were likely a result of groundwater seepage. The sum of the areas of these six sites was 15.1 acres (mean = 2.52 acres) or 16.8% of the overall size of all sampled areas (Table 2).

Mean current velocities were generally less than 1.0 fps (Table 2; Figure 4). Higher current velocities were found in side channel habitat types with good connectivity. Nearly half of the mean current velocities were below 0.1 fps, and could thus provide refuge from higher current velocities found in the main channel. As expected, velocities varied by habitat type with the highest average velocity being observed in side channels (0.85 fps), followed by margins (0.18 fps) and backwaters (0.05 fps). Stagnant water (no current velocity) was occasionally observed in habitats that were only minimally connected to the river or isolated from the channel by dense stands of vegetation. Such areas, though present on virtually all sampled off-channel habitats, were generally restricted to the immediate vicinity of the wetted margin. The highest average flow was observed in a side channel (2.79 fps). Flow conditions were tolerable for salmonid rearing at all sampled locations.

Site depth varied greatly both within and between sampling locations (Table 2; Figure 5). Average site depth overall was 1.9 ft; with a minimum average floodplain depth of 0.5 ft and a maximum of 3.5 ft. The highest average depths were observed in margin habitat (2.1 ft), followed by side channels (1.9 ft) and backwaters (1.7 ft). While these average depths are greater than other notable floodplains in the Sacramento-San Joaquin basin, they are still within the tolerable limits for juvenile salmonid rearing. It should again be noted that measured average depths of each habitat type might not be indicative of the river overall as sampling was not conducted in locations with depths greater than 3.5 ft.

Evaluation of NewFields model

Evaluation of the NewFields 3,000 cfs model layer was conducted qualitatively due to flows of less than 3,000 cfs being released out of Goodwin Dam. However, despite diminished flows it was possible to verify the accuracy of the model layer based on morphological features and floodplain characteristics. In general, the Newfields model appeared to be very precise, with connectivity to the main channel at 154 of the 161 identified sites despite reduced flows. Floodplain characteristics, such as depressions or islands, highlighted on the model were easily recognizable in the field. At sites with little or no connectivity it was still possible to predict the precision of the model with increased flows.

Fish Sampling

No salmonids were captured or observed at any of the 31 sites sampled downstream of RM 48.6 (Table 3). Upstream of RM 48.6 a total of 265 Chinook salmon and 10 rainbow trout were observed or captured. The majority of these fish (count = 180) were observed at the Honolulu Bar restoration area with an additional 19 Chinook being observed at the Russian Rapids side-channel complex, and Lancaster Road restoration area. Another 58 juvenile Chinook were observed in the main channel of the river directly adjacent to the floodplains (at the boundary between the temporary off-channel habitats and the main stem of the river). While these fish were not seen directly in the floodplain, observations still provide proof of their existence near identified off-channel habitats.

A small number of non-salmonids were captured or observed throughout the river, with larval and juvenile Sacramento pikeminnow, Sacramento sucker, threespine stickleback, and mosquitofish being the most abundant. Most areas were also heavily utilized by non-salmonid larval fish (unknown species, but likely suckers or pikeminnow), which were too small to be sampled. Total electrofishing effort (time that electrofishing unit was active) was 3,549 seconds, for an average of 273 seconds per site.

Discussion

Floodplains are increasingly being found to support juvenile salmon rearing in other areas of the Central Valley; namely the Yolo Bypass on the Sacramento River and the Cosumnes River Preserve on the Cosumnes River. A number of studies have been conducted in recent years that have demonstrated the benefits provided by these habitat areas to juvenile salmonids. Floodplains located on the Yolo Bypass and Cosumnes River Preserve are large (Yolo – 240,000,000 m^2 or 59,305 acres; Cosumnes – 186,150,000 m^2 or 45,999 acres), shallow (generally < 1 m depth) and warm (generally > 68°F and often up to 77°F) (Jeffres et al. 2008, Moyle et al. 2007, Sommer et al. 2001, Sommer et al. 2005). All of these habitat characteristics are conducive to prolific primary and secondary production, in the form of phytoplankton, zooplankton and benthic macroinvertebrates (Jeffres et al. 2008, Sommer et al. 2001). Studies have shown that this increased food supply results in floodplain-reared salmon that are significantly larger than those that stayed in the main channel of the river (Jeffres et al. 2008, Katz et al. 2012 Sommer et al. 2001). Since it has been shown that size at ocean entry can increase likelihood of survival upon ocean entry, these floodplains provide an important and necessary component to one of the most genetically and phenotypically diverse populations of Chinook salmon on the Pacific Coast (Unwin 1997, Yoshiyama et al. 2000).

Although it is clear that fragments of off-channel habitat, some of which may be considered floodplain, are created by increasing discharge out of Goodwin Dam, the quality and usefulness of this habitat is questionable. Environmental conditions of inundated areas varied greatly (i.e., relative quality or potential of habitats). While most sampled locations were determined to have conditions that were within thresholds for juvenile salmonid rearing, most lacked the warmer temperatures, shallow depths, and open sunlit areas more typical of the larger floodplain areas in the Sacramento – San Joaquin basin. Thermal benefits (i.e., warmer water temperatures) are frequently associated with floodplain rearing of juvenile salmonids, and are thought to provide increased food productivity and, subsequently, improved growth conditions compared to the main channel (Sommer et al. 2001). On the Stanislaus River, temperatures remained low throughout the duration of the sampling period. Water temperatures on average were only about 0.5°F warmer in off-channel habitats compared to surface waters of the adjacent main channel, though some areas with limited water circulation warmed to greater than 3°F above in-river temperatures. As expected, off-channel areas provided low-velocity habitat with mean current velocities of less than 0.4 fps, and many areas with no current were observed as well. Water was often warmer in areas with low current velocities (i.e. sites that were not classified as side-channels), particularly when shade was sparse. Incidents of low dissolved oxygen (nearly anoxic conditions) were occasionally observed in these areas, in particular at sampling points located farthest from the main river channel. Such adverse conditions were likely exacerbated by large amounts of decaying organic matter in these areas, which would be expected to increase the biological oxygen demand.

Increased sampling coverage (spatially – more units) and additional methods (snorkel, seine) provided more information than in 2013 about salmonid presence/absence in off-channel habitats. Due to changes in study design, all sites were only sampled once resulting in an absence of temporal data. It should be noted that even though sampling was conducted three separate times during the pulse flow in 2013, no substantial differences in either environmental conditions or fish habitat usage were noted during sampling events. Therefore, we expect that the one sampling event this year still adequately characterized both environmental conditions and fish habitat usage during the pulse flow in 2014. Sampling gear (backpack electroshocker, seine, and snorkel) efficiency was demonstrated by captures of various fish species, including Chinook salmon, present in inundated areas. Despite extensive sampling effort and collection of non-salmonid species, no juvenile Chinook salmon were documented below RM 48.6. Overall, side-channels (located in upper reaches above Oakdale) appeared to have the greatest usage by salmonids. Honolulu Bar, the Russian Rapids side-channel complex, and Lancaster Road restoration area provided habitat for the vast majority of observed juvenile Chinook salmon. Numerous areas were identified during sampling that have restoration potential, which, similar to existing restoration projects would provide increased side-channel areas at multiple flows.

It is worth noting that relatively small number of Chinook captures cannot be attributed to absence of fish in the system, as large numbers of juveniles were documented at the Oakdale rotary screw trap. Between April 21 and 30, 228 juvenile Chinook (mean fork length = 69.4 mm, min = 50 mm, max = 88 mm) and one rainbow trout (fork length = 48 mm) were captured. Using known catch efficiency rates of the Oakdale rotary screw trap,an estimated 38,000 juvenile Chinook salmon passed the trap during this time period. Though the reasons for presumed lack of off-channel habitat use by juvenile salmonids are speculative, timing of the inundation event is likely an important variable. Given that the majority of juvenile salmon that remain in the system after April are smolts, and considering evidence that larger migrating juveniles typically use mid-channel, higher velocity areas for migration (Kemp et al. 2005; Svendsen et al. 2007), it is likely that these salmon do not utilize the floodplain habitat for extended rearing, but instead migrate rapidly through the lower reaches of the Stanislaus.

It is possible that inundation of these areas earlier in the year (e.g., January and February), under similar flow conditions, could provide suitable rearing habitat for the (often large) number of fry migrating past Oakdale. It is possible that fry, rather than juveniles emigrating from the river and (presumably) searching for rearing habitat near and in the Delta, would use these areas, as expected thermal benefits of off-channel habitat would be more pronounced during this time. In addition, migration speed of fry is likely much slower than that of parr and smolt lifestages, which exhibit active migration behavior and are ocean-bound by late spring, rather than searching for and remaining in freshwater rearing habitat.

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Table 1. Summary of unit size by habitat type on the Stanislaus River, sampled during flows between 2,400 and 2,700 cfs in late April 2014.

Habitat Type	Count	Average Size (m²)	Average Size (acres)	Total Size (m²)	Total Size (acres)	% of Total Area
Margin	78	6,051.8	1.5	472,040.4	116.6	33.7
Backwater	32	11,147.9	2.8	356,733.9	88.2	25.5
Side Channel	14	7,820.7	1.9	109,489.8	27.1	7.8
Meander Cutoff	7	11,274.8	2.8	78,923.3	19.5	5.6
Oxbow	6	11,755.8	2.9	70,534.7	17.4	5.0
Flooded Point Bar	8	6,400.2	1.6	51,201.3	12.7	3.7
Anthropogenic	3	9,591.6	2.4	28,774.8	7.1	2.1
Dry	5	4,983.8	1.2	24,919.1	6.2	1.8
Flooded Island	1	8,791.6	2.2	8,791.6	2.2	0.6
Complex[1]	18	11,103.4	2.7	199,861.9	49.4	14.3
Total	172	8,146.90	2.0	1,401,270.70	346.3	100.0

[1] Complex units were made up of two or more of the primary habitat types

Table 2. Summary of sampled off-channel areas on the lower Stanislaus River at flows between 2,400 and 2,700 cfs.

Site	River Mile	Size (acres)	Habitat Type	Average Temperature (°F)	Average DO (mg/L)	Average Depth (feet)	Average Velocity (fps)
2R	0.7	0.4	Backwater	59.89	4.54	1.08	0.00
4R	2.1	0.2	Margin	58.22	9.69	1.74	0.34
5R	2.8	0.6	Margin	58.42	9.58	2.58	0.08
6R	3.0	0.2	Margin	60.32	8.09	1.66	0.02
8L	3.6	0.7	Margin/Backwater	58.60	9.27	2.40	-0.02
9R	4.5	0.6	Margin	59.39	8.51	2.68	0.01
10R	4.9	2.1	Margin	59.35	9.24	1.45	0.05
69L	17.4	6.2	Side Channel/Backwater	56.12	9.82	2.40	0.22
73L	18.7	1.2	Margin	56.80	9.85	3.00	NA
74L	19.0	1.9	Meander Cutoff	57.13	8.83	0.75	0.08
81R	19.5	5.1	Meander Cutoff	56.90	9.30	3.40	0.79
84R	20.2	1.2	Margin	56.67	7.77	1.17	0.01
94L	23.0	2.3	Meander Cutoff	56.80	9.90	1.85	0.58
95R	23.1	5.7	Meander Cutoff	59.20	3.66	1.22	0.00
97R	23.8	4.8	Margin	57.18	8.49	2.60	0.00
100R	24.6	2.8	Margin	58.25	2.05	2.15	0.00
101L	25.5	1.6	Margin	56.75	9.55	3.50	0.00
107L	27.4	5.5	Side Channel	56.67	10.18	1.90	0.46
119R	31.1	1.2	Side Channel	57.90	0.65	1.00	0.65
120L	31.3	1.1	Margin/Side Channel	57.70	7.58	1.50	0.00
122L	32.3	3.6	Side Channel	58.80	6.30	1.90	0.00
124R	33.4	2.4	Backwater	58.34	10.62	1.46	0.01
126L	36.3	1.1	Meander Cutoff	53.72	10.00	1.72	0.15
130L	38.7	2.9	Margin	54.00	10.22	1.28	0.32
164R	38.8	0.9	Margin	54.80	10.75	1.36	0.52
131R	39.6	2.3	Backwater	NA	NA	0.50	NA
132R	39.7	1.1	Backwater	58.20	9.20	1.90	NA
139R	42.7	1.6	Margin	54.60	10.75	2.25	0.06
141R	44.3	0.6	Side Channel/Flooded Island	55.10	11.05	2.30	0.94
143R	47.5	2	Side Channel/Margin	56.10	10.03	1.00	0.05
168L	48.3	0.7	Margin	NA	NA	1.70	0.28
169L	48.6	0.6	Side Channel	55.33	11.35	2.27	0.07
144L	49.3	1.6	Side Channel	55.76	11.38	2.40	2.00
146L	50.1	1.9	Margin	55.20	11.24	2.30	0.68
149R	51.1	7.5	Side Channel/Flooded Island	54.85	NA	2.36	1.09
171L	52.5	0.9	Anthropogenic	55.95	11.18	0.95	0.03
152R	52.7	0.9	Margin/Side Channel	54.63	11.40	2.63	1.03
156R	53.9	3.5	Side Channel/Margin	54.60	11.29	1.27	0.45
158R	54.1	1.4	Backwater	57.58	4.34	1.33	0.02
159R	54.4	1.3	Margin	53.87	11.08	1.43	0.19
160L	55.6	3.6	Side Channel	54.99	NA	2.07	2.09
161L	56.0	1.9	Side Channel	54.84	NA	3.02	2.79

Table 3. Summary of fish catch data from sampled off-channel areas on the lower Stanislaus River at flows between 2,400 and 2,700 cfs.

Site	River Mile	Date Sampled	Habitat Type	Species (number)[a]	Method	Effort (seconds)	Comment
2R	0.7	4/21/2014	Backwater	MQK (20), LARV (3)	Efish	444	No fish captured during E-fishing, all fish observed visually in the field
4R	2.1	4/21/2014	Margin	LARV (NA)	Efish	394	Larval fish observed, not enumerated
5R	2.8	4/21/2014	Margin	NONE	Efish	175	
6R	3.0	4/21/2014	Margin	LARV (NA)	Efish	277	Larval fish observed, not enumerated
8L	3.6	4/21/2014	Margin/ Backwater	LARV (NA)	Visual	NA	Larval fish not enumerated
9R	4.5	4/21/2014	Margin	NONE	Efish	287	
10R	4.9	4/21/2014	Margin	LARV (NA)	Efish	382	Larval fish observed, not enumerated
68R	17.4	4/22/2014	Anthropogenic	LARV (NA)	Visual	NA	Larval fish not enumerated
69L	17.4	4/22/2014	Side Channel/ Backwater	LARV (NA)	Visual	NA	Larval fish not enumerated
73L	18.7	4/22/2014	Margin	LARV (NA)	Visual	NA	Larval fish not enumerated
74L	19.0	4/22/2014	Meander Cutoff	NONE	Efish	119	
94L	23.0	4/22/2014	Meander Cutoff	NONE	Efish	283	
95R	23.1	4/22/2014	Meander Cutoff	LARV (NA)	Visual	NA	Larval fish only noted at inlet, not enumerated
97R	23.8	4/22/2014	Margin	LARV (NA)	Efish	279	Larval fish observed, not enumerated
107L	27.4	4/22/2014	Side Channel	LARV (NA)	Visual	NA	Larval fish not enumerated
120L	31.3	4/22/2014	Margin/ Side Channel	LARV (NA)	Visual	NA	Larval fish not enumerated

Table 3 (cont'd). Summary of fish catch data from sampled off-channel areas on the lower Stanislaus River at flows between 2,400 and 2,700 cfs.

124R	33.4	4/22/2014	Backwater	UNID SNF, LARV	Efish	285	No fish captured during E-fishing, all fish observed visually in the field
126L	36.3	4/23/2014	Meander Cutoff	SASQ (3)	Efish	180	One fish captured during E-fishing (56 mm), Two fish observed visually in the field
130L	38.7	4/23/2014	Margin	SASQ (2), MQK (1), LARV (NA)	Efish	192	Both SASQ smaller than 62mm; larval fish observed, not enumerated
164R	38.8	4/23/2014	NA	SASU (1), SASQ (1), LARV	Efish	252	All fish smaller than 63 mm; larval fish observed, not enumerated
139R	42.7	4/23/2014	Margin	SASU (2), TSS (5), PRS (1), LARV	Seine/ Snorkel	NA	All fish smaller than 54 mm; larval fish observed, not enumerated
168L	48.3	4/23/2014	Margin	TSS (1)	Visual	NA	Fish observed in field, no size measurement obtained
169L	48.6	4/23/2014	Side Channel	CHN (6), SASQ (2), TSS (4)	Seine/ Snorkel	NA	All SASQ smaller than 52 mm, no CHN or TSS measurements obtained
144L	49.3	4/23/2014	Side Channel	CHN (10), SASU (1)	Snorkel	NA	Majority of fish observed in main side channel, no size measurements obtained
149R	51.1	4/30/2014	Side Channel/ Flooded Island	CHN (180), SASU (202), SASQ (1)	Snorkel	NA	No size measurements obtained
171L	52.5	4/24/2014	Anthropogenic	SASU (NA), MQK (1)	Visual	NA	No size measurement obtained, no count of juvenile SASU
152R	52.7	4/24/2014	Margin/ Side Channel	TSS (2), UNID (1)	Snorkel	NA	Adult UNID, possible BAS, swam away quickly when diver scared it
156R	53.9	4/24/2014	Margin/ Side Channel	CHN (1), TSS (3), SASU (1)	Snorkel	NA	No size measurements obtained
158R	54.1	4/24/2014	Backwater	SASU (1), UNID (3)	Snorkel	NA	No size measurements obtained, 3 unidentified cyprinids (juveniles)
159R	54.4	4/24/2014	Margin	CHN (20), RBT (1)	Snorkel	NA	No CHN size measurements obtained; RBT fry ~ 40 mm
160L	55.6	4/30/2014	Side Channel	CHN (9), RBT (8)	Snorkel	NA	No size measurement obtained; 5 adult RBT & 3 juvenile RBT observed
161L	56.0	4/30/2014	Side Channel	CHN (39), RBT (1), TSS (40)	Snorkel	NA	No size measurements obtained; Juvenile RBT observed

[a] Species codes are as follows: LARV (unidentified larval fish), MQK (mosquitofish), PRS (prickly sculpin), RBT (Rainbow trout), SASQ (Sacramento pikeminnow), SASU (Sacramento sucker), SNF (sunfish), TSS (threespine stickleback), UNID (unidentified)

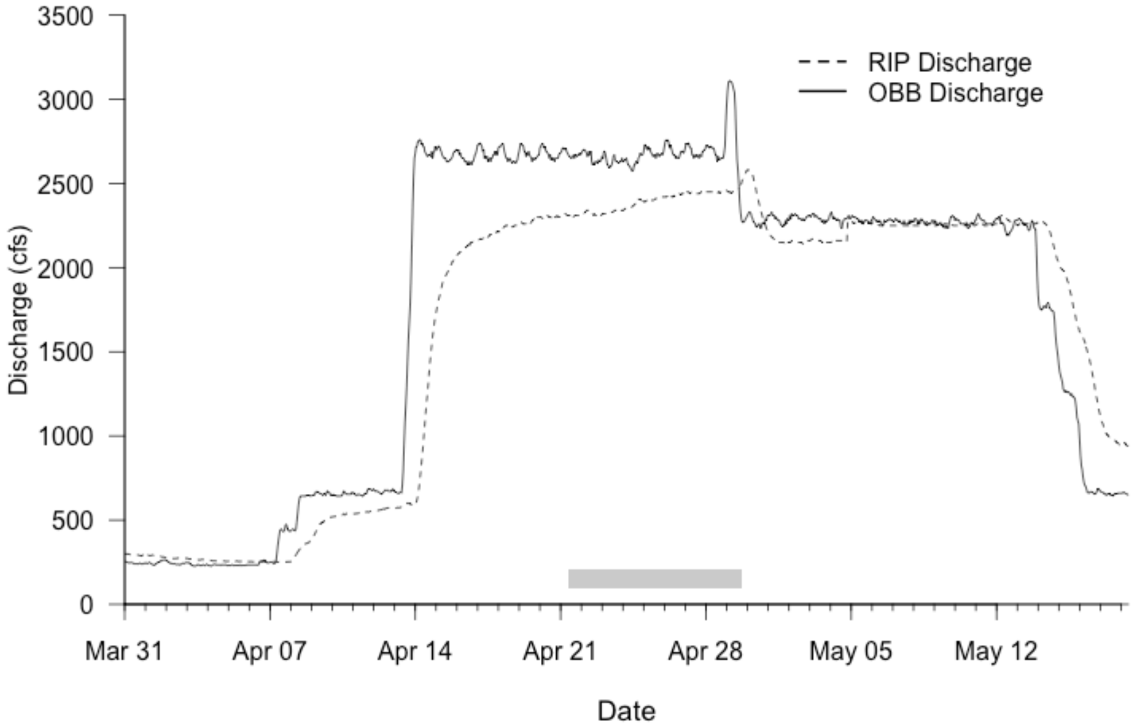

Figure 1. Discharge plots (hourly) from April 1 to May 14, 2014 on the Stanislaus River at Ripon (RIP; RM 17.1) and at Orange Blossom Bridge (OBB; RM 48.4). Shaded rectangle represents sampling period.

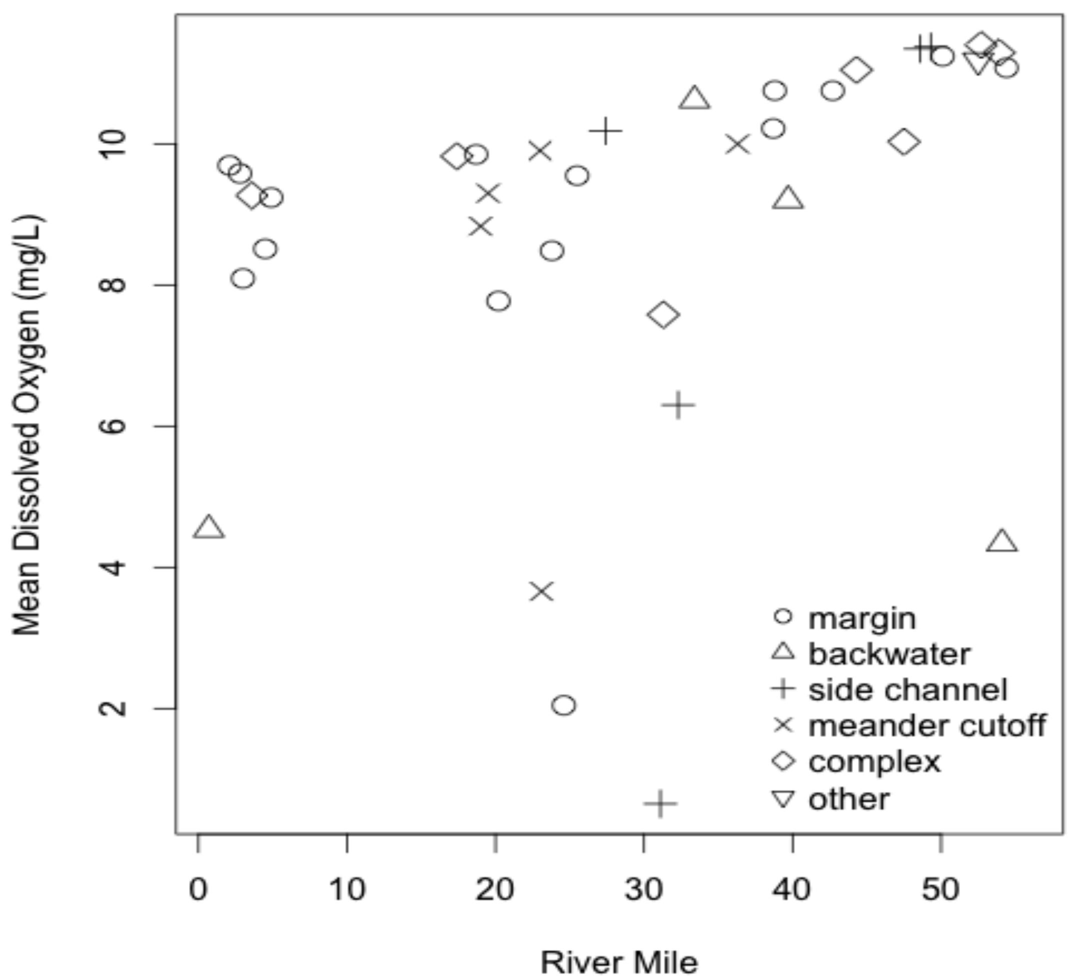

Figure 2. Physical habitat measurements by river mile on the Stanislaus River, sampled during flows between 2,400 and 2,700 cfs in late April 2014.

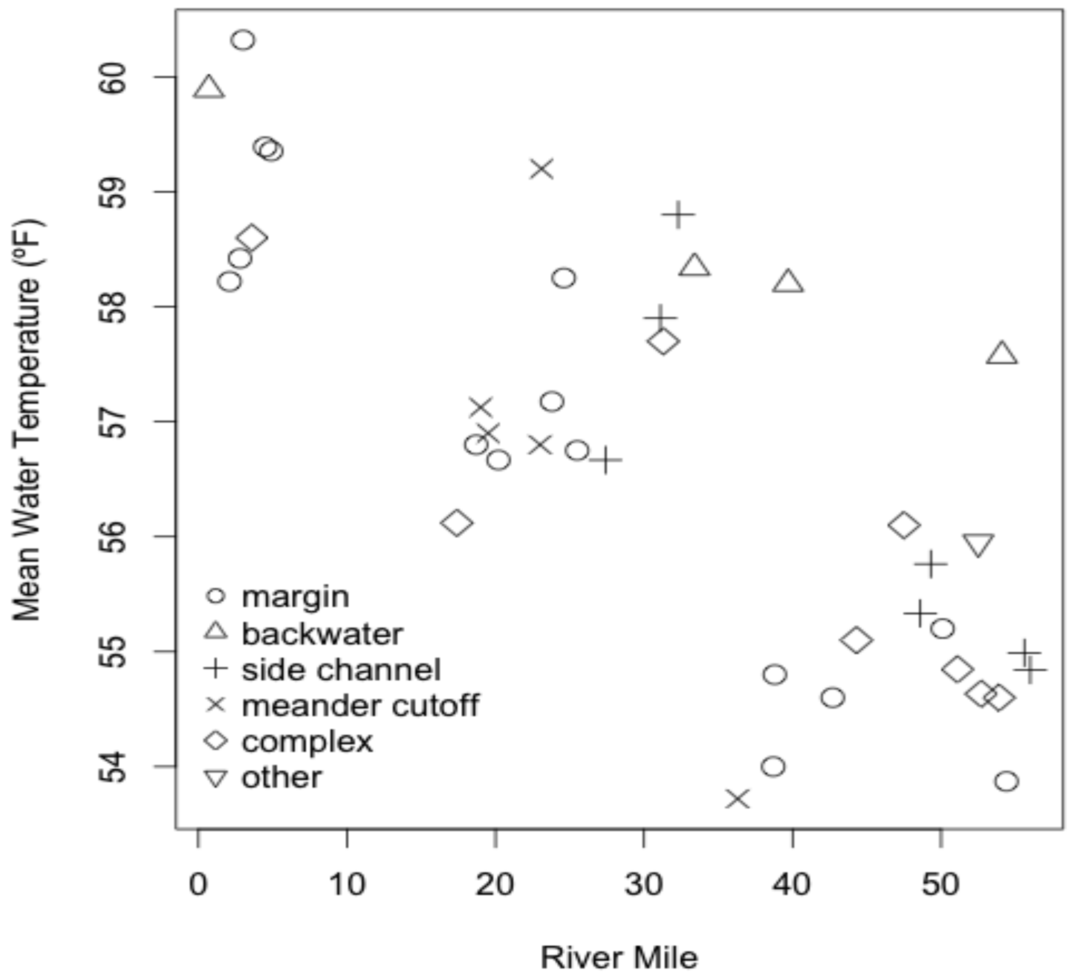

Figure 3. Physical habitat measurements by river mile on the Stanislaus River, sampled during flows between 2,400 and 2,700 cfs in late April 2014.

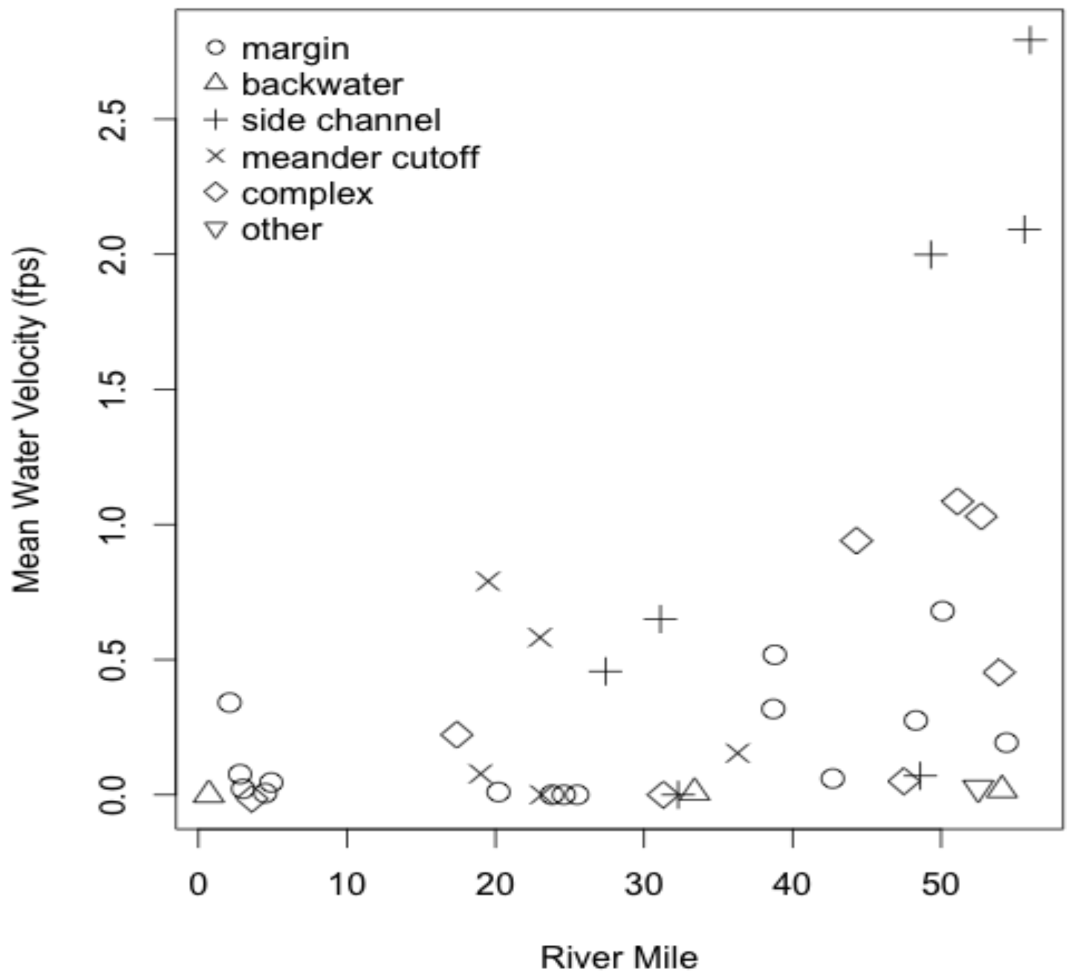

Figure 4. Physical habitat measurements by river mile on the Stanislaus River, sampled during flows between 2,400 and 2,700 cfs in late April 2014.

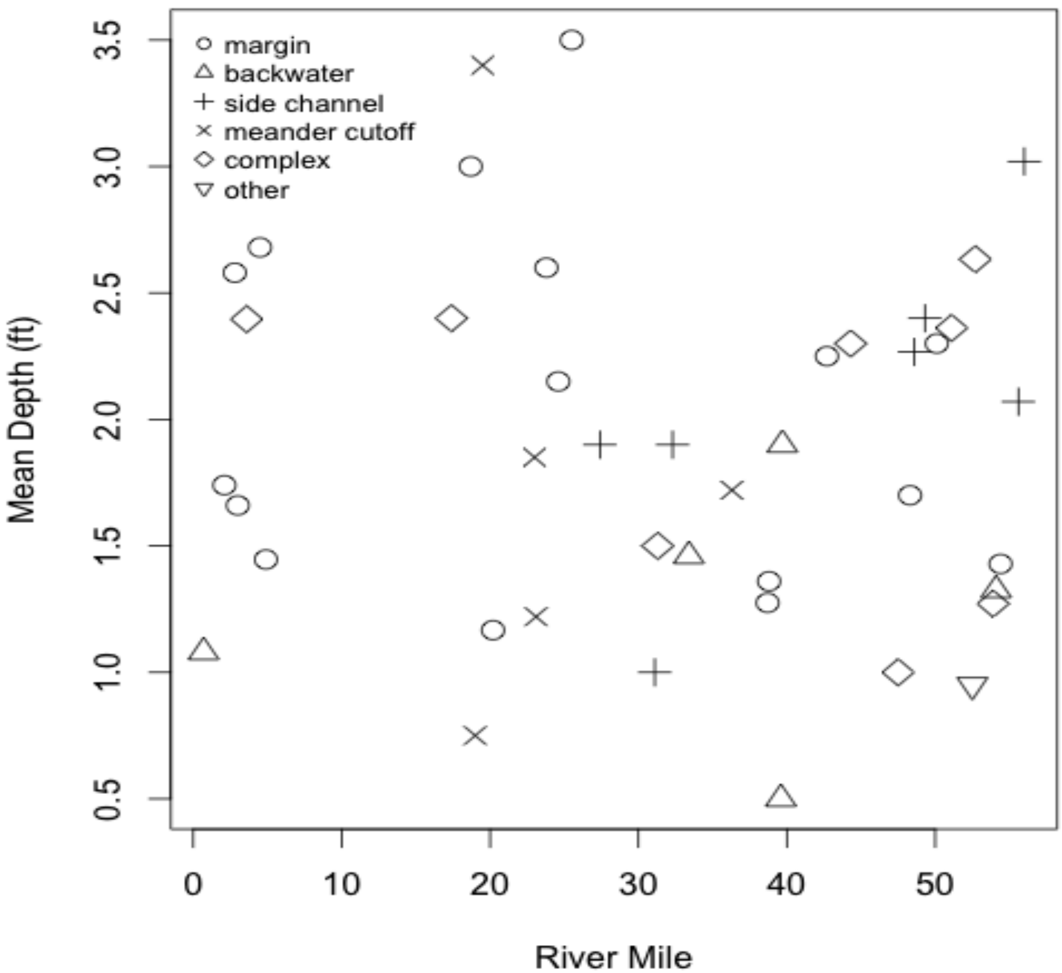

Figure 5. Physical habitat measurements by river mile on the Stanislaus River, sampled during flows between 2,400 and 2,700 cfs in late April 2014.

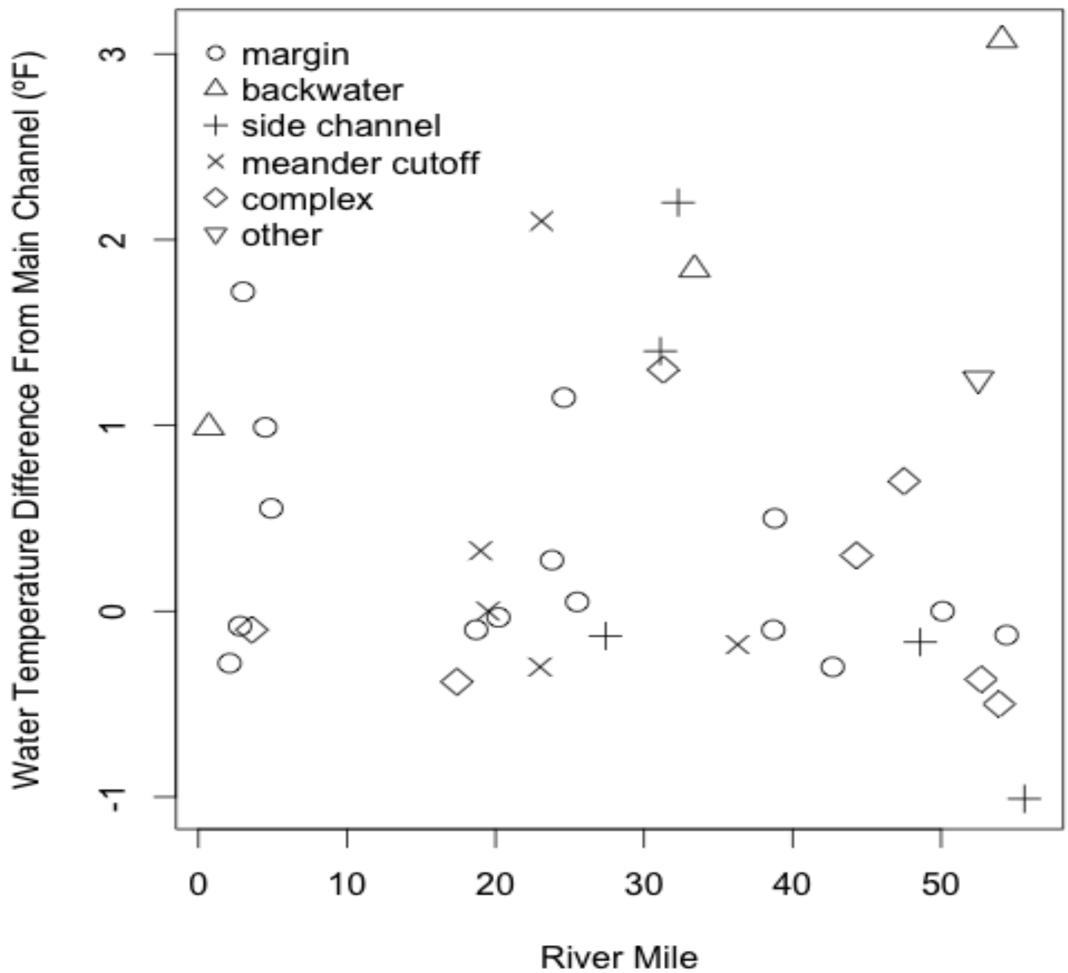

Figure 6. Physical habitat measurements by river mile on the Stanislaus River, sampled during flows between 2,400 and 2,700 cfs in late April 2014.

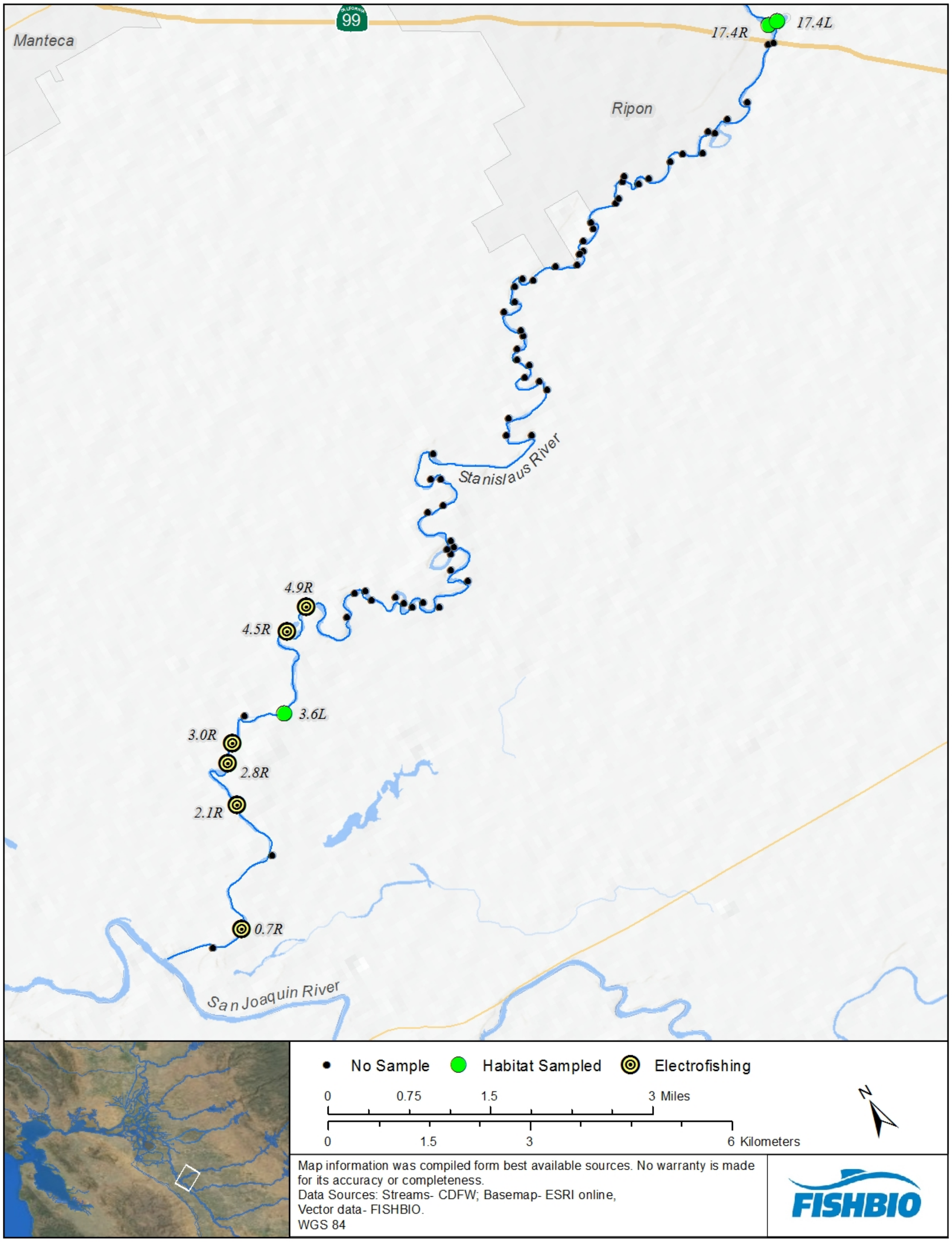

Figure 7. Location of off-channel habitats along the Stanislaus River downstream of Ripon, identified at flows between 2,400 and 2,700 cfs.

