March 19, 2009

Ms. Becky Victorine
United States Bureau of Reclamation
2800 Cottage Way, MP-410
Sacramento, CA 95825

Mr. Michael Hendrick
California Department of Water Resources
P.O. Box 942836
West Sacramento, CA 94236

Subject: Comments on Environmental Reviews for the *2009 Drought Water Bank*.

Dear Ms. Victorine and Mr. Hendrick:

Butte Environmental Council, the California Sportfishing Protection Alliance, the Center for Biological Diversity, and the California Water Impact Network ("the Coalition") submit the following comments and questions for the Draft Environmental Assessment ("EA") and Findings of No Significant Impact ("FONSI"), for the *2009 Drought Water Bank* ("DWB" or "Project"). We also provide comments about the purpose and need for the 2009 Drought Water Bank, the Governor's recent drought emergency declaration, and the CEQA Notice of Exemption to cover this project's implementation with mitigation measures from the 2003 and 2007 Environmental Water Account environmental documents.

The Bureau of Reclamation's draft environmental review of the California Department of Water Resources ("DWR's") DWB does not comply with the requirements of National Environmental Policy Act ("NEPA"), 42 U.S.C. §4321 *et seq*. First, we believe that the Bureau needs to prepare an environmental impact statement ("EIS") on this proposal that could allow up to 600,000 acre-feet (AF) of surface water transfers, up to 340,000 AF of groundwater substitution, and significant crop idling. Bureau reliance on the EA itself violates NEPA requirements because, among other things, the EA fails to provide a reasoned analysis and explanation to support the Bureau's proposed finding of no significant impact. The EA contains a fundamentally flawed alternatives analysis, and treatment of the chain of cause and effect extending from project implementation leading to inadequate analyses of nearly every resource and cumulative impacts.

An EIS would afford the Bureau, DWR, the State Water Resources Control Board, and the California public far clearer insight into how, where, and why the DWB might or might not be needed. The draft EA/FONSI as released this month fails to provide adequate disclosure of these impacts.

Second, exemption of the 2009 DWB from the requirements of the California Environmental Quality Act (CEQA) does not reflect the actual environmental effects of the proposal—which are similar to the proposed 1994 Drought Water Banks and for which a final Program Environmental Impact Report was completed in November 1993. In 2000, the Governor's Advisory Drought Planning Panel report, *Critical Water Shortage Contingency Plan* promised a program EIR on a drought-response water transfer program, but was never undertaken. Twice in recent history, the state readily acknowledged that CEQA review for a major drought water banking program was appropriate. So, DWR's Notice of Exemption reflects an end-run around established water law through the use of water transfers, and is therefore vulnerable to legal challenge under the California Environmental Quality Act.

Finally, we also question the merits of and need for the DWB project itself. The existence of drought conditions at this point in time is highly questionable and reflects the state's abandonment of a sensible water policy framework given our state and national economic recession and tattered public budgets. Our organizations believe the Governor's drought emergency declaration goes too far to help a few junior water right holders, and that at bottom, the 2009 Drought Water Bank is not needed. The DWB will directly benefit the areas of California whose water supplies are the least reliable by operation of state water law. Though their unreliable supplies have long been public knowledge, local, state, and federal agencies in these areas have failed to stop blatantly wasteful uses and diversions of water and to pursue aggressive planning for regional water self-sufficiency.

The proposed DWB will have significant effects on the environment—both standing alone and when reviewed in conjunction with the multitude of other plans that incorporate and are dependent on Sacramento Valley water. Ironically, the Bureau appears to recognize in its cumulative impacts discussion that there is potential for significant adverse impacts associated with the DWB, but instead of conducting an EIS as required, attempts to assure the public that the 2009 DWB will be deferred to the "willing sellers" through individual "monitoring and mitigation programs" as well as through constraining actions taken by both DWR and Bureau professional staff whose criteria ought instead be incorporated into the Proposed Action Alternative. EA at p. 37, FONSI at p. 3, 4, 5, 6, 7. Of course, this is not a permissible approach under NEPA; significant adverse impacts should be mitigated—or avoided altogether as CEQA normally requires.[1] Moreover, in light of the wholly inadequate monitoring planned for the 2009

[1] Perhaps even more telling, the Bureau actually began its own Programmatic EIS to facilitate water transfers from the Sacramento Valley and the interconnected actions that are integrally related to it, but never completed that EIS and now has impermissibly broken out this current segment of the overall Program for piecemeal review in the present draft EA. See 68 Federal Register 46218 (Aug 5, 2003) (promising a Programmatic EIS on these related activities, "include[ing] groundwater substitution in lieu of surface water supplies, conjunctive use of groundwater

DWB's extensive water transfer program, the suggestion that the public should be required to depend on that insufficient monitoring to provide the necessary advance notice of "significant adverse impacts" is an unacceptable position.

We incorporate by reference the following documents:

- Butte Environmental Council's comments on the Supplemental Environmental Water Account EIR/EIR, 2006.
- Butte Environmental Council's letter to DWR regarding the Drought Water Bank Addendum from Lippe Gaffney Wagner LLP, 2009.
- Butte Environmental Council's letter to DWR regarding the Drought Water Bank Addendum.
- Multi-Signatories letter regarding the Drought Water Bank, 2008.
- Professor Kyran Mish's White Paper, 2008.
- Professor Kyran Mish's comments on the 2009 DWB EA/FONSI
- Professor Karin Hoover's Declaration, 2008.

I. The Bureau and DWR Must Prepare an Environmental Impact Statement/ Environmental Impact Report on the Proposed 2009 Drought Water Bank

We strongly urge the Bureau and DWR to withdraw these inadequate environmental documents and instead prepare a joint EIR/S on the 2009 DWB, before approval by the State Water Resources Control Board (SWRCB), in order to comply with both NEPA and CEQA requirements for full disclosure of human and natural environmental effects.

NEPA requires federal agencies to prepare a detailed environmental impact statement on all "major Federal actions significantly affecting the quality of the human environment . . . ." 42 U.S.C. §4332(2)(C). This requirement is to ensure that detailed information concerning potential environmental impacts is made available to agency decision makers and the public before the agency makes a decision. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989). CEQA has similar requirements and criteria.

Under NEPA's procedures, an agency may prepare an EA in order to decide whether the environmental impacts of a proposed agency action are significant enough to warrant preparation of an EIS. 40 C.F.R. §1508.9. An EA must "provide sufficient evidence and analysis for determining whether to prepare an [EIS]" (*id.*), and must demonstrate that it has taken a "'hard look' at the potential environmental impact of a project." *Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d 1208, 1212 (9th Cir. 1998) (internal quotation marks omitted). However, the U.S. Court of Appeals for the Ninth Circuit has cautioned that "[i]f an agency decides not to

---

and surface water, refurbish existing groundwater extraction wells, install groundwater monitoring stations, install new groundwater extraction wells…" *Id.* At 46219. See also http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=788 (current Bureau website on "Short-term Sacramento Valley Water Management Program EIS/EIR").

prepare an EIS, it must supply a convincing statement of reasons to explain why a project's impacts are insignificant." *Id.* (internal quotation marks omitted). The Bureau has not provided a convincing statement of reasons explaining why the DWB's impacts are not significant. So long as there are "substantial questions whether a project *may* have a significant effect on the environment," an EIS must be prepared. *Id.* (emphasis added and internal quotation marks omitted). Thus, "the threshold for requiring an EIS is quite low." *NRDC v. Duvall*, 777 F. Supp. 1533, 1538 (E.D. Cal. 1991). Put another way, as will be shown through our comments, the bar for sustaining an EA/FONSI under NEPA procedures is set quite high, and the Bureau fails to surmount it with its report on the 2009 DWB.

NEPA regulations promulgated by the Council on Environmental Quality identify factors that the Bureau must consider in assessing whether a project may have significant environmental effects, including:

(1) "The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks." 40 C.F.R. §1508.27(b)(5).
(2) "The degree to which the effects on the quality of the human environment are likely to be highly controversial." *Id.* §1508.27(b)(4).
(3) "Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate on a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts." *Id.* §1508.27(b)(7).
(4) "The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration." *Id.* §1508.27(b)(6).
(5) "The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973." *Id.* §1508.27(b)(9).