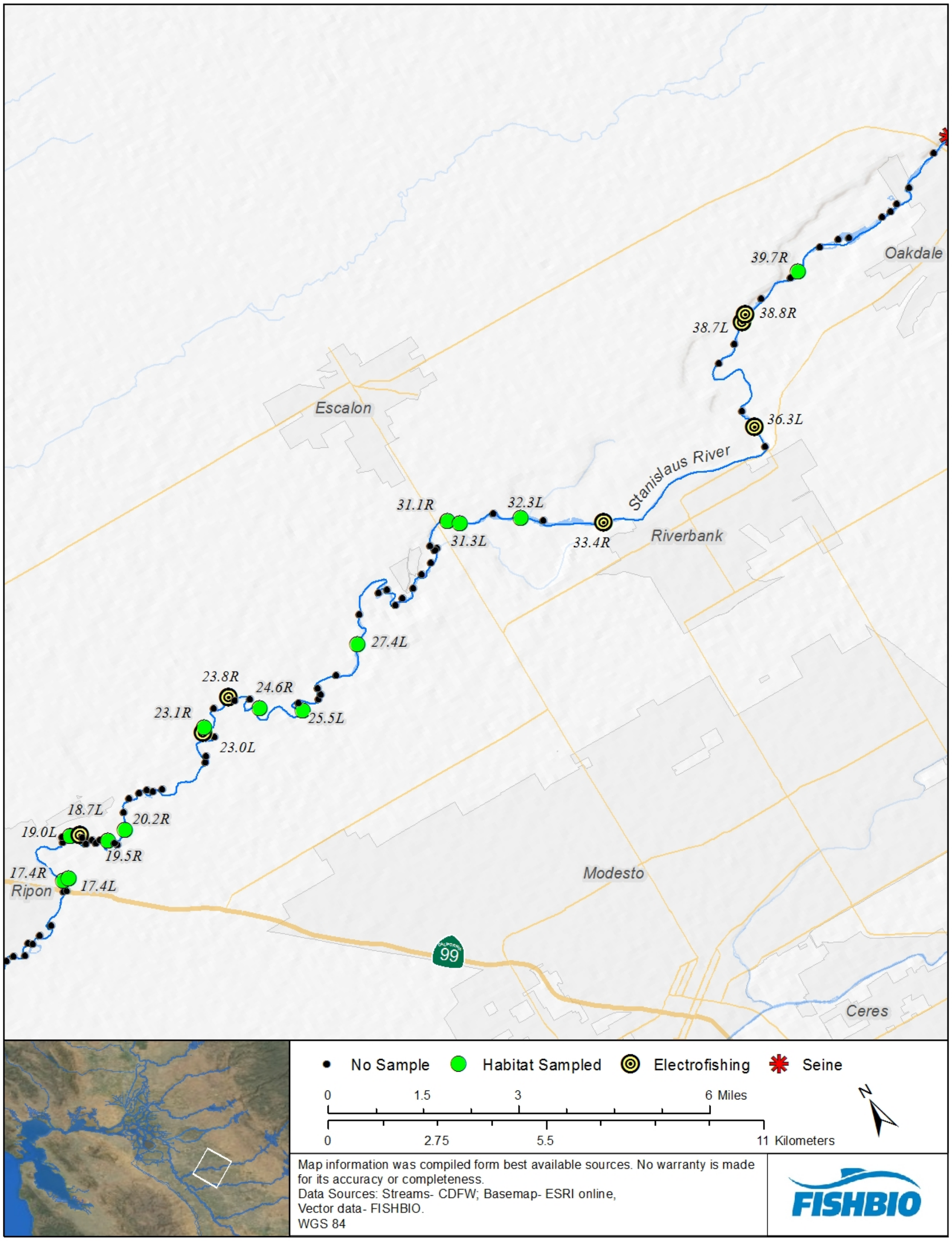

Figure 8. Location of off-channel habitats along the Stanislaus River downstream of Oakdale, identified at flows between 2,400 and 2,700 cfs.

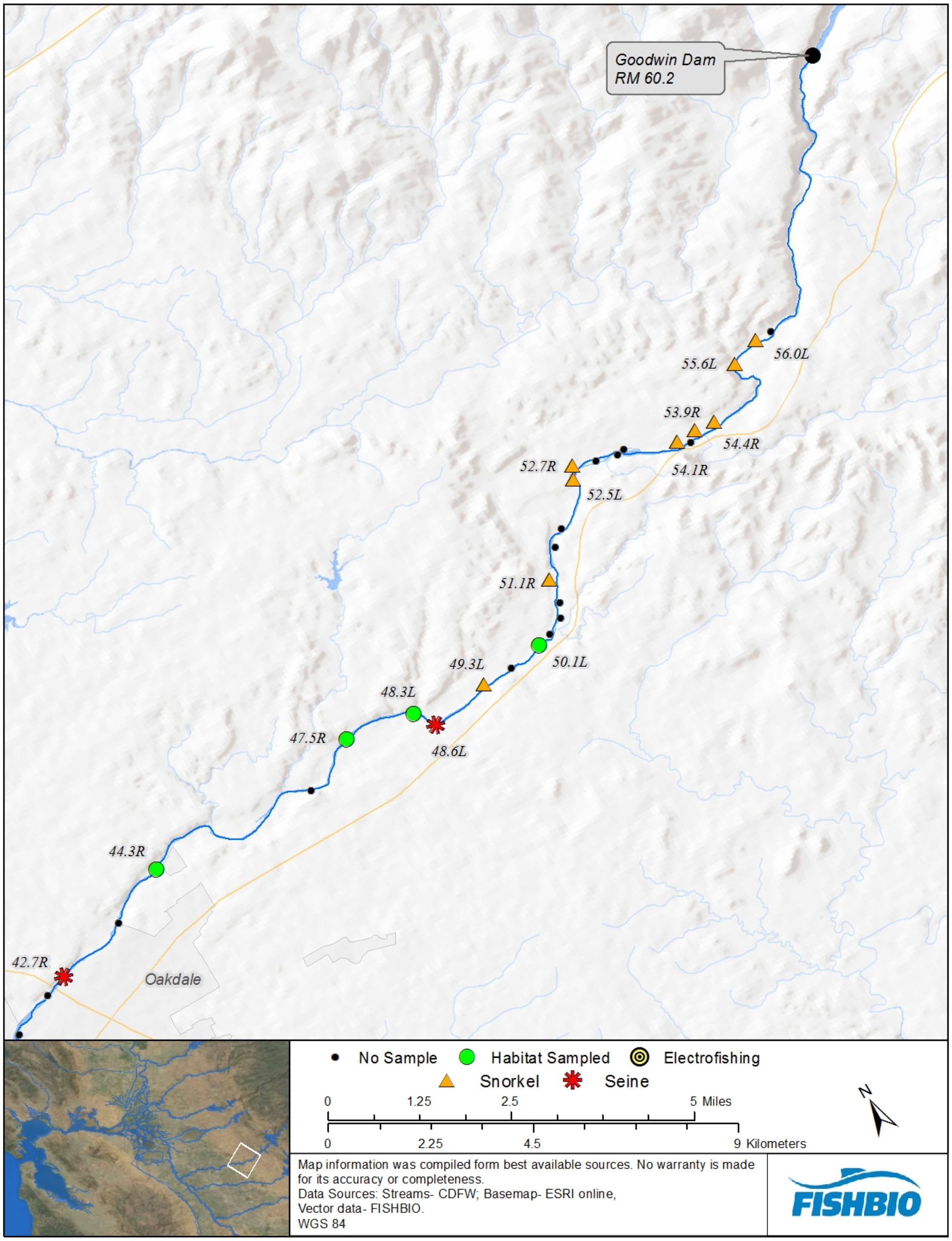

Figure 9. Location of off-channel habitats along the Stanislaus River downstream of Ripon, identified at flows between 2,400 and 2,700 cfs.

Appendices

Appendix 1 – Site Descriptions

Table A-1. Descriptions of habitat, water quality characteristics and summary of fish observations for each inundation site surveyed at flows between 2,400 and 2,700 cfs.

Backwater - Site 1L (RM 0.4) - Deep backwater, good connectivity, 5.2' deep near mouth. No fish or environmental sampling conducted at this site.
Backwater - Site 2R (RM 0.7) was sampled on 2014-04-21. Backwater, no flow through site, zero velocity at all points. Temperature in the main channel was 58.9°F and dissolved oxygen was 8.55 mg/L. Mean site depth was 1.08 feet (min = 0.5 feet; max = 1.6 feet). Mean site water velocity was 0 feet per second ([fps]; min = 0 fps; max = 0 fps). Mean water temperature was 59.89°F (min = 58.9°F; max = 61.2°F). Dissolved oxygen (mg/L) ranged from 1.75 to 8.17 (mean = 4.54 mg/L). E-fishing was conducted for 444 seconds, but yielded no fish. Unidentified larval fish and mosquitofish were observed.
Flooded point bar - Site 3R (RM 1.5) - Dense vegetation, no open water habitat. No fish or environmental sampling conducted at this site.
Margin - Site 4R (RM 2.1) was sampled on 2014-04-21 and was classified as narrow margin. Temperature in the main channel was 58.5°F and dissolved oxygen was 9.65 mg/L. Mean site depth was 1.74 feet (min = 0.7 feet; max = 2.8 feet). Mean site water velocity was 0.34 feet per second ([fps]; min = 0.04 fps; max = 1.08 fps). Mean water temperature was 58.22°F (min = 58°F; max = 58.6°F). Dissolved oxygen (mg/L) ranged from 9.6 to 9.75 (mean = 9.69 mg/L). E-fishing was conducted for 394 seconds but no fish were captured. Only unidentified larval fish were observed.
Margin - Site 5R (RM 2.8) was sampled on 2014-04-21. Margin habitat, fairly large and shallow, very thick vegetation, only accessible along narrow margin. Temperature in the main channel was 58.5°F and dissolved oxygen was 9.51 mg/L. Mean site depth was 2.58 feet (min = 1.5 feet; max = 3.2 feet). Mean site water velocity was 0.08 feet per second ([fps]; min = -0.18 fps; max = 0.37 fps). Mean water temperature was 58.42°F (min = 58.2°F; max = 58.8°F). Dissolved oxygen (mg/L) ranged from 9.33 to 9.75 (mean = 9.58 mg/L). E-fishing was conducted for 175 seconds but no fish were captured or observed.
Margin - Site 6R (RM 3.0) was sampled on 2014-04-21. Brushy margin habitat, no trees on sampled portion. Temperature in the main channel was 58.6°F and dissolved oxygen was 9.67 mg/L. Mean site depth was 1.66 feet (min = 0.8 feet; max = 2.7 feet). Mean site water velocity was 0.02 feet per second ([fps]; min = -0.02 fps; max = 0.09 fps). Mean water temperature was 60.32°F (min = 58.8°F; max = 62.3°F). Dissolved oxygen (mg/L) ranged from 3.34 to 9.6 (mean = 8.09 mg/L). E-fishing was conducted for 277 seconds but no fish were captured or observed.
Backwater - Site 7R (RM 3.2) - Dense vegetation, no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Margin / Backwater - Site 8L (RM 3.6) was sampled on 2014-04-21. Combination of inundated margin (downstream end) and backwater (upstream end). Temperature in the main channel was 58.7°F and dissolved oxygen was 9.68 mg/L. Mean site depth was 2.4 feet (min = 1.6 feet; max = 3.3 feet). Mean site water velocity was -0.02 feet per second ([fps]; min = -0.05 fps; max = 0.01 fps). Mean water temperature was 58.6°F (min = 58.2°F; max = 59.4°F). Dissolved oxygen (mg/L) ranged from 8.45 to 9.64 (mean = 9.27 mg/L). No electrofishing was conducted. Unidentified larval fish were observed.
Margin - Site 9R (RM 4.5) was sampled on 2014-04-21. Margin habitat just upstream of outside bend. Temperature in the main channel was 58.4°F and dissolved oxygen was 9.51 mg/L. Mean site depth was 2.68 feet (min = 2 feet; max = 3.6 feet). Mean site water velocity was 0.01 feet per second ([fps]; min = -0.06 fps; max = 0.05 fps). Mean water temperature was 59.39°F (min = 58.7°F; max = 59.8°F). Dissolved oxygen (mg/L) ranged from 3.03 to 9.65 (mean = 8.51 mg/L). E-fishing was conducted for 287 seconds, no fish captured or observed.
Margin - Site 10R (RM 4.9) was sampled on 2014-04-21. Margin habitat with broad connection to main channel. Temperature in the main channel was 58.8°F and dissolved oxygen was 9.71 mg/L. Mean site depth was 1.45 feet (min = 0.6 feet; max = 3.1 feet). Mean site water velocity was 0.05 feet per second ([fps]; min = 0 fps; max = 0.13 fps). Mean water temperature was 59.35°F (min = 58.7°F; max = 60.1°F). Dissolved oxygen (mg/L) ranged from 5.53 to 9.82 (mean = 9.24 mg/L). E-fishing was conducted for 382

seconds but no fish were captured. Unidentified larval fish were present.
Backwater - Site 11R (RM 5.7) - Backwater habitat - no description from field notes (typed from inundation layer). No fish or environmental sampling was conducted at this site.
Flooded point bar - Site 12L (RM 6) - Dense vegetation, no open water habitat. No fish or environmental sampling conducted at this site.
Margin - Site 13R (RM 6.1) - Downstream end covered with low brush, upstream end with willows. No fish or environmental sampling conducted at this site.
Margin - Site 14L (RM 6.2) - Dense vegetation, no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Backwater / Oxbow - Site 15R (RM 6.5) - Oxbow.
Backwater / Oxbow - Site 16R (RM 6.5) - Oxbow.
Backwater - Site 17L (RM 6.7) - Backwater habitat - no description from field notes (typed from inundation layer). No fish or environmental sampling conducted at this site.
Margin - Site 18R (RM 6.9) - Dense vegetation, no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Backwater - Site 19L (RM 7.1) - Small connection at current flows to very large and deep backwater pond. No fish or environmental sampling conducted at this site.
Backwater - Site 21L (RM 7.5) - flooded backwater covered in small woody debris. No fish or environmental sampling conducted at this site.
Margin - Site 20R (RM 7.7) - Dense vegetation, no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Backwater / Oxbow - Site 22R (RM 8.1) - Oxbow. No fish or environmental sampling conducted at this site.
Backwater / Oxbow - Site 23R (RM 8.1) - Part of 22R oxbow (upstream end). No fish or environmental sampling conducted at this site.
Margin - Site 25L (RM 8.1) - Margin habitat, would call side channel but no flow or current through the connection, good connections at downstream and upstream ends. No fish or environmental sampling conducted at this site.
Margin - Site 24L (RM 8.2) - flooded margin with woody debris habitat, too deep to sample, small.
Margin - Site 26R (RM 8.7) - Margin habitat, fairly narrow, brushy and covered in small woody debris, difficult access. No fish or environmental sampling conducted at this site.
Margin - Site 27L (RM 8.8) - Margin habitat, small, open water habitat, grasses present. No fish or environmental sampling conducted at this site.
Margin - Site 27R (RM 9.1) - Flooded margin, small brush and grassy, small. No fish or environmental sampling conducted at this site.
Backwater - Site 28L (RM 9.3) - Backwater, no connection, likely seepage due to higher groundwater levels, water covered in small woody debris, range (cows were present). No fish or environmental sampling conducted at this site.
Margin - Site 29R (RM 9.8) - Flooded margin with small willows and grasses. No fish or environmental sampling conducted at this site.
Margin - Site 30L (RM 10.8) - Dense vegetation, no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Margin - Site 31R (RM 11) - Flooded margin with dense vegetation at downstream end, more small brush and grasses at upstream end. No fish or environmental sampling conducted at this site.
Margin - Site 32R (RM 11.2) - Flooded margin with dense vegetation (willows and trees), little to no open water habitat. No fish or environmental sampling conducted at this site.
Margin - Site 33L (RM 11.6) - Flooded margin with small brush and medium debris floating on surface (no current), deep. No fish or environmental sampling conducted at this site.
Margin - Site 34L (RM 11.7) - Flooded margin with dense vegetation (willows and trees), little to no open water habitat. No fish or environmental sampling conducted at this site.
Margin - Site 35R (RM 12.0) - No connection observed at current flows, dense vegetation, no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Margin - Site 36L (RM 12.1) - Dense vegetation, no open water habitat, difficult access. No sampling

conducted at this site.
Flooded point bar - Site 37L (RM 12.2) - Flooded point bar with younger willows, little to no open water habitat. No fish or environmental sampling conducted at this site.
Margin - Site 38R (RM 12.4) - Dense vegetation, no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Margin - Site 39R (RM 12.5) - Flooded margin with mostly open water habitat, well connected to main channel. No fish or environmental sampling conducted at this site.
Margin - Site 40L (RM 12.6) - Flooded margin with dense vegetation (willows and trees), little to no open water habitat.
Oxbow - Site 41R (RM 12.8) - Oxbow. No fish or environmental sampling conducted at this site.
Margin - Site 42L (RM 13.1) - Dense vegetation, no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Margin - Site 43L (RM 13.3) - Dense vegetation, no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Backwater - Site 44R (RM 13.4) - Deep. No fish or environmental sampling conducted at this site.
Margin - Site 45L (RM 13.5) - Dense vegetation, no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Margin - Site 46R (RM 13.7) - Dense vegetation, little to no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Margin - Site 47R (RM 13.9) - Dense vegetation, little to no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Margin - Site 48L (RM 14.1) - Dense vegetation, no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Margin - Site 49R (RM 14.1) - Small narrow strip of flooded margin, open water habitat. No fish or environmental sampling conducted at this site.
Backwater - Site 50R (RM 14.2) - Deep, dense vegetation, no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Side Channel - Site 51R (RM 14.3) - Open side channel, good connection to main channel, shaded by mature trees, may be range area. No fish or environmental sampling conducted at this site.
Flooded point bar - Site 52L (RM 14.5) - Flooded point bar - no description from field notes (typed from inundation layer). No fish or environmental sampling conducted at this site.
Dry - Site 53R (RM 14.8) - No connection observed at current flows, did not evaluate habitat if flows were higher. No fish or environmental sampling conducted at this site.
Margin - Site 54L (RM 14.8) - Flooded margin with grasses. No fish or environmental sampling conducted at this site.
Dry - Site 55L (RM 15.0) - No connection observed at current flows, did not evaluate habitat if flows were higher.
Margin / Backwater - Site 56R (RM 15.0) - Dense vegetation, no open water habitat, difficult access, opens into large backwater habitat complex. No fish or environmental sampling conducted at this site.
Margin - Site 58L (RM 15.2) - Dense vegetation, no open water habitat, difficult access, some large woody debris present. No fish or environmental sampling conducted at this site.
Margin - Site 57R (RM 15.4) - Dense vegetation, no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Margin - Site 59L (RM 15.7) - Dense vegetation, no open water habitat, difficult access, could not locate connection due to dense vegetation, likely not connected at 2500 cfs. No fish or environmental sampling conducted at this site.
Dry - Site 60L (RM 15.8) - Open goat pasture, but not inundated at observed flows, shaded, grassy. No fish or environmental sampling conducted at this site.
Margin - Site 61L (RM 16.0) - Flooded margin with some open water, moderate willows, no current. No fish or environmental sampling conducted at this site.
Margin - Site 62R (RM 16.2) - Dense vegetation, no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Backwater - Site 63L (RM 16.2) - Moderate connection at current flow that opens into large backwater,

lower end is connected oxbow. No fish or environmental sampling conducted at this site.
Margin - Site 64R (RM 16.3) - flooded margin, deep, little open water, well connected. No fish or environmental sampling conducted at this site.
Margin - Site 65L (RM 16.6) - Dense vegetation, little to no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Margin - Site 66R (RM 17.2) - Shallow area under and adjacent to Hwy 99 Bridge, grassy. No fish or environmental sampling conducted at this site.
Margin / Backwater - Site 67L (RM 17.2) - Flooded margin and backwater just upstream of Hwy 99 Bridge, well shaded, moderate amount of open water.
Anthropogenic - Site 68R (RM 17.4) Flooded walking path, inundated area small, walking path turned "side channel", larval fish present. No electrofishing was conducted.
Side Channel / Backwater - Site 69L (RM 17.4) was sampled on 2014-04-22. Small side channel connection to large forested off-channel area, no live vegetation, only leaf litter. Temperature in the main channel was 56.5°F and dissolved oxygen was 9.96 mg/L. Mean site depth was 2.4 feet (min = 1.3 feet; max = 3.5 feet). Mean site water velocity was 0.22 feet per second ([fps]; min = 0.02 fps; max = 0.66 fps). Mean water temperature was 56.12°F (min = 55.7°F; max = 56.4°F). Dissolved oxygen (mg/L) ranged from 9.61 to 9.92 (mean = 9.82 mg/L). No electrofishing was conducted. Unidentified larval fish were observed at the site.
Backwater - Site 70L (RM 18.5) - Deep. No fish or environmental sampling conducted at this site.
Oxbow - Site 71R (RM 18.6) - Oxbow, very dense vegetation. No fish or environmental sampling conducted at this site.
Dry - Site 72R (RM 18.7) - Dry, no connection at observed flows, did not evaluate habitat if flows were higher. No fish or environmental sampling conducted at this site.
Margin - Site 73L (RM 18.7) was sampled on 2014-04-22. Deep margin habitat, grassy with some LWD, too deep to E-fish (3.0'). Temperature in the main channel was 56.9 °F and dissolved oxygen was 9.94 mg/L. Only one point was taken at this site. Depth was 3.0 feet, water velocity was not measured, and dissolved oxygen was 9.85 mg/L. No electrofishing was conducted. Unidentified larval fish were observed at the site.
Meander cutoff - Site 74L (RM 19.0) was sampled on 2014-04-22. Shallow, small meander cutoff, all shaded. Temperature in the main channel was 56.8 °F and dissolved oxygen was 9.87 mg/L. Mean site depth was 0.75 feet (min = 0.5 feet; max = 0.9 feet). Mean site water velocity was 0.08 feet per second ([fps]; min = 0 fps; max = 0.24 fps). Mean water temperature was 57.12°F (min = 57.0°F; max = 57.4 °F). Dissolved oxygen (mg/L) ranged from 8.22 to 9.39 (mean = 8.83 mg/L). E-fishing was conducted for 119 seconds and yielded no captures or observations of fish.
Backwater - Site 75R (RM 19.0) - Deep backwater, floating debris, no current. No fish or environmental sampling conducted at this site.
Backwater - Site 76L (RM 19.1) - Deep backwater, good connectivity. No fish or environmental sampling conducted at this site.
Margin - Site 77R (RM 19.3) - Moderate vegetation, moderate open water, good connectivity. No fish or environmental sampling conducted at this site.
Backwater - Site 78L (RM 19.3) - Deep backwater, good connectivity. No fish or environmental sampling conducted at this site.
Margin - Site 79R (RM 19.4) - Flooded margin, small brush, small size. No fish or environmental sampling conducted at this site.
Margin - Site 80L (RM 19.4) - flooded margin, small brush and grassy, small. No fish or environmental sampling conducted at this site.
Meander cutoff - Site 81R (RM 19.5) was sampled on 2014-04-22. Very large meander cutoff, deep with dense vegetation, flow noticeable on downstream end. Temperature in the main channel was 56.9°F and dissolved oxygen was 9.86 mg/L. Only one point taken at downstream end. Site depth was 3.4 feet, water velocity was 0.79 feet per second, water temperature was 56.9°F and dissolved oxygen (mg/L) was 9.3 mg/L. No fish sampling was conducted.
Backwater - Site 83L (RM 19.8) - Deep backwater, moderate amount of large woody debris, shaded. No fish or environmental sampling conducted at this site.
Flooded point bar - Site 82L (RM 19.9) - Small vegetation, moderate open water. No fish or

environmental sampling conducted at this site.
Margin - Site 84R (RM 20.2) was sampled on 2014-04-22. Shaded, shallow flooded off-channel habitat, very small connection to main channel, barely inundated at 2500 cfs. Temperature in the main channel was 56.7°F and dissolved oxygen was 9.96 mg/L. Mean site depth was 1.17 feet (min = 0.3 feet; max = 2.1 feet). Mean site water velocity was 0.01 feet per second ([fps]; min = 0 fps; max = 0.03 fps). Mean water temperature was 56.67 °F (min = 56°F; max = 57.6°F). Dissolved oxygen (mg/L) ranged from 6.42 to 9.67 (mean = 7.77 mg/L). No fish sampling was conducted.
Margin - Site 85R (RM 20.5) - Dense vegetation, little to no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Backwater - Site 86R (RM 20.7) - Large backwater, but very difficult to access due to dense vegetation. No fish or environmental sampling conducted at this site.
Margin - Site 87L (RM 20.9) - Too deep and dense to sample. No fish or environmental sampling conducted at this site.
Backwater - Site 88R (RM 21) - Very large backwater (based on inundation layer) with poor connectivity. No fish or environmental sampling conducted at this site.
Backwater - Site 89L (RM 21.2) - Deep. No fish or environmental sampling conducted at this site.
Margin - Site 90R (RM 21.3) - large but very dense vegetation. No fish or environmental sampling conducted at this site.
Meander cutoff - Site 91R (RM 22.2) - Dense vegetation. No fish or environmental sampling conducted at this site.
Backwater - Site 92L (RM 22.3) - Large and deep, very dense vegetation. No fish or environmental sampling conducted at this site.
Margin - Site 93L (RM 22.8) - Flooded margin, heavily shaded, moderate to little open water. No fish or environmental sampling conducted at this site.
Meander cutoff - Site 94L (RM 23.0) was sampled on 2014-04-22. Good flow and connectivity. Temperature in the main channel was 57.1°F and dissolved oxygen was 9.89 mg/L. Mean site depth was 1.85 feet (min = 1.2 feet; max = 3 feet). Mean site water velocity was 0.58 feet per second ([fps]; min = 0.16 fps; max = 0.92 fps). Mean water temperature was 56.8°F (min = 56.7°F; max = 57°F). Dissolved oxygen (mg/L) ranged from 9.77 to 9.96 (mean = 9.9 mg/L). E-fishing was conducted for 283 seconds but yielded no observed or captured fish.
Meander cutoff - Site 95R (RM 23.1) was sampled on 2014-04-22. Large low-lying, dense vegetation, wet areas but stagnant water (likely seepage from raised groundwater level), very small upstream connection, larval fish were observed at inlet. Temperature in the main channel was 57.1°F and dissolved oxygen was 9.89 mg/L. Mean site depth was 1.22 feet (min = 0.4 feet; max = 2.1 feet). The site had zero flow. Mean water temperature was 59.2°F (min = 57.7 °F; max = 60.4 °F). Dissolved oxygen (mg/L) ranged from 0.27 to 9.54 (mean = 3.66 mg/L). No electrofishing was conducted.
Margin / Backwater - Site 96R (RM 23.5) - Densely vegetated. No fish or environmental sampling conducted at this site.
Margin - Site 97R (RM 23.8) was sampled on 2014-04-22. Large, shallow densely vegetated area. Temperature in the main channel was 56.9°F and dissolved oxygen was 9.96 mg/L. Mean site depth was 2.6 feet (min = 2.3 feet; max = 3.1 feet). No flow was observed at site. Mean water temperature was 57.17°F (min = 56.9 °F; max = 57.6 °F). Dissolved oxygen (mg/L) ranged from 5.31 to 9.75 (mean = 8.48 mg/L). Electrofishing was conducted for 279 seconds but yielded no captured or observed fish. Unidentified larval fish were observed.
Margin - Site 98L (RM 23.9) - very large, very densely vegetated. No fish or environmental sampling conducted at this site.
Margin - Site 99R (RM 24.2) - Dense vegetation, little to no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Margin - Site 100R (RM 24.6) was sampled on 2014-04-22. Long margin habitat, presumably connected to large backwater via narrow channel, however backwater and margin not connected at current flows. Temperature in the main channel was 57.1°F and dissolved oxygen was 9.98 mg/L. Mean site depth was 2.15 feet (min = 1.7 feet; max = 2.6 feet). No flow was observed. Mean water temperature was 58.25°F (min = 56.9°F; max = 59.6°F). Dissolved oxygen (mg/L) ranged from 0.61 to 3.48 (mean = 2.04 mg/L). No electrofishing was conducted.

Margin - Site 101L (RM 25.5) was sampled on 2014-04-22. Inundated forest floor, seemingly only one small connection to main channel, too deep to sample. Temperature in the main channel was 56.7°F and dissolved oxygen was 10.12 mg/L. Mean site depth was 3.5 feet (min = 3.2 feet; max = 3.8 feet). No flow was observed. Mean water temperature was 56.75°F (min = 56.7°F; max = 56.8°F). Dissolved oxygen (mg/L) ranged from 9.47 to 9.63 (mean = 9.55 mg/L). No fish sampling was conducted.
Meander cutoff - Site 102L (RM 25.8) - large meander cutoff, unable to locate connection or verify connectivity at current flows (very unlikely connection). No fish or environmental sampling conducted at this site.
Margin - Site 103R (RM 26.1) - Dense willows. No fish or environmental sampling conducted at this site.
Margin - Site 104L (RM 26.2) - Dense vegetation, no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Possible margin - Site 105L (RM 26.3) - Notes: not sure how to classify, unaccessible due to dense vegetation, no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Margin - Site 106R (RM 26.7) - Long, narrow inudnated margin, dense vegetation. No fish or environmental sampling conducted at this site.
Side Channel - Site 107L (RM 27.4) was sampled on 2014-04-22. Large, shallow side channel area with good flow at upstream end, connectivity obscured by dense vegetation. Temperature in the main channel was 56.8°F and dissolved oxygen was 10.27 mg/L. Mean site depth was 1.9 feet (min = 1.2 feet; max = 2.9 feet). Mean site water velocity was 0.46 feet per second ([fps]; min = 0.3 fps; max = 0.68 fps). Mean water temperature was 56.67°F (min = 56.6°F; max = 56.8°F). Dissolved oxygen (mg/L) ranged from 10.16 to 10.21 (mean = 10.18 mg/L). No electrofishing was conducted, but unidentified larval fish were observed.
Margin / Side Channel - Site 108R (RM 27.9) - Long inundated margin and side channel. No fish or environmental sampling conducted at this site.
Backwater - Site 109L (RM 28.9) - Off-channel pond. No fish or environmental sampling conducted at this site.
Margin - Site 111R (RM 29) - Notes: flooded beach (McHenry park), moderate amount of open water, deep. No fish or environmental sampling conducted at this site.
Margin / Oxbow - Site 110L (RM 29.4) - Densely vegetated margin, presumably connected to oxbow. No fish or environmental sampling conducted at this site.
Dry - Site 112R (RM 29.5) - Not connected at current flows. No fish or environmental sampling conducted at this site.
Margin - Site 113L (RM 29.8) - No description from field notes. No fish or environmental sampling conducted at this site.
Margin - Site 114R (RM 30.0) - No description from field notes. No fish or environmental sampling conducted at this site.
Side Channel - Site 115R (RM 30.3) - Flooded side channel, inlet open, decent flow. No fish or environmental sampling conducted at this site.
Margin - Site 116L (RM 30.5) - Dense vegetation, little to no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Margin - Site 117R (RM 30.5) - Flooded beach, small, no vegetation for cover. No fish or environmental sampling conducted at this site.
Side Channel - Site 116bL (RM 30.6) - barely connected at current flows, lots of larval fish. No fish or environmental sampling conducted at this site.
Flooded point bar - Site 118L (RM 31.0) - Dense vegetation, no open water habitat, difficult access. No fish or environmental sampling conducted at this site.
Side Channel - Site 119R (RM 31.1) was sampled on 2014-04-22. Shallow, side channel, only connected at lower end. Temperature in the main channel was 56.5°F and dissolved oxygen was 10.26 mg/L. Only one point was taken; site depth was 1 feet, water velocity was 0.0 feet per second, water temperature was 57.9°F and dissolved oxygen (mg/L) was 0.65 mg/L. No fish sampling was conducted.
Margin / Side Channel - Site 120L (RM 31.3) was sampled on 2014-04-22. Flooded margin / side channel. Temperature in the main channel was 56.4°F and dissolved oxygen was 10.33 mg/L. Only one point was taken at this site. Site depth was 1.5 feet, water velocity was 0 feet per second, water temperature was

57.7°F, and dissolved oxygen (mg/L) was 7.58 mg/L. No electrofishing was conducted but unidentified larval fish were observed at the site.
Flooded point bar - Site 121L (RM 31.8) - Dense vegetation. No fish or environmental sampling conducted at this site.
Side Channel - Site 122L (RM 32.3) was sampled on 2014-04-22. Shallow side channel with thick vegetation, very little flow. Temperature in the main channel was 56.6°F and dissolved oxygen was 10.46 mg/L. Only one point taken at this site; site depth was 1.9 feet, water velocity was 0 feet per second, water temperature was 58.8°F, and dissolved oxygen (mg/L) was 6.3 mg/L. No fish sampling was conducted.
Margin - Site 123R (RM 32.6) - Long flooded margin. No fish or environmental sampling conducted at this site.
Backwater - Site 124R (RM 33.4) was sampled on 2014-04-22. Well connected backwater (at downstream end), noticed juvenile sunfishes when pulling up. Temperature in the main channel was 56.5°F and dissolved oxygen was 10.59 mg/L. Mean site depth was 1.46 feet (min = 1 feet; max = 2 feet). Mean site water velocity was 0.01 feet per second ([fps]; min = 0 fps; max = 0.02 fps). Mean water temperature was 58.34°F (min = 56.9°F; max = 60.3°F). Dissolved oxygen (mg/L) ranged from 9.79 to 11.73 (mean = 10.62 mg/L). E-fishing was conducted for 285 seconds, but no fish were captured, however unidentified larval fish were observed.
Meander cutoff / Margin - Site 125R (RM 35.9) - Densely vegetated. No fish or environmental sampling conducted at this site.
Meander cutoff - Site 126L (RM 36.3) was sampled on 2014-04-23. Well connected upstream end, thick vegetation. Temperature in the main channel was 53.9°F and dissolved oxygen was 10.16 mg/L. Mean site depth was 1.72 feet (min = 1 feet; max = 2.9 feet). Mean site water velocity was 0.15 feet per second ([fps]; min = 0.09 fps; max = 0.21 fps). Mean water temperature was 53.72°F (min = 53.6°F; max = 53.8°F). Dissolved oxygen (mg/L) ranged from 9.75 to 10.15 (mean = 10.0 mg/L). E-fishing was conducted for 180 seconds and captured 1 juvenile pikeminnow and observed 2 others.
Flooded point bar - Site 127L (RM 36.6) - Larger grassy area only a couple inches above water would likely inundate at 3000 cfs. No fish or environmental sampling conducted at this site.
Margin - Site 128L (RM 38.0) - Long, narrow inundated margin, dense vegetation. No fish or environmental sampling conducted at this site.
Margin - Site 129R (RM 38.3) - Inundated margin, dense and inaccessible. No fish or environmental sampling conducted at this site.
Margin - Site 130L (RM 38.7) was sampled on 2014-04-23. Long inundated margin, rough boatramp or access road only accessible spot. Temperature in the main channel was 54.1°F and dissolved oxygen was 10.38 mg/L. Mean site depth was 1.27 feet (min = 0.7 feet; max = 1.7 feet). Mean site water velocity was 0.32 feet per second ([fps]; min = 0.01 fps; max = 1.03 fps). Mean water temperature was 54°F (min = 53.8°F; max = 54.3°F). Dissolved oxygen (mg/L) ranged from 10.03 to 10.42 (mean = 10.22 mg/L). E-fishing was conducted for 192 seconds and juvenile pikeminnow and mosquitofish were captured. Unidentified larval fish were present.
Margin - Site 199R (RM 38.8) was sampled on 2014-04-23. Shallow inundated area with moderate current, downstream of walnut orchard. Temperature in the main channel was 54.3°F and dissolved oxygen was 10.54 mg/L. Mean site depth was 1.36 feet (min = 0.5 feet; max = 1.9 feet). Mean site water velocity was 0.52 feet per second ([fps]; min = -0.02 fps; max = 1.94 fps). Mean water temperature was 54.8°F (min = 54.1°F; max = 56.4°F). Dissolved oxygen (mg/L) ranged from 10.59 to 11.18 (mean = 10.75 mg/L). E-fishing was conducted for 252 seconds and juvenile suckers, pikeminnow and unidentified larval fish were observed but not captured.
Backwater - Site 130cR (RM 39.1) - Pond behind residence part of deep backwater that stays inundated year-round. No fish or environmental sampling conducted at this site.
Backwater - Site 131R (RM 39.6) - Large backwater, not connected at current flows (a few inches more would connect). No fish or environmental sampling conducted at this site.
Backwater - Site 132R (RM 39.7) was sampled on 2014-04-23. Just barely connected at current flow, covered with duckweed. Only one point taken at this site, water temperature was 58.2°F and dissolved oxygen (mg/L) was 9.2 mg/L.
Margin - Site 133L (RM 40.2) - Deep (4.4' off bow of boat), very dense vegetation just downstream of "lake" at Oakdale Recreation Area. No fish or environmental sampling conducted at this site.

Backwater - Site 134R (RM 40.5) - Oakdale Recreation Area, always inundated, deep. No fish or environmental sampling conducted at this site.
Backwater - Site 135R (RM 40.6) - Other side of lake/pond at Oakdale Recreation Area. No fish or environmental sampling conducted at this site.
Backwater - Site 136R (RM 41.1) - Large deep backwater covered with aquatic vegetation. No fish or environmental sampling conducted at this site.
Flooded island - Site 137L (RM 41.3) - Large inundated island, too deep to sample (good flow through). No fish or environmental sampling conducted at this site.
Backwater - Site 137R (RM 41.4) - Pond immediately adjacent to Oakdale RST, barely connected at 2500 cfs. No fish or environmental sampling conducted at this site.
Anthropogenic - Site 138L (RM 41.8) - Flooded backyards on River Left - did not sample due to access issues, heavily modified.
Side Channel - Site 138bR (RM 42.4) - Narrow side channel covered in blackberries. No fish or environmental sampling conducted at this site.
Margin - Site 139R (RM 42.7) was sampled on 2014-04-23. Long narrow flooded margin, too deep to wade at downstream end, access point at middle of site (seined and snorkeled), maintained access road through vegetation, unpaved. Temperature in the main channel was 54.9°F and dissolved oxygen was 10.9 mg/L. Mean site depth was 2.25 feet (min = 2 feet; max = 2.6 feet). Mean site water velocity was 0.06 feet per second ([fps]; min = 0.03 fps; max = 0.09 fps). Mean water temperature was 54.6°F (min = 54.3°F; max = 55°F). Dissolved oxygen (mg/L) ranged from 10.62 to 10.85 (mean = 10.75 mg/L). No electrofishing was conducted. Seining was conducted in open area and captured prickly sculpin, juvenile suckers and threespine stickleback.
Side Channel / Backwater / Flooded island - Site 140L (RM 43.5) - too deep to seine or wade. No fish or environmental sampling conducted at this site.
Side Channel / Flooded island - Site 141R (RM 44.3) was sampled on 2014-04-23. Deep side channel (>5'), dense willows. Temperature in the main channel was 54.8°F and dissolved oxygen was 11.14 mg/L. Mean site depth was 2.3 feet (min = 1.3 feet; max = 3.4 feet). Mean site water velocity was 0.94 feet per second ([fps]; min = 0.07 fps; max = 2.29 fps). Mean water temperature was 55.1°F (min = 54.8°F; max = 55.6°F). Dissolved oxygen (mg/L) ranged from 10.86 to 11.14 (mean = 11.05 mg/L). No fish sampling was conducted.
Margin - Site 142L (RM 46.7) - Flooded margin, very dense vegetation, some open area further off-channel but inaccessible, more open towards top but too deep to wade. No fish or environmental sampling conducted at this site.
Side Channel / Margin / Island - Site 143R (RM 47.5) was sampled on 2014-04-23. Side channel/flooded margin, side channel too deep to sample, margin/island barely inundated. Temperature in the main channel was 55.4°F and dissolved oxygen was 11.26 mg/L. Mean site depth was 1 feet (min = 0.3 feet; max = 1.7 feet). Mean site water velocity was 0.05 feet per second ([fps]; min = 0.05 fps; max = 0.05 fps). Mean water temperature was 56.1°F (min = 55.5°F; max = 56.7°F). Dissolved oxygen (mg/L) ranged from 9.83 to 10.23 (mean = 10.03 mg/L). No fish sampling was conducted.
Margin - Site bonus2 (RM 48.3) was sampled on 2014-04-23. Just downstream of Orange Blossom Bridge on river left, inundated margin, noted 1 stickleback, well connected to main channel, did not take DO or temp (not on original list). No mid-channel temperature or dissolved oxygen readings were taken. Mean site depth was 1.7 feet (min = 1.5 feet; max = 1.9 feet). Mean site water velocity was 0.28 feet per second ([fps]; min = 0.15 fps; max = 0.4 fps).
Side Channel - Site bonus3 (RM 48.6) was sampled on 2014-04-23. Not on original list, side channel, connected through dense debris, seined (1 juvenile Chinook; FL = 52 mm) and snorkeled (observed 4 juvenile Chinook on margin adjacent to river). Temperature in the main channel was 55.5°F and dissolved oxygen was 10.91 mg/L. Mean site depth was 2.27 feet (min = 2.1 feet; max = 2.5 feet). Mean site water velocity was 0.07 feet per second ([fps]; min = 0.05 fps; max = 0.1 fps). Mean water temperature was 55.33°F (min = 55.3°F; max = 55.4°F). Dissolved oxygen (mg/L) ranged from 11.31 to 11.37 (mean = 11.35 mg/L). Juvenile pikeminnow and threespine stickleback were also observed at the site.
Side Channel - Site 144L (RM 49.3) was sampled on 2014-04-23. Lancaster Road restoration area, series of side channels, snorkeled with 2 divers, observed 10 juvenile Chinook and 1 adult sucker. No mid-channel temperature or dissolved oxygen readings were taken. Mean site depth was 2.4 feet (min = 1.7

feet; max = 3.2 feet). Mean site water velocity was 2.0 feet per second ([fps]; min = 1.0 fps; max = 3.19 fps). Mean water temperature was 55.76°F (min = 55.6°F; max = 56.2°F). Dissolved oxygen (mg/L) ranged from 11.28 to 11.42 (mean = 11.38 mg/L).
Side Channel - Site 145R (RM 49.7) - Flooded side channel, many points of connectivity, long island separates main channel. No fish or environmental sampling conducted at this site.
Margin - Site 146L (RM 50.1) was sampled on 2014-04-24. Flooded margin with total connectivity, many deep spots throughout, heavily wooded, good flow. Temperature in the main channel was 55.2°F and dissolved oxygen was 11.21 mg/L. Mean site depth was 2.3 feet (min = 1.5 feet; max = 3.1 feet). Mean site water velocity was 0.68 feet per second ([fps]; min = 0.56 fps; max = 0.8 fps). Mean water temperature was 55.2°F (min = 55.1°F; max = 55.3°F). Dissolved oxygen (mg/L) ranged from 11.14 to 11.34 (mean = 11.24 mg/L). No fish sampling was conducted.
Side Channel - Site 147R (RM 50.4) - Long side channel, connectivity at top and bottom. No fish or environmental sampling conducted at this site.
Side Channel - Site 147bL (RM 50.6) - Flooded side channel, inlet at top and bottom (well connected), may be part of 148 (very large). No fish or environmental sampling conducted at this site.
Margin - Site 148L (RM 50.8) - high flows through margin, total connectivity - may be better floodplain at slightly higher flows. No fish or environmental sampling conducted at this site.
Side Channel / Flooded island - Site 149R (RM 51.1) was sampled on 2014-04-30. Honolulu Bar restoration area; snorkeled and observed 180 juvenile Chinook (147 in side channel and 33 in flood margin), 200 juvenile suckers, 2 adult suckers, 1 adult pikeminnowNo mid-channel temperature or dissolved oxygen readings were taken. Mean site depth was 2.36 feet (min = 1.4 feet; max = 3.1 feet). Mean site water velocity was 1.09 feet per second ([fps]; min = 0 fps; max = 4.67 fps). Mean water temperature was 54.85°F (min = 54.5°F; max = 56.2°F).
Margin / Backwater - Site 150L (RM 51.6) - Little connectivity at top and bottom. No fish or environmental sampling conducted at this site.
Backwater - Site 151R (RM 51.8) - Connectivity year-round (Dominic Giudice - CDFW pers. comm.), deep backwater just downstream of take out at Horseshoe Bend. No fish or environmental sampling conducted at this site.
Anthropogenic - Site Bonus4 (RM 52.5) was sampled on 2014-04-24. Flooded access road at upstream end of Horseshoe Bend campground, water trickled down road into several isoloated ponds (no connection for fish; observed school of juvenile suckers, mosquitofish, and unidentified larval fish in connected portion). Temperature in the main channel was 54.7°F and dissolved oxygen was 11.31 mg/L. Mean site depth was 0.95 feet (min = 0.9 feet; max = 1 feet). Mean site water velocity was 0.02 feet per second ([fps]; min = 0 fps; max = 0.05 fps). Mean water temperature was 55.95°F (min = 54.8 °F; max = 57.1°F). Dissolved oxygen (mg/L) ranged from 11.04 to 11.32 (mean = 11.18 mg/L).
Margin / Side Channel - Site 152R (RM 52.7) was sampled on 2014-04-24. Margin and top of side channel (depth of side channel would suggest that likely remains wet year-round, but unverified), total connectivity, backyard / beach like area. Temperature in the main channel was 55°F and dissolved oxygen was 11.28 mg/L. Mean site depth was 2.63 feet (min = 1.6 feet; max = 3.4 feet). Mean site water velocity was 1.03 feet per second ([fps]; min = 0.09 fps; max = 1.51 fps). Mean water temperature was 54.63°F (min = 54.6°F; max = 54.7°F). Dissolved oxygen (mg/L) ranged from 11.35 to 11.44 (mean = 11.4 mg/L). Threespine stickleback and 1 adult unidentified fish was observed during snorkeling.
Side Channel / Backwater / Flooded island - Site 153L (RM 52.9) - Long side channel, huge complex of habitat, well connected, good flow even at lower discharges (Dominic Giudice, CDFW, personal communication). No fish or environmental sampling conducted at this site.
Margin - Site 154L (RM 53.2) - Difficult access, no points or samples. No fish or environmental sampling conducted at this site.
Margin / Islands - Site 155L (RM 53.2) - Edge of Wilm pond, good connectivity. No fish or environmental sampling conducted at this site.
Side Channel / Margin - Site 156R (RM 53.9) was sampled on 2014-04-24.Lover's Leap restoration area, multiple channels inundated, fish observed during snorkeling included threespine stickleback 1 adult sucker and 1 juvenile Chinook at outlet of main side channel. Temperature in the main channel was 55.1°F and dissolved oxygen was 11.27 mg/L. Mean site depth was 1.27 feet (min = 0.5 feet; max = 2.3 feet). Mean site water velocity was 0.45 feet per second ([fps]; min = 0 fps; max = 1.09 fps). Mean water

temperature was 54.6°F (min = 54.1°F; max = 55.5°F). Dissolved oxygen (mg/L) ranged from 10.04 to 12.3 (mean = 11.29 mg/L).
Backwater - Site 157L (RM 54) - Deep backwater, over 4' deep at opening, over 6' deep in opening, snorkeled briefly, did not observe any fish. No environmental sampling conducted at this site.
Backwater - Site 158R (RM 54.1) was sampled on 2014-04-24. Flooded backwater with very small connection to main channel (covered in sticks from beaver), observed 1 juvenile sucker and 3 unidentified juvenile cyprinids. Temperature in the main channel was 54.5°F and dissolved oxygen was 11.14 mg/L. Mean site depth was 1.33 feet (min = 0.8 feet; max = 2.1 feet). Mean site water velocity was 0.02 feet per second ([fps]; min = 0.01 fps; max = 0.03 fps). Mean water temperature was 57.58 °F (min = 55 °F; max = 58.9 °F). Dissolved oxygen (mg/L) ranged from 2.35 to 5.67 (mean = 4.34 mg/L).
Margin - Site 159R (RM 54.4) was sampled on 2014-04-24. Flooded margin with multiple connections to main channel, snorkeled river margin (observed 17 juvenile Chinook), observed 1 trout fry in unit, 3 juvenile Chinook near top of floodplain at point 159-7. Temperature in the main channel was 54°F and dissolved oxygen was 11.04 mg/L. Mean site depth was 1.43 feet (min = 0.9 feet; max = 2.3 feet). Mean site water velocity was 0.19 feet per second ([fps]; min = 0 fps; max = 0.63 fps). Mean water temperature was 53.87°F (min = 53.7°F; max = 54.2°F). Dissolved oxygen (mg/L) ranged from 10.81 to 11.35 (mean = 11.08 mg/L).
Side Channel - Site 160L (RM 55.6) was sampled on 2014-04-30. Russian Rapid side channel, snorkeled and observed 8 rainbow trout (5 adults, 3 juveniles), and 9 juvenile Chinook. Temperature in the main channel was 56.0°F and dissolved oxygen was 10.89 mg/L. Mean site depth was 2.07 feet (min = 1 feet; max = 2.9 feet). Mean site water velocity was 2.09 feet per second ([fps]; min = 0.58 fps; max = 3.83 fps). Mean water temperature was 54.99 °F (min = 54.8 °F; max = 55.5 °F).
Side Channel - Site 161L (RM 56.0) was sampled on 2014-04-30. Snorkeled and observed 1 juvenile rainbow trout, 39 juvenile Chinook, and 40 threespine stickleback. No mid-channel temperature or dissolved oxygen readings were taken. Mean site depth was 3.02 feet (min = 2 feet; max = 4.1 feet). Mean site water velocity was 2.79 feet per second ([fps]; min = 1.43 fps; max = 3.61 fps). Mean water temperature was 54.84°F (min = 54.8°F; max = 55.0°F).
Margin / Backwater - Site 161R (RM 56.2) - Did not sample on 4/24 or 4/30, sampled 161L instead (thought it was the intended location to sample), habitat type from layer.