Here, the Bureau has failed to take a hard look at the environmental impacts of the DWB. As detailed below, there are substantial questions about whether the 2009 DWB's proposed water transfers will have significant effects on the region's environmental and hydrological conditions especially the interactions between groundwater and surface streams of interest in the Sacramento Valley region. There are also substantial questions about whether the 2009 DWB will have significant adverse environmental impacts when considered in conjunction with the other related water projects underway and proposed in the region. The Bureau simply cannot rely on the EA/FONSI for the foreseeable environmental impacts of the proposed 2009 DWB and still comply with NEPA's requirements.

A. The Proposed Action Alternative is poorly specified making it difficult to identify chains of cause and effect necessary to analyze adequately the alternative's environmental effects.

The Proposed Action Alternative is poorly specified and needs additional clarity before decision makers and the public can understand the human and environmental consequences of the 2009 Drought Water Bank. The EA describes the Proposed Action Alternative as one reflecting the Bureau's intention to approve transfers of Central Valley Project water from willing sellers who contract with the Bureau ordinarily to use surface water on their croplands. Up to 208,000 AF of CVP water are on offer from these sellers, according to Table 1 of the EA. "Priority criteria" are described in the EA indicating that sales will be prioritized for water-short public health, urban, and then agricultural uses, in that order. Table 2 of the EA indicates that as much as 839,117 AF has been requested.

The EA/FONSI's statement of purpose and need states specifically that "the purpose of the proposed action is to help facilitate the transfer of water throughout the State from willing sellers of CVP water upstream of the Delta to buyers that are at risk of experiencing water shortage in 2009." This paragraph omits coherent discussion of need. The purpose and need should also state that this transfer program would be subject to specific criteria for prioritizing transfers, as described on page 6: "It is anticipated that water made available to [potential buyers] from the DWB would be prioritized as flows: existing health and safety domestic needs, municipal supply subject to water shortage contingency plan measures, and agricultural irrigation for existing crops and livestock subject to water shortage contingency plan measures."

The EA's description of the proposed action alternative needs to make clear what would occur if the sale criteria are in fact applied. Are both project agencies applying them, or just one and not the other? What is the legal or policy basis authorizing use of these criteria? Will exceptions be provided, and if so, by what criteria would exceptions be made?

Taken together with DWR's March 4th Addendum to the EWA EIS/R, there is considerable ambiguity over just how many potential sellers there are and how much water they would make available to the DWB. This is reflected in different numbers in the two environmental documents justifying the DWB. The following table shows the discrepancies across these uncoordinated environmental reviews:

Comparison of Environmental Review Parameters for the 2009 Drought Water Bank	**DWR Addendum, March 4th**	**Bureau EA, March 4th**
Narrative project description present in document?	No	Yes
DWB sale criteria discussed?	No	Yes
Total potential water for sale (AF)	533,435	389,328
Total potential water requests (AF)	818,905	839,117
Total potential water sales covered by environmental compliance with the EWA EIS/R (AF)	600,000	Not described.

Absence of agreement among these documents on basic facts of the 2009 DWB signals that neither the Bureau nor DWR have a clear idea what the DWB is. This problem contributes

greatly to and helps explain the poorly rendered treatment of causes and effects that permeate the Bureau's EA. The project agencies, decision-makers, and the public all face a moving target with the 2009 Drought Water Bank. Such discrepancies reflect hasty consideration and poor planning by project proponents. Nor can the agencies reasonably attribute their inadequate environmental reviews on lack of warning. The Governor has made fear of drought a centerpiece of his recent water statements since at least last June. Yet DWR and the Bureau apparently have not agreed on these basic facts making up the DWB.

From data available in the EA and the Addendum, it is not possible to determine with confidence just how much water is requested by potential urban and agricultural buyers. There is no attempt to describe how firmly tendered are offers of water to sell or requests to purchase. With between 400,000 and 500,000 AF of presumably urban buyer requests[2] (which have priority over agricultural purchases, according to the DWB priorities) and a cumulative total of less than 400 TAF from willing sellers (with just over half that coming from CVP water), it would appear that many agricultural buyers are not likely to have their needs addressed by the 2009 DWB? If so, the Bureau and DWR should state the likelihood that all urban requests and perhaps no agricultural requests will be fulfilled in order to achieve a full and correct environmental compliance treatment of the proposed action. Such an estimate is necessary for accurate explication of the chains of cause and effect associated with the 2009 DWB—and which must propagate throughout a NEPA document for it to be adequate as an analysis of potential natural and human environmental effects of the proposed project. We have additional specific questions:

- Within the request of the San Luis and Delta Mendota Water Authority (SLDMWA), its requesters include SCVWD in Table 2 of the EA/FONSI. Is this request for an agricultural use or an urban use of DWB water? At 30,000 acre-feet, it represents one-sixth of SLDMWA's 180,000 acre-feet request. If it is entirely for agricultural uses, how likely is it to be fulfilled under DWB priorities for water sales?
- What are the specific urban requests for water made by Avenal State Prison, and the cities of Avenal, Huron, and Coalinga, nested within the SLDMWA request?
- Sale criteria should be premised on full compliance with all applicable environmental and water rights laws.

Application of DWB priority criteria will depend on intervening economic factors beyond the control of the DWB. Given this uncertainty, an EIS should be prepared to provide the agencies with advance information and insight into what the sensitivity of the program's sellers and buyers are to the influences of prices—prices for water as well as crops such as rice, orchard and vineyard commodities, and other field crops. It is plausible that crop idling will occur more in field crops, while groundwater substitution would be more likely for orchard and vineyard crops. However, high prices for rice—the Sacramento Valley's largest field crop—would undermine

[2] Neither DWR's Addendum nor the Bureau's EA specify numerical requests for the cities of Huron, Avenal, Coalinga, and the Avenal State Prison making it impossible to have a firmer number for the amount of urban request for water. Our estimate assumes SCVWD's 30,000 AF and MWD's 300,000 AF requests are for entirely urban uses of DWB-purchased water.

this logic, and could lead to substantial groundwater substitution. We have further extensive concerns about this, described below.

On page 96, the EA finally acknowledges this reality of crop prices:

> *"Hydrologic conditions change the supply of water available for transfers, which would shift the price of water. The difference in supply of water in a wet and dry year amounts to millions of acre-feet. The regional source of the water plays a role in pricing as well. Also, agricultural prices could also affect supply of water transfers. Small changes in agricultural prices can have a large effect on water transfer supply because net returns in farming are very responsive to agricultural prices. These factors are not controlled by participants in the market."*

This statement is actually not a matter of cumulative effects, but an integral part of the chains of cause and effect that affect how the DWB would unfold in the human and natural environments. It should be recognized as part of the 2009 DWB description and should directly apply to the Agriculture and Land Use, and Socioeconomic sections of the EA, because crop prices are key factors in choices potential water sellers would weigh in deciding whether to idle crops, substitute groundwater, or decline to participate in the DWB altogether. The EA and Addendum are inadequate because they fail to identify and analyze the market context for crops as well as water that would ultimately influence the size and scope of the DWB in 2009.

Rice prices are high because of conditions for the grain in the world market. Drought elsewhere is a factor in reduced yields, but growing populations in south and east Asia demand more rice and the rice industry has struggled to meet that demand.[3]

This is very important. The Bureau tacitly admits that the Bureau—and by logical extension, DWR—has no idea how many sales of what type (public health, urban, agricultural) can be expected to occur. Put another way, there is a range of potential outcomes for the 2009 DWB, and yet the Bureau has failed utterly to use the EA to examine a reasonable and representative range of alternatives as it concerns how the priority criteria would affect DWB transfers. And DWR did not bother to conduct an appropriate level of review under the California Environmental Quality Act.

Nor does the 2009 DWB prevent rice growers (or other farmers) from "double-dipping." It appears to us they could opt to turn back their surface supplies from the CVP and the State Water Project and substitute groundwater to cultivate their rice crop—thereby receiving premiums on both their CVP contract surface water as well as their rice crop this fall when it goes to market. There appear to be no caps on water sale prices to prevent windfall profits to sellers of Sacramento Valley water in the event that groundwater is substituted in producing crops—

[3] "Panic over rice prices hits California," *AZCentral.com*, April 24, 2008; UN News Service, "Bumper rice harvests could bring down prices but poor may not benefit, warns UN," 25 February 2009; "Era of cheap rice at an end in Taiwan: COA," *The China Post*, March 5, 2009; Jim Downing, "Sacramento Valley growers se rice prices soar," *Sacramento Bee*, 18 January 2009.

especially for crops where market prices are high, such as in rice. The DWB in the 1990s capped water prices at $125/acre-foot, much to the disappointment of some water sellers at that time. Why are the state and federal projects encouraging such potential windfall profits at a time when many others suffer through this recession?