Report of Daniel B. Steiner

ATTACHMENT 5

Memorandum

Subject: **San Joaquin River Basin Analysis – Baseline and 40% Unimpaired Requirement**

From: **Daniel B. Steiner**

Date: **March 10, 2017**

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1. Introduction

The State Water Resources Control Board (SWRCB) has issued a draft Substitute Environmental Document (SED) in support of potential changes to the water quality control plan for the Bay-Delta, San Joaquin River Flows and Southern Delta Water Quality. The potential changes to the water quality control plan include implementing flow requirements in the Stanislaus, Tuolumne and Merced River tributaries.

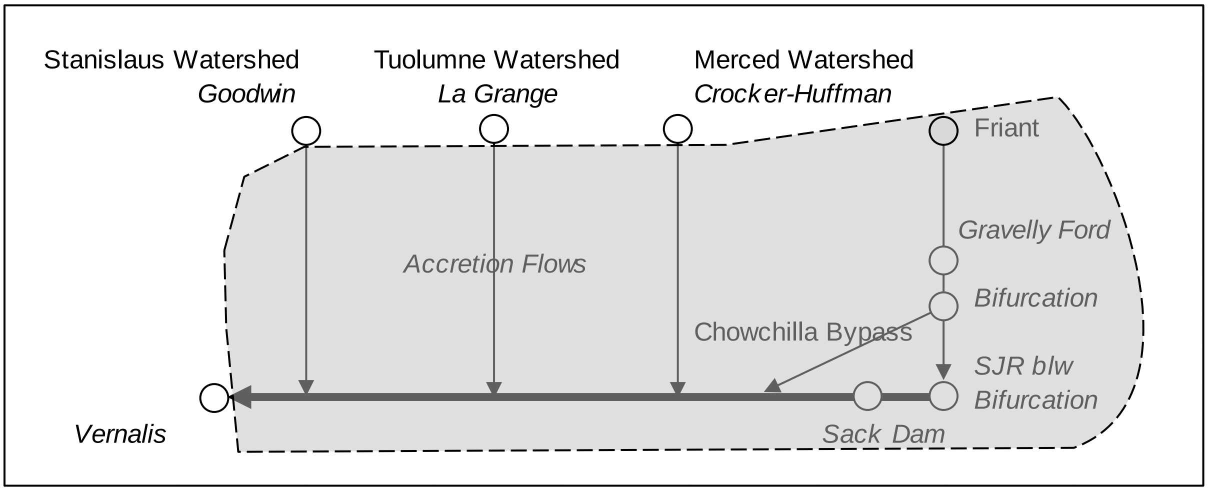
The results and information described in this memorandum pertain to questions asked by and studies performed for the San Joaquin Tributaries Authority (SJTA) regarding the SWRCB's current process and the SED. The results described in this memorandum supplement the Oakdale Irrigation District and South San Joaquin Irrigation District memorandum "Stanislaus River Analysis – Baseline and 40% Unimpaired Requirement", dated November 16, 2016.

2. Baseline (Existing) and 40% Unimpaired Flow Requirements Conditions

Several analyses were performed to review the SWRCB's SED and investigate the SWRCB's potential changes to the water quality control plan. While the SWRCB used its own WSE model for its analysis the SJTA used models previously developed by its members, and DWR and Reclamation.

SJTA models the San Joaquin River system upstream of Vernalis. Four separate components of modeling occur. Individual, separate watershed models are used to simulate the Stanislaus, Tuolumne and Merced Rivers and their projects' operations. The control point releases results of these models (at Goodwin, La Grange and Crocker-Huffman) are combined with an estimate of hydrology for the rest of the San Joaquin River (treated as accretions, from CALSIM II) to provide an estimate of flow at Vernalis. Figure 1 illustrates the four components of modeling.

Figure 1. Modeling Components



<u>Summary of Assumptions for SJTA Baseline</u>

New Melones and Stanislaus River

The New Melones Operations Model (model) was developed to perform simulations of the operation of the New Melones Project under varying assumptions for Stanislaus River water allocations and alternative boundary conditions within the San Joaquin River Basin. The model is an Excel workbook with a single model worksheet and several ancillary worksheets that provide input and reporting functions. The model provides a simulation of operations for a 95-year trace of hydrology, water years 1922 through 2016. Annual operations can be divided among two periods per month, with the two periods within a month capable of being divided into any two groups of days.

The boundary condition affecting Stanislaus River operations is imported from a CALSIM II simulation. Specifically, information required from CALSIM II includes flow and water quality conditions for the San Joaquin River above the confluence of the Stanislaus River (Maze Boulevard, CALSIM II Node 636), accretion and loss information (flow and water quality) upstream of Vernalis to Goodwin Dam (Stanislaus River) and Maze Boulevard (San Joaquin River), and a Vernalis flow and quality objective.

Water allocations from New Melones can be fashioned various ways, along with the capability to vary the order of priority of these allocations. The structure of the water allocations has a resemblance to the methodology used for Reclamation's plan of operations, with allocations triggered by a water supply index comprised of the current year's storage plus anticipated inflow. The categories of water allocation include in-stream fishery releases, water quality at Vernalis, in-stream dissolved oxygen (flow surrogate) releases, flow requirements for Vernalis, CVP diversions at Goodwin and Reclamation's agreement for diversions by Oakdale Irrigation District and South San Joaquin Irrigation District. This model has been used previously in proceedings for the SWRCB. The Baseline operation for the Stanislaus River includes the following assumptions.

- 2005/2020 (same) LOD New Melones Inflow, CALSIM II derived, extended with actual hydrology
- 2009 BO RPA 5 Schedules (Appendix 2e)
- DO, modeled by a flow surrogate

- D1641 Salinity (at Vernalis)
- D1641 Vernalis Flow Requirement, WSE D1641 Base Flow, Actual 602020
- SJR Maze flow and quality, DWR 2015 Reliability Report (2020 LOD), w/o SJRRP
- OID/SSJID Land Use based demand (CALSIM II derived), limited by formula
- CVP Contractors <1,400<1,800> 0/49/155
- Minimum New Melones storage 80,000 acre-feet, OID/SSJID curtailment to maintain

Don Pedro and Tuolumne River

Similarly, an Excel workbook model simulates the operations of Tuolumne River and the Don Pedro Project. The Modesto Irrigation District (MID) and Turlock Irrigation District (TID) operation simulation model is a version of a tool created for the development of the Tuolumne River segment of the statewide planning model CALSIM II. The model is an Excel spreadsheet that performs a monthly time-step simulation of MID and TID operations for the sequential period water year 1922 through water year 2003. This model assumes a specified upstream operation of the facilities of the City and County of San Francisco and regulates inflow to Don Pedro Reservoir for MID and TID diversions, and for other project purposes as flood control, hydroelectric generation, fish and wildlife protection and recreation. Flood control reservoir storage space reservation in Don Pedro Reservoir reflects Corps of Engineers flood control objectives. For the SJTA Baseline, minimum stream release requirements below La Grange are consistent with current Federal Energy Regulatory Commission license requirements.

New Exchequer and Merced River

The Merced Irrigation District operation model for New Exchequer and McSwain (Merced Model) is an Excel workbook model that operates similar to the statewide planning model, CALSIM II. The Merced Model uses the same hydrology inputs (reservoir inflow, irrigation demands, etc.) as CALSIM II and similar operational constraints and logic. The Merced Model simulates operational decisions for flood control, in-stream flow requirements, water supply, and hydropower generation. The Merced Model simulates operation of New Exchequer and McSwain dams on a monthly time-step under specified operating criteria for 82-years of historical hydrology, from water year 1922 through 2003.

For the SJTA Baseline, the Merced Model simulates release of the current FERC, Davis-Grunsky Act, and Cowell Agreement flows from New Exchequer, in combination with water that will be diverted at the Northside and Main canals and flood control releases. The Merced Model simulates FERC, Davis-Grunsky Act, and Cowell Agreement flows as they move downstream to below Crocker-Huffman.

San Joaquin River at Vernalis

The San Joaquin River at Vernalis is depicted by combining the three separate watershed simulation results (at Goodwin Dam, La Grange Dam, and Crocker-Huffman Dam) with CALSIM II derived accretions for the remainder of the San Joaquin River system upstream of Vernalis. The computation of the non-three watershed released flow occurring upstream of Vernalis is computed from CALSIM II results. The computation is the flow at Vernalis (Node 639) minus the sum of flow released at Goodwin Dam (Node 520), La Grange Dam (Node 540) and Crocker-Huffman Dam (Node 561). This computation treats all other interactions of flow into and out of the river system below these “control points” as a constant among study scenarios. It is assumed that to a very large extent, operations upstream of the watershed control points have very little affect, if any, upon this accretion flow component when modest changes to watershed diversions occur.

3. 40% Unimpaired February-June (Potential Change)

Summary of Assumptions

For the operation of the Stanislaus River under the SJTA 40% unimpaired flow requirement the following assumptions are used:

- 2005/2020 (same) LOD New Melones Inflow, CALSIM II derived, extended with actual hydrology
- The greater of RPA (Appendix 2e) Schedules (at Goodwin), or 40% UF applied at Ripon, burdened by reach depletions, no credit for accretions
- DO, modeled by a flow surrogate
- D1641 Salinity, at Vernalis
- No Vernalis Flow Requirement (replaced by individual tributary contributions), minimum Vernalis 800-1,200 cfs minimum not yet evaluated
- SJR Maze flow and quality, DWR 2015 Reliability Report (2020 LOD), w/o SJRRP
- OID/SSJID Land Use based demand (CALSIM derived), limited by formula
- CVP Contractors <1,400<1,800> 0/49/155
- Minimum New Melones storage 80,000 acre-feet, OID/SSJID curtailment to maintain

For the Tuolumne River, all Baseline assumptions continue except the current FERC minimum flow requirement is supplemented with a 40% unimpaired flow requirement during February through June. The modeling portrays a minimum flow requirement that is the current FERC requirement or the 40% unimpaired flow requirement, whichever is greater.

The depiction of the SJTA 40% unimpaired flow requirement conditions also incorporates the Baseline assumptions for the Merced River with the addition of the supplemental requirement of 40% of the unimpaired flow during February through June.

Each of three tributary simulations will differ from the SWRCB modeling of the alternative as portrayed in the implementation analysis due to the modeling not incorporating carryover storage targets and protocols, refill curtailments, and flow shifting. Also, the SED's assumed flow requirement creates a compliance location of the X% requirement at a downstream location near the mouths of the three rivers. For modeling purposes the SED assumes a computation at Ripon, Modesto and Stevenson. In effect, the SED analysis "translates" the X% requirement upstream to each river's control point either up to account for depletions, or down to account for accretions. For the SJTA analysis only depletions will adjust the X% requirement at the upstream control point. The reasoning is although there has historically been an overall accretion occurring between Goodwin and Ripon and La Grange and Modesto due to groundwater accretion, return flows and surface runoff countering stream depletions (pumping), return flows and groundwater accretion are anticipated to decrease due to the proposed flow requirements as water users are expected to deplete the adjacent basins and also increase water management efficiency. Also, in practical operation water project operators will not be able to rely on the certainty of flashy surface runoff to partially offset the downstream-located flow requirement; therefore, the full requirement will typically be required to be released at each river's control point to assure compliance.

For the SJTA San Joaquin River accretion/depletion component, analysis from the support modeling for "The State Water Project Final Delivery Capability Report 2015", State of California Natural Resources Agency Department of Water Resources, July 2015 has been relied upon. The CALSIM II model portraying current conditions was used as a contemporary representation of current San Joaquin River Basin hydrology and CVP/SWP operations. A single modification was made to this model for SJTA purposes. The State Water Project analysis assumes the release of the San Joaquin River Restoration Program flows to the San Joaquin River, which are not currently fully occurring. To depict more current conditions SJTA modeling returned the model to use pre- restoration program releases from Friant Dam. Results from this model simulation provided accretion/depletion hydrology to compliment the three separate tributary simulation hydrology in deriving flow estimates for Vernalis. The CALSIM II model results also established boundary conditions for the New Melones Operations Model. The SJTA CALSIM II simulation model produced results included in DCR2015_Base_ExistingNoCC_NoSJRR_DV.dss.

4. Results

The SJTA CALSIM II results for San Joaquin River accretions and depletions between the tributary control points and Vernalis are exemplified in Table 1.

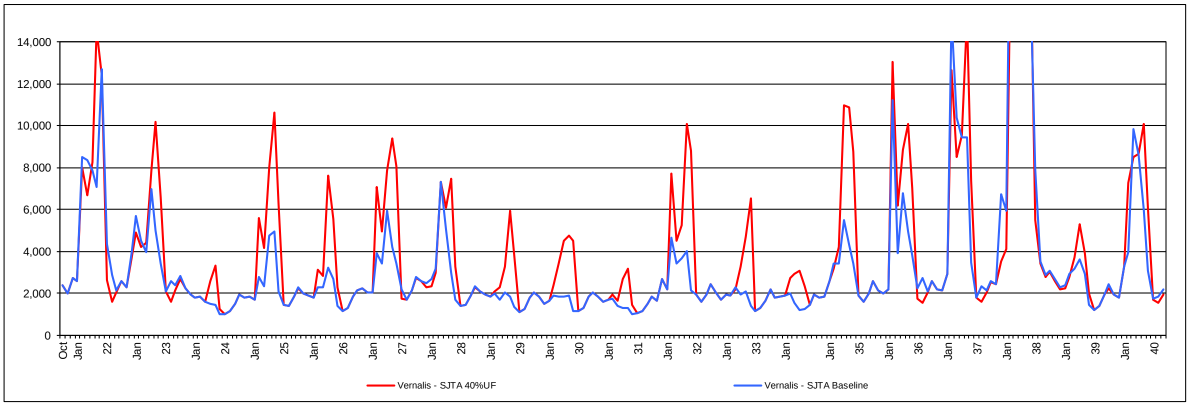
Table 1. CALSIM II Results for San Joaquin River Accretions/Depletions.

		Vernalis Flow Meld	Vernalis Flow NP	Vernalis Flow P	Goodwin Flow Meld	Goodwin Flow NP	Goodwin Flow P	LaGrange Flow Meld	LaGrange Flow NP	LaGrange Flow P	Crocker-Huffman Meld	Vernalis A/D w/o SJRRP Meld
		Vernalis Melded Flow C639	Vernalis Non-Pulse Flow C639_NP_DV	Vernalis Pulse Flow C639_P_DV	Stanislaus Melded Flow C520	Stanislaus Non_pulse Flow C520_NP_DV	Stanislaus Pulse Flow C520_P_DV	Tuolumne Melded Flow C540	Tuolumne Non-pulse Flow C540_C1	Tuolumne Pulse Flow C540_C5	Merced CH Melded Flow C561	Vernalis Melded A/D w/o SJRRP
WY	Mo	CFS	CFS	CFS	CFS	CFS	CFS	CFS	CFS	CFS	CFS	CFS
		Accretion/depletion of San Joaquin River between Vernalis and [Goodwin + La Grange + Crocker-Huffman] Added to separate-model output of Stanislaus-Tuolumne-Merced to estimate Vernalis flows SWP 2015 Reliability Report - MBK Modified DCR2015_Base_ExistingNoCC_DV.dss as rerun to not include SJRRP flows										
1922	Oct	2,528	2,528	2,528	797	797	797	397	397	397	304	1,030
1922	Nov	1,978	1,978	1,978	200	200	200	300	300	300	270	1,208
1922	Dec	2,741	2,741	2,741	200	200	200	300	300	300	270	1,971
1922	Jan	2,584	2,584	2,584	232	232	232	300	300	300	270	1,782
1922	Feb	5,451	5,451	5,451	236	236	236	300	300	300	270	4,645
1922	Mar	7,447	7,447	7,447	1,521	1,521	1,521	1,541	1,541	1,541	385	4,000
1922	Apr	7,707	7,922	7,520	1,400	1,614	1,213	2,931	2,931	2,931	250	3,126
1922	May	7,639	6,577	8,772	1,555	1,200	1,933	1,007	300	1,762	2,628	2,449
1922	Jun	13,462	13,462	13,462	940	940	940	7,192	7,192	7,192	3,808	1,522
1922	Jul	5,227	5,227	5,227	300	300	300	1,711	1,711	1,711	1,402	1,814
1922	Aug	2,479	2,479	2,479	300	300	300	250	250	250	1,064	864
1922	Sep	2,506	2,506	2,506	300	300	300	250	250	250	553	1,403
1923	Oct	2,826	2,826	2,826	797	797	797	397	397	397	518	1,114

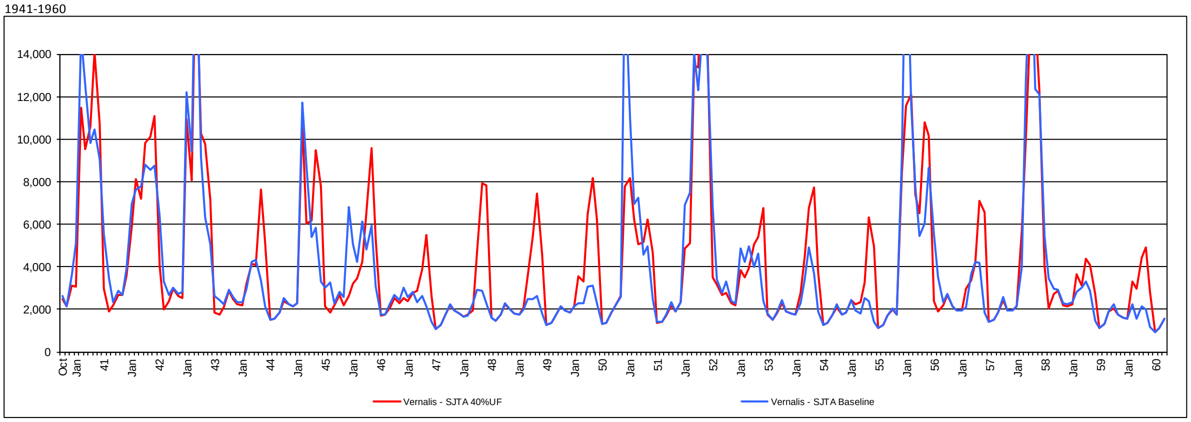
Results from the SJTA simulations of tributary operations under the SJTA Baseline and SJTA 40% UF conditions were combined with the San Joaquin River accretion/depletion results to estimate flow at Vernalis. Figure 2 illustrates the simulated monthly flow at Vernalis for 1922 through 2013 for each of the scenarios.

Figure 2. Vernalis Flow for SJTA Baseline and SJTA 40%UF

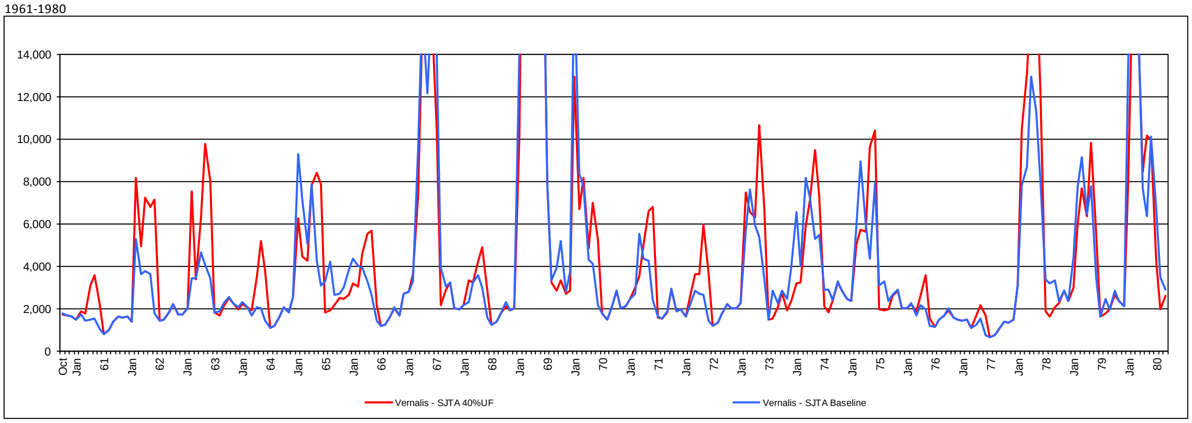
1922-1940



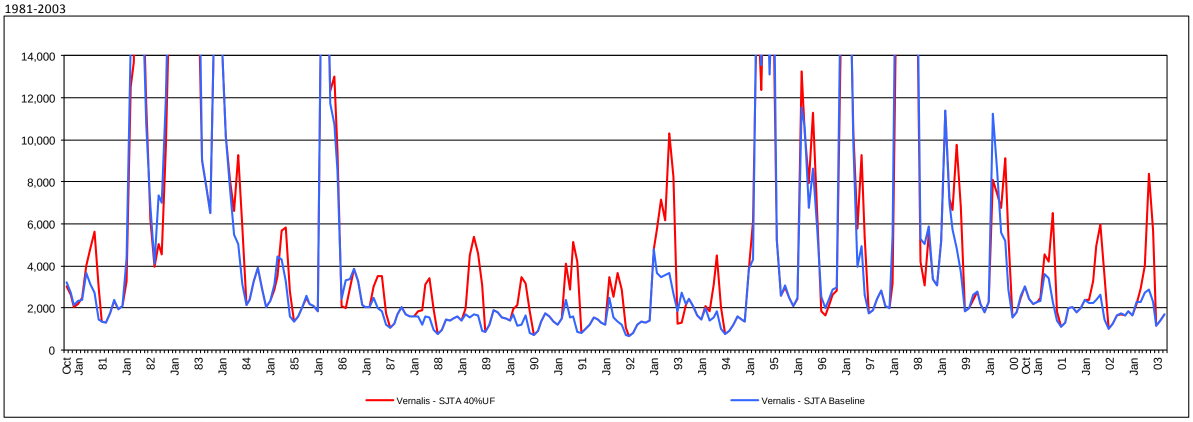
1941-1960



1961-1980



1981-2003



These results are summarized in Table 2 in terms of average monthly flow within year type (San Joaquin Valley Water Year Hydrologic Classification – SJRI 602020).

Table 2. Vernalis Flow for SJTA Baseline and SJTA 40%UF

Vernalis - SJTA 40%UF												
Rank-ordered by SJRBI (1922-2003)		CFS										AX
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
W	2,457	2,384	3,749	7,603	12,264	13,306	12,381	14,950	12,409	5,087	2,635	2,751
AN	2,837	3,139	4,014	4,587	7,517	6,043	6,950	9,466	6,654	1,783	1,699	2,153
BN	2,344	2,053	1,989	2,150	3,444	4,005	5,574	7,453	5,555	1,406	1,426	1,789
D	2,750	2,210	2,030	2,159	2,659	3,159	4,506	5,393	3,265	1,167	1,323	1,789
C	2,144	1,918	1,667	1,592	2,167	2,476	3,312	3,808	2,314	897	1,082	1,479
All	2,499	2,360	2,843	4,114	6,446	6,692	7,224	9,002	6,780	2,420	1,750	2,081
Vernalis - SJTA Baseline												
Rank-ordered by SJRBI (1922-2003)		CFS										AR
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
W	2,644	2,513	4,260	9,619	13,001	14,543	11,832	11,365	10,621	6,766	3,584	3,169
AN	3,011	3,165	4,978	5,301	7,036	6,335	5,648	5,097	3,138	1,904	2,085	2,252
BN	2,438	2,109	2,108	2,353	2,904	3,711	3,832	3,517	2,022	1,412	1,428	1,797
D	2,810	2,246	2,099	2,214	2,399	2,815	2,978	2,587	1,452	1,167	1,323	1,790
C	2,178	1,922	1,667	1,595	1,880	1,594	1,616	1,627	1,005	897	1,082	1,479
All	2,618	2,419	3,211	4,885	6,386	6,838	5,960	5,606	4,468	2,935	2,103	2,224
Difference												
Rank-ordered by SJRBI (1922-2003)		CFS										
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
W	-186	-129	-511	-2,016	-738	-1,237	550	3,585	1,787	-1,678	-949	-418
AN	-174	-26	-964	-714	481	-291	1,302	4,369	3,515	-121	-385	-99
BN	-94	-56	-120	-204	540	294	1,742	3,936	3,533	-5	-3	-8
D	-60	-37	-69	-56	260	344	1,528	2,806	1,813	0	0	0
C	-33	-4	0	-3	286	882	1,695	2,181	1,308	0	0	0
All	-119	-58	-368	-771	61	-146	1,264	3,396	2,312	-516	-353	-143

5. Additional Information

The SJTA also investigated the "fate of water" associated with Vernalis flows as depicted by the SJTA Baseline and SJTA 40%UF conditions. Several sample years were selected for detailed investigation, one to be representative of each a "Below Normal" (1966), "Dry" (1968), and "Critical" (1988) year. The investigation estimated the fate of San Joaquin River water under (1) a baseline condition as depicted by SJTA CALSIM II simulation described above which is inclusive of Central Valley and Delta operations including the Central Valley Project and the State Water Project, and (2) the same CALSIM II simulation except Vernalis flows are modified during February through June for the sample years by the incremental difference in year type average flow that occurs due to the SJTA 40%UF in comparison to the SJTA Baseline condition. The incremental flow that is adjusted to the baseline Vernalis flow (Table 3) for February through June for the sample years is shown in Table 4.

Table 3. Baseline Vernalis Flow. (average monthly cfs)

Year	February	March	April	May	June
1966 – BN	3,940	3,761	3,159	2,600	1,449
1968 – D	2,343	3,160	3,604	2,941	1,533
1988 - C	1,732	1,338	1,860	1,740	952

Table 3. Incremental Flow Added to Vernalis Due to 40%UF Requirement. (average monthly cfs)

Year	February	March	April	May	June
1966 – BN	550	300	1,750	3,950	3,550
1968 – D	250	350	1,550	2,800	1,800
1988 - C	300	900	1,700	2,200	1,300

Exhibit A

Memorandum

Subject: **Stanislaus River Analysis – Baseline and 40% Unimpaired Requirement**

From: **Daniel B. Steiner**

Date: **November 16, 2016**

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1. Introduction

The State Water Resources Control Board has issued a draft Substitute Environmental Document (SED) in support of potential changes to the water quality control plan for the Bay-Delta, San Joaquin River Flows and Southern Delta Water Quality. The potential changes to the water quality control plan include implementing flow requirements in the Stanislaus, Tuolumne and Merced River tributaries.

The results described in this memorandum pertain to an investigation of the Oakdale Irrigation District and South San Joaquin Irrigation District (collectively, the “Districts”) modeling of a current “Baseline” and their version of SWRCB “40% Unimpaired February-June” condition for the Stanislaus River. The Districts’ worksheet model of the Stanislaus River and the New Melones Project was used for this investigation. Summary assumptions and results follow.

2. Baseline Stanislaus River (Existing)

<u>Summary of Assumptions</u>

- 2005/2020 (same) LOD New Melones Inflow, Calsim derived, extended with actual hydrology
- 2009 BO RPA 5 Schedules (Table 2e)
- DO, modeled by a flow surrogate
- D1641 Salinity (at Vernalis)
- D1641 Vernalis Flow Requirement, WSE D1641 Base Flow, Actual 602020
- SJR Maze flow and quality, DWR 2015 Reliability Report (2020 LOD), w/o SJRRP
- OID/SSJID Land Use based demand (Calsim derived), limited by formula
- CVP Contractors <1,400<1,800> 0/49/155
- Minimum New Melones storage 80,000 acre-feet, OID/SSJID curtailment to maintain

Summary of Results

Table 1. Stanislaus Baseline

	New Melones		Goodwin																
1922-2015	New Melones Inflow	New Melones Storage	OID & SSJID Canals	SEWD NM Water	CSJWCD NM Water	Instream Fish	Dissolved Oxygen	Vernalis Water Quality	Vernalis Flow Objective	Total Goodwin Release to River	Release above Minimum	NM Forecast Index	Missed Vernalis WQ Release	Missed Vernalis Flow Release (Base 1641)	Districts Formula Water	Unused Districts Formula Water	Land Use & Commit w/ Formula	Land Use & Commit Div Reqd	District Shortage other than Formula
Avg:	1,068	1,182	505	48	59	334	11	7	25	439	62		0	0	581	77	510	522	5
	WY	EOS	WY	M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F		M-F	M-F	WY	WY	WY	WY	WY
1922	1,391	1,343	506	75	80	347	3	0	0	350	0	2,227	0	0	600	94	506	506	0
1923	1,109	1,384	507	75	80	347	3	0	29	379	0	2,332	0	0	600	93	507	507	0
1924	385	940	457	0	49	185	18	44	0	251	4	1,619	0	0	457	0	457	630	0
1925	1,092	1,167	444	75	80	234	15	0	13	263	0	1,940	0	0	600	156	444	444	0
1926	619	848	559	0	49	185	27	5	45	266	3	1,623	0	0	600	41	559	559	0
1927	1,256	1,063	515	75	80	235	15	0	114	364	0	1,996	0	0	600	85	515	515	0
1928	952	1,066	509	75	80	234	15	0	3	252	0	1,905	0	0	600	91	509	509	0
1929	506	722	530	0	49	185	27	6	0	219	0	1,432	0	0	537	8	530	530	0
1930	671	574	559	0	0	185	25	11	0	221	0	1,247	0	0	600	41	559	559	0
1931	438	213	492	0	0	186	18	70	0	275	1	924	0	0	492	0	492	549	0
1932	1,160	508	531	0	0	185	27	0	114	327	0	1,280	0	0	600	69	531	531	0
1933	586	244	574	0	0	185	26	11	28	250	0	957	0	0	591	17	574	574	0
1934	498	92	380	0	0	185	23	47	63	318	0	652	0	0	532	152	532	564	152
1935	1,082	369	436	0	0	186	27	0	96	339	30	1,040	0	0	600	164	464	464	28
1936	1,291	897	480	0	49	185	27	0	15	235	7	1,570	0	0	600	120	480	480	0
1937	1,080	1,073	498	75	80	234	15	0	0	268	19	1,854	0	0	600	102	498	498	0
1938	2,032	1,897	495	75	80	589	0	0	0	589	0	2,973	0	0	600	105	495	495	0
1939	562	1,333	529	75	80	347	3	0	0	350	0	2,274	0	0	575	46	529	529	0
1940	1,327	1,486	514	75	80	484	0	0	0	484	0	2,509	0	0	600	86	514	514	0
1941	1,290	1,625	486	75	80	484	0	0	0	484	0	2,622	0	0	600	114	486	486	0
1942	1,450	1,877	454	75	80	589	0	0	0	758	169	2,937	0	0	600	146	454	454	0
1943	1,538	1,884	484	75	80	590	0	0	0	708	117	3,090	0	0	600	116	484	484	0
1944	649	1,398	547	75	80	347	3	0	0	350	0	2,338	0	0	600	53	547	547	0
1945	1,228	1,482	474	75	80	484	0	0	0	484	0	2,514	0	0	600	126	474	474	0
1946	1,175	1,495	481	75	80	484	0	0	0	484	0	2,543	0	0	600	119	481	481	0
1947	634	1,006	600	75	80	235	15	10	48	308	0	1,979	0	0	600	0	600	637	0
1948	853	953	489	0	49	234	15	2	74	325	0	1,726	0	0	600	111	489	489	0
1949	732	760	583	0	49	185	27	7	35	255	0	1,532	0	0	600	17	583	583	0
1950	1,027	899	549	0	49	185	27	2	51	269	4	1,650	0	0	600	51	549	549	0
1951	1,656	1,406	505	75	80	484	0	0	25	515	6	2,494	0	0	600	95	505	505	0
1952	1,844	2,032	496	75	80	589	0	0	0	711	122	3,140	0	0	600	104	496	496	0
1953	965	1,608	546	75	80	484	0	0	15	498	0	2,695	0	0	600	54	546	546	0
1954	882	1,318	590	75	80	347	3	0	12	362	0	2,294	0	0	600	10	590	590	0
1955	656	1,003	516	75	80	235	15	3	1	274	20	1,831	0	0	600	84	516	516	0
1956	1,825	1,655	527	75	80	484	0	0	0	484	0	2,720	0	0	600	73	527	527	0
1957	878	1,417	557	75	80	347	3	0	0	350	0	2,365	0	0	600	43	557	557	0
1958	1,599	1,888	419	75	80	589	0	0	0	589	0	2,890	0	0	600	181	419	419	0
1959	624	1,362	556	75	80	347	3	0	0	350	0	2,311	0	0	600	44	556	556	0
1960	574	983	583	0	49	234	15	5	0	254	0	1,780	0	0	583	0	583	608	0
1961	446	642	497	0	0	185	18	25	0	232	4	1,323	0	0	497	0	497	549	0
1962	863	703	540	0	0	185	27	0	42	255	0	1,396	0	0	600	60	540	540	0
1963	1,227	988	481	0	49	235	15	0	144	394	0	1,799	0	0	600	119	481	481	0
1964	632	724	578	0	49	185	27	8	7	237	10	1,501	0	0	600	22	578	578	0
1965	1,666	1,328	500	75	80	347	3	0	69	419	0	2,315	0	0	600	100	500	500	0
1966	733	1,023	552	75	80	234	15	0	72	321	0	1,917	0	0	600	48	552	552	0
1967	1,831	1,697	486	75	80	484	0	0	0	484	0	2,685	0	0	600	114	486	486	0
1968	670	1,271	534	75	80	347	3	0	0	375	25	2,202	0	0	600	66	534	534	0
1969	2,118	2,100	502	75	80	589	0	0	0	1,203	613	3,287	0	0	600	98	502	502	0
1970	1,321	1,616	528	75	80	484	0	0	24	508	0	2,720	0	0	600	72	528	528	0
1971	1,066	1,477	528	75	80	484	0	0	6	490	0	2,551	0	0	600	72	528	528	0
1972	764	1,082	600	75	80	234	15	2	88	343	4	2,090	0	0	600	0	600	625	0
1973	1,237	1,277	490	75	80	347	3	0	46	396	0	2,222	0	0	600	110	490	490	0
1974	1,500	1,677	439	75	80	484	0	0	0	484	0	2,686	0	0	600	161	439	439	0
1975	1,210	1,699	492	75	80	484	0	0	20	504	0	2,744	0	0	600	108	492	492	0
1976	467	1,172	511	75	80	234	15	10	0	260	0	2,012	0	0	511	0	511	608	0
1977	271	743	381	0	0	185	14	39	1	239	1	1,295	0	0	381	0	381	608	0
1978	1,311	1,213	454	75	80	234	15	0	0	249	0	1,960	0	0	600	146	454	454	0
1979	1,139	1,219	529	75	80	347	3	0	86	439	3	2,226	0	0	600	71	529	529	0
1980	1,721	1,724	481	75	80	589	0	0	0	589	0	2,839	0	0	600	119	481	481	0
1981	634	1,305	540	75	80	234	15	0	11	298	37	2,152	0	0	600	60	540	540	0
1982	2,229	2,100	429	75	80	589	0	0	0	1,814	1,225	3,419	0	0	600	171	429	429	0
1983	2,900	2,100	413	75	80	590	0	0	0	2,255	1,665	3,965	0	0	600	187	413	413	0

Table 1. Stanislaus Baseline (continued)

	New Melones		Goodwin															
1922-2015	New Melones Inflow	New Melones Storage	OID & SSJID Canals	SEWD NM Water	CSJWCD NM Water	Instream Fish	Dissolved Oxygen	Vernalis Water Quality	Vernalis Flow Objective	Total Goodwin Release to River	Release above Minimum	NM Forecast Index	Missed Vernalis WQ Release	Missed Vernalis Flow Release (Base 1641)	Districts Formula Water	Unused Districts Formula Water	Land Use & Commit w/ Formula	Land Use & Commit Div Reqd	District Shortage other than Formula
Avg:	1,068	1,182	505	48	59	334	11	7	25	439	62		0	0	581	77	510	522	5
	WY	EOS	WY	M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F		M-F	M-F	WY	WY	WY	WY	WY
1984	1,621	1,587	549	75	80	589	0	0	0	589	0	2,765	0	0	600	51	549	549	0
1985	744	1,234	510	75	80	347	3	0	0	374	24	2,179	0	0	600	90	510	510	0
1986	1,869	1,835	475	75	80	589	0	0	0	642	52	2,984	0	0	600	125	475	475	0
1987	497	1,293	531	75	80	235	15	7	0	257	0	2,139	0	0	531	0	531	531	0
1988	390	865	460	0	49	185	18	39	0	242	0	1,548	0	0	460	0	460	543	0
1989	648	677	548	0	0	185	27	22	2	237	0	1,365	0	0	600	52	548	548	0
1990	491	370	527	0	0	185	21	37	0	243	0	1,058	0	0	527	0	527	570	0
1991	502	94	526	0	0	186	16	25	2	228	0	734	0	0	535	8	526	526	0
1992	459	91	210	0	0	185	15	29	14	250	7	466	0	0	506	296	506	508	296
1993	1,275	540	447	0	0	185	27	16	154	383	0	1,310	0	0	600	153	477	477	30
1994	501	239	529	0	0	185	13	46	0	258	14	931	0	0	534	5	529	529	0
1995	2,160	1,478	452	75	80	347	3	0	0	359	9	2,306	0	0	600	148	452	452	0
1996	1,512	1,731	517	75	80	589	0	0	0	1,376	787	2,838	0	0	600	83	517	517	0
1997	1,902	1,624	556	75	80	484	0	0	0	505	21	2,749	0	0	600	44	556	556	0
1998	1,876	2,100	444	75	80	589	0	0	0	1,246	657	3,373	0	0	600	156	444	444	0
1999	1,326	1,712	508	75	80	590	0	0	0	590	0	2,860	0	0	600	92	508	508	0
2000	1,062	1,588	488	75	80	484	0	0	2	488	2	2,593	0	0	600	112	488	488	0
2001	588	1,258	469	75	80	234	15	0	34	284	0	2,070	0	0	592	124	469	469	0
2002	710	844	548	75	80	234	15	4	131	384	0	1,801	0	0	600	52	548	548	0
2003	896	712	530	0	49	186	26	10	179	400	0	1,570	0	0	600	70	530	530	0
2004	670	538	600	0	0	185	25	14	0	237	12	1,248	0	0	600	0	600	647	0
2005	1,576	1,205	524	75	80	234	15	0	59	309	0	2,047	0	0	600	76	524	524	0
2006	2,061	2,005	496	75	80	589	0	0	0	706	117	3,060	0	0	600	104	496	496	0
2007	581	1,273	587	75	80	347	3	0	25	375	0	2,289	0	0	587	0	587	589	0
2008	579	946	550	0	49	185	21	45	43	295	0	1,714	0	0	586	36	550	550	0
2009	866	779	555	0	49	185	27	6	147	366	0	1,640	0	0	600	45	555	555	0
2010	1,011	1,023	478	0	49	185	27	0	0	217	5	1,672	0	0	600	122	478	478	0
2011	2,093	1,971	466	75	80	590	0	0	0	652	61	3,030	0	0	600	134	466	466	0
2012	607	1,379	525	75	80	347	3	4	15	369	0	2,351	0	0	600	75	525	525	0
2013	559	1,024	544	0	49	234	15	0	9	259	0	1,792	0	0	573	28	544	544	0
2014	339	635	426	0	0	185	27	5	28	246	0	1,245	0	0	426	0	426	575	0
2015	333	263	422	0	0	186	27	0	119	332	0	892	0	0	422	0	422	533	0
2016	1,003	196	575	0	0	101	27	8	212	349	0	1,085	0	0	600	25	575	575	0

All units in 1,000 acre-feet unless otherwise noted.

Figure 1. OID/SSJID Water Use and Commitments – Baseline (Chronological)

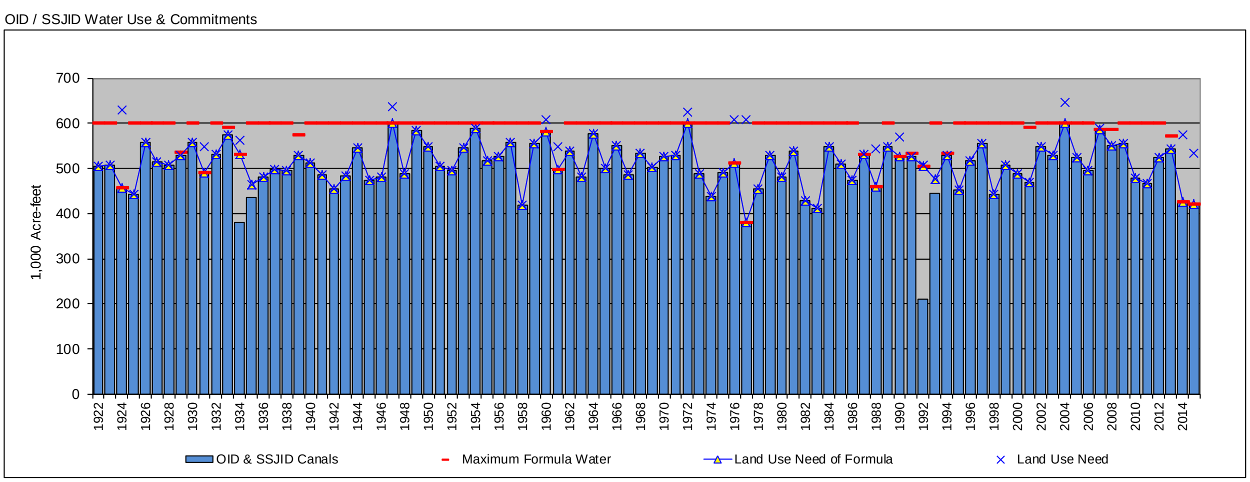


Figure 2. New Melones Reservoir Storage, End of September – Baseline (Chronological)

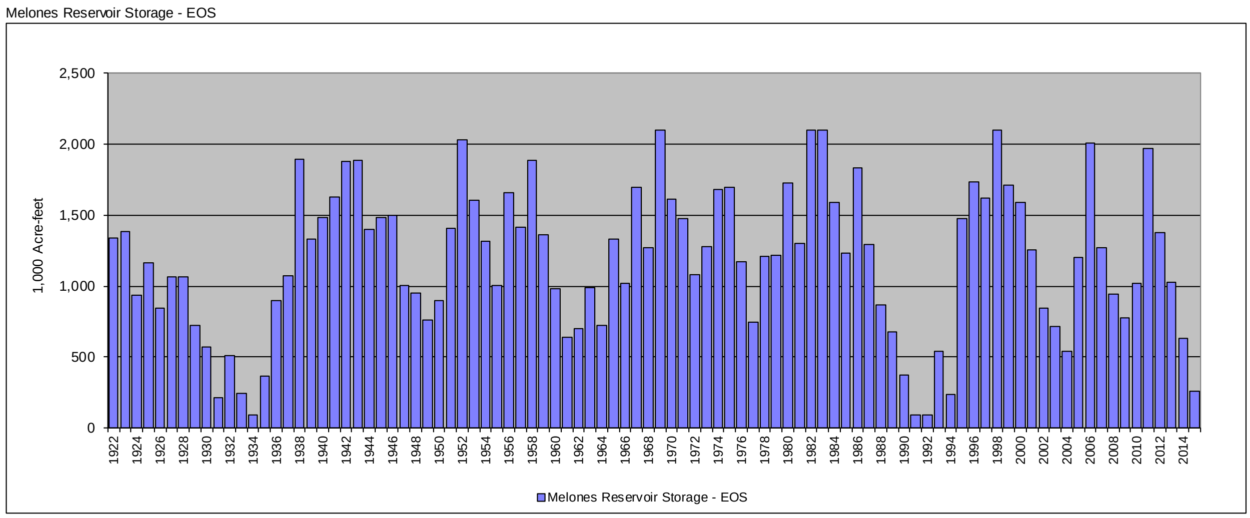


Figure 3. Stanislaus River Release – Baseline (Chronological)

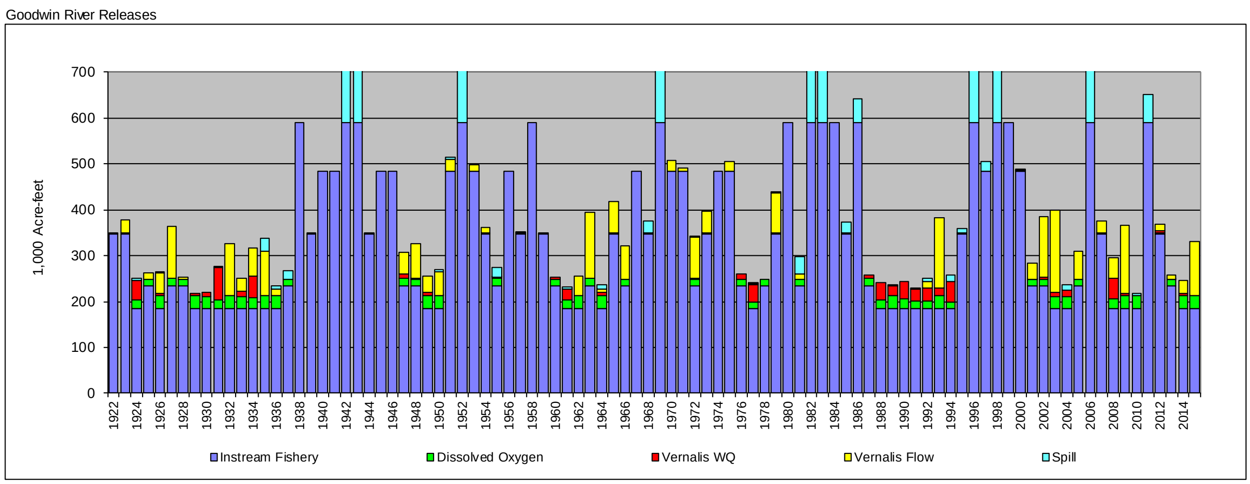


Figure 4. CVP Contractors – Baseline (Chronological)

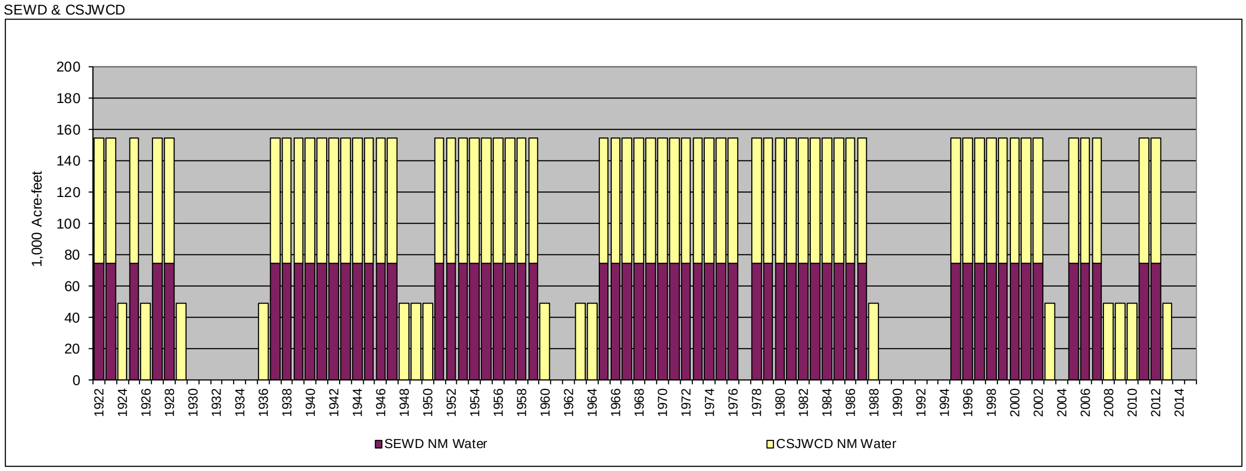


Figure 5. New Melones Reservoir Storage, End of September Ranked by NMI – Baseline

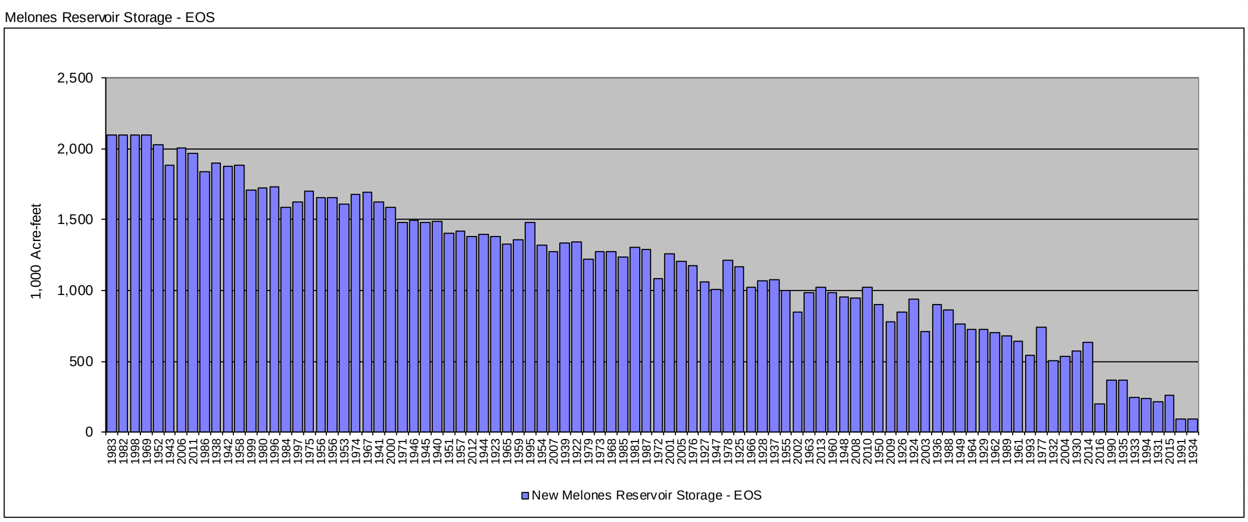


Figure 6. Stanislaus River Release, Ranked by NMI – Baseline

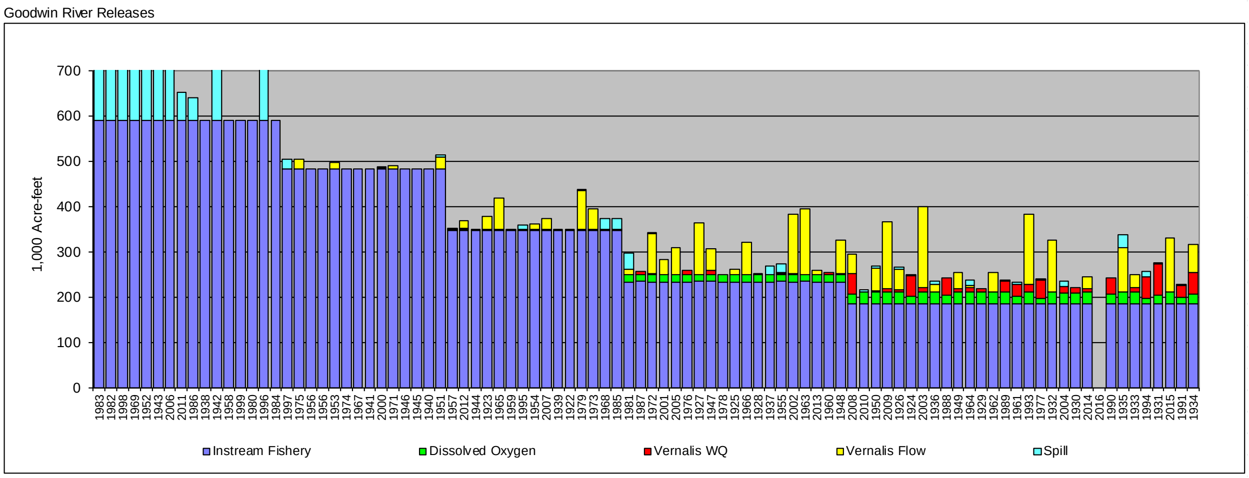
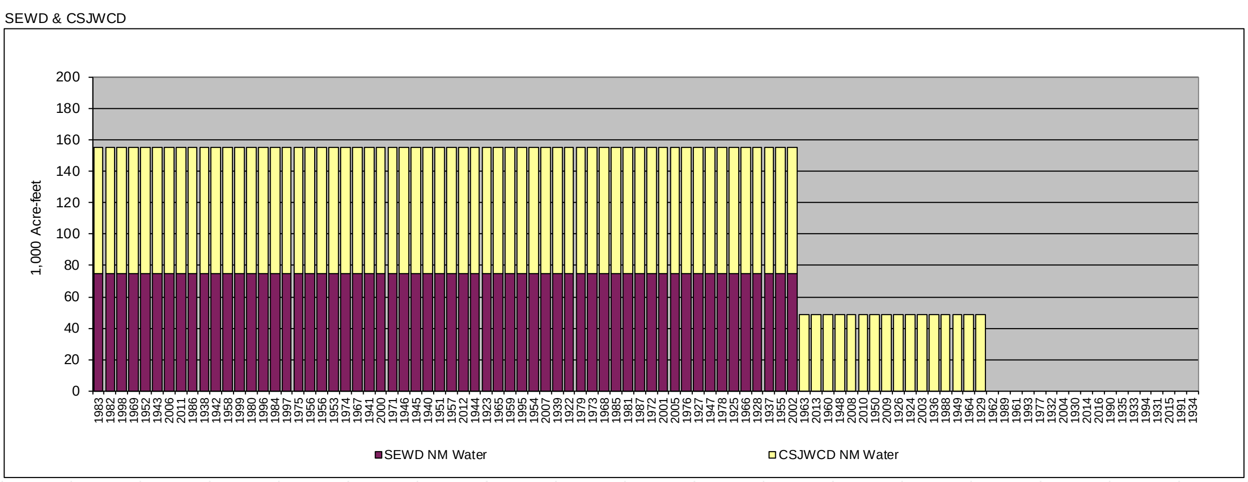


Figure 7. CVP Contractors, Ranked by NMI – Baseline



3. 40% Unimpaired February-June (Potential Change)

Summary of Assumptions

- 2005/2020 (same) LOD New Melones Inflow, Calsim derived, extended with actual hydrology
- The greater of RPA (Table 2e) Schedules (at Goodwin), or 40% UF applied at Ripon, burdened by reach depletions, no credit for accretions
- DO, modeled by a flow surrogate
- D1641 Salinity, at Vernalis
- No Vernalis Flow Requirement (replaced by individual tributary contributions), minimum Vernalis 800-1,200 cfs minimum not yet evaluated
- SJR Maze flow and quality, DWR 2015 Reliability Report (2020 LOD), w/o SJRRP
- OID/SSJID Land Use based demand (Calsim derived), limited by formula
- CVP Contractors <1,400<1,800> 0/49/155
- Minimum New Melones storage 80,000 acre-feet, OID/SSJID curtailment to maintain

This analysis will differ from the SWRCB modeling of the alternative as portrayed in the implementation analysis due to the Districts' modeling <u>not</u> incorporating carryover storage targets and protocols, refill curtailments, and flow shifting.

The SWRCB flow requirement assumes that the compliance location of the X% requirement is at a downstream location near the mouth of the Stanislaus River. For modeling purposes the SED assumes a computation at Ripon, which corresponds with CalSim Node 528. In effect, the SED analysis "translates" the X% requirement upstream to Goodwin for comparison to the BO RPA requirement at Goodwin. In the translation the X% requirement (an absolute value) may be decreased or increased when made comparable to the RPA requirement at Goodwin, as the Ripon flow would be affected by accretions/depletions between Goodwin and Ripon. The SED analysis adjusts the Ripon-translated X% flow requirement at Goodwin either up to account for depletions, or down to account for accretions. For the Districts' analysis only depletions will adjust the X% requirement placed at Goodwin. The reasoning is although there has historically been an overall accretion occurring between Goodwin and Ripon due to groundwater accretion, return flows and surface runoff countering stream depletions (pumping), return flows and groundwater accretion are anticipated to decrease due to the proposed flow requirements as water users are expected to deplete the adjacent basins and also increase water management efficiency. Also, in practical operation water project operators will not be able to rely on the certainty of flashy surface runoff to partially offset the downstream-located flow requirement; therefore, the full requirement will typically be required to be released at Goodwin to assure compliance.

Summary of Results

Table 2. Stanislaus 40% UF

1922-2015	New Melones Inflow	New Melones Storage	OID & SSJID Canals	SEWD NM Water	CSJWCD NM Water	Instream Fish	Dissolved Oxygen	Vernalis Water Quality	Vernalis Flow Objective	Total Goodwin Release to River	Release above Minimum	NM Forecast Index	Missed Vernalis WQ Release	Missed Vernalis Flow Release (Base 1641)	Districts Formula Water	Unused Districts Formula Water	Land Use & Commit w/ Formula	Land Use & Commit Div Reqd	District Shortage other than Formula
	New Melones		Goodwin																
Avg:	1,068	748	480	31	43	471	14	2	0	511	24		0	7	581	101	510	522	
	WY	EOS	WY	M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F		M-F	M-F	WY	WY	WY	WY	WY
1922	1,391	1,046	506	75	80	634	3	0	0	637	0	2,204	0	0	600	94	506	506	0
1923	1,109	998	507	75	80	446	12	0	0	458	0	2,028	0	0	600	93	507	507	0
1924	385	602	457	0	0	260	18	28	0	305	0	1,244	0	0	457	0	457	630	0
1925	1,092	656	444	0	49	493	21	0	0	514	0	1,570	0	0	600	156	444	444	0
1926	619	337	559	0	0	355	21	0	0	376	0	1,122	0	18	600	41	559	559	0
1927	1,256	464	515	0	49	511	21	0	0	532	0	1,451	0	0	600	85	515	515	0
1928	952	434	509	0	0	422	21	0	0	443	0	1,315	0	0	600	91	509	509	0
1929	506	82	530	0	0	295	21	0	0	316	0	826	0	0	537	8	530	530	0
1930	671	80	290	0	0	349	20	2	0	371	0	667	0	0	600	310	559	559	269
1931	438	90	115	0	0	297	18	20	0	335	0	438	0	0	492	377	492	549	377
1932	1,160	182	496	0	0	514	21	0	0	535	0	1,154	0	18	600	104	531	531	35
1933	586	80	328	0	0	329	20	1	0	351	0	633	0	24	591	262	574	574	246
1934	498	92	171	0	0	285	17	4	0	306	0	501	0	56	532	361	532	564	361
1935	1,082	199	436	0	0	588	21	0	0	609	0	1,096	0	19	600	164	464	464	28
1936	1,291	445	480	0	0	531	21	0	0	552	0	1,361	0	0	600	120	480	480	0
1937	1,080	513	498	0	0	528	21	0	0	549	0	1,390	0	0	600	102	498	498	0
1938	2,032	1,143	495	75	80	755	0	0	0	755	0	2,400	0	0	600	105	495	495	0
1939	562	763	529	0	49	332	21	0	0	353	0	1,552	0	2	575	46	529	529	0
1940	1,327	822	514	75	80	565	12	0	0	577	0	1,906	0	0	600	86	514	514	0
1941	1,290	890	486	75	80	559	12	0	0	571	0	1,942	0	0	600	114	486	486	0
1942	1,450	1,140	454	75	80	591	3	0	0	594	0	2,187	0	0	600	146	454	454	0
1943	1,538	1,404	484	75	80	599	0	0	0	599	0	2,521	0	0	600	116	484	484	0
1944	649	931	547	75	80	417	12	0	0	429	0	1,889	0	0	600	53	547	547	0
1945	1,228	954	474	75	80	489	12	0	0	501	0	1,997	0	0	600	126	474	474	0
1946	1,175	996	481	75	80	453	12	0	0	465	0	2,021	0	0	600	119	481	481	0
1947	634	604	600	0	49	302	19	3	0	325	0	1,488	0	16	600	0	600	637	0
1948	853	481	489	0	0	431	21	0	0	452	0	1,337	0	42	600	111	489	489	0
1949	732	221	583	0	0	388	21	0	0	409	0	1,078	0	0	600	17	583	583	0
1950	1,027	182	549	0	0	510	21	0	0	539	7	1,109	0	0	600	51	549	549	0
1951	1,656	888	505	0	49	408	12	0	0	428	8	1,756	0	20	600	95	505	505	0
1952	1,844	1,307	496	75	80	770	0	0	0	770	0	2,609	0	0	600	104	496	496	0
1953	965	1,093	546	75	80	416	12	0	0	428	0	2,121	0	10	600	54	546	546	0
1954	882	731	590	75	80	450	12	0	0	462	0	1,802	0	0	600	10	590	590	0
1955	656	475	516	0	0	357	19	2	0	405	27	1,254	0	0	600	84	516	516	0
1956	1,825	1,053	527	75	80	566	3	0	0	569	0	2,182	0	0	600	73	527	527	0
1957	878	831	557	0	49	452	12	0	0	464	0	1,756	0	0	600	43	557	557	0
1958	1,599	1,172	419	75	80	697	3	0	0	699	0	2,289	0	0	600	181	419	419	0
1959	624	814	556	0	49	292	21	0	0	313	0	1,616	0	7	600	44	556	556	0
1960	574	418	583	0	0	308	20	1	0	330	0	1,244	0	0	583	0	583	608	0
1961	446	86	486	0	0	271	13	8	0	292	0	777	0	0	497	11	497	549	11
1962	863	80	393	0	0	508	21	0	0	529	0	859	0	0	600	207	540	540	147
1963	1,227	318	441	0	0	457	21	0	0	478	0	1,163	0	48	600	159	481	481	40
1964	632	84	533	0	0	326	21	0	0	361	14	867	0	0	600	67	578	578	45
1965	1,666	711	489	0	49	471	21	0	0	492	0	1,669	0	0	600	111	500	500	11
1966	733	508	552	0	0	338	21	0	0	359	0	1,320	0	29	600	48	552	552	0
1967	1,831	1,014	486	75	80	735	3	0	0	738	0	2,221	0	0	600	114	486	486	0
1968	670	699	534	0	49	359	21	0	0	399	19	1,500	0	0	600	66	534	534	0
1969	2,118	1,347	502	75	80	815	0	0	0	818	3	2,684	0	0	600	98	502	502	0
1970	1,321	1,414	528	75	80	526	0	0	0	526	0	2,517	0	10	600	72	528	528	0
1971	1,066	1,285	528	75	80	461	3	0	0	464	0	2,334	0	2	600	72	528	528	0
1972	764	862	600	75	80	404	12	0	0	416	0	1,903	0	5	600	0	600	625	0
1973	1,237	910	490	75	80	508	12	0	0	520	0	1,968	0	1	600	110	490	490	0
1974	1,500	1,240	439	75	80	573	3	0	0	576	0	2,317	0	0	600	161	439	439	0
1975	1,210	1,171	492	75	80	585	3	0	0	588	0	2,293	0	0	600	108	492	492	0
1976	467	765	511	0	49	214	25	9	0	248	0	1,489	0	0	511	0	511	608	0
1977	271	360	381	0	0	227	11	31	0	270	1	901	0	1	381	0	381	608	0
1978	1,311	546	454	0	49	624	21	0	0	645	0	1,548	0	0	600	146	454	454	0
1979	1,139	575	529	0	49	567	21	0	0	592	4	1,543	0	50	600	71	529	529	0
1980	1,721	1,066	481	75	80	500	12	0	0	512	0	2,128	0	0	600	119	481	481	0
1981	634	736	540	0	49	419	21	0	0	446	6	1,534	0	0	600	60	540	540	0
1982	2,229	1,586	429	75	80	834	0	0	0	1,184	350	2,776	0	0	600	171	429	429	0
1983	2,900	2,100	413	75	80	956	0	0	0	2,256	1,299	3,965	0	0	600	187	413	413	0

Table 2. Stanislaus 40% UF (continued)

	New Melones		Goodwin																
1922-2015	New Melones Inflow	New Melones Storage	OID & SSJID Canals	SEWD NM Water	CSJWCD NM Water	Instream Fish	Dissolved Oxygen	Vernalis Water Quality	Vernalis Flow Objective	Total Goodwin Release to River	Release above Minimum	NM Forecast Index	Missed Vernalis WQ Release	Missed Vernalis Flow Release (Base 1641)	Districts Formula Water	Unused Districts Formula Water	Land Use & Commit w/ Formula	Land Use & Commit Div Reqd	District Shortage other than Formula
Avg:	1,068	748	480	31	43	471	14	2	0	511	24		0	7	581	101	510	522	
	WY	EOS	WY	M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F		M-F	M-F	WY	WY	WY	WY	WY
1984	1,621	1,576	549	75	80	600	0	0	0	600	0	2,765	0	0	600	51	549	549	0
1985	744	1,223	510	75	80	530	12	0	0	542	0	2,168	0	0	600	90	510	510	0
1986	1,869	1,619	475	75	80	683	0	0	0	683	0	2,806	0	0	600	125	475	475	0
1987	497	1,057	531	75	80	263	15	5	0	283	0	1,924	0	0	531	0	531	531	0
1988	390	658	460	0	0	229	14	13	0	257	0	1,313	0	0	460	0	460	543	0
1989	648	326	548	0	0	380	21	1	0	403	0	1,171	0	0	600	52	548	548	0
1990	491	89	428	0	0	257	18	10	0	285	0	718	0	0	527	100	527	570	100
1991	502	80	174	0	0	317	13	9	0	338	0	503	0	0	535	360	526	526	352
1992	459	91	150	0	0	278	15	12	0	312	7	450	0	7	506	356	506	508	356
1993	1,275	310	447	0	0	565	21	0	0	586	0	1,278	0	16	600	153	477	477	30
1994	501	82	416	0	0	294	10	16	0	333	14	703	0	0	534	118	529	529	112
1995	2,160	890	425	75	80	881	12	0	0	893	0	2,149	0	0	600	175	452	452	27
1996	1,512	1,070	517	75	80	558	12	0	0	715	145	2,161	0	0	600	83	517	517	0
1997	1,902	1,614	556	75	80	580	0	0	0	580	0	2,749	0	0	600	44	556	556	0
1998	1,876	2,080	444	75	80	826	0	0	0	1,174	348	3,298	0	0	600	156	444	444	0
1999	1,326	1,657	508	75	80	701	0	0	0	701	0	2,860	0	0	600	92	508	508	0
2000	1,062	1,450	488	75	80	516	0	0	0	519	3	2,484	0	0	600	112	488	488	0
2001	588	1,052	469	75	80	323	15	0	0	338	0	1,933	0	24	592	124	469	469	0
2002	710	721	548	0	49	374	19	2	0	395	0	1,615	0	29	600	52	548	548	0
2003	896	566	530	0	49	433	21	0	0	455	0	1,484	0	39	600	70	530	530	0
2004	670	277	600	0	0	366	21	0	0	399	12	1,111	0	0	600	0	600	647	0
2005	1,576	645	524	0	49	661	12	0	0	673	0	1,756	0	16	600	76	524	524	0
2006	2,061	1,280	496	75	80	781	0	0	0	781	0	2,525	0	0	600	104	496	496	0
2007	581	857	587	0	49	278	24	0	0	302	0	1,696	0	13	587	0	587	589	0
2008	579	511	550	0	0	321	21	7	0	349	0	1,312	0	26	586	36	550	550	0
2009	866	342	555	0	0	439	21	0	0	460	0	1,245	0	20	600	45	555	555	0
2010	1,011	391	478	0	0	478	21	0	0	505	7	1,246	0	0	600	122	478	478	0
2011	2,093	1,174	466	75	80	720	3	0	0	723	0	2,384	0	0	600	134	466	466	0
2012	607	822	525	0	49	304	21	0	0	326	0	1,652	0	20	600	75	525	525	0
2013	559	512	544	0	0	261	22	0	0	283	0	1,257	0	2	573	28	544	544	0
2014	339	155	426	0	0	241	27	0	0	269	0	750	0	15	426	0	426	575	0
2015	333	80	156	0	0	224	25	0	0	249	0	390	0	85	422	266	422	533	266
2016	1,003	80	540	0	0	345	21	0	0	366	0	981	0	57	600	60	575	575	35

All units in 1,000 acre-feet unless otherwise noted.

Figure 8. OID/SSJID Water Use and Commitments – 40% UF (Chronological)

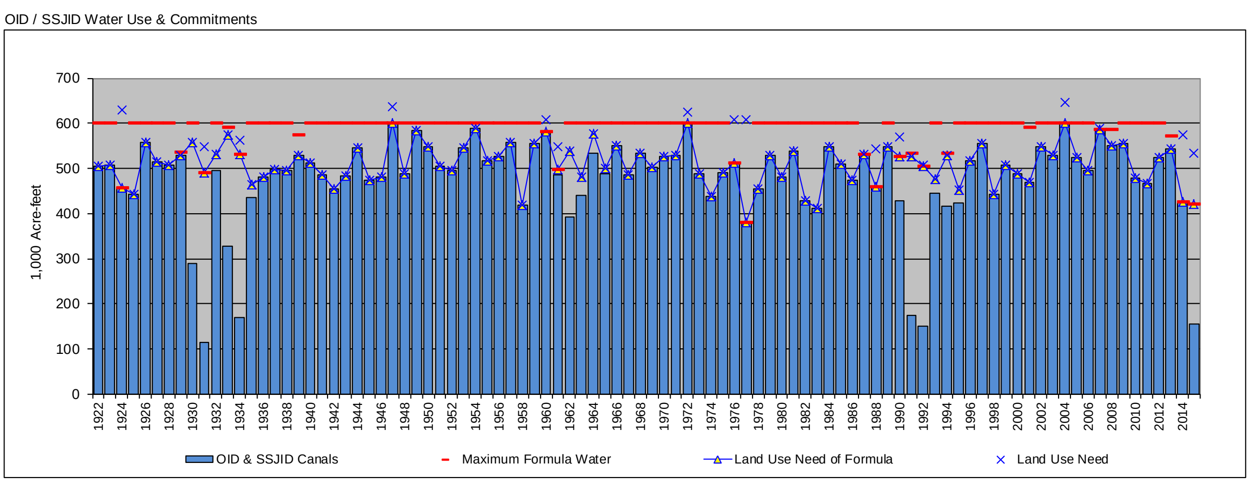


Figure 9. New Melones Reservoir Storage, End of September – 40% UF (Chronological)

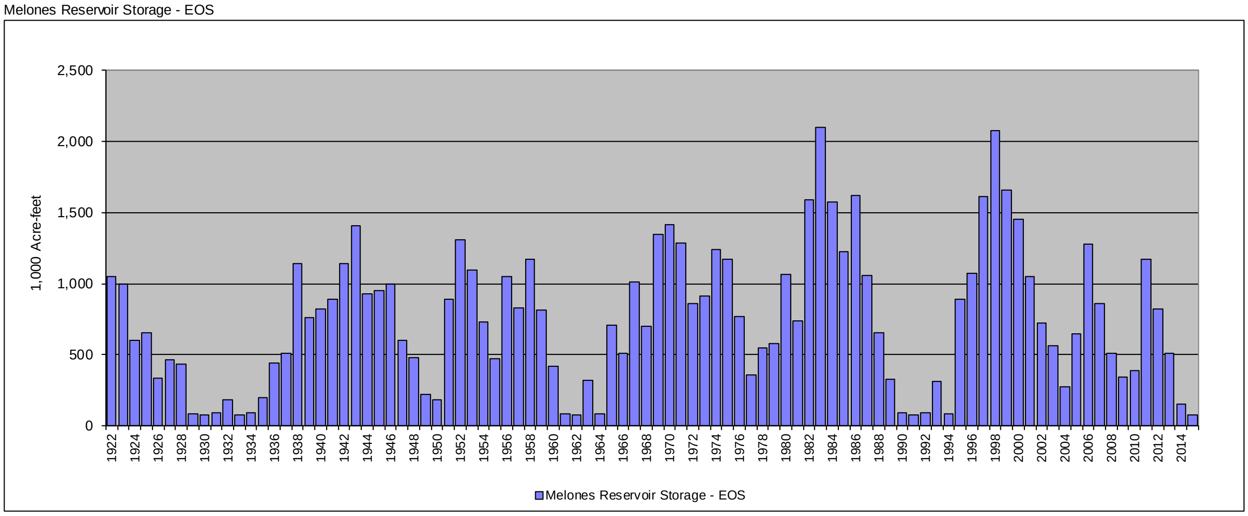


Figure 10. Stanislaus River Release – 40% UF (Chronological)

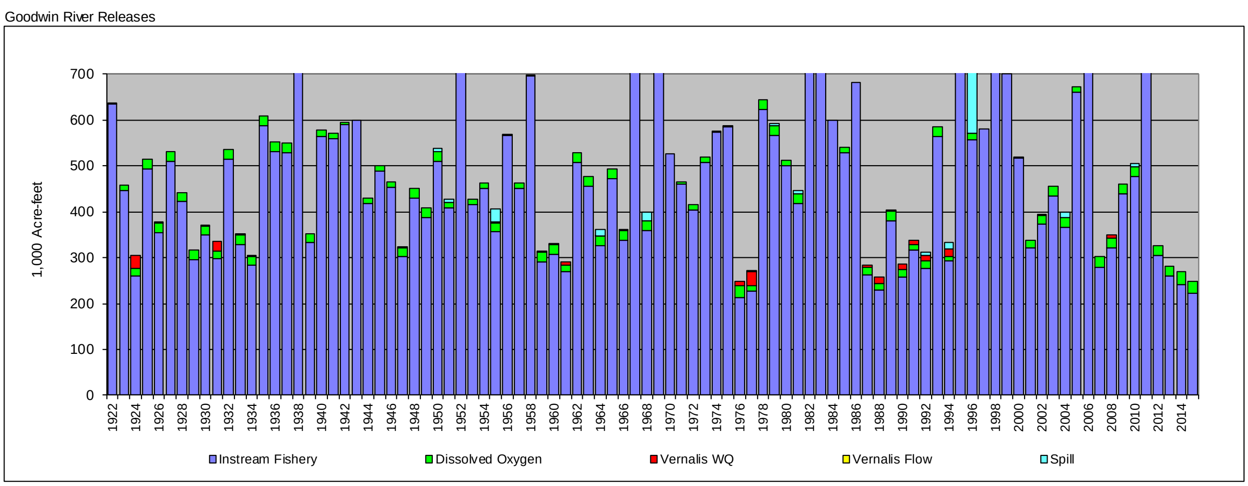


Figure 11. CVP Contractors – 40% UF (Chronological)

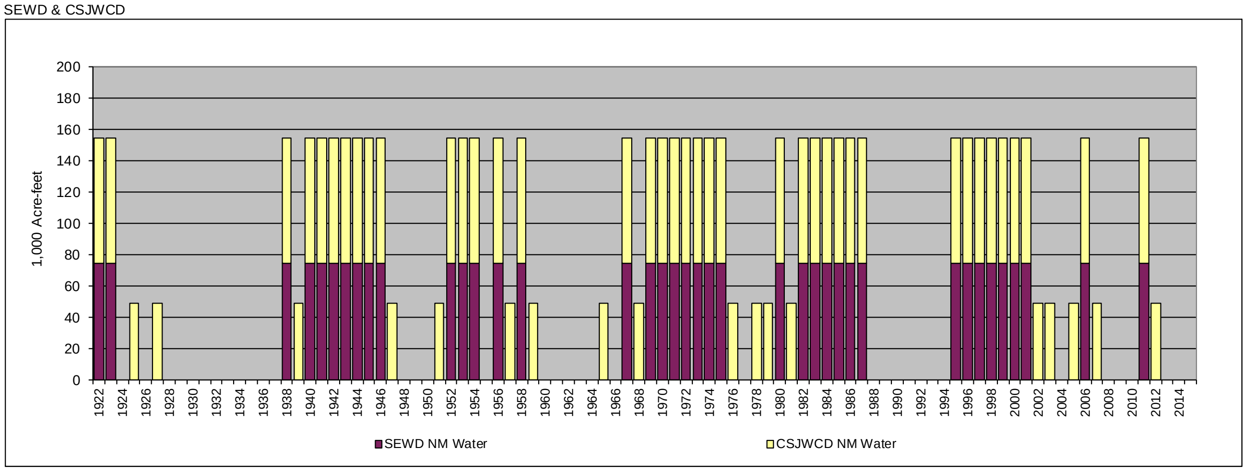


Figure 12. New Melones Reservoir Storage, End of September Ranked by NMI – 40% UF

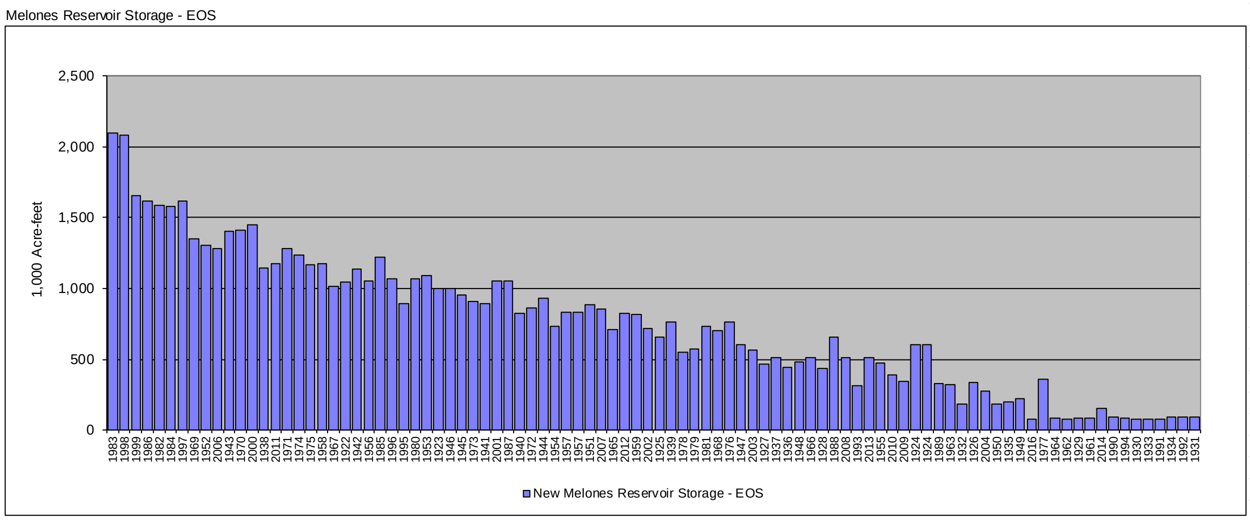


Figure 13. Stanislaus River Release, Ranked by NMI – 40% UF

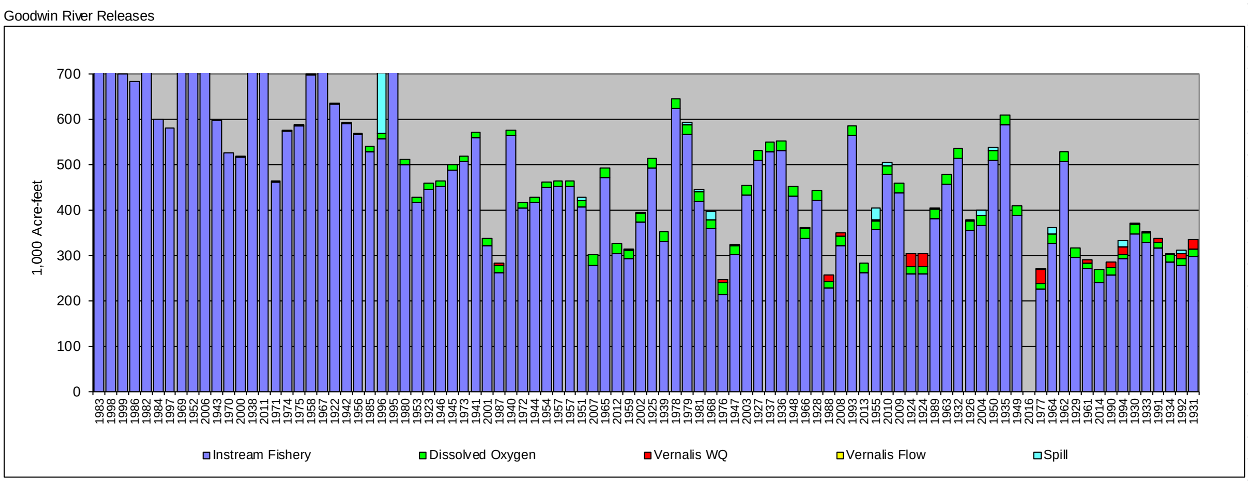


Figure 14. CVP Contractors, Ranked by NMI – 40% UF

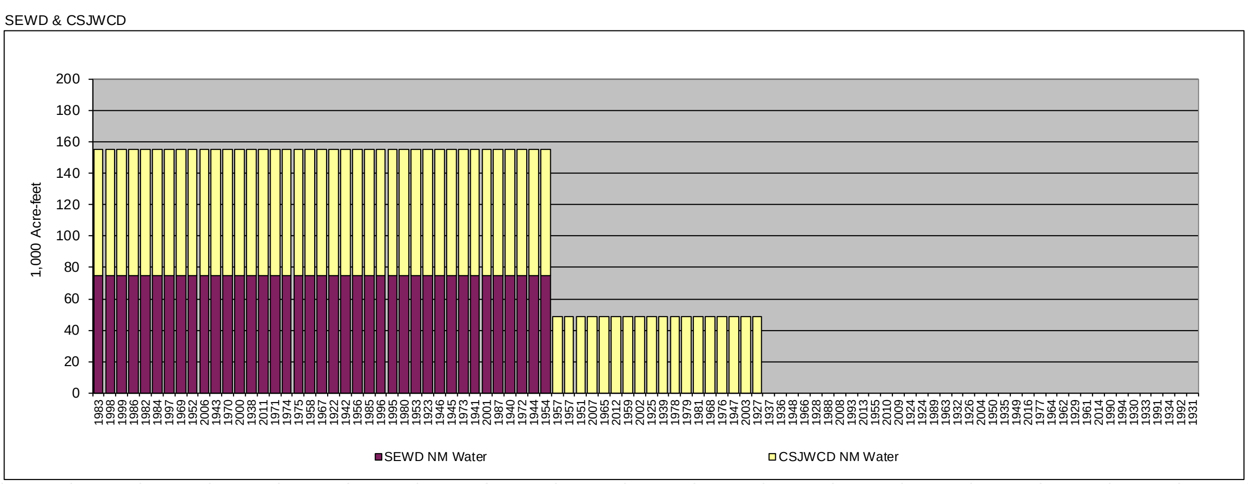


Table 3. Comparison of Studies

Base

1922-2015	New Melones		Goodwin																
	New Melones Inflow	New Melones Storage	OID & SSJID Canals	SEWD NM Water	CSJWCD NM Water	Instream Fish	Dissolved Oxygen	Vernalis Water Quality	Vernalis Flow Objective	Total Goodwin Release to River	Release above Minimum	NM Forecast Index	Missed Vernalis WQ Release	Missed Vernalis Flow Release (Base 1641)	Districts Formula Water	Unused Districts Formula Water	Land Use & Commit w/ Formula	Land Use & Commit Div Reqd	District Shortage other than Formula
Avg:	1,068	1,182	505	48	59	334	11	7	25	439	62		0	0	581	77	510	522	5
	WY	EOS	WY	M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F		M-F	M-F	WY	WY	WY	WY	WY

40% UF

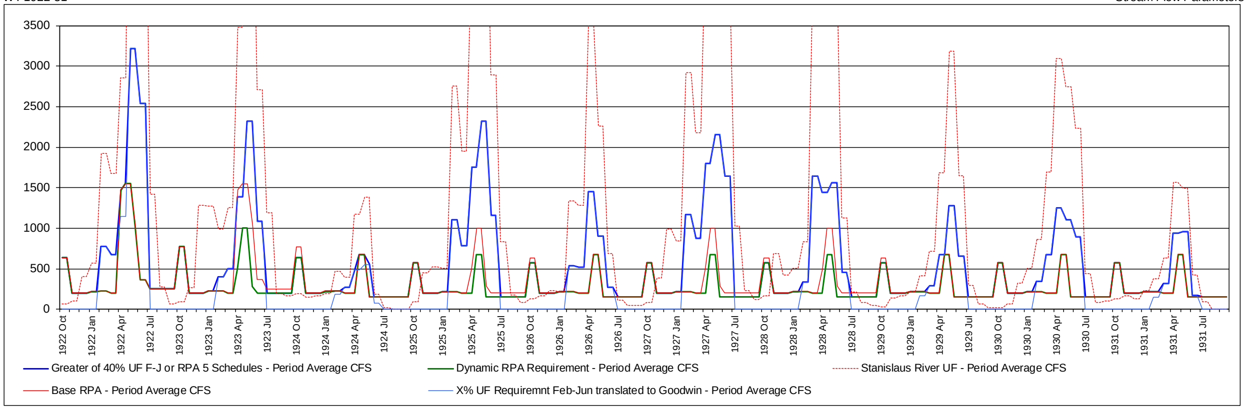
1922-2015	New Melones		Goodwin																
	New Melones Inflow	New Melones Storage	OID & SSJID Canals	SEWD NM Water	CSJWCD NM Water	Instream Fish	Dissolved Oxygen	Vernalis Water Quality	Vernalis Flow Objective	Total Goodwin Release to River	Release above Minimum	NM Forecast Index	Missed Vernalis WQ Release	Missed Vernalis Flow Release (Base 1641)	Districts Formula Water	Unused Districts Formula Water	Land Use & Commit w/ Formula	Land Use & Commit Div Reqd	District Shortage other than Formula
Avg:	1,068	748	480	31	43	471	14	2	0	511	24		0	7	581	101	510	522	
	WY	EOS	WY	M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F		M-F	M-F	WY	WY	WY	WY	WY

Figure 15. Comparison of Flows

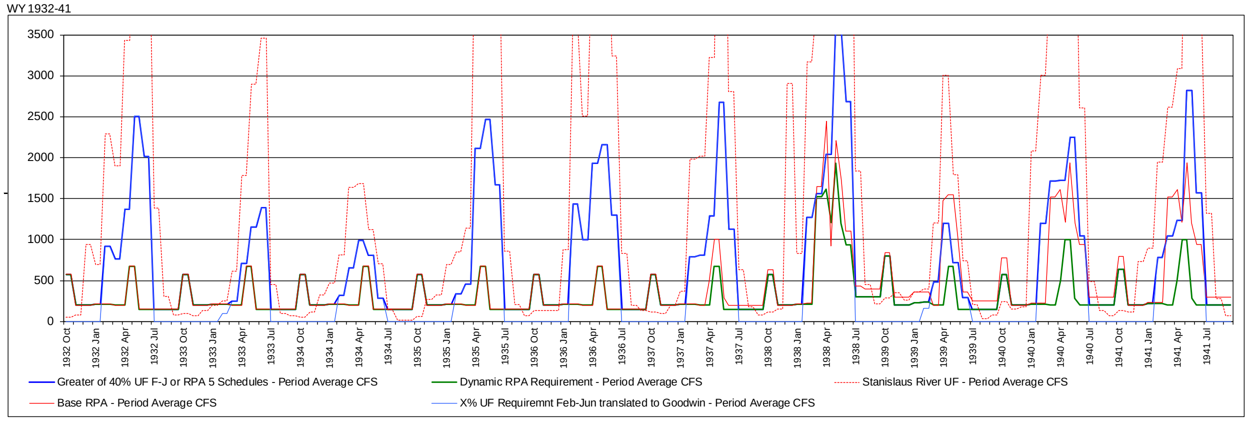
The following graphs illustrate a comparison between required instream flow (blue line, representing the greater of the study's dynamic RPA requirement or 40% UF (SNS) translated to Goodwin), total UF at Goodwin (SNS, dashed red line), 40% UF February-June (SNS) translated to Goodwin (thin blue line), the dynamic RPA requirement of this study (green line), and the RPA requirement of the Base study (thin red line). All values are in expressed in period-cfs.

WY 1922-31

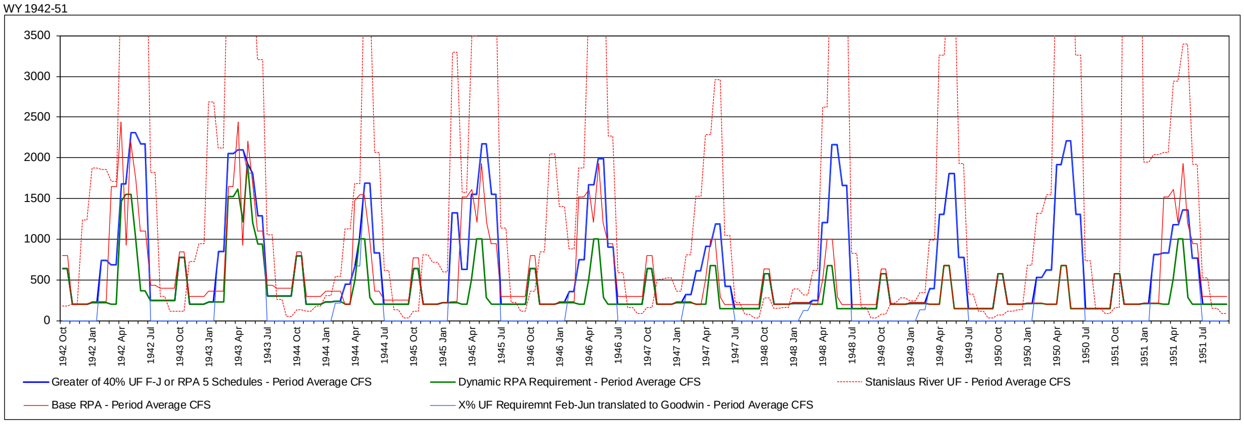
Stream Flow Parameters



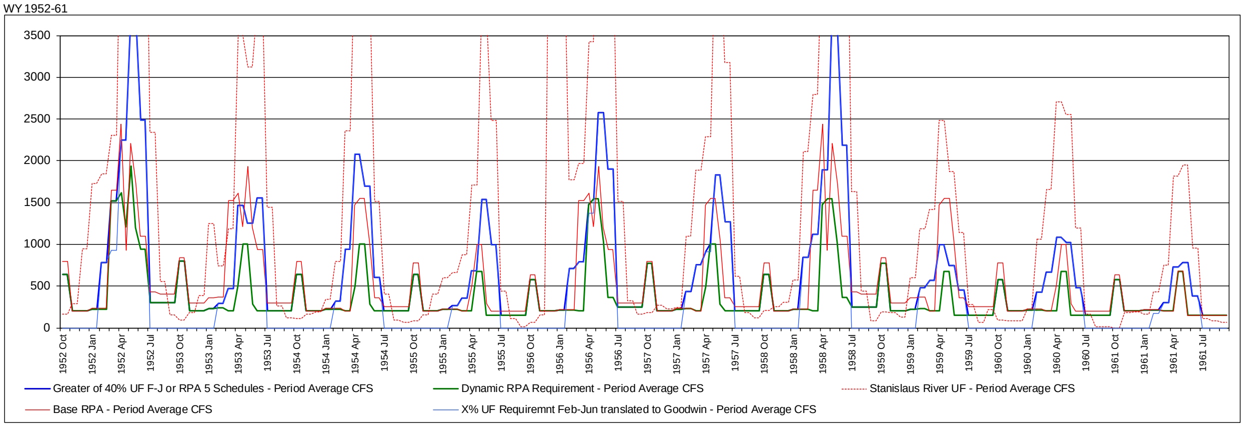
WY 1932-41



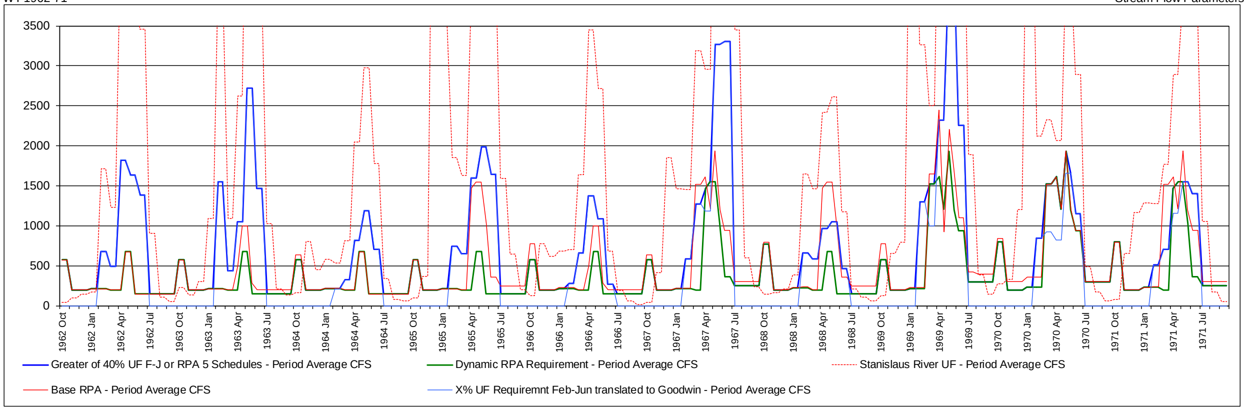
WY 1942-51



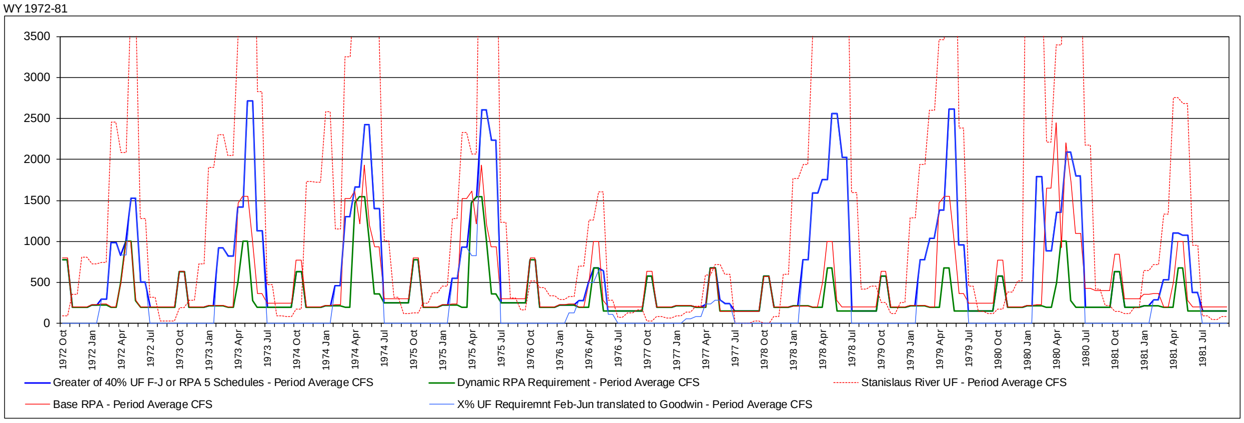
WY 1952-61



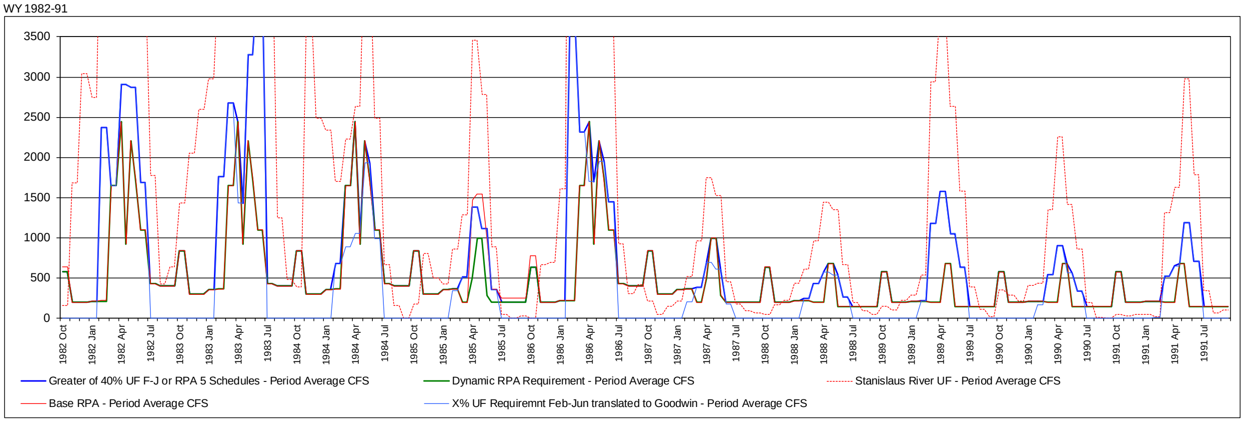
WY 1962-71



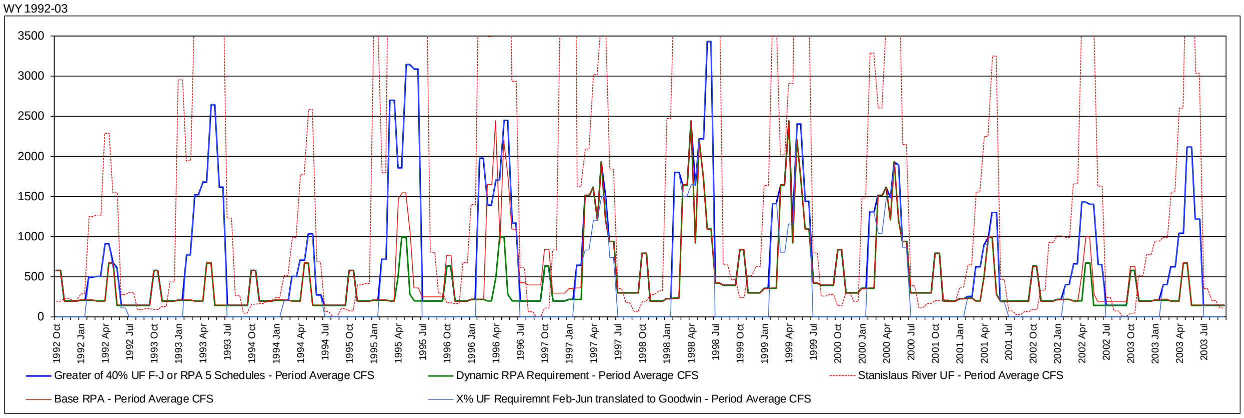
WY 1972-81

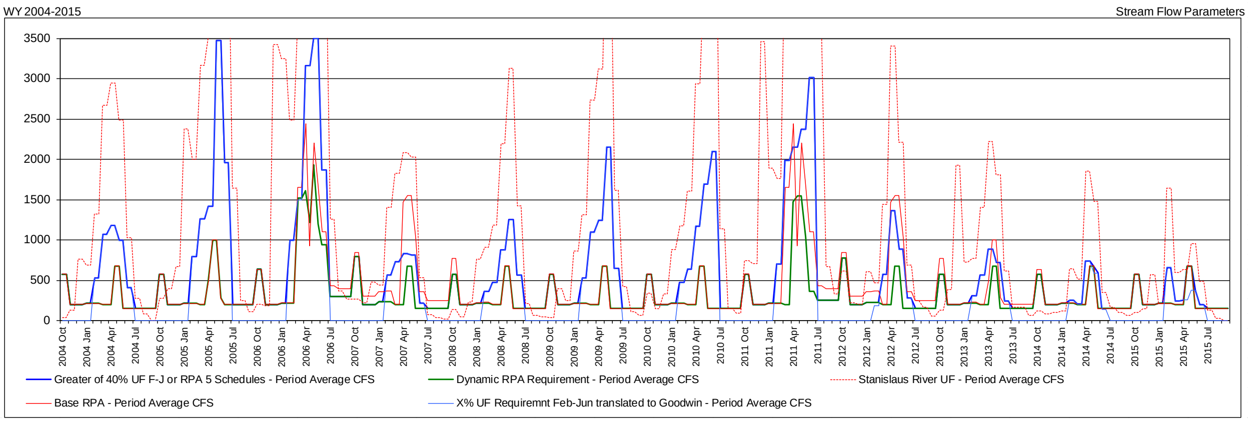


WY 1982-91



WY 1992-03





4. Additional Information

The SWRCB Staff analysis of the 40% scenario using its WSE model results in an end-of-September New Melones Reservoir storage as shown in Figure 16. The difference in New Melones Reservoir storage between the SWRCB modeling results and the Districts' modeling of the 40% conditions is illustrated in Figure 17. The differences are primarily the result of the assumed carryover storage target.

Figure 16. New Melones Reservoir Storage, End of September – SWRCB 40% WSE Modeling

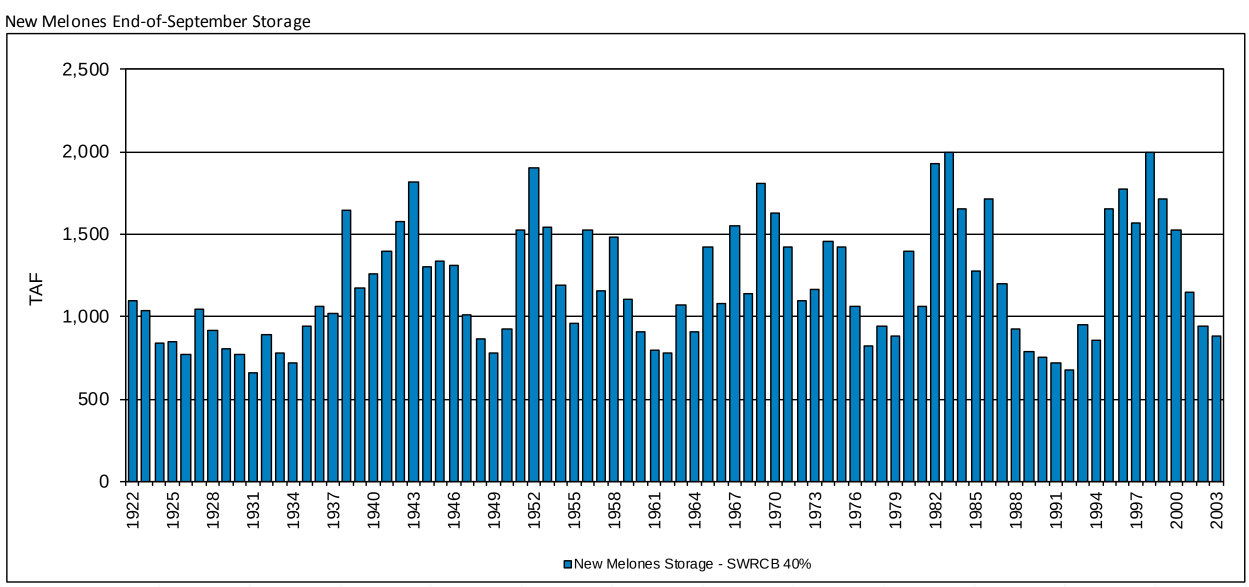
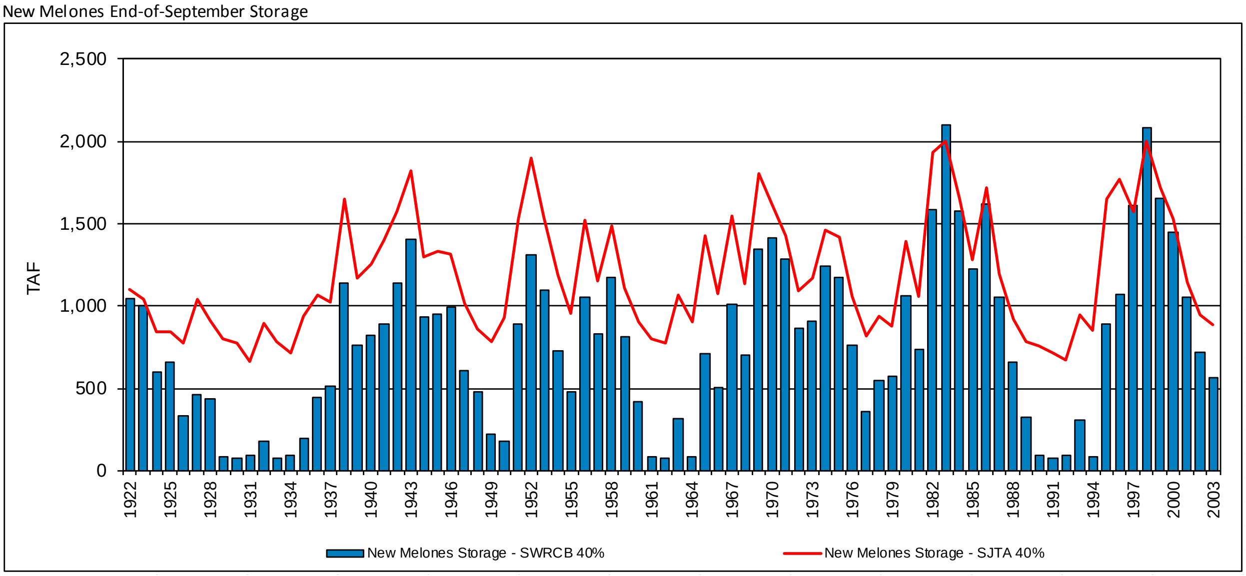


Figure 17. New Melones Reservoir Storage Difference, End of September – 40% Condition



The SWRCB WSE modeling results for its Baseline and 40% conditions were reviewed and Table 4 illustrates annual results concerning hydrology and the WSE operation simulation results.

Table 4. SWRCB WSE Modeling Results – Baseline and 40% Conditions

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
All values expressed in 1,000 acre-feet				NM Storage		OID/SSJID				CVP		
Water Year	SJR Basin WYT	Stanislaus UF	New Melones Reservoir Inflow	**WSE NM EOS Storage SWRCB 40%**	***WSE NM EOS Storage SWRCB Baseline***	Districts' Model Land Use	Districts' Formula Water	**WSE OID/SSJID Diversion SWRCB 40%**	***WSE OID/SSJID Diversion SWRCB Baseline***	**WSE CVP Contractor Allotment SWRCB 40%**	***WSE CVP Contractor Allotment SWRCB Baseline***	**WSE Total Goodwin Release SWRCB 40%**
	602020	TAF	TAF	**TAF**	***TAF***	TAF	TAF	**TAF**	***TAF***	**TAF**	***TAF***	**TAF**
								Land Use				
Does not change among scenarios				SWRCB	*SWRCB*	*Districts' -*		CO Stor	*SWRCB*	SWRCB	*SWRCB*	SWRCB
Districts' and SWRCB Use Same Values				40%	*Baseline*	*SWRCB Differs*		Refill	*Baseline*	40%	*Baseline*	40%
				Alt				Min Diver		Alt		Alt
1922-2003								Formula				
Average		1,118		**1,188**	***1,125***	520	583	**446**	***510***	**91**	***106***	**524**
1922	W	1,431	1,389	**1,097**	***1,340***	506	600	**507**	***507***	**155**	***155***	**606**
1923	AN	1,130	1,109	**1,038**	***1,340***	507	600	**512**	***512***	**155**	***155***	**480**
1924	C	261	385	**842**	***822***	630	457	**252**	***489***	**31**	***78***	**251**
1925	BN	1,225	1,092	**844**	***1,039***	444	600	**451**	***461***	**124**	***136***	**493**
1926	D	607	619	**771**	***677***	559	600	**305**	***553***	**31**	***78***	**320**
1927	AN	1,365	1,256	**1,041**	***899***	515	600	**358**	***521***	**87**	***136***	**522**
1928	BN	951	952	**913**	***935***	509	600	**522**	***529***	**102**	***78***	**427**
1929	C	517	506	**802**	***639***	530	537	**261**	***529***	**20**	***24***	**298**
1930	C	732	671	**773**	***495***	559	600	**314**	***554***	**0**	***16***	**354**
1931	C	316	438	**662**	***169***	549	492	**217**	***457***	**0**	***3***	**289**
1932	AN	1,355	1,160	**894**	***483***	531	600	**363**	***529***	**4**	***12***	**541**
1933	D	610	586	**782**	***216***	574	591	**319**	***570***	**1**	***16***	**338**
1934	C	427	498	**717**	***119***	564	532	**221**	***338***	**0**	***3***	**306**
1935	AN	1,213	1,082	**939**	***334***	464	600	**326**	***467***	**47**	***12***	**470**
1936	AN	1,322	1,291	**1,063**	***752***	480	600	**483**	***491***	**136**	***50***	**547**
1937	W	1,107	1,080	**1,021**	***974***	498	600	**504**	***504***	**155**	***59***	**450**
1938	W	2,076	2,032	**1,647**	***1,870***	495	600	**498**	***498***	**155**	***136***	**764**
1939	D	526	562	**1,171**	***1,299***	529	575	**536**	***536***	**44**	***155***	**401**
1940	AN	1,400	1,327	**1,257**	***1,543***	514	600	**522**	***522***	**128**	***155***	**572**
1941	W	1,336	1,290	**1,399**	***1,658***	486	600	**493**	***493***	**155**	***155***	**478**
1942	W	1,485	1,450	**1,577**	***1,944***	454	600	**476**	***477***	**155**	***155***	**617**
1943	W	1,553	1,538	**1,821**	***1,866***	484	600	**503**	***503***	**155**	***155***	**620**
1944	BN	675	649	**1,301**	***1,328***	547	600	**547**	***547***	**155**	***155***	**418**
1945	AN	1,278	1,228	**1,335**	***1,491***	474	600	**500**	***500***	**155**	***155***	**508**
1946	AN	1,178	1,175	**1,312**	***1,444***	481	600	**510**	***510***	**155**	***155***	**494**
1947	D	634	632	**1,014**	***945***	637	600	**526**	***613***	**31**	***155***	**327**
1948	BN	898	853	**862**	***866***	489	600	**491**	***495***	**43**	***78***	**438**
1949	BN	745	732	**781**	***669***	583	600	**400**	***575***	**10**	***59***	**371**
1950	BN	1,076	1,027	**928**	***779***	549	600	**381**	***547***	**13**	***59***	**463**
1951	AN	1,692	1,654	**1,528**	***1,330***	505	600	**512**	***518***	**128**	***136***	**407**
1952	W	1,920	1,844	**1,902**	***1,931***	496	600	**504**	***504***	**155**	***155***	**808**
1953	BN	976	965	**1,542**	***1,563***	546	600	**548**	***548***	**155**	***155***	**570**
1954	BN	889	882	**1,187**	***1,277***	590	600	**577**	***577***	**155**	***155***	**458**
1955	D	681	656	**955**	***1,036***	516	600	**473**	***521***	**31**	***78***	**351**
1956	W	1,881	1,825	**1,524**	***1,671***	527	600	**521**	***524***	**124**	***136***	**608**
1957	BN	895	878	**1,156**	***1,372***	557	600	**552**	***552***	**155**	***155***	**491**
1958	W	1,678	1,599	**1,485**	***1,878***	419	600	**441**	***441***	**155**	***155***	**683**
1959	D	586	624	**1,106**	***1,341***	556	600	**551**	***551***	**103**	***155***	**298**
1960	C	594	574	**904**	***934***	608	583	**389**	***584***	**18**	***78***	**324**
1961	C	404	446	**799**	***583***	549	497	**256**	***502***	**0**	***24***	**249**
1962	BN	994	863	**778**	***584***	540	600	**421**	***542***	**0**	***16***	**437**
1963	AN	1,267	1,227	**1,067**	***824***	481	600	**349**	***493***	**87**	***50***	**484**
1964	D	644	632	**907**	***599***	578	600	**415**	***575***	**21**	***24***	**316**
1965	W	1,750	1,666	**1,425**	***1,163***	500	600	**506**	***512***	**124**	***128***	**512**
1966	BN	704	733	**1,075**	***917***	552	600	**558**	***558***	**122**	***78***	**355**
1967	W	1,932	1,831	**1,548**	***1,578***	486	600	**492**	***492***	**147**	***136***	**723**
1968	D	640	670	**1,137**	***1,126***	534	600	**545**	***545***	**72**	***155***	**413**
1969	W	2,212	2,118	**1,807**	***1,983***	502	600	**510**	***510***	**135**	***155***	**810**
1970	AN	1,322	1,321	**1,628**	***1,562***	528	600	**543**	***543***	**155**	***155***	**774**

Table 4. SWRCB WSE Modeling Results – Baseline and 40% Conditions (continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
All values expressed in 1,000 acre-feet				NM Storage		OID/SSJID				CVP		
Water Year	SJR Basin WYT	Stanislaus UF	New Melones Reservoir Inflow	WSE NM EOS Storage SWRCB 40%	*WSE NM EOS Storage SWRCB Baseline*	Districts' Model Land Use	Districts' Formula Water	WSE OID/SSJID Diversion SWRCB 40%	*WSE OID/SSJID Diversion SWRCB Baseline*	WSE CVP Contractor Allotment SWRCB 40%	*WSE CVP Contractor Allotment SWRCB Baseline*	WSE Total Goodwin Release SWRCB 40%
	602020	TAF	TAF	TAF	*TAF*	TAF	TAF	TAF	*TAF*	TAF	*TAF*	TAF
								Land Use				
Does not change among scenarios				SWRCB	*SWRCB*	*Districts' -*		CO Stor	*SWRCB*	SWRCB	*SWRCB*	SWRCB
Districts' and SWRCB Use Same Values				40%	*Baseline*	*SWRCB Differs*		Refill	*Baseline*	40%	*Baseline*	40%
				Alt				Min Diver		Alt		Alt
1922-2003								Formula				
Average		1,118		1,188	1,125	520	583	446	510	91	106	524
1971	BN	1,074	1,064	1,425	1,462	528	600	538	538	155	155	535
1972	D	775	764	1,095	1,015	625	600	600	600	39	155	409
1973	AN	1,281	1,237	1,169	1,144	490	600	508	508	126	155	518
1974	W	1,560	1,500	1,460	1,477	439	600	478	479	155	155	555
1975	W	1,249	1,210	1,422	1,461	492	600	506	507	155	155	553
1976	C	373	467	1,059	1,012	608	511	445	512	31	78	298
1977	C	155	271	820	587	608	381	229	394	0	24	231
1978	W	1,589	1,311	938	1,064	454	600	446	457	124	128	620
1979	AN	1,163	1,139	879	1,032	529	600	536	535	137	155	510
1980	W	1,806	1,721	1,393	1,571	481	600	502	502	150	155	538
1981	D	590	633	1,061	1,074	540	600	551	551	60	155	307
1982	W	2,346	2,229	1,932	2,000	429	600	447	447	132	155	799
1983	W	2,950	2,900	2,000	2,000	413	600	436	436	155	155	2,288
1984	AN	1,434	1,621	1,651	1,651	549	600	560	560	155	155	1,227
1985	D	678	744	1,279	1,289	510	600	529	529	155	155	379
1986	W	1,936	1,869	1,718	1,817	475	600	495	495	155	155	774
1987	C	372	497	1,197	1,160	531	531	537	539	31	155	392
1988	C	378	389	922	758	543	460	337	456	0	43	278
1989	C	780	648	785	598	548	600	354	536	0	16	391
1990	C	469	491	757	297	570	527	217	524	0	16	262
1991	C	510	502	717	116	526	535	209	444	0	3	298
1992	C	486	459	673	100	508	506	210	248	0	0	266
1993	W	1,558	1,275	950	549	477	600	335	474	71	12	581
1994	C	454	501	852	248	529	534	222	526	17	16	315
1995	W	2,349	2,160	1,652	1,433	452	600	447	463	124	128	800
1996	W	1,489	1,512	1,772	1,744	517	600	510	510	155	155	690
1997	W	1,758	1,902	1,572	1,589	556	600	563	563	155	155	1,375
1998	W	2,092	1,876	2,000	2,000	444	600	454	454	155	155	848
1999	AN	1,347	1,326	1,716	1,713	508	600	526	526	155	155	893
2000	AN	1,162	1,062	1,529	1,581	488	600	477	477	155	155	583
2001	D	566	588	1,145	1,122	469	592	493	493	120	155	332
2002	D	849	710	944	774	548	600	452	558	22	78	392
2003	BN	994	896	885	627	530	600	454	536	0	59	466

The record of historical hydrology was reviewed for a comparison of unimpaired runoff from the Stanislaus River Basin to the releases to the Stanislaus River at Goodwin Dam. Table 5 illustrates the monthly values of each parameter for the 2011 through 2016 period. Table 6 provides a comparison of the monthly volumes as summed for different periods of the year.

Table 5. Stanislaus Unimpaired Runoff and River Releases at Goodwin Dam

Stanislaus Unimpaired at Goodwin - TAF (DWR)

WY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Total	Feb-Jun
2011	46	42	213	116	98	305	321	364	449	217	41	20	2,231	1,537
2012	38	13	12	37	27	89	202	136	41	15	10	3	624	495
2013	8	23	119	45	43	86	132	111	36	10	10	4	627	409
2014	7	5	6	7	36	32	110	91	21	10	6	4	336	289
2015	6	9	35	13	91	37	38	59	29	8	2	0	326	253
2016	8	14	50	87	90	250	221	205	119	23	8	6	1,081	885

Stanislaus River @ Goodwin - Converted to TAF (USGS/DWR)

WY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Total	Feb-Jun
2011	39	12	28	15	17	36	139	120	118	133	113	92	863	430
2012	139	34	31	37	26	19	92	84	55	27	17	15	577	277
2013	46	17	18	20	76	29	79	87	18	17	13	12	431	289
2014	35	15	13	18	14	25	92	77	16	19	14	9	349	225
2015	26	21	13	16	17	29	29	9	10	10	9	9	198	94
2016	27	21	13	13	12	13	72	90	26	18	14	9	326	212

Table 6. Comparison of Stanislaus River Runoff and Release

Stanislaus River Runoff and River Release

<table>
<tr><th>WY</th><th>OCT</th><th>NOV</th><th>DEC</th><th>JAN</th><th>FEB</th><th>MAR</th><th>APR</th><th>MAY</th><th>JUN</th><th>JUL</th><th>AUG</th><th>SEP</th><th>Total</th></tr>
<tr><td>2011 Release</td><td colspan="4">95</td><td colspan="5">430</td><td colspan="3">339</td><td>863</td></tr>
<tr><td>Runoff</td><td colspan="4">417</td><td colspan="5">1,537</td><td colspan="3">278</td><td>2,231</td></tr>
<tr><td></td><td colspan="4"></td><td colspan="5">Release as % of Feb-Jun Runoff 28%</td><td colspan="3"></td><td>39%</td></tr>
<tr><td colspan="14"></td></tr>
<tr><td>2012 Release</td><td colspan="4">241</td><td colspan="5">277</td><td colspan="3">59</td><td>577</td></tr>
<tr><td>Runoff</td><td colspan="4">100</td><td colspan="5">495</td><td colspan="3">29</td><td>624</td></tr>
<tr><td></td><td colspan="4"></td><td colspan="5">Release as % of Feb-Jun Runoff 56%</td><td colspan="3"></td><td>92%</td></tr>
<tr><td colspan="14"></td></tr>
<tr><td>2013 Release</td><td colspan="4">100</td><td colspan="5">289</td><td colspan="3">42</td><td>431</td></tr>
<tr><td>Runoff</td><td colspan="4">194</td><td colspan="5">409</td><td colspan="3">24</td><td>627</td></tr>
<tr><td></td><td colspan="4"></td><td colspan="5">Release as % of Feb-Jun Runoff 71%</td><td colspan="3"></td><td>69%</td></tr>
<tr><td colspan="14"></td></tr>
<tr><td>2014 Release</td><td colspan="4">81</td><td colspan="5">225</td><td colspan="3">43</td><td>349</td></tr>
<tr><td>Runoff</td><td colspan="4">26</td><td colspan="5">289</td><td colspan="3">20</td><td>336</td></tr>
<tr><td></td><td colspan="4"></td><td colspan="5">Release as % of Feb-Jun Runoff 78%</td><td colspan="3"></td><td>104%</td></tr>
<tr><td colspan="14"></td></tr>
<tr><td>2015 Release</td><td colspan="4">76</td><td colspan="5">94</td><td colspan="3">28</td><td>198</td></tr>
<tr><td>Runoff</td><td colspan="4">63</td><td colspan="5">253</td><td colspan="3">10</td><td>326</td></tr>
<tr><td></td><td colspan="4"></td><td colspan="5">Release as % of Feb-Jun Runoff 37%</td><td colspan="3"></td><td>61%</td></tr>
<tr><td colspan="14"></td></tr>
<tr><td>2016 Release</td><td colspan="4">73</td><td colspan="5">212</td><td colspan="3">40</td><td>326</td></tr>
<tr><td>Runoff</td><td colspan="4">159</td><td colspan="5">885</td><td colspan="3">38</td><td>1,081</td></tr>
<tr><td></td><td colspan="4"></td><td colspan="5">Release as % of Feb-Jun Runoff 24%</td><td colspan="3"></td><td>30%</td></tr>
</table>

All values 1,000 acre-feet unless otherwise noted (UF and release at Goodwin Dam)

Report of Dr. Susan Paulsen

ATTACHMENT 6

San Joaquin Tributaries Authority
Comments on the Draft Substitute Environmental Document

Evaluation of the fate of San Joaquin River inflow to the Delta at Vernalis for WY 1966, 1968 and 1988

March 13, 2017

Simulated San Joaquin River Flow Scenarios

- **Case 1:** CalSim II Delta inflows from the DWR *State Water Project Delivery Capability Report 2015* (2015 Reliability Study), with San Joaquin River inflows reduced to reflect a scenario without the San Joaquin River Restoration Plan
- **Case 2**: Same as Case 1, but with additional San Joaquin River flows in the months of February through June (system not reoperated)

CASE 1: MODELING BASED ON THE 2015 RELIABILITY STUDY EXCLUDING SAN JOAQUIN RIVER RESTORATION PLAN

DSM2 Simulation Notes

- CalSim II model output data were used as the model starting point
  - Data from the 2015 Reliability Study were downloaded from http://baydeltaoffice.water.ca.gov/swpreliability/
  - San Joaquin River flows were modified to exclude the San Joaquin River Restoration Plan (modifications by Dan Steiner)
- CalSim II model output data (monthly time steps) were smoothed for input to DSM2 as daily average data using scripts provided by DWR in DSM2 package
- San Joaquin River inflow at Vernalis between February 1 and June 30 was tagged to track its movement through the Delta (note that modeled San Joaquin River flows continued before and after this time period but were not tagged)
- Volumetric fingerprinting results were used to track the tagged San Joaquin River inflow exported at Tracy Pumping Station (CVP), Clifton Court (SWP), Rock Slough (CCWD), and exiting the Delta at Martinez (Delta outflow)

DSM2 Simulation Notes (cont.)

- Data Gaps: used files from DWR's existing conditions model run released in 2013 (EBC2; including the Fall X2 standard) as follows:
  - Information used in CalSim II output smoothing: Historical Stage data at Martinez, DICU flow and water quality data (2020 version), Clifton Court Gate operation, DAYFLOW data, minimum San Joaquin River flow
  - DSM2 simulation: Channel Profiles, Reservoir/Gate Configurations, Operation rules of temporary barriers (except Head of Old River)

DSM2 Simulation Notes (cont.)

- Water years of interest: WY 1966 (BN), 1968 (Dry), and 1988 (Critical)
- Head of Old River barrier operations were modified to follow the 2015 schedule

	Installation			Removal		
	Started	Closed	Completed	Started	Breached	Completed
Spring	3/16	4/3	4/8	5/27	6/1	6/8
Fall	9/3	9/13	9/17	11/12	11/12	11/18

Note: The “completed” dates shown in red were used in simulations

Case 1: Summary of the fate of San Joaquin River Inflow

Fate of San Joaquin River Inflow at Vernalis between Feb.1 and Jun.30 by Mass								
Water Year	Year Type	Total Inflow (TAF)	Exported: Central Valley Project (TAF)	Exported: State Water Project (TAF)	Diverted: Contra Costa Canal (TAF)	Delta Outflow (TAF)	Total Exports, Diversions & Outflow (TAF)	Amount in DICU/Delta at end of WY (TAF)
1966	Below Normal	884	363	354	4.21	2.35	723	161
1968	Dry	816	322	317	3.84	3.16	647	169
1988	Critical	456	167	134	2.41	0.62	304	152

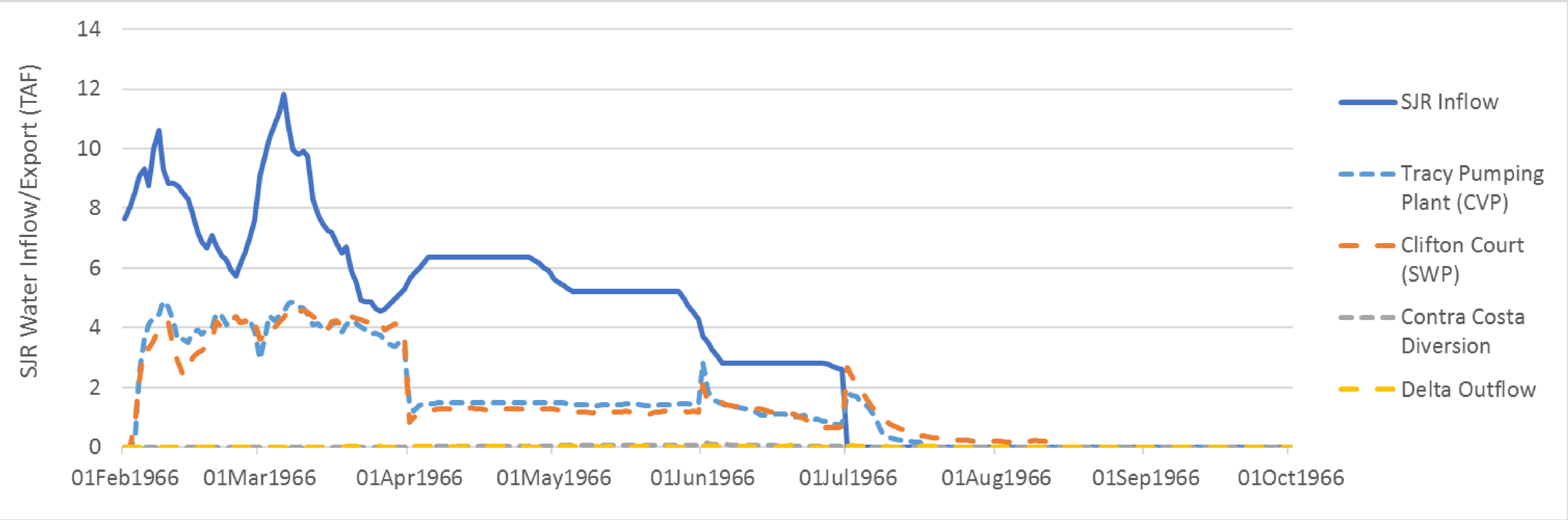
Fate of San Joaquin River Inflow at Vernalis between Feb.1 and Jun.30 by Percentage								
Water Year	Year Type	Total Inflow	Exported: Central Valley Project (%)	Exported: State Water Project (%)	Diverted: Contra Costa Canal (%)	Delta Outflow (%)	Total Exports, Diversions & Outflow (%)	Amount in DICU/Delta at end of WY (%)
1966	Below Normal	100%	41.0%	40.0%	0.48%	0.27%	81.8%	18.2%
1968	Dry	100%	39.5%	38.9%	0.47%	0.39%	79.3%	20.7%
1988	Critical	100%	36.7%	29.4%	0.53%	0.13%	66.7%	33.3%

Case 1: San Joaquin River Contribution to Delta Outflow

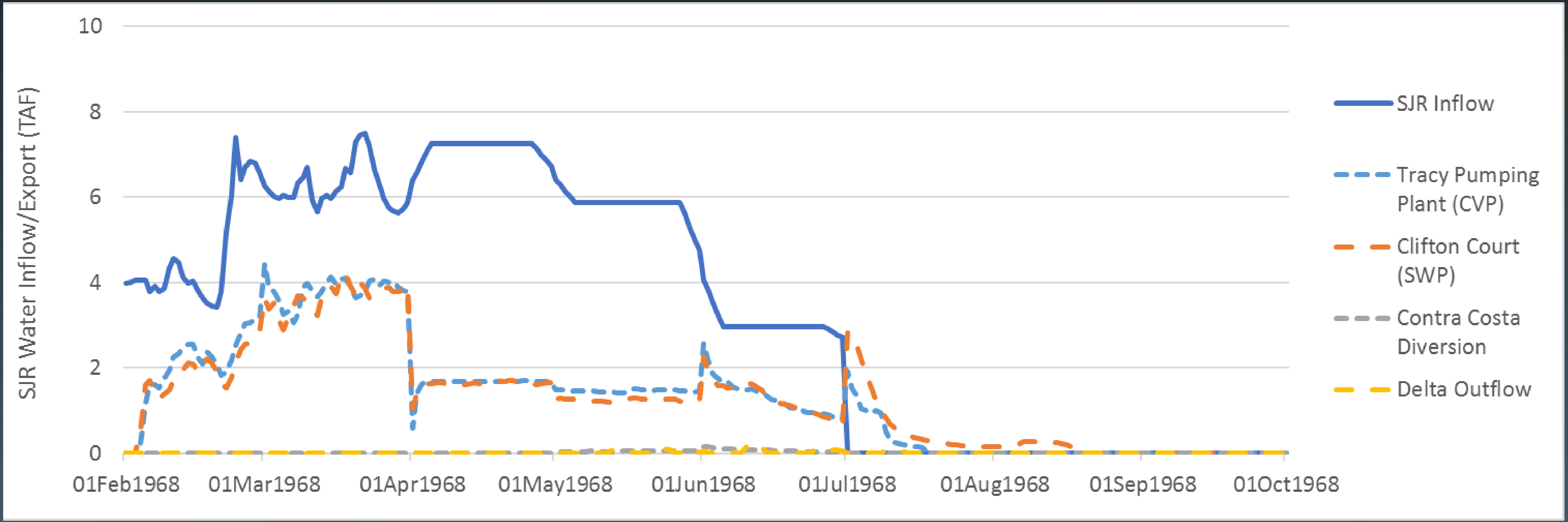
Water Year	Total Delta outflow at Martinez (Feb - Jun) (TAF)[a]	SJR water inflow to Delta at Vernalis (Feb - Jun) (TAF)[a]	SJR water that entered Delta from Feb - Jun that exited the Delta at Martinez (TAF)[b]
1966	4288	884	2.35
1968	6742	816	3.16
1988	2848	456	0.62

[a] Delta outflow volumes and SJR inflow volumes are for the period of Feb 1 – Jun 30.
[b] SJR water was tagged as it entered the Delta between Feb 1 – Jun 30, then tracked through the remainder of the water year to determine the volume of that tagged flow that exited the Delta at Martinez.

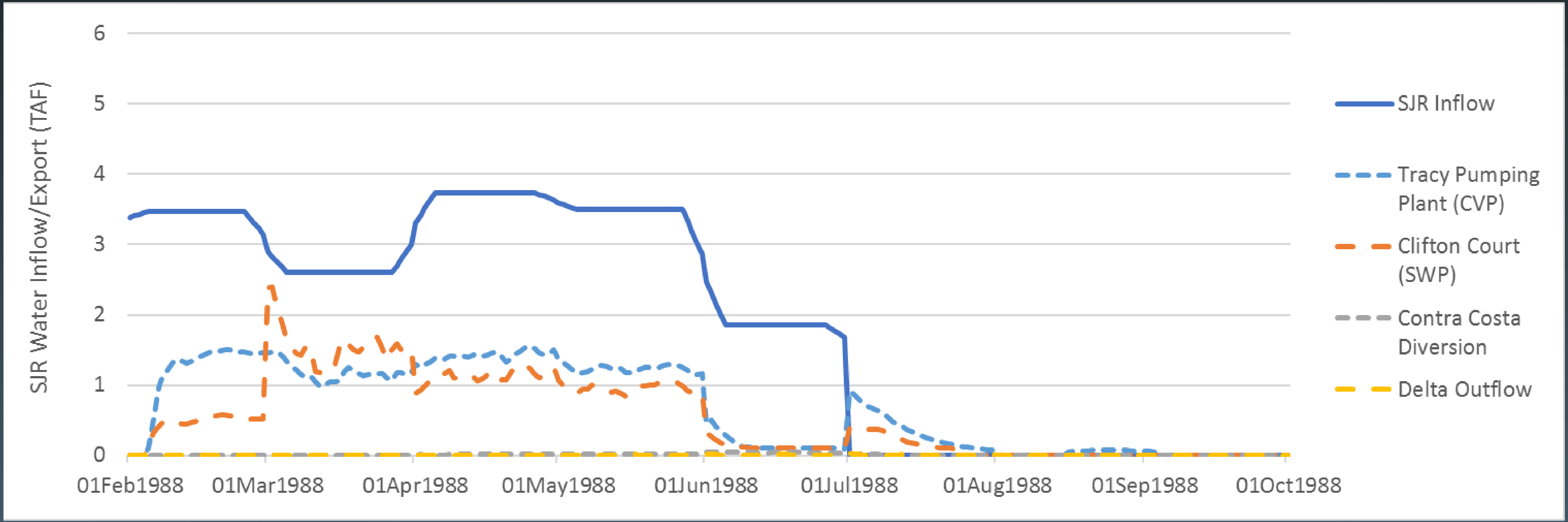
Case 1: WY 1966 (Below Normal)
Fate of San Joaquin River Inflow (Daily average values, TAF)



Case 1: WY 1968 (Dry)
Fate of San Joaquin River Inflow (Daily average values, TAF)

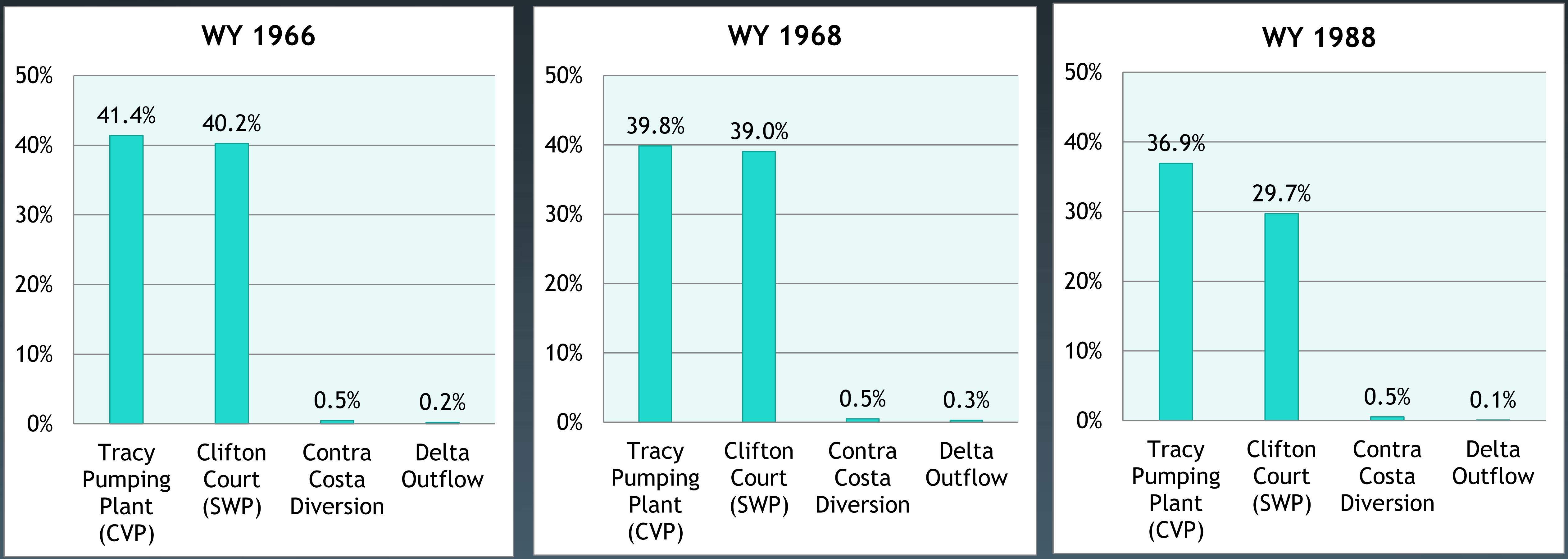


Case 1: WY 1988 (Critical)
Fate of San Joaquin River Inflow (Daily average values, TAF)



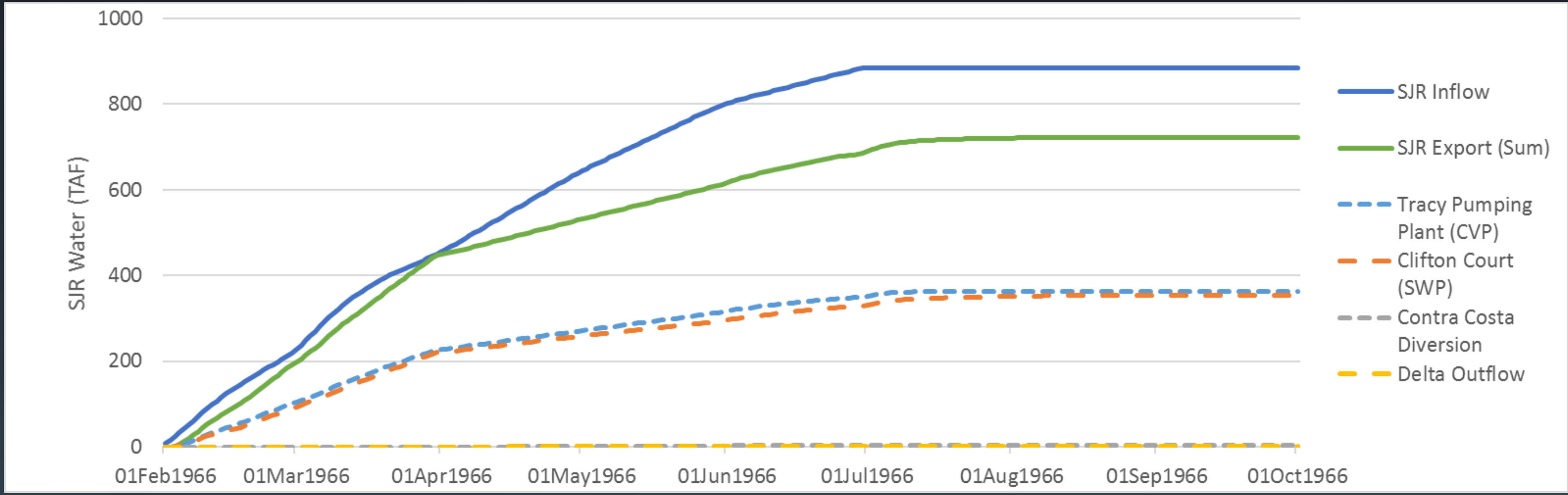
Exponent

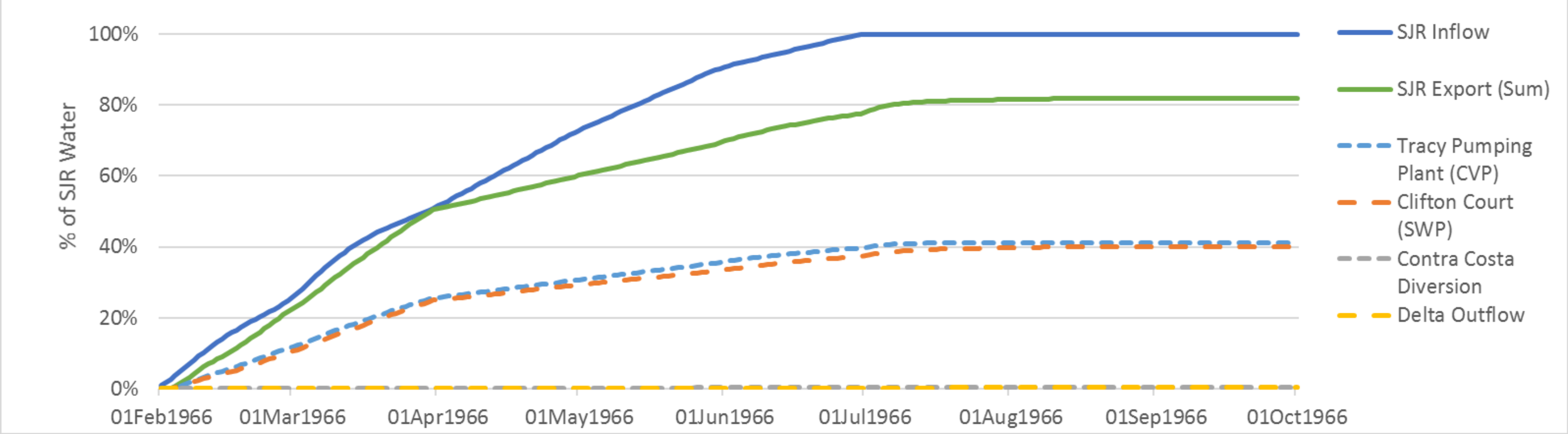
Case 1: Fate of San Joaquin River Water Inflow entering Delta at Vernalis between Feb 1 – Jun 30



Exponent

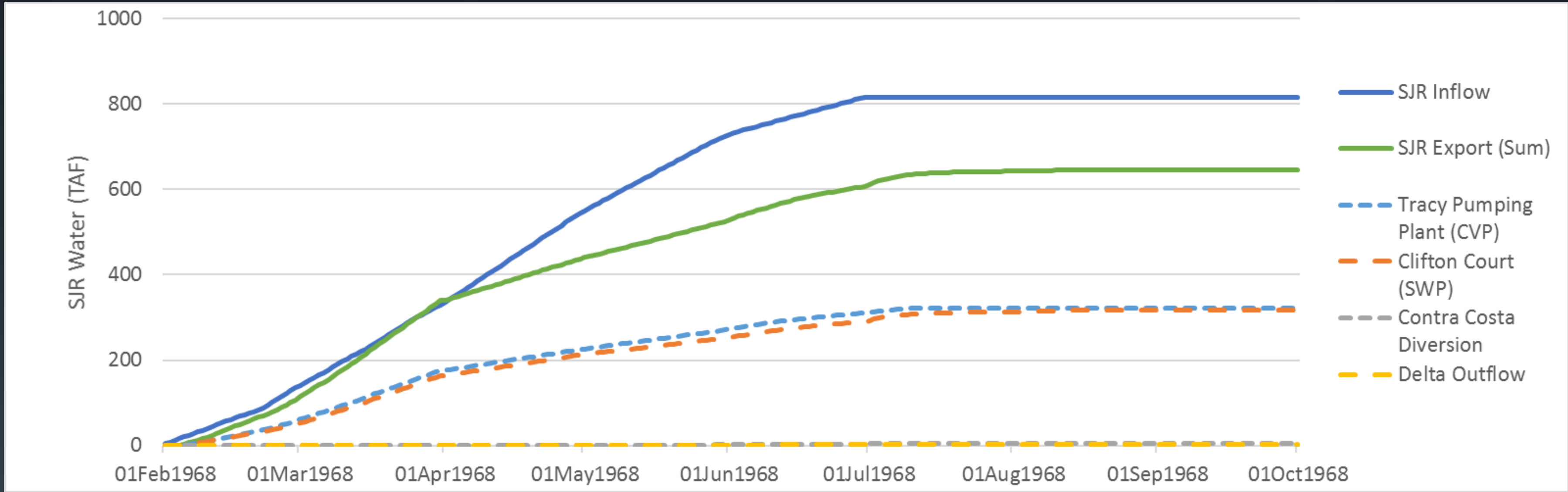
Case 1: WY 1966 – Fate of San Joaquin River Water (Cumulative)

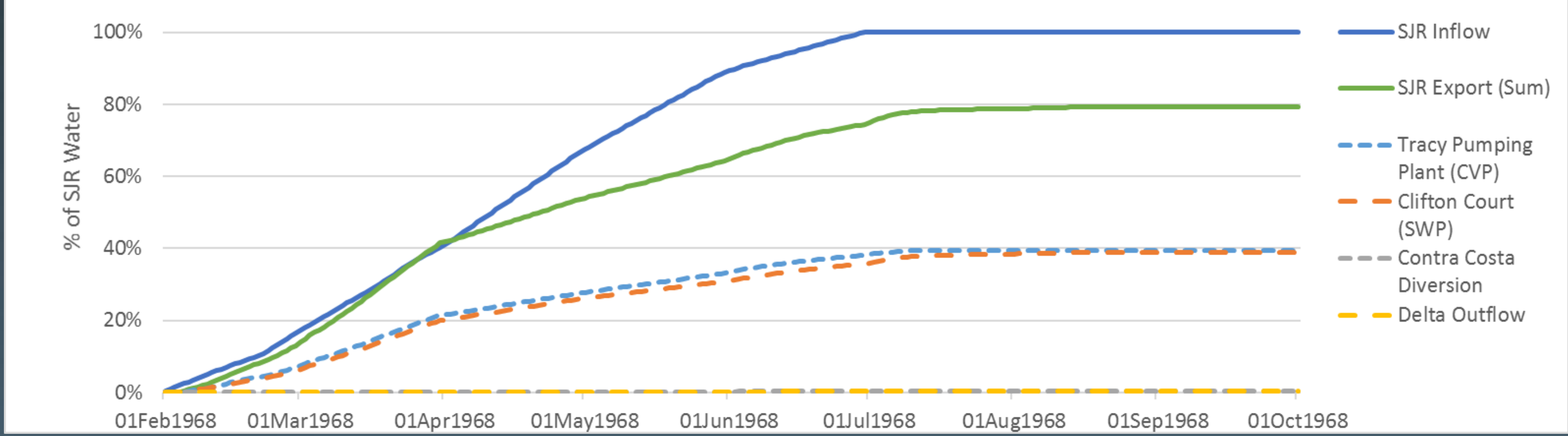




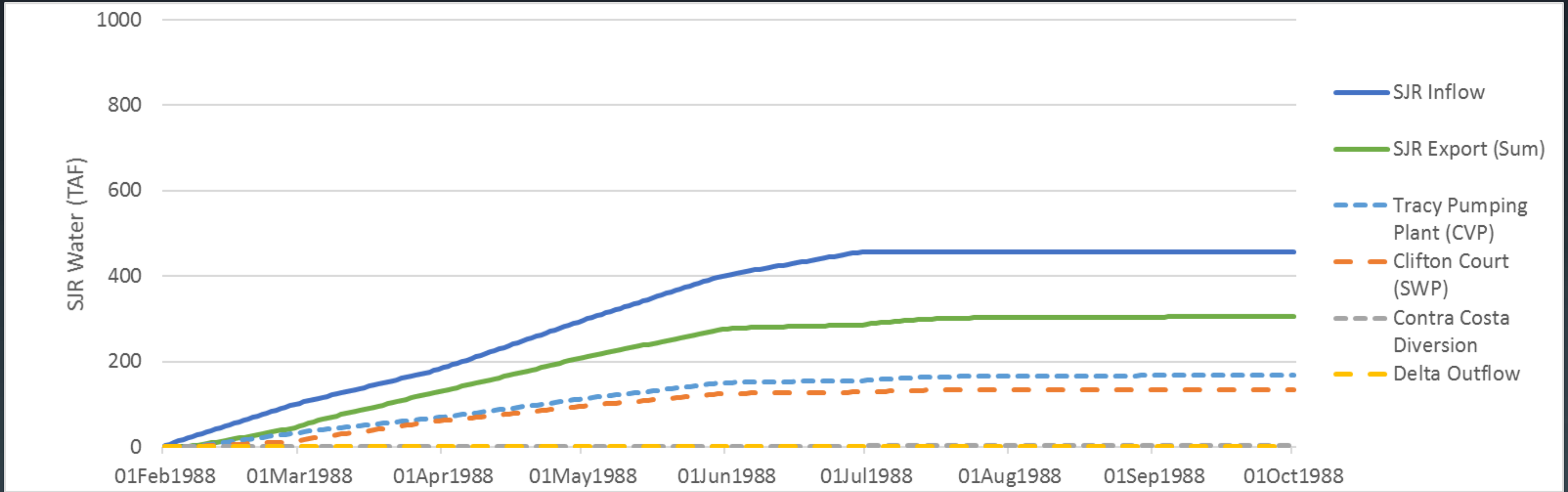
Exponent

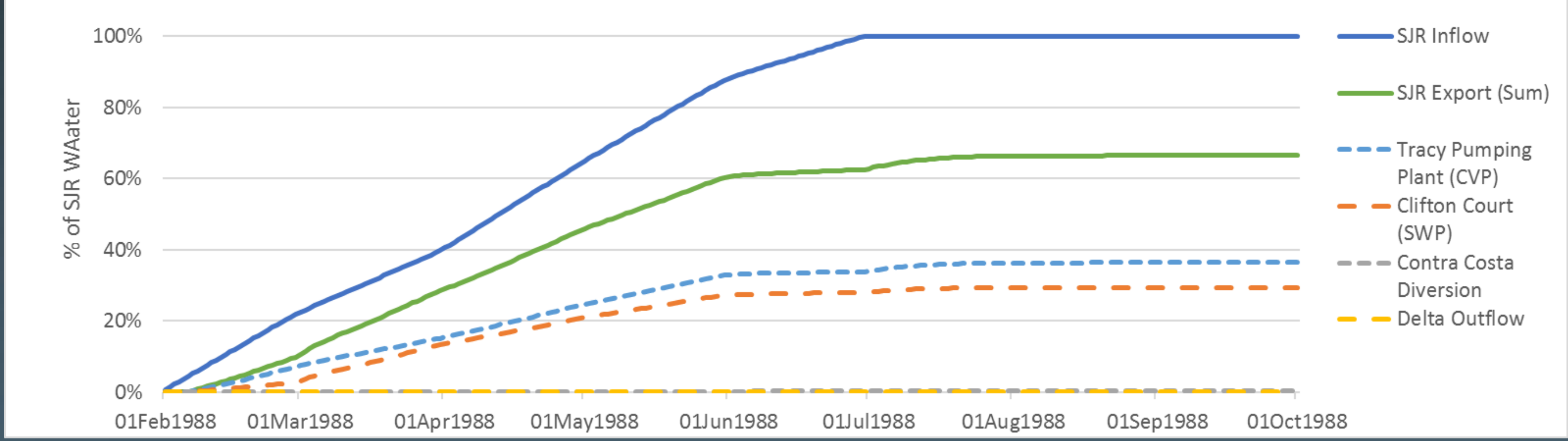
Case 1: WY 1968 – Fate of San Joaquin River Water (Cumulative)





Case 1: WY 1988 – Fate of San Joaquin River Water (Cumulative)





CASE 2: CASE 1 ASSUMPTIONS WITH ADDITIONAL SAN JOAQUIN RIVER INFLOWS

Case 2: Modeling Assumptions

- Same as Case 1, except the San Joaquin River inflows were modified as follows:

	Additional flows added to the baseline flow at Vernalis by month (cfs)				
Water Year Type	February	March	April	May	June
Below Normal	550	300	1,750	3,950	3,550
Dry	250	350	1,550	2,800	1,800
Critical	300	900	1,700	2,200	1,300

- Monthly flows were smoothed to daily flows using the same algorithm that pre-processes the CalSim II output to DSM2 input
- Other assumptions remain unchanged, including channel configuration, pumping rates, diversions and other Delta inflows

Case 2: Summary of the fate of Increased San Joaquin River Inflow

Fate of San Joaquin River Inflow at Vernalis between Feb.1 and Jun.30 by Mass

Water Year	Year Type	Total Inflow (TAF)	Exported: Central Valley Project (TAF)	Exported: State Water Project (TAF)	Diverted: Contra Costa Canal (TAF)	Delta Outflow (TAF)	Total Exports, Diversions & Outflow (TAF)	Amount in DICU/Delta at end of WY (TAF)
1966	Below Normal	1491	471	508	16.50	18.85	1014	477
1968	Dry	1223	393	417	10.92	14.93	837	386
1988	Critical	843	235	208	11.90	6.96	462	380

Fate of San Joaquin River Inflow at Vernalis between Feb.1 and Jun.30 by Percentage

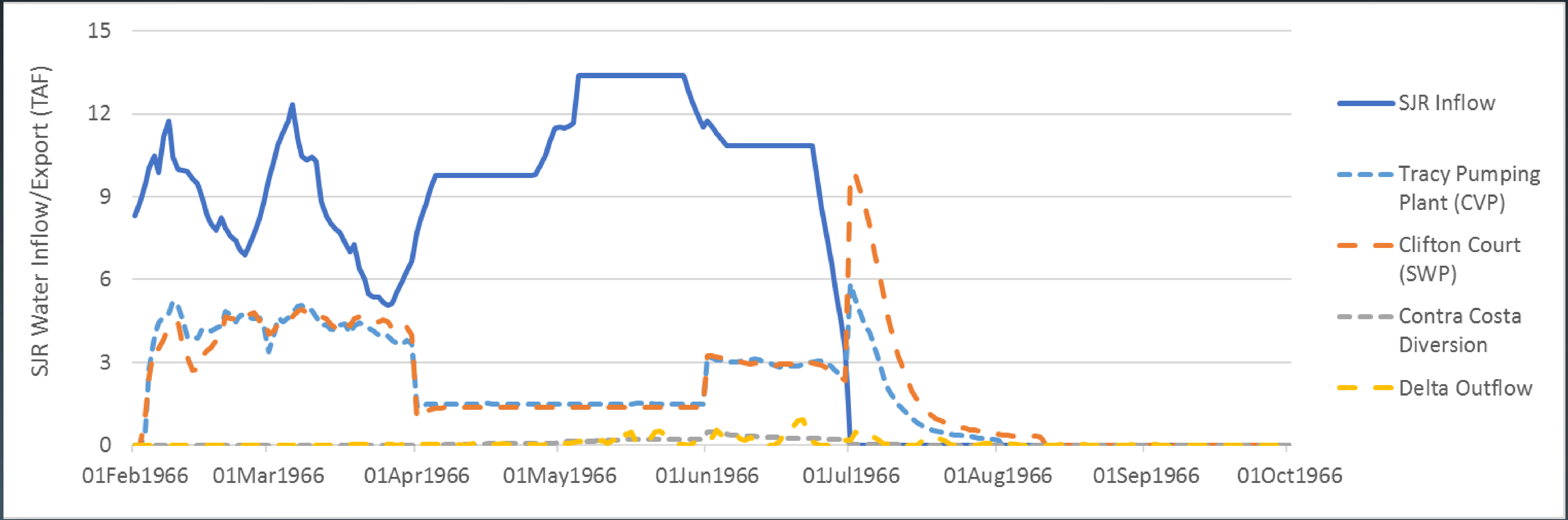
Water Year	Year Type	Total Inflow	Exported: Central Valley Project (%)	Exported: State Water Project (%)	Diverted: Contra Costa Canal (%)	Delta Outflow (%)	Total Exports, Diversions & Outflow (%)	Amount in DICU/Delta at end of WY (%)
1966	Below Normal	100%	31.6%	34.1%	1.11%	1.26%	68.0%	32.0%
1968	Dry	100%	32.2%	34.1%	0.89%	1.22%	68.4%	31.6%
1988	Critical	100%	27.9%	24.7%	1.41%	0.83%	54.9%	45.1%

Case 2: San Joaquin River Contribution to Delta Outflow

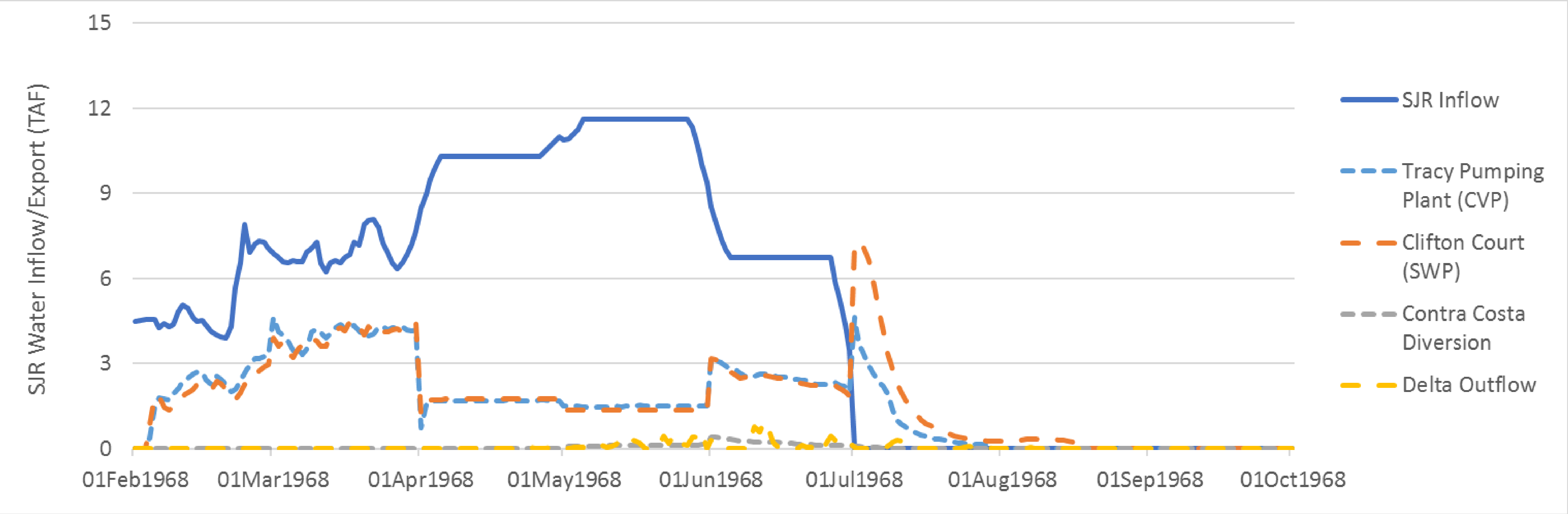
Water Year	Total Delta Outflow at Martinez (Feb - Jun) (TAF)[a]	SJR water inflow at Vernalis (Feb - Jun) (TAF) [a]	SJR water leaving Delta at Martinez (Feb - Jun) (TAF)[b]
1966	4804	1491	18.85
1968	7087	1223	14.93
1988	3157	843	6.96

[a] Delta outflow volumes and SJR inflow volumes are for the period of Feb 1 – Jun 30.
[b] SJR water was tagged as it entered the Delta between Feb 1 – Jun 30, then tracked through the remainder of the water year to determine the volume of that tagged flow that exited the Delta at Martinez.

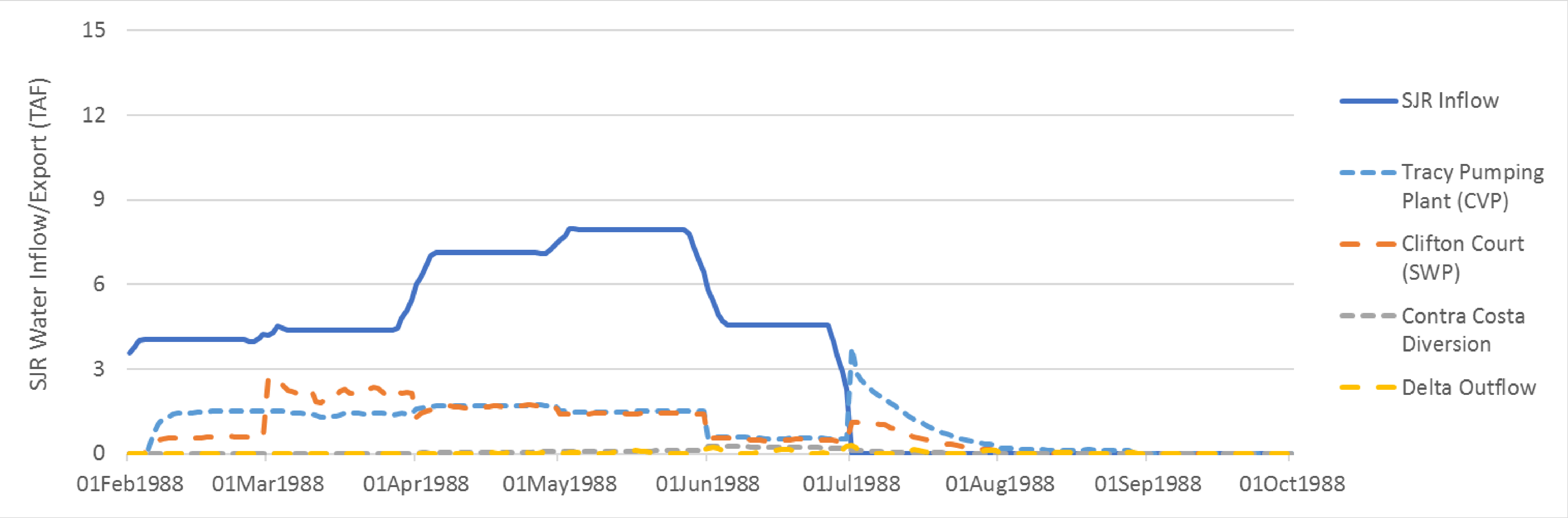
Case 2: WY 1966 (Below Normal)
Fate of Increased San Joaquin River Inflow (Daily average values, TAF)



Case 2: WY 1968 (Dry)
Fate of Increased San Joaquin River Inflow (Daily average values, TAF)

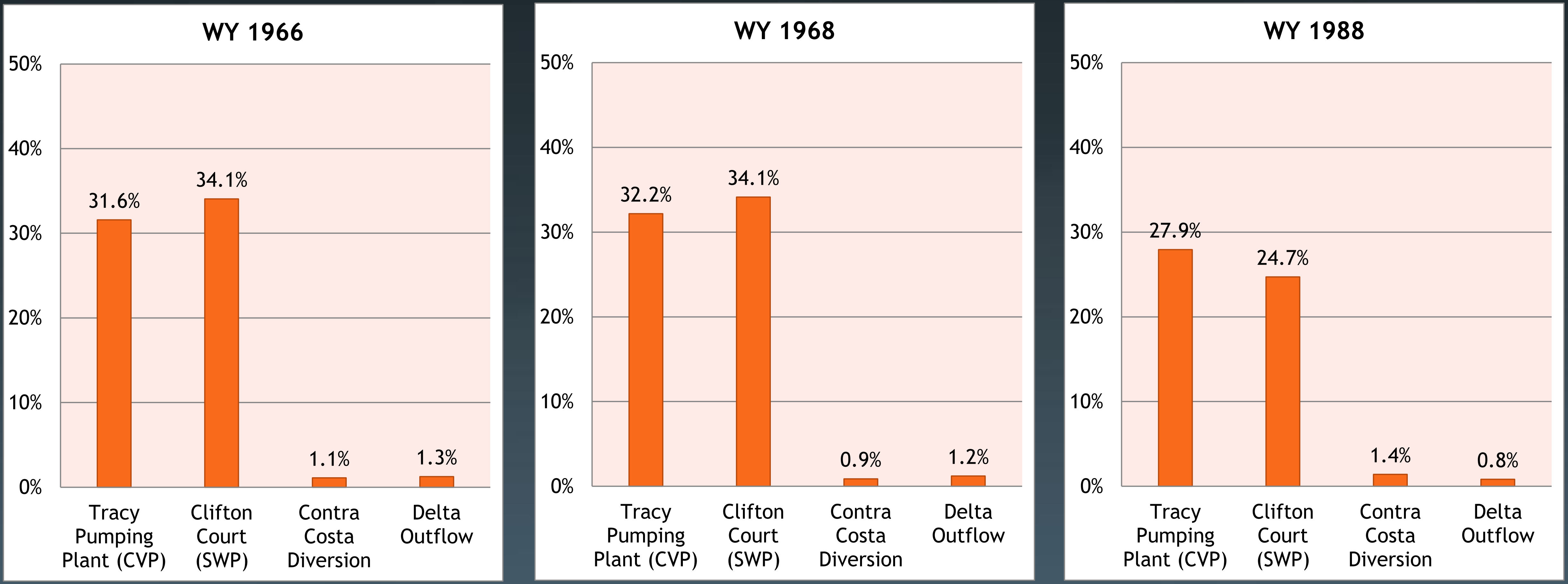


Case 2: WY 1988 (Critical)
Fate of Increased San Joaquin River Inflow (Daily average values, TAF)



Exponent

Case 2: Fate of Increased San Joaquin River Water Inflow at Vernalis



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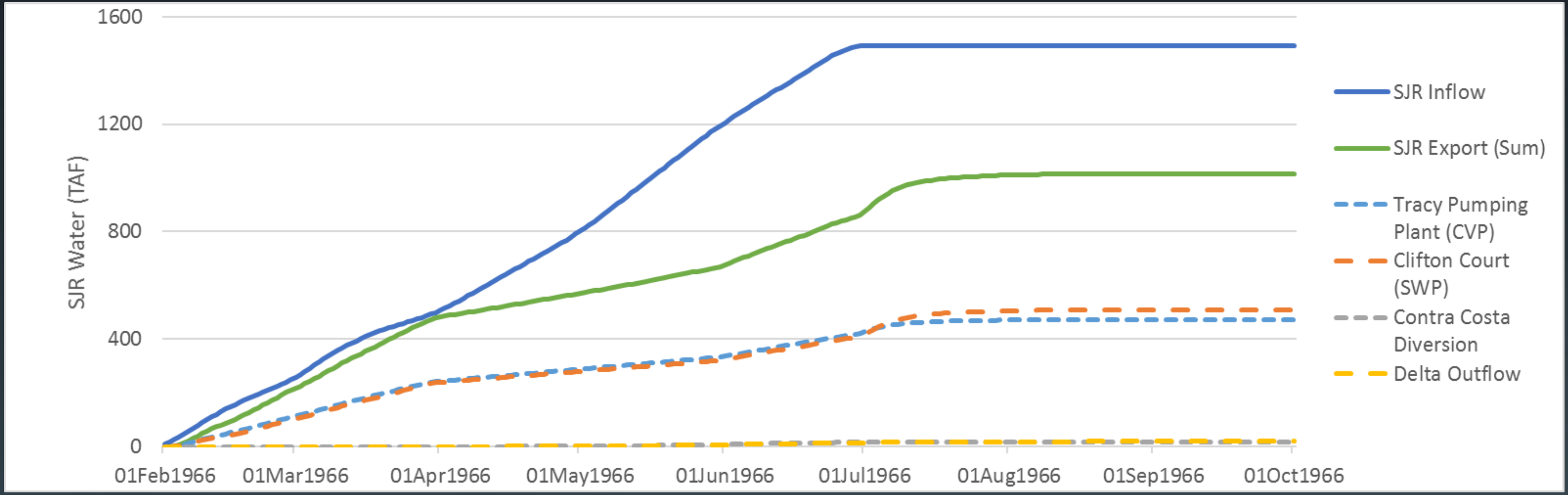
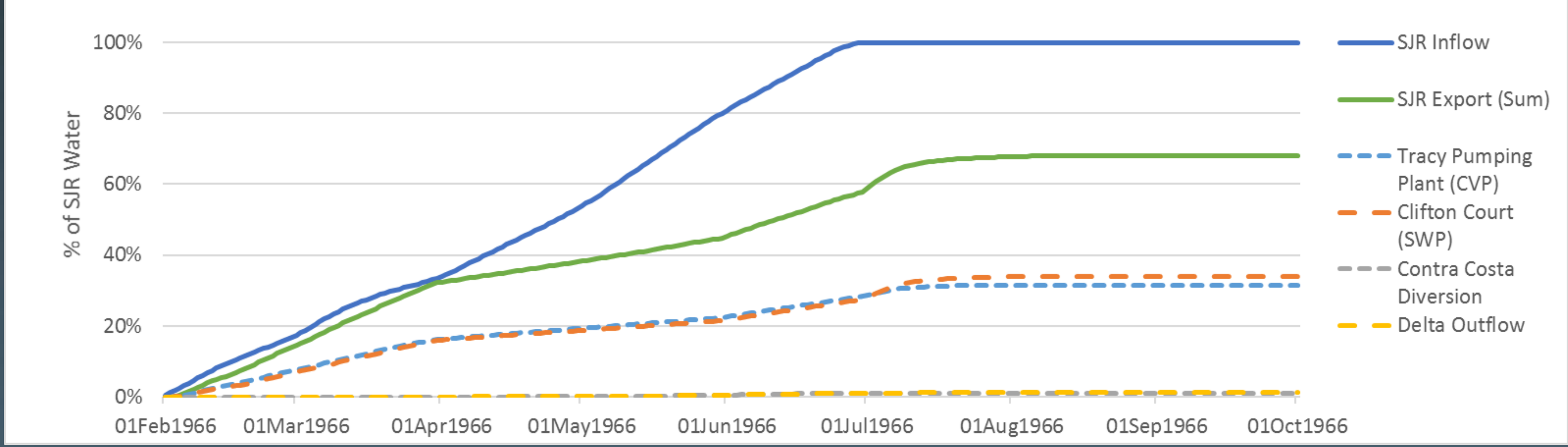
Case 2: WY 1966 – Fate of Increased San Joaquin River Water (Cumulative)





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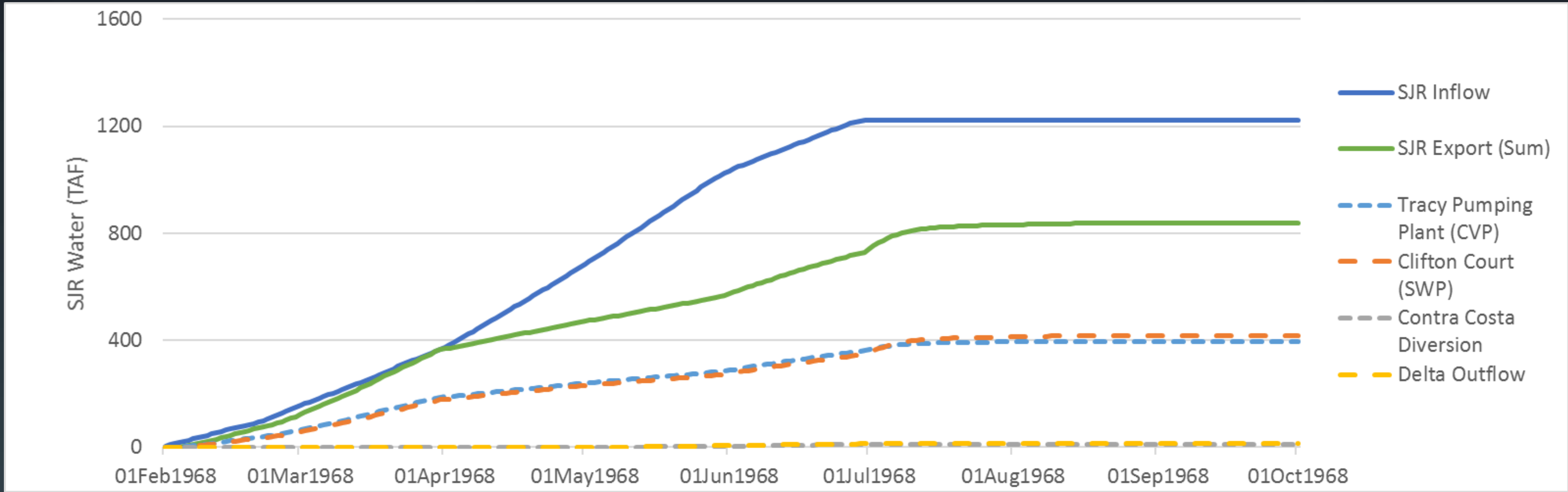
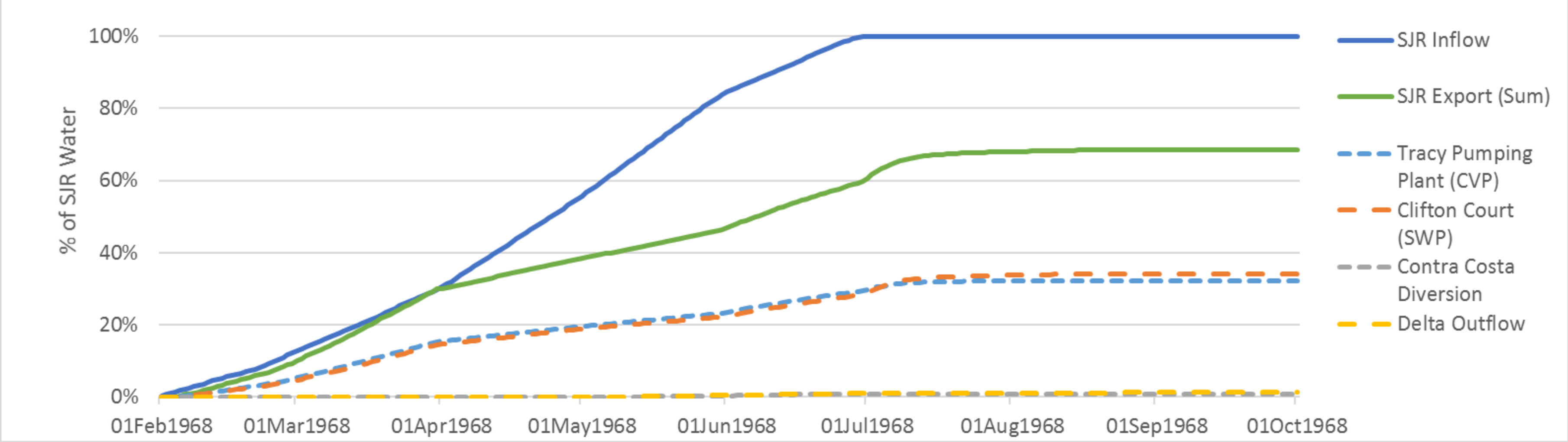
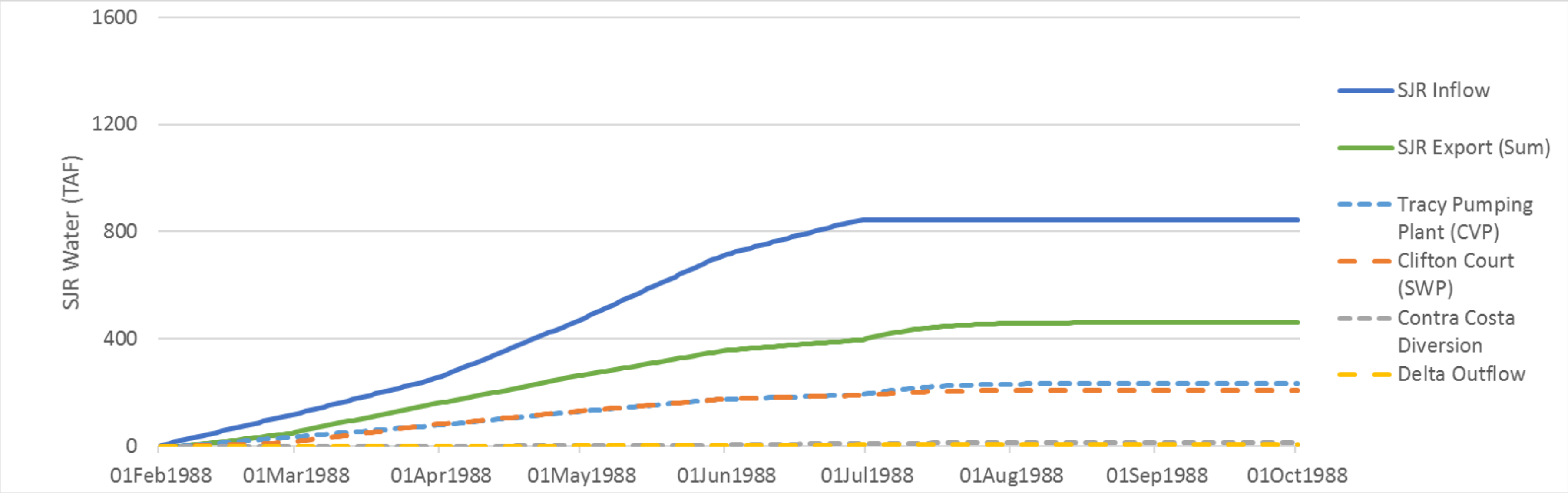
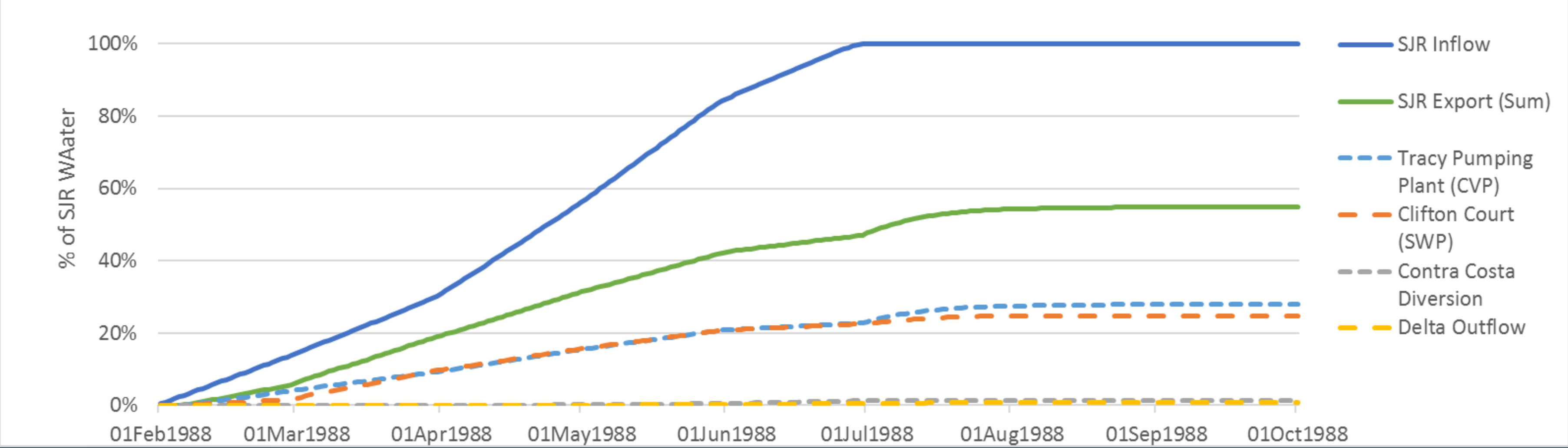
Case 2: WY 1968 – Fate of Increased San Joaquin River Water (Cumulative)





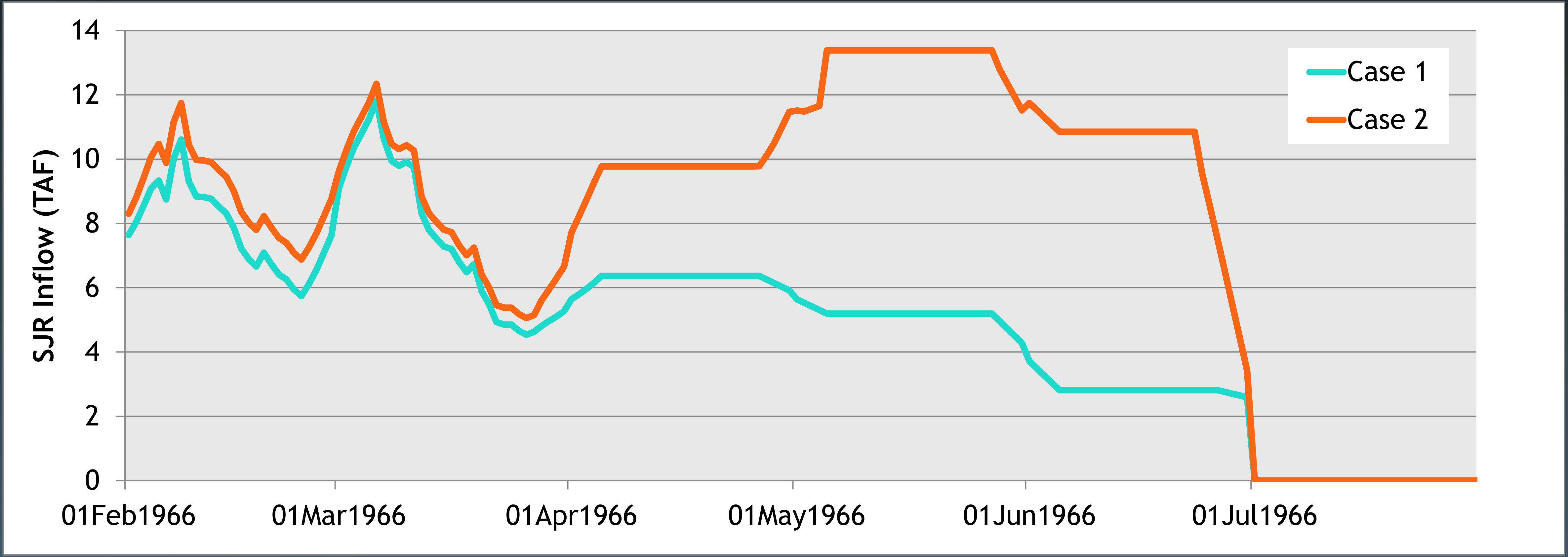
Case 2: WY 1988 – Fate of Increased San Joaquin River Water (Cumulative)



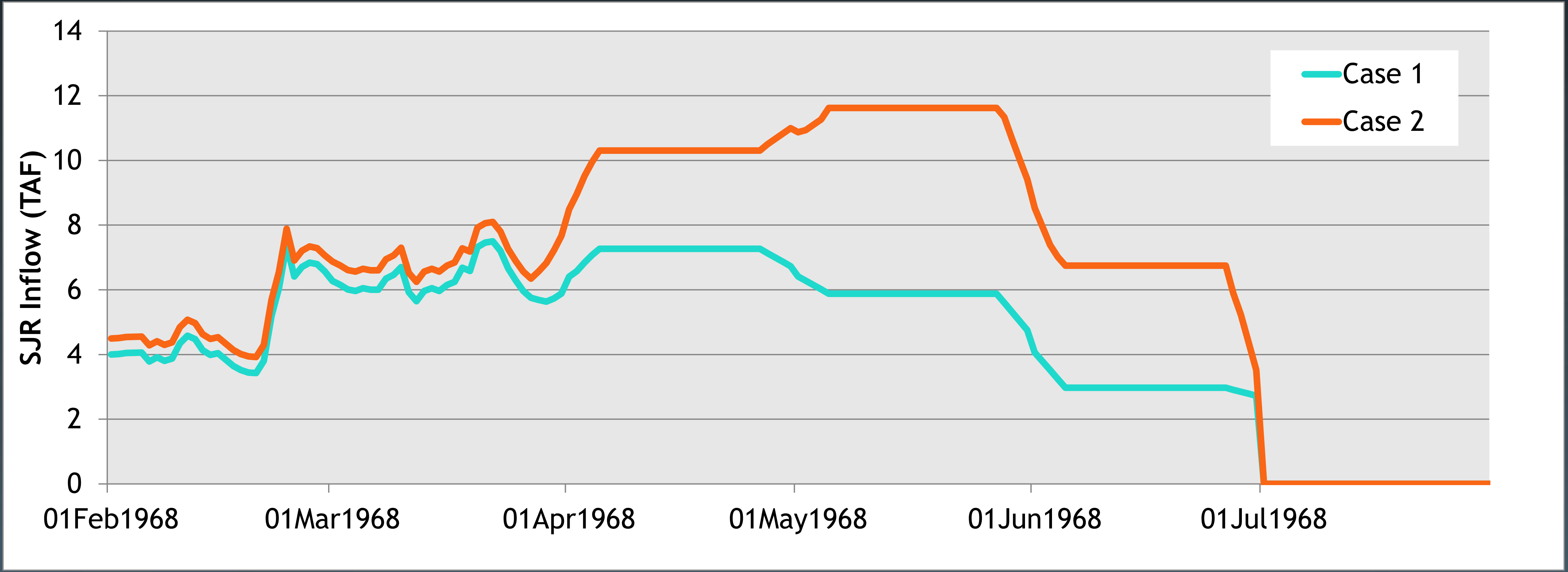


COMPARISON OF CASE 1 AND CASE 2

Cases 1 and 2: WY 1966 Tagged San Joaquin River Inflow



Cases 1 and 2: WY 1968 Tagged San Joaquin River Inflow



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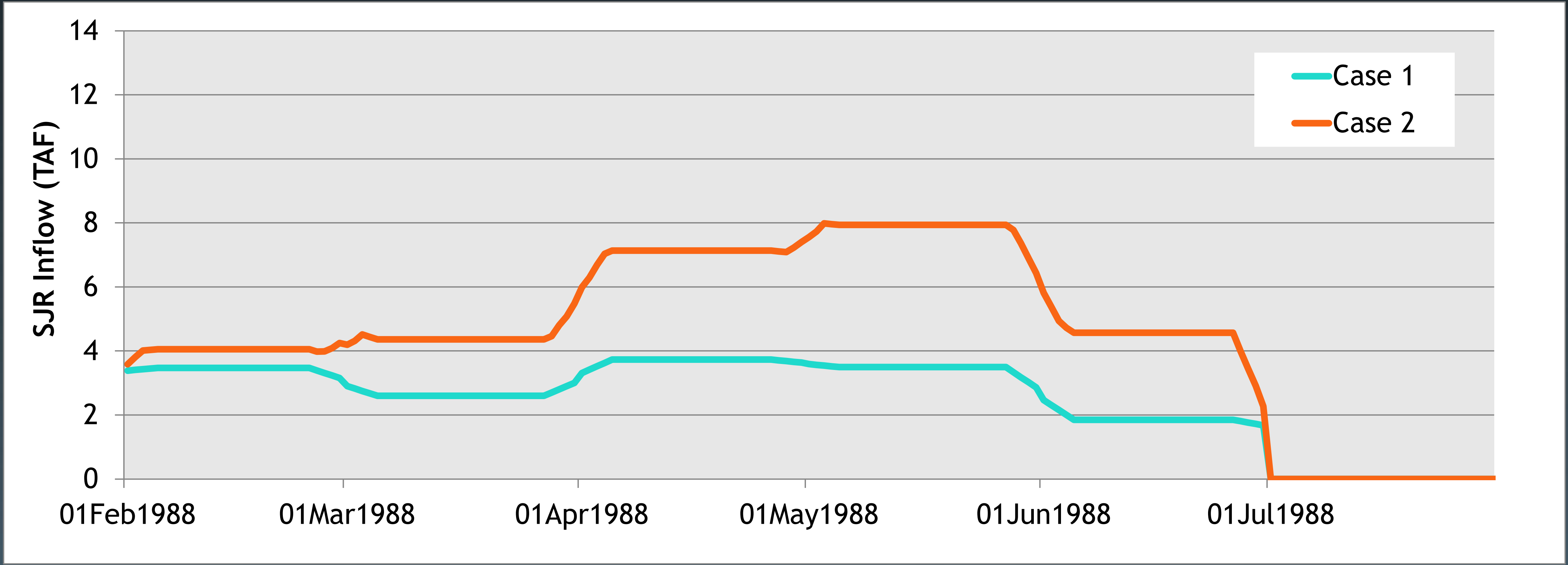
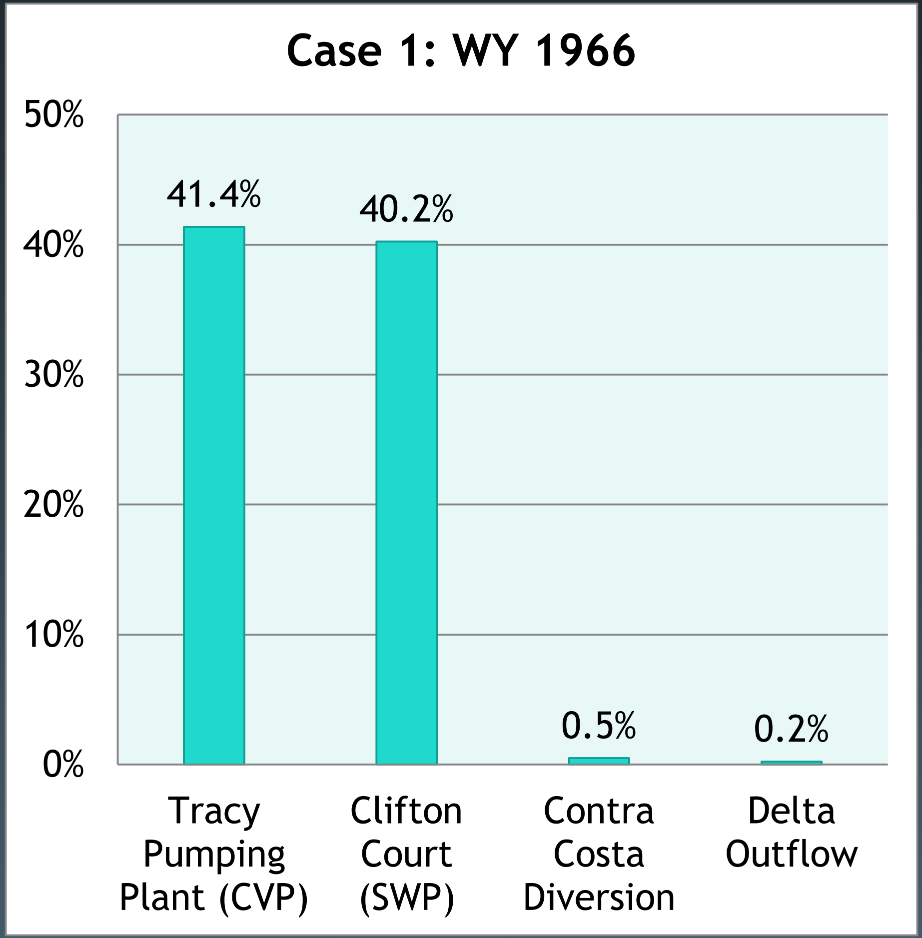
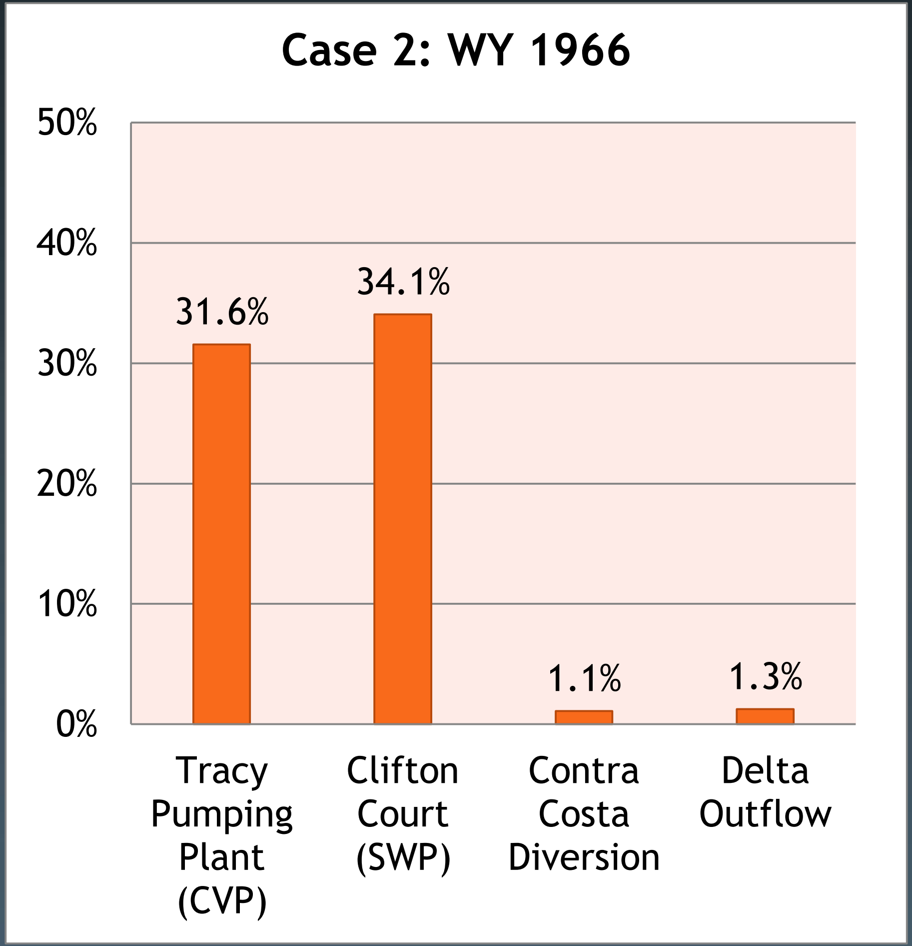
Cases 1 and 2: WY 1988 Tagged San Joaquin River Inflow



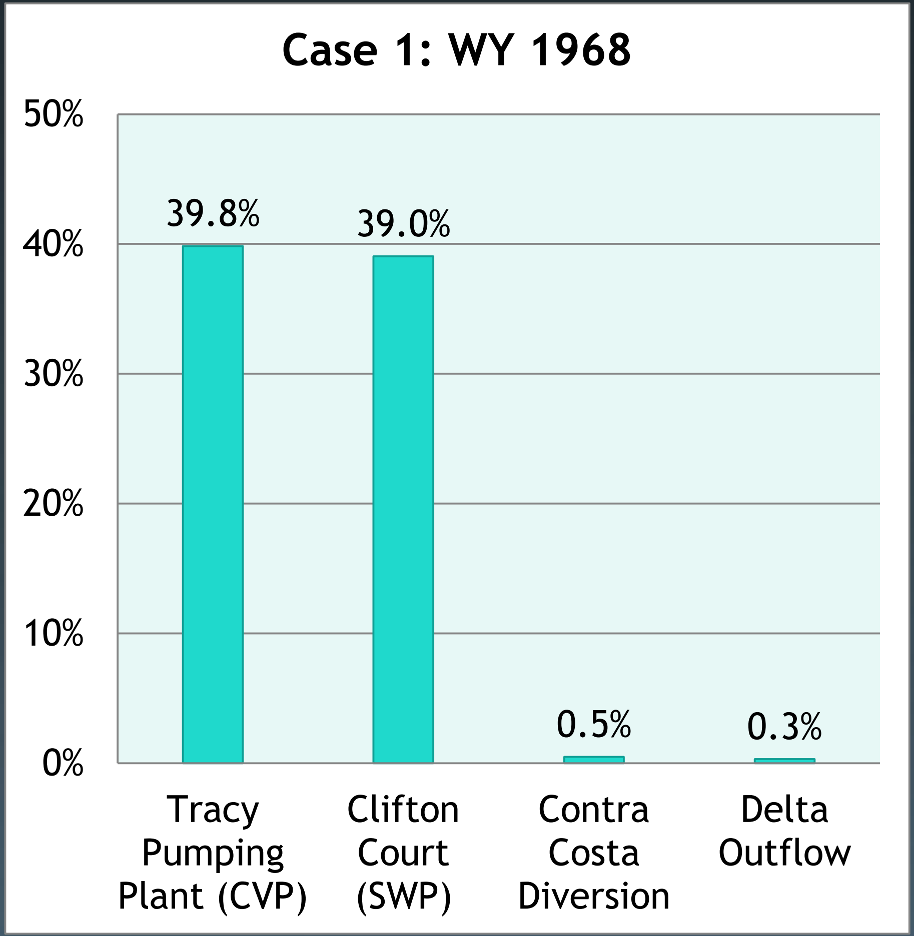
Exponent

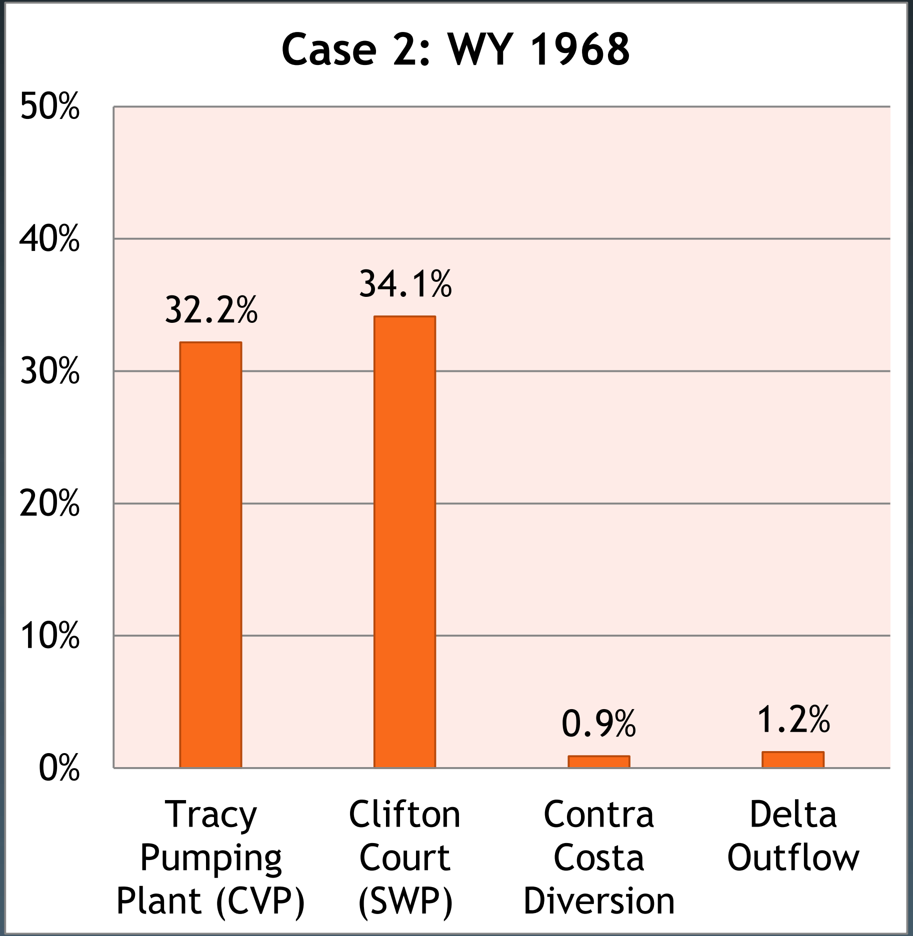
Fate of San Joaquin River Inflow at Vernalis



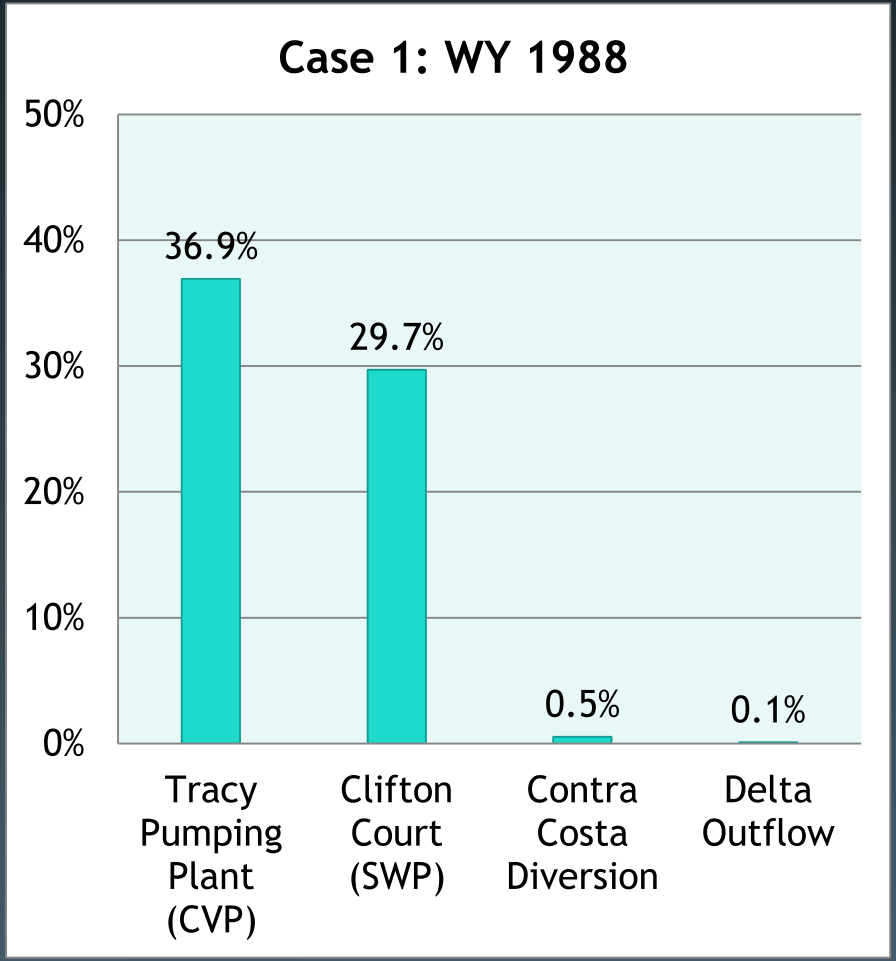


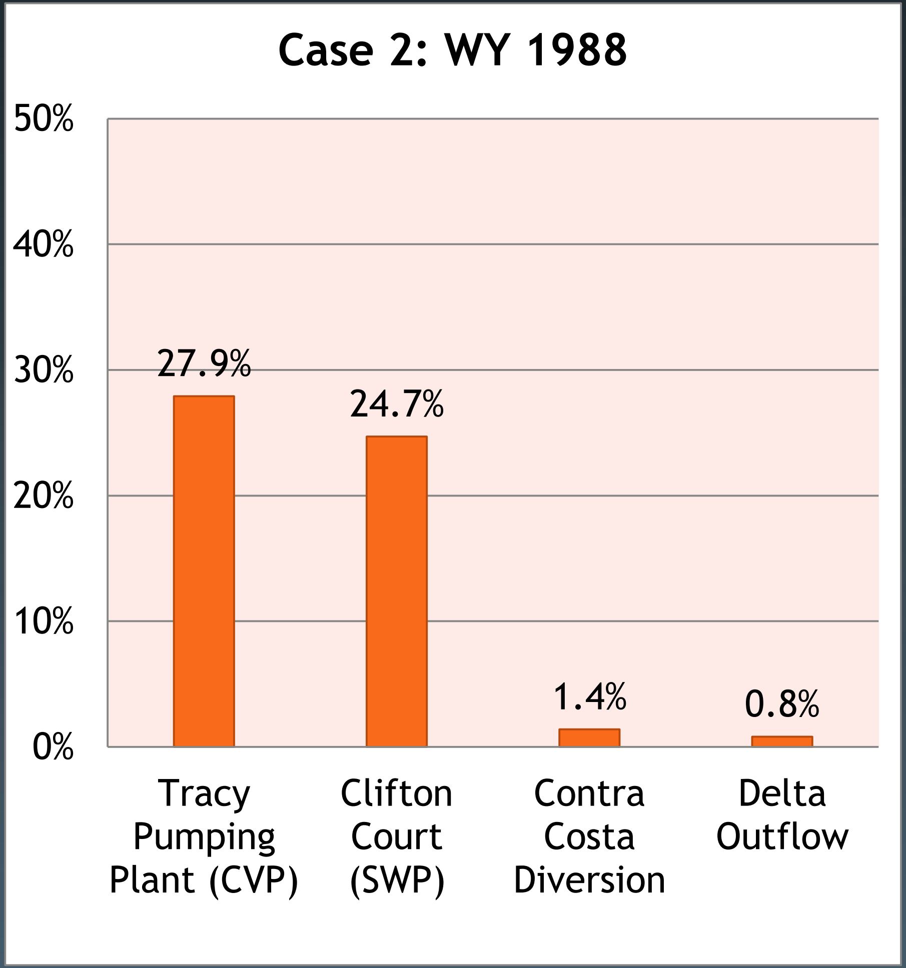
Fate of San Joaquin River Inflow at Vernalis





Fate of San Joaquin River Inflow at Vernalis





Comparison Summary (for Feb-Jun San Joaquin River inflows)

Water Year	Water Year Type	San Joaquin River Inflow (TAF)		Total Exports, Diversions & Outflow (TAF)		Total Exports, Diversions & Outflow (%)		Amount in DICU/Delta at end of WY (TAF)		Amount in DICU/Delta at end of WY (%)	
		Case 1	Case 2	Case 1	Case 2	Case 1	Case 2	Case 1	Case 2	Case 1	Case 2
1966	Below Normal	884	1491	723	1014	81.8%	68.0%	161	477	18.2%	32.0%
1968	Dry	816	1223	647	837	79.3%	68.4%	169	386	20.7%	31.6%
1988	Critical	456	843	304	462	66.7%	54.9%	152	380	33.3%	45.1%

San Joaquin River Contribution to Delta Outflow

Case 1

Water Year	Total Delta outflow at Martinez (Feb - Jun) (TAF)[a]	SJR water inflow at Vernalis (Feb - Jun) (TAF)[a]	SJR water leaving Delta at Martinez (Feb - Jun) (TAF)[b]
1966	4288	884	2.35
1968	6742	816	3.16
1988	2848	456	0.62

Case 2

Water Year	Total Delta outflow at Martinez (Feb - Jun) (TAF)[a]	SJR water inflow at Vernalis (Feb - Jun) (TAF)[a]	SJR water leaving Delta at Martinez (Feb - Jun) (TAF)[b]
1966	4804	1491	18.85
1968	7087	1223	14.93
1988	3157	843	6.96

[a] Delta outflow volumes and SJR inflow volumes are for the period of Feb 1 – Jun 30.

[b] SJR water was tagged as it entered the Delta between Feb 1 – Jun 30, then tracked through the remainder of the water year to determine the volume of that tagged flow that exited the Delta at Martinez.

Hoppin, et al letter re Doubling Goal

10-12-2011

ATTACHMENT 7

O'Laughlin & Paris LLP

Attorneys at Law

SENT VIA ELECTRONIC TRANSMISSION/FIRST-CLASS MAIL

October 12, 2011

Charlie Hoppin
Tam Doduc
Frances Spivy-Weber
State Water Resources Control Board
1001 I Street
PO Box 2815
Sacramento, CA 95812-2815

Re: Use of Fish Doubling Goal as Basis for Narrative Standard Proposed as Part of the Amendments to the San Joaquin River Flow Objectives is Improper

Dear Members of the Board:

The State Water Resources Control Board ("SWRCB") stated in its April 1, 2011 Revised Notice of Preparation and Notice of Additional Scoping Meeting that it was considering adoption of flow objectives designed to meet a narrative standard intended to double the natural production of salmon. Specifically, the proposed narrative standard provided:

> "flow conditions shall be maintained, together with other reasonably controllable measures in the San Joaquin River watershed, sufficient to support a doubling of natural production of Chinook salmon from the average production of 1967-1991, consistent with the provisions of State and federal law."

For a host of reasons, discussed in detail below, the SWRCB's intended use of the doubling goal as the basis for the proposed narrative standard is improper and the SWRCB should commission additional workshops to develop and explore proper and achievable goals for any amendments to the San Joaquin River flow objectives.

The Doubling Goal Does Not Apply to the San Joaquin River Basin or to Individual Streams in the San Joaquin River Basin.

The proposed narrative standard indicates that it is consistent with the provisions of the doubling goals found in both State and federal law. However, this characterization is not accurate. As proposed, the

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narrative standard would apply to the San Joaquin River between the confluence of the Merced River and Vernalis, and in each of the three major tributaries to the San Joaquin River. (April 1, 2011 Notice, Attachment 2, Table 3). Neither the State nor federal law concerning the doubling of the natural production of anadromous fish is so limited.

The State law concerning the doubling of anadromous fish applies State-wide. (*See, e.g.*, Fish & Game Code § 6912 [term "program" defined as "the program for protecting and increasing the naturally spawning salmon and steelhead trout **of the state**…."]; *see also* Fish & Game Code § 6922 [requiring one of the elements of the "program" to be the identification alternatives to manmade factors "which cause the loss of juvenile and adult fish **in California's stream system**."])(emphasis added). There is nothing in the State law that requires the SWRCB to attempt to double the natural production of salmon and steelhead in a particular stream or basin while leaving out other streams or portions of a basin, particularly where the anadromous fish utilize these streams.[1] Nor is there any analysis of whether this is achievable.

Similarly, the federal Central Valley Project Improvement Act, P.L. 102-575 ("CVPIA") does not apply to a particular stream or basin. It applies to "anadromous fish in the Central Valley rivers and streams…." Indeed, the United States Fish and Wildlife Service ("USFWS") defines "Central Valley rivers and streams" to mean "all rivers, streams, creeks, sloughs and other watercourses, regardless of volume and frequency of flow" that drain into the Sacramento River Basin, San Joaquin River Basin and Delta. (*see* http://www.fws.gov/stockton/afrp/definitions.cfm?code=4). To be sure, the USFWS has attempted to implement the mandate of the CVPIA by entering into partnerships on specific and individual watersheds and streams, but such approach is not required by law. Moreover, the law does not consider the doubling of fish on any particular stream as satisfaction of the overall mandate, nor does it require that each stream at least double its natural production when compared to the baseline. If the total amount of anadromous fish in the Central Valley can be doubled, it will not matter if one stream has achieved more or less than a 100% increase when compared to the baseline. The idea behind the legislation is to double the number of Central Valley anadromous fish, which leaves flexibility to the agencies to focus their attention and efforts in those locales where the greatest restoration can occur.[2]

This is not to say that the San Joaquin River Basin and the three major tributaries have no role to play in the effort to double the natural production of anadromous fish. Theoretically, specific factual findings could support changes to the timing, magnitude and volume of water of any or all of the three tributaries and the main stem to increase the natural production of anadromous fish. However, the SWRCB has not made any such findings, but has instead attempted to justify the narrative standard as being required of State and federal law. Such attempted justification is inappropriate and, in the absence of any specific factual findings indicating that the increase of flows would be successful in

[1] The Department of Fish and Game ("DFG") was directed to develop a program, which included identifying streams where natural production of salmon and steelhead could be increased through streamflow operations. (Fish & Game Code § 6922(b)). There is no indication that the SWRCB's narrative standard is in response to any such identification by DFG.

[2] Table 1 of the AFRP Final Restoration Plan identifies the number of fish needed to meet the doubling goal. It does not identify any particular stream or watercourse, nor does it allocate or assign a particular number to a particular stream. (*see* Table 1, AFRP Final Restoration Plan, found here: http://www.fws.gov/stockton/afrp/restplan_final.cfm#3a).

increasing the fish population, the use of the doubling goal established in State and federal law in the proposed amendments to the San Joaquin Basin flow objectives must be reconsidered.

Even if the SWRCB Can Use the Doubling Goal as a Basis for the Proposed Amendments to the San Joaquin River Flow Objectives, Facts and Logic Indicate that Such Approach is Inappropriate.

A. Ocean Harvest Protocols Will Prevent the Doubling of Anadromous Fish Regardless of the SWRCB's Efforts.

Although the legislative policy cited by the SWRCB applies to all anadromous fish in California (*see* Fish & Game Code § 6902 [salmon and steelhead]; *see also* CVPIA P.L. 102-275, § 34069b)(1), October 30, 1992; 106 Stat. 4600 [anadromous fish]), the time of year associated with the SWRCB's proposed narrative standard is identified as "February through June," which is relevant only to the life history of Central Valley Fall Run Chinook Salmon ("CVFRCS"). Recent information has come to light demonstrating that any effort by the SWRCB to double the natural production of CVFRCS in the San Joaquin River Basin will be ineffective and doomed to failure due to the commercial fishery management protocols affecting the number of CVFRCS that are harvested in the ocean. The SWRCB needs to reconsider the proposed amendments to San Joaquin River flow objectives in light of the ocean harvest protocols.

At the SWRCB's June 6, 2011 scoping workshop, the National Marine Fisheries Service ("NMFS") made a presentation which, among other things, identified the fishery conservation and management considerations under the federal Magnuson-Stevens Act, 16 U.S.C. §§ 1801 *et seq*. ("MSA"), as part of the regulatory framework affecting salmonids in the San Joaquin River Basin. (*See* NMFS' June 6, 2011 presentation, slide #2, found at http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/bay_delta_plan/water_quality_control_planning/docs/060611wrkshp/nmfs.pdf). Due to the obvious link between the ocean harvest protocols developed under the MSA and the health and well-being of salmon populations in the San Joaquin River Basin, the San Joaquin River Group Authority ("SJRGA") sued NMFS, the National Oceanic and Atmospheric Administration, the United States Department of Commerce, and the Pacific Fishery Management Council ("PFMC") (collectively "the United States") regarding NMFS' adoption of the 2011 harvest of Sacramento River fall-run Chinook salmon ("SRFC").[3] Given the dire condition of CVFRCS as expressed to you by NMFS, USFWS, the DFG, and the non-governmental organizations ("NGOs"), and as evidenced by the population crash in 2007 resulting in the closure of the ocean fishery in 2008 and 2009, the SJRGA was greatly concerned about the impact that overfishing was having on CVFRCS. The SJRGA concluded that because SRFC, which are classified by NMFS as a "species of concern" (and more recently "reclassified" as a candidate species for listing as threatened or endangered) under the Endangered Species Act, 16 U.S.C. §§ 1531 *et seq*. ("ESA") are in peril, preventing the loss of 50-65 percent of the SRFC adult population due to ocean harvest would be both wise and in concert with the State's goal of doubling the production of salmon.

[3] SRFC include all salmon runs in the Central Valley.

In response to the SJRGA's suit, the United States has made three unexpected yet highly revealing arguments. First, the United States argued that despite the 2007 population crash and the designation of the SRFC as a "species of concern" under the ESA, the SRFC population is in good condition. According to the United States,

> "[d]espite [SJRGA's] attempt to paint a dire picture, the record shows that ***SRFC are not in decline***." (United States' brief, p.1). Second, the United States argued that the current population objectives for SRFC under the MSA, which call for natural and hatchery spawners of between 122,000 and 180,000 each year, are sufficient to enable the ocean harvest of 50-65% of SRFC. (United States' brief, p. 4). Third, the United States addressed the substance of the SJRGA's claim that the current ocean harvest protocols will result in a violation of the doubling goal by disingenuously arguing that the SWRCB's proposed amendments to the San Joaquin River flow objectives have nothing to do with the doubling of salmon. Indeed, according to the United States, "the SWRCB ha[s] already determined that the flow objectives will be structured around a proportion of natural flow, not achieving a certain number of returning Chinook. The Court should not credit [SJRGA's] argument that the 2011 fishing regulations somehow affect, let alone violate, whatever requirements will be implemented to achieve the salmon production doubling goal." (United States' brief, p. 18 [internal citation and footnote omitted]).

The significance of these three arguments is that irrespective of the doubling goal, or any efforts to implement it, NMFS' management goal is to cap the number of returning spawners at no more than 180,000 in any given year. Assuming that NMFS adheres to this position, it will be **impossible** to achieve the doubling goal.

As part of its submittal to the SWRCB on February 8, 2011, the Department of Interior ("DOI") provided what it termed a "lifecycle approach to developing survival goals." (*See* DOI's February 8, 2001 comments, p. 16-18, and 49-50). Such approach indicated that a cohort replacement rate of 1.77 will double the starting population size in six years. (Id., p. 16). Since 1996, the San Joaquin River Basin has been responsible for 4.8% of the escapement of all CVFRCS. (PFMC's "*Review of 2010 Ocean Salmon Fisheries*" dated February 2011, Table B-1, p. 191). The best single year was 2000, in which the San Joaquin River Basin was responsible for 10 percent of the escapement of CVFRCS. (Id.). If San Joaquin River Basin escapement is assumed to be 10 percent each year, and total escapement is limited by NMFS' ocean harvest protocols at 180,000 fish, only 18,000 fish will return to the San Joaquin River Basin to spawn. At this number, even assuming the cohort replacement rate is 1.77 (and all other elements depicted in the first row of DOI's lifecycle approach are the same, including 250 emigrants per spawner which DOI considers "achievable" based on past estimates of production), the total San Joaquin River Basin production will never double, as total production will be capped at 31,860 fish (18,000 X 1.77=31,860). Since the doubling goal for the San Joaquin River Basin is approximately 78,000 fish (*see* DOI, p. 16), the ocean harvest protocols which cap returning spawners at 180,000 per year will make it **impossible** to double San Joaquin River Basin FRCS.

B. Given the Small Contribution of the San Joaquin River Basin to the Total Population of CVFRCS, It Makes Little Sense to Focus Restoration Efforts in the San Joaquin River Basin.

As noted above, even if all of DOI's goals are met concerning the number of eggs per adult, the rate of egg to fry survival, in-river juvenile survival, the number of emigrants per adult, and the rate of through-Delta survival, provided the cap remains at 180,000[4] returning spawners each year, the San Joaquin River Basin population can never double. Certainly, restoration efforts can possibly raise the San Joaquin River Basin population without doubling it, and such increase may have merit. However, information indicates that the SWRCB will have a far greater likelihood of success if it focuses its efforts on the Sacramento River Basin.

For example, while DOI indicates that getting 250 emigrants per spawner is achievable, the data show that the average number of emigrants per spawner in the Stanislaus, Tuolumne and Merced Rivers has been 166, 46 and 10 respectively, and neither the Tuolumne or Merced Rivers have achieved as many as 250 in any recent single year. (DOI, Table 4.2, p. 18). Further, the scenario depicted in DOI's first row of Table 4.1 assumes a through-Delta survival rate of .5, yet it admits that "survival through the Delta has not been greater than 0.20 since 2001…." (DOI, p. 19). At this point, it is **impossible** to know what flows or other actions will be needed to increase the number of emigrants per spawner, or to improve the rate of survival through the Delta. However, because the San Joaquin River Basin's contribution is so small to begin with – on average only about 5 percent - it makes little sense for the SWRCB to focus its effort on improving these factors.

Logic and mathematics dictate that if the SWRCB is interested in doubling the natural production of anadromous fish, it must focus its efforts in the Sacramento River Basin where 90 percent of the fish are located. Again, assuming 180,000 returning spawners, 162,000 (90%) would return to the Sacramento River Basin. Actions that improve this number by 1 percent would net an additional 16,200 fish. As noted above, doubling the San Joaquin River Basin would, at best, net an increase of 13,860 fish.

Moreover, the State and federal doubling goals apply to winter-run and spring-run Chinook salmon, neither of which is currently found in the San Joaquin River Basin, but both of which are found in the Sacramento River Basin. (PCFMC, *Pacific Salmon Fishery Management Plan* (1999), p. 3-8). Again, in the absence of very specific factual findings to the contrary, simple logic indicates that the SWRCB can obtain the greatest benefit to all anadromous fish species by focusing its efforts in the Sacramento River Basin.

Absent very specific, detailed factual findings indicating that the water and dollar costs to improve Sacramento River Basin conditions dramatically exceed the water and dollar costs to achieve a similar improvement in the San Joaquin River Basin, the SWRCB should reconsider whether it is reasonable and prudent to impose new flow conditions designed to double the natural production of

[4] This is actually the ceiling, and the actual number is often far less. For example, the number of returning spawners in 2007, 2008 and 2009 was 87,940, 64,456, and 39,530 respectively. With low numbers such as these, which occurred despite the "management" by NMFS and the PFMC, the doubling goal will never be reached as there are not enough improvements in the rivers and the Delta to offset the low overall number of returning spawners.

anadromous fish in the San Joaquin River Basin. This is particularly so where any such effort will have little chance of success overall, will likely be of little comparative benefit, and will be grossly unfair and burdensome to the San Joaquin River Basin water users.

C. The State and Federal Doubling Goal Focuses on Natural Production, But the Evidence Shows that the San Joaquin River System is Dominated By Hatchery Fish.

Both State (Fish & Game Code § 6902(a)) and federal law (CVPIA Section 3406(b)(1)) are focused on doubling the "natural" production of anadromous fish. Use of such term means that hatchery fish are not to be counted towards or used to achieve the doubling goal. Regardless of the wisdom of eliminating hatchery fish from the calculation, the data shows that the San Joaquin River Basin in particular is dominated by hatchery fish and increasing flows, in the absence of any plan, program or effort to reduce or eliminate hatchery fish, will not improve the natural production of anadromous fish.

Beginning in the spring of 2007, DFG began the Constant Fractional Marking ("CFM") program throughout the Central Valley to determine, among other things, the proportions of hatchery and natural origin returners. Pursuant to the CFM program, a minimum of 25 percent of hatchery releases of fall-run Chinook salmon are (1) marked by removal of the adipose fin, and (2) are tagged with an internal Coded Wire Tag ("CWT"). In 2010, the first year that all major age classes of returning adults had received 25 percent CFM, the data showed that the vast majority of returning spawners on the Mokelumne and Merced Rivers were hatchery fish. (DFG PowerPoint, p. 3). This result is not surprising, given that the Mokelumne and Merced Rivers both have hatcheries. However, on the Stanislaus and Tuolumne Rivers, neither of which has a hatchery, the proportion of hatchery and natural returners was evenly split. (Id.). These data[5] unequivocally demonstrate that the San Joaquin River Basin population of fall-run Chinook salmon is dominated by hatchery fish.[6]

Given that increased flows will not prefer natural fish over hatchery fish, any increased flow regime imposed by the SWRCB will not do much to increase the production of natural fish. Absent a change in the hatchery management protocols, hatchery fish will continue to dominate the San Joaquin River Basin regardless of the flows in the tributaries and at Vernalis, and little headway will be made toward the goal of doubling the natural production.

The Decision to Attempt to Implement the Doubling Goal Will Be Arbitrary and Capricious.

The fish doubling goal established in Fish and Game Code section 6902 is nothing more than a statement of policy and the SWRCB is not required to effectuate it. Similarly, the provisions of the CVPIA apply only to the agencies of the United States, and are in no way binding on the SWRCB. As

[5] The SJRGA does not believe that these data are accurate. The raw numbers were analyzed by its consultant, FISHBIO, which concluded that the proportion of returning hatchery fish in the San Joaquin River Basin approached 100 percent.

[6] Even this analysis is skewed by the agencies' treatment of the various returning fish. If two hatchery fish return to the Stanislaus River and spawn, their progeny are considered "natural." However, if the same two hatchery fish return to their natal stream and spawn at or near the hatchery, their progeny are considered "non-natural." Such arbitrary treatment and classification calls into question the veracity of any differentiation between "natural" and "hatchery" fish.

such, the decision to implement the doubling goal is a discretionary one, and must be based upon logic and evidence. In light of the fact that:

- the doubling goal applies statewide, and not to any particular stream or basin;

- it will be impossible to double the production of San Joaquin River Basin fish provided NMFS continues to manage the ocean harvest to prevent more than 180,000 spawners from returning;

- the small overall contribution of the San Joaquin River Basin to anadromous fish generally;

- the lack of any spring-run or winter-run Chinook salmon in the San Joaquin River Basin;

- no facts indicate that the water and dollar costs of attempting to double fish in the San Joaquin River Basin are significantly less than those necessary to attempt to double fish in the Sacramento River Basin; and

- hatchery fish dominate the San Joaquin River Basin, including the Stanislaus and Tuolumne Rivers where no hatchery is present,

any effort by the SWRCB to attempt to double fish in the San Joaquin River Basin will be contrary to both logic and evidence, not to mention extremely unfair and prejudicial to the SJRGA and its members. The SJRGA urges the SWRCB to conduct additional workshops to determine its ability, and the wisdom of attempting, to double salmon in the San Joaquin River Basin. At a minimum, such effort should not begin unless and until the protocols affecting hatchery production and ocean harvest are made part of, and indeed subject to, the overall effort to double the natural production of anadromous fish. Changing the flow-dependent objectives of the San Joaquin River and its tributaries will not change hatchery policies or ocean harvest protocols.

Very truly yours,
O'LAUGHLIN & PARIS LLP

TIM O'LAUGHLIN

TO/tb
cc: San Joaquin River Group Authority
David Guy
Thad Bettner
Byron Buck

Unpublished Stanislaus Weir data from FishBio

ATTACHMENT 8A

San Joaquin Tributaries Authority
Comments on the Draft Substitute Environmental Document

2015				2016		
Date	Net Upstream Passage	# Ad-clipped		Date	Net Upstream Passage	# Ad-clipped
9/14/2015	0	0		9/8/2016	0	0
9/15/2015	0	0		9/9/2016	0	0
9/16/2015	0	0		9/10/2016	0	0
9/17/2015	0	0		9/11/2016	0	0
9/18/2015	0	0		9/12/2016	0	0
9/19/2015	0	0		9/13/2016	0	0
9/20/2015	0	0		9/14/2016	0	0
9/21/2015	0	0		9/15/2016	0	0
9/22/2015	1	0		9/16/2016	0	0
9/23/2015	0	0		9/17/2016	2	0
9/24/2015	0	0		9/18/2016	0	0
9/25/2015	0	0		9/19/2016	0	0
9/26/2015	0	0		9/20/2016	0	0
9/27/2015	0	0		9/21/2016	1	0
9/28/2015	1	0		9/22/2016	0	0
9/29/2015	1	0		9/23/2016	0	0
9/30/2015	2	0		9/24/2016	0	0
10/1/2015	1	0		9/25/2016	2	2
10/2/2015	2	0		9/26/2016	6	3
10/3/2015	2	0		9/27/2016	8	1
10/4/2015	5	0		9/28/2016	3	0
10/5/2015	6	1		9/29/2016	5	1
10/6/2015	7	2		9/30/2016	9	2
10/7/2015	3	1		10/1/2016	4	1
10/8/2015	18	3		10/2/2016	0	0
10/9/2015	21	4		10/3/2016	5	3
10/10/2015	6	2		10/4/2016	19	4
10/11/2015	12	0		10/5/2016	40	9
10/12/2015	14	2		10/6/2016	101	28
10/13/2015	25	8		10/7/2016	80	22
10/14/2015	25	2		10/8/2016	47	15
10/15/2015	31	9		10/9/2016	45	12
10/16/2015	21	5		10/10/2016	43	11
10/17/2015	26	5		10/11/2016	58	10
10/18/2015	33	7		10/12/2016	78	21
10/19/2015	31	8		10/13/2016	121	25
10/20/2015	131	20		10/14/2016	71	21
10/21/2015	158	44		10/15/2016	215	51
10/22/2015	34	8		10/16/2016	137	33

2015				2016	
Date	Net Upstream Passage	# Ad-clipped	Date	Net Upstream Passage	# Ad-clipped
10/23/2015	61	14	10/17/2016	254	55
10/24/2015	174	40	10/18/2016	525	141
10/25/2015	685	151	10/19/2016	507	131
10/26/2015	301	80	10/20/2016	461	131
10/27/2015	414	89	10/21/2016	678	171
10/28/2015	566	144	10/22/2016	523	126
10/29/2015	386	102	10/23/2016	650	160
10/30/2015	203	56	10/24/2016	401	75
10/31/2015	196	61	10/25/2016	323	69
11/1/2015	415	119	10/26/2016	422	104
11/2/2015	598	148	10/27/2016	182	50
11/3/2015	360	105	10/28/2016	1363	275
11/4/2015	201	46	10/29/2016	357	106
11/5/2015	239	70	10/30/2016	366	104
11/6/2015	99	26	10/31/2016	411	114
11/7/2015	261	71	11/1/2016	420	137
11/8/2015	290	84	11/2/2016	195	51
11/9/2015	735	195	11/3/2016	154	57
11/10/2015	261	66	11/4/2016	107	27
11/11/2015	47	10	11/5/2016	117	16
11/12/2015	70	16	11/6/2016	106	16
11/13/2015	87	18	11/7/2016	98	34
11/14/2015	150	45	11/8/2016	68	26
11/15/2015	115	39	11/9/2016	101	34
11/16/2015	205	63	11/10/2016	93	26
11/17/2015	176	44	11/11/2016	67	19
11/18/2015	116	30	11/12/2016	84	19
11/19/2015	96	22	11/13/2016	142	34
11/20/2015	190	49	11/14/2016	129	27
11/21/2015	193	56	11/15/2016	149	47
11/22/2015	73	13	11/16/2016	169	52
11/23/2015	89	29	11/17/2016	299	81
11/24/2015	198	46	11/18/2016	91	21
11/25/2015	326	82	11/19/2016	177	51
11/26/2015	138	39	11/20/2016	796	210
11/27/2015	155	40	11/21/2016	127	32
11/28/2015	135	38	11/22/2016	210	63
11/29/2015	66	14	11/23/2016	118	26
11/30/2015	72	17	11/24/2016	164	42

2015				2016		
Date	Net Upstream Passage	# Ad-clipped		Date	Net Upstream Passage	# Ad-clipped
12/1/2015	95	20		11/25/2016	77	22
12/2/2015	137	31		11/26/2016	85	26
12/3/2015	245	67		11/27/2016	274	78
12/4/2015	188	56		11/28/2016	79	27
12/5/2015	115	29		11/29/2016	97	33
12/6/2015	125	41		11/30/2016	68	16
12/7/2015	74	28		12/1/2016	72	20
12/8/2015	100	28		12/2/2016	30	10
12/9/2015	86	21		12/3/2016	55	12
12/10/2015	154	38		12/4/2016	42	16
12/11/2015	229	60		12/5/2016	45	15
12/12/2015	140	34		12/6/2016	50	12
12/13/2015	150	40		12/7/2016	30	2
12/14/2015	168	50		12/8/2016	24	7
12/15/2015	100	27		12/9/2016	2	2
12/16/2015	85	24		12/10/2016	35	9
12/17/2015	66	15		12/11/2016	78	35
12/18/2015	109	25		12/12/2016	74	22
12/19/2015	86	21		12/13/2016	69	19
12/20/2015	61	16		12/14/2016	52	12
12/21/2015	61	19		12/15/2016	73	28
12/22/2015	75	13		12/16/2016	49	10
12/23/2015	45	3		12/17/2016	38	5
12/24/2015	44	9		12/18/2016	16	4
12/25/2015	41	4		12/19/2016	27	5
12/26/2015	34	10		12/20/2016	30	8
12/27/2015	16	7		12/21/2016	14	2
12/28/2015	16	3		12/22/2016	9	1
12/29/2015	11	4		12/23/2016	8	2
12/30/2015	6	1		12/24/2016	7	1
12/31/2015	2	3		12/25/2016	9	1
1/1/2016	18	7		12/26/2016	13	2
1/2/2016	4	2		12/27/2016	9	6
1/3/2016	6	1		12/28/2016	8	4
1/4/2016	5	1		12/29/2016	6	0
1/5/2016	4	1		12/30/2016	6	1
1/6/2016	1	0		12/31/2016	2	2
1/7/2016	2	1		1/1/2017	4	0
1/8/2016	5	0		1/2/2017	12	1

	2015				2016	
Date	Net Upstream Passage	# Ad-clipped		Date	Net Upstream Passage	# Ad-clipped
1/9/2016	9	2		1/3/2017	6	2
1/10/2016	3	0		1/4/2017	6	2
1/11/2016	1	0		1/5/2017	2	1
1/12/2016	4	1			14396	3718
1/13/2016	4	1				
1/14/2016	3	2				
1/15/2016	1	0				
1/16/2016	2	0				
1/17/2016	0	0				
1/18/2016	1	0				
1/19/2016	0	0				
1/20/2016	6	2				
1/21/2016	2	0				
1/22/2016	0	0				
1/23/2016	0	0				
1/24/2016	0	0				
1/25/2016	0	0				
1/26/2016	0	0				
1/27/2016	0	0				
1/28/2016	0	0				
1/29/2016	0	0				
1/30/2016	1	1				
1/31/2016	0	0				
2/1/2016	0	0				
2/2/2016	2	1				
2/3/2016	0	0				
2/4/2016	0	0				
2/5/2016	0	0				
2/6/2016	0	0				
2/7/2016	0	0				
2/8/2016	0	0				
2/9/2016	0	0				
2/10/2016	0	0				
2/11/2016	1	1				
	12708	3279				

Unpublished Tuolumne Weir data from FishBio

ATTACHMENT 8B

San Joaquin Tributaries Authority
Comments on the Draft Substitute Environmental Document

2015			2016		
Date	Net Upstream Passage	# Ad-clipped	Date	Net Upstream Passage	# Ad-clipped
9/28/2015	0	0	9/19/2016	0	0
9/29/2015	0	0	9/20/2016	0	0
9/30/2015	0	0	9/21/2016	0	0
10/1/2015	0	0	9/22/2016	0	0
10/2/2015	0	0	9/23/2016	0	0
10/3/2015	0	0	9/24/2016	0	0
10/4/2015	0	0	9/25/2016	0	0
10/5/2015	0	0	9/26/2016	0	0
10/6/2015	0	0	9/27/2016	0	0
10/7/2015	0	0	9/28/2016	1	0
10/8/2015	1	0	9/29/2016	1	0
10/9/2015	0	0	9/30/2016	0	0
10/10/2015	1	0	10/1/2016	0	0
10/11/2015	0	0	10/2/2016	1	0
10/12/2015	0	0	10/3/2016	1	0
10/13/2015	1	1	10/4/2016	5	0
10/14/2015	0	0	10/5/2016	7	1
10/15/2015	0	0	10/6/2016	2	0
10/16/2015	1	0	10/7/2016	5	0
10/17/2015	0	0	10/8/2016	2	0
10/18/2015	1	0	10/9/2016	8	2
10/19/2015	0	0	10/10/2016	9	2
10/20/2015	0	0	10/11/2016	6	0
10/21/2015	0	0	10/12/2016	20	1
10/22/2015	2	0	10/13/2016	17	4
10/23/2015	1	0	10/14/2016	9	3
10/24/2015	7	2	10/15/2016	33	6
10/25/2015	1	0	10/16/2016	118	26
10/26/2015	1	0	10/17/2016	118	22
10/27/2015	8	0	10/18/2016	70	14
10/28/2015	2	0	10/19/2016	36	6
10/29/2015	2	0	10/20/2016	99	21
10/30/2015	4	1	10/21/2016	136	33
10/31/2015	2	1	10/22/2016	110	27
11/1/2015	2	1	10/23/2016	34	7
11/2/2015	1	0	10/24/2016	79	13
11/3/2015	11	1	10/25/2016	95	21
11/4/2015	5	2	10/26/2016	104	27
11/5/2015	9	2	10/27/2016	169	46

2015				2016		
Date	Net Upstream Passage	# Ad-clipped		Date	Net Upstream Passage	# Ad-clipped
11/6/2015	10	5		10/28/2016	289	82
11/7/2015	6	0		10/29/2016	190	52
11/8/2015	12	4		10/30/2016	131	41
11/9/2015	7	2		10/31/2016	80	25
11/10/2015	16	5		11/1/2016	82	18
11/11/2015	15	1		11/2/2016	54	6
11/12/2015	14	1		11/3/2016	99	23
11/13/2015	8	3		11/4/2016	47	12
11/14/2015	10	1		11/5/2016	57	17
11/15/2015	11	3		11/6/2016	38	4
11/16/2015	2	1		11/7/2016	28	7
11/17/2015	4	1		11/8/2016	24	5
11/18/2015	0	0		11/9/2016	12	2
11/19/2015	4	0		11/10/2016	35	16
11/20/2015	11	4		11/11/2016	33	5
11/21/2015	3	0		11/12/2016	26	7
11/22/2015	4	2		11/13/2016	11	3
11/23/2015	14	5		11/14/2016	23	6
11/24/2015	16	3		11/15/2016	21	4
11/25/2015	1	0		11/16/2016	40	9
11/26/2015	3	2		11/17/2016	24	5
11/27/2015	5	1		11/18/2016	32	10
11/28/2015	8	2		11/19/2016	43	10
11/29/2015	2	1		11/20/2016	39	7
11/30/2015	6	1		11/21/2016	75	24
12/1/2015	8	3		11/22/2016	67	18
12/2/2015	5	1		11/23/2016	57	17
12/3/2015	6	1		11/24/2016	52	11
12/4/2015	8	4		11/25/2016	23	4
12/5/2015	3	2		11/26/2016	23	4
12/6/2015	6	2		11/27/2016	20	1
12/7/2015	12	3		11/28/2016	26	6
12/8/2015	5	1		11/29/2016	40	7
12/9/2015	10	1		11/30/2016	21	7
12/10/2015	15	3		12/1/2016	26	6
12/11/2015	7	1		12/2/2016	12	4
12/12/2015	15	1		12/3/2016	1	0
12/13/2015	11	1		12/4/2016	12	3
12/14/2015	3	0		12/5/2016	23	5

2015

Date	Net Upstream Passage	# Ad-clipped
12/15/2015	5	2
12/16/2015	4	0
12/17/2015	3	0
12/18/2015	3	1
12/19/2015	4	0
12/20/2015	7	3
12/21/2015	7	1
12/22/2015	7	1
12/23/2015	1	0
12/24/2015	3	1
12/25/2015	0	0
12/26/2015	1	0
12/27/2015	2	0
12/28/2015	3	1
12/29/2015	2	2
12/30/2015	0	0
12/31/2015	0	0
1/1/2016	0	0
1/2/2016	0	0
1/3/2016	0	0
1/4/2016	1	0
1/5/2016	0	0
1/6/2016	0	0
1/7/2016	2	1
1/8/2016	0	0
1/9/2016	0	0
1/10/2016	0	0
1/11/2016	0	0
1/12/2016	0	0
1/13/2016	0	0
1/14/2016	1	1
1/15/2016	2	1
1/16/2016	0	0
1/17/2016	1	0
1/18/2016	0	0
1/19/2016	1	1
1/20/2016	1	0
1/21/2016	0	0
1/22/2016	0	0

2016

Date	Net Upstream Passage	# Ad-clipped
12/6/2016	15	4
12/7/2016	5	1
12/8/2016	18	1
12/9/2016	15	4
12/10/2016	47	11
12/11/2016	31	4
12/12/2016	26	5
12/13/2016	35	12
12/14/2016	18	3
12/15/2016	8	2
12/16/2016	23	8
12/17/2016	11	2
12/18/2016	7	1
12/19/2016	8	1
12/20/2016	11	3
12/21/2016	6	3
12/22/2016	3	0
12/23/2016	5	1
12/24/2016	9	3
12/25/2016	3	0
12/26/2016	5	0
12/27/2016	0	0
12/28/2016	3	3
12/29/2016	6	0
12/30/2016	4	0
12/31/2016	2	0
1/1/2017	1	0
1/2/2017	2	1
1/3/2017	1	0
	3559	848

2015				2016	
Date	Net Upstream Passage	# Ad-clipped	Date	Net Upstream Passage	# Ad-clipped
1/23/2016	1	0			
1/24/2016	0	0			
1/25/2016	0	0			
1/26/2016	0	0			
1/27/2016	0	0			
1/28/2016	0	0			
1/29/2016	1	0			
1/30/2016	0	0			
1/31/2016	0	0			
2/1/2016	0	0			
2/2/2016	0	0			
2/3/2016	0	0			
2/4/2016	1	1			
2/5/2016	1	0			
2/6/2016	0	0			
2/7/2016	0	0			
2/8/2016	0	0			
2/9/2016	0	0			
2/10/2016	0	0			
2/11/2016	0	0			
2/12/2016	0	0			
2/13/2016	0	0			
2/14/2016	0	0			
2/15/2016	0	0			
2/16/2016	0	0			
2/17/2016	0	0			
2/18/2016	0	0			
2/19/2016	0	0			
2/20/2016	0	0			
2/21/2016	0	0			
2/22/2016	0	0			
2/23/2016	0	0			
2/24/2016	0	0			
2/25/2016	0	0			
2/26/2016	0	0			
2/27/2016	0	0			
2/28/2016	0	0			
2/29/2016	0	0			
3/1/2016	0	0			

2015				2016	
Date	Net Upstream Passage	# Ad-clipped	Date	Net Upstream Passage	# Ad-clipped
3/2/2016	0	0			
3/3/2016	0	0			
3/4/2016	0	0			
3/5/2016	0	0			
3/6/2016	0	0			
3/7/2016	0	0			
3/8/2016	0	0			
3/9/2016	0	0			
3/10/2016	0	0			
3/11/2016	0	0			
3/12/2016	0	0			
3/13/2016	0	0			
3/14/2016	0	0			
3/15/2016	0	0			
3/16/2016	0	0			
3/17/2016	0	0			
3/18/2016	0	0			
3/19/2016	0	0			
3/20/2016	0	0			
3/21/2016	0	0			
3/22/2016	0	0			
3/23/2016	0	0			
3/24/2016	0	0			
3/25/2016	0	0			
3/26/2016	0	0			
3/27/2016	0	0			
3/28/2016	0	0			
3/29/2016	0	0			
3/30/2016	0	0			
3/31/2016	0	0			
4/1/2016	0	0			
4/2/2016	0	0			
4/3/2016	1	0			
4/4/2016	0	0			
4/5/2016	0	0			
4/6/2016	0	0			
4/7/2016	0	0			
4/8/2016	0	0			
4/9/2016	0	0			

2015				2016		
Date	Net Upstream Passage	# Ad-clipped		Date	Net Upstream Passage	# Ad-clipped
4/10/2016	0	0				
4/11/2016	0	0				
4/12/2016	0	0				
4/13/2016	0	0				
4/14/2016	0	0				
4/15/2016	0	0				
4/16/2016	0	0				
4/17/2016	0	0				
4/18/2016	0	0				
4/19/2016	0	0				
4/20/2016	0	0				
4/21/2016	0	0				
4/22/2016	0	0				
4/23/2016	0	0				
4/24/2016	0	0				
4/25/2016	0	0				
4/26/2016	0	0				
4/27/2016	0	0				
4/28/2016	0	0				
4/29/2016	0	0				
4/30/2016	0	0				
5/1/2016	0	0				
5/2/2016	0	0				
5/3/2016	0	0				
5/4/2016	0	0				
5/5/2016	0	0				
5/6/2016	0	0				
5/7/2016	0	0				
5/8/2016	0	0				
5/9/2016	0	0				
5/10/2016	1	0				
5/11/2016	0	0				
5/12/2016	1	0				
	437	100				

SRGA v. EPA Order

ATTACHMENT 11

UNITED STATES DISTRICT COURT

EASTERN DISTRICT OF CALIFORNIA

SAN JOAQUIN RIVER GROUP AUTHORITY,

Plaintiff,

v.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY; LISA P. JACKSON, in her official capacity as Administrator of the United States Environmental Protection Agency; and JARED BLUMENFELD, in his official capacity as Regional Administrator for Region 9 of the United States Environmental Protection Agency,

Defendants.

______________________________/

Case No. 2:11-CV-03243-JAM-KJN

ORDER GRANTING DEFENDANTS' MOTION TO DISMISS FOR LACK OF JURISDICTION

Before the Court is a Motion to Dismiss for Lack of Jurisdiction filed by Defendants, the United States Environmental Protection Agency; Lisa P. Jackson, in her official capacity as Administrator of the United States Environmental Protection Agency; and Jared Blumenfeld, in his official capacity as Regional Administrator of Region 9 of the United States Environmental Protection Agency (collectively "Defendants" or "EPA") [Dkt. #11]. The claims sought to be dismissed are asserted by Plaintiff, the San Joaquin River Group Authority, in the Complaint for Declaratory and Injunctive Relief [Dkt. #1]. Plaintiff's claims regard a decision made by EPA on October 11, 2011, pursuant to Section 303(d) of the Clean Water Act, 33 U.S.C. § 1313(d), to add several segments of waterbodies to the State of California's list of waters that are impaired due to the presence of pollutants and to disapprove the State's failure to list those waters in its proffered list. The first three claims, generally speaking, take issue with EPA's determination that the Old River and portions of the San Joaquin River are impaired due to salinity, a pollutant. The remaining three claims challenge EPA's determination that the

"Lower Tributaries," i.e., the San Joaquin River below the Merced River confluence and the Stanislaus, Tuolumne, and Merced Rivers, are impaired due to another pollutant, temperature. The crux of all claims is that EPA's disapproval and listing decision is unsupported, i.e., "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law" within the meaning of the judicial review provisions of the Administrative Procedure Act ("APA"), 5 U.S.C. §§ 701-706.

After careful consideration of the Motion, Plaintiff's Opposition [Dkt. #13], and EPA's Reply [Dkt. #15], as well as the arguments of counsel during oral argument on May 16, 2012, the Court concludes that it lacks jurisdiction over Plaintiff's claims on the grounds asserted by EPA. The Court communicated this determination from the bench at the conclusion of oral argument [Dkt. #s 16, 17], and this Order of Dismissal elaborates on the Court's reasoning.[1]

I. BACKGROUND

EPA's disapproval and listing decision is but a predicate step of a larger statutory process. The next step under the Clean Water Act is for California, through its State Water Resources Control Board and Regional Water Quality Control Boards, to develop total maximum daily loads ("TMDLs") for the impaired waterways. 33 U.S.C. § 1313(d)(1). The State will then submit the TMDLs to EPA for approval or disapproval. 33 U.S.C. § 1313(d)(2). Ultimately, the State will choose "both <u>if</u> and <u>how</u>" it will implement the nonpoint sources provisions of any TMDL approved or promulgated by EPA. <u>Pronsolino v. Nastri</u>, 291 F.3d 1123, 1126-27 (9th Cir. 2002) (emphasis added). EPA does not approve or disapprove a state's implementation plan.

To date, with respect to the waters added by EPA to the State's Section 303(d) list in October 2011, no TMDL has been developed by California or approved by EPA. Nor has the

[1] As directed by the Court, counsel for Defendants, Andrew J. Doyle, submitted a proposed order within 10 days of oral argument. Counsel for Plaintiff, Kenneth Petruzzelli, reviewed the proposal and agrees that it reflects the Court's reasoning.

State adopted or begun executing any relevant TMDL implementation plan.

II. PLAINTIFF LACKS STANDING

The Court concludes that Plaintiff lacks standing under Article III, § 2, of the Constitution and 5 U.S.C. § 702 to challenge the salinity portion of EPA's disapproval listing decision (i.e., claims one, two, and three of the complaint). As an essential element of standing, "the plaintiff must have suffered an injury in fact . . . which is (a) concrete and particularized and (b) actual or imminent, not conjectural or hypothetical." Lujan v. Defenders of Wildlife, 504 U.S. 555, 560-61 (1992) (citations and quotation marks omitted). See also Director, Office of Workers' Comp. Programs, Dep't of Labor v. Newport News Shipbuilding & Dry Dock Co., 514 U.S. 122, 127 (1995) (stating that 5 U.S.C. § 702 requires "a litigant to show, at the outset of the case, that he is injured in fact by agency action") (citation omitted). With regard to the claims related to salinity, the only purported injury that Plaintiff asserts is "regulatory uncertainty and redundant regulation." Opp. at 20:17-18. The allegations are too conclusory and abstract to be cognizable. As the Ninth Circuit has explained, "[t]he injury cannot be a general or amorphous harm but must be particular, distinct and concrete." National Wildlife Fed'n v. Burford, 871 F.2d 849, 852 (9th Cir. 1989) (citation omitted).

Similarly, the Court concludes that Plaintiff lacks standing to challenge the temperature portion of EPA's disapproval and listing decision (i.e., claims four, five, and six of the complaint). Plaintiff, a joint powers authority consisting of irrigation and water districts with rights to use water in the San Joaquin River Basin (Compl. ¶ 5), acknowledges that "the temperature listing has not presently resulted in harm to the water rights" of its members. Opp. at 17:17-18 (emphasis added). That narrows the standing question to whether the purported harm, appropriation of water rights, is "imminent." It is not. It is undisputed that no TMDL for temperature has been established for the Lower Tributaries.

Moreover, the development and implementation of TMDLs related to the temperature listing are not likely to occur until many years from now. Federal law provides no fixed deadline for the development of a TMDL following a listing decision. 33 U.S.C. § 1313(d); 40 C.F.R. § 130.7(d); San Francisco Baykeeper v. Whitman, 297 F.3d 877, 885 (9th Cir. 2002) ("[T]he EPA has not set a schedule for TMDL development.") (citing 40 C.F.R. § 130.7(d)(1)). "EPA has issued guidelines . . . suggesting that states allocate between eight and thirteen years from the time of initial listing to the development of TMDLs, in order of priority, for all waters within their borders." Baykeeper, 297 F.3d at 885 (citation omitted). See also Center for Native Ecosystems v. Cables, 509 F.3d 1310, 1319 (10th Cir. 2007) ("This process can take several years."). There is no indication from the complaint or any other information the parties have brought to the Court's attention that California will act any sooner than EPA's guidance suggests.

Further, Plaintiff's belief that the purported injury will ever occur – i.e., its assertion that EPA's disapproval and listing decision has left California with no choice but to establish and implement TMDLs for temperature in a manner that will appropriate Plaintiff's members' water rights (Compl. ¶¶16-17, 169, 221, 236-38, 253) – is entirely speculative. EPA's regulations require that each State, including California, subject the development of TMDLs to public review. 40 C.F.R. § 130.7(c)(1)(ii). That means that the Irrigation Group will have the opportunity to participate in the process. See EPA, Guidelines for Reviewing TMDLs under Existing Regulations Issued in 1992, § 11 ("EPA policy is that there should be full and meaningful public participation in the TMDL development process.") (available at http://water.epa.gov/ lawsregs/lawsguidance/cwa/tmdl/ final52002.cfm). Indeed, "[p]rovision of inadequate public participation may be a basis for [EPA's] disapproving a TMDL." Id. TMDLs are also subject to judicial review in state court. See, e.g., San Joaquin River Exch. Contractors Water Auth. v. State Water Res. Control Bd., 183 Cal. App. 4th 1110 (2010). There is simply no way for Plaintiff to know what the outcome of this process – process that has yet to occur and in which Plaintiff will have the opportunity to participate – will be.[2]

Plaintiff cites Central Delta Water Agency v. United States, 306 F.3d 938 (9th Cir. 2002), but that case is readily distinguishable. There, the Bureau of Reclamation had adopted a water discharge operations plan. In the present case, no TMDL has been developed or implemented.

The Court's conclusion is supported by Barnum Timber Co. v. EPA, 633 F.3d 894 (9th Cir. 2011), which involved a challenge to EPA's approval of a prior version of California's Section 303(d) list. There, with respect to the injury-in-fact element of standing, the court found that the plaintiff had made "[a] specific, concrete, and particularized allegation of a reduction in the value of property" and had corroborated the allegation with expert affidavits "testifying to the property value reductions." Barnum, 633 F.3d at 898. Nothing approaching those facts can be found in the San Joaquin River Group Authority's complaint.

The Court is persuaded by Missouri Soybean Ass'n v. U.S. EPA, 289 F.3d 509 (8th Cir. 2002). There, the plaintiff alleged that EPA's approval of the State of Missouri's Section 303(d) list injured its members because of "the inability to plan for and rely on the use of certain waters and land caused by Clean Water Act requirements," among other allegations. 289 F.3d at 511. The Eighth Circuit upheld the district court's dismissal of the challenge, finding that any injury due to "[m]ore stringent controls on water use . . . will not occur until after TMDLs are developed and implemented. Even then, it remains uncertain whether TMDL development or regulatory implementation will adversely impact [plaintiff]'s members." Id. at 512. The court concluded that "until objectionable TMDLs are developed and implemented, '[plaintiff]'s claims of harm are too remote to be anything other than speculative.'" Id. at 513 (citation omitted).[3] Just so here.

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[2] Nor is there any suggestion in the complaint that the State has previously implemented TMDLs for temperature in a manner that harmed anyone's water rights.

[3] The basis for dismissal in Missouri Soybean was ripeness, although the foregoing excerpts (continued...)

III. PLAINTIFF'S CLAIMS ARE NOT RIPE FOR REVIEW

The Court agrees with EPA that none of Plaintiff's claims is ripe for review. A claim's ripeness depends on a two-part test: (1) whether the parties will suffer hardship if review is delayed; and (2) whether the issue is fit for judicial review. Whitman v. Am. Trucking Ass'ns, Inc., 531 U.S. 457, 479 (2001); Ohio Forestry Ass'n, Inc. v. Sierra Club, 523 U.S. 726, 732-33 (1998). Plaintiff's claims fail both parts. In light of Plaintiff's failure to demonstrate actual or imminent harm, it cannot be said that delaying judicial review will cause a "direct and immediate" hardship. See United States v. Lazarenko, 476 F.3d 642, 652-53 (9th Cir. 2007); see also Mayfield v. Dalton, 109 F.3d 1423, 1425 (9th Cir. 1997) (concluding that a claim was not ripe because any threat of harm was not "sufficiently imminent"). In addition, "[a] claim is not ripe for adjudication if it rests upon contingent future events that may not occur as anticipated, or indeed may not occur at all." Texas v. United States, 523 U.S. 296, 300 (1998) (internal quotations omitted). As discussed above, whether and to what extent Plaintiff may become adversely impacted by EPA's disapproval listing decision depend on a contingent sequence of events that may or may not occur.

IV. CONCLUSION

Standing concerns who may assert claims, and ripeness concerns when claims may be asserted. The San Joaquin River Group Authority is not a proper plaintiff because EPA's Clean Water Act decision neither harms nor threatens to imminently harm its members. The San Joaquin River Group Authority's claims are premature because further steps in the statutory process, including the development of TMDLs by the State of California, have yet to occur. As EPA notes, "it is conceivable that [Plaintiff] could factually allege injury later in the process – for example, if California implements an EPA-approved TMDL for one of the waters of concern[.]" Mot. at 2:24-3:2. Accordingly,

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[3](...continued)
would also lead to the conclusion that the plaintiff lacked standing.

1. EPA's Motion to Dismiss [Dkt. #11] is GRANTED.

2. Plaintiff's Request for Judicial Notice [Dkt. #14] is GRANTED, in that the state court decisions attached to the request are matters of public record and their authenticity is not in dispute; however, EPA's relevancy objection is sustained.

3. All claims alleged in the Complaint for Declaratory and Injunctive Relief [Dkt. #1] are DISMISSED WITHOUT PREJUDICE. See Freemand v. Oakland Unified Sch. Dist., 179 F.3d 846, 847 (9th Cir. 1999).

4. No leave to amend the complaint will be granted because any such amendment at this juncture would be futile. See Cigarettes Cheaper! v. State Bd. of Equalization, No. 11-00631-JAM-EFB, 2011 WL 2560214, at *2 (E.D. Cal. June 28, 2011).

IT IS SO ORDERED.

DATED: May 25, 2012

/s/ John A. Mendez
United States District Court Judge

Proposed order respectfully submitted by:

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