As stated, neither the Bureau nor DWR state how much of these transfers would go to public health, urban or agricultural buyers. The EA must also (but fails to) address the ability and willingness of potential buyers to pay for DWB water given the supplies that may be available. Historically, complaints from agricultural water districts were registered in the comments on the Draft EWA EIS/R and reported in the Final EIS/R in January 2004 indicating that they could not compete on price with urban areas buying water from the EWA. Given the DWB's priority criteria, will agricultural water buyers identified in Table 2 of the EA be able to buy water when competing with the likes of the Santa Clara Valley Water District and the Metropolitan Water District, representing two of the wealthiest regions of California? As a matter of statewide water, infrastructure, and economic policy, is it wise to foment urban versus agricultural sector competition for water based solely on price? Shouldn't other factors be considered in allocating water among our state's regions? This fails dramatically to encourage regions to develop their own water supplies more efficiently and cost-effectively without damage to resources of other regions.

Full disclosure of each offer of and each request for DWB water should be provided as part of the EA. This is necessary so the public can understand and have confidence in the efficacy of the DWB, benefit from full disclosure of who requests how much DWB water and for what uses, and so that the public may easily verify chains of cause and effect. Urban application of transferred surface water is not examined in the EA/FONSI, as though how urban buyers would use their purchased water had no environmental effects. Since the dry period could last beyond 2009, how will purchased water be used and conserved?

Nor is a hierarchy of priority uses among urban users stated in the criteria for purchasing DWB water. Could purchased water be used for any kind of landscaping, rather than clearly domestic purposes or strictly for drought-tolerant landscaping? We cannot tell from the EA/FONSI narrative. How can the citizens of California be assured that water purchased through the DWB will not be used wastefully, in violation of the California Constitution, Article X, Section 2?

Will urban users need their DWB purchased water only in July through September, or is that the delivery period preferred in the DWB because of ecological and fishery impact constraints on conveyance of purchased water?

Should agricultural water users be able to buy any DWB water, how will DWR and the Bureau assure that transferred water for irrigation is used efficiently? Many questions are embedded within these concerns that DWR and the Bureau should address, especially when they approach the State Water Resources Control Board to justify consolidating their places of use in their respective water rights permits:

- How much can be expected to be purchased by agricultural water users, given the priority criteria of the 2009 Drought Water Bank?
- How much can be expected to be consumptively used by agricultural water buyers?
- How much can be expected to result in tailwater and ag drainage?
- How much can be expected to add to the already high water table in the western San Joaquin Valley?
- What selenium and boron loads in Mud Slough and other tributaries to the San Joaquin River may be expected from application of this water to WSJ lands?
- What mitigation measures are needed to limit such impacts consistent with the public trust doctrine, Article X, Section 2 of the California Constitution, the Porter-Cologne Water Quality Control Act, and California Fish and Game Code Section 5937?

In other words, the most important chains of cause and effect—extending from the potential for groundwater resource impacts in the Sacramento Valley to potential for contaminated drainage water from farm lands in the western San Joaquin Valley where much of the agricultural buyers are located—are ignored in the Bureau's EA and DWR's Notice of Exemption based upon its EWA EIS/R Addendum.

Will more of surface water transfers go to urban users than to ag users given the 2009 DWB priority criteria? The EA's silence on this is disturbing, and suggests that the DWB's priority criteria may not be that important to the actual functioning of the DWB. What assurances will the Bureau and DWR provide that these criteria will be closely followed?

- The more that goes to urban water agencies the less environmental impacts there would be on drainage impaired lands of the San Joaquin Valley, a neutral to beneficial impact of the DWB's operation on high groundwater and drainage to the SJR.
- However, the more DWB water goes to agricultural users than to urban users, the higher would be groundwater levels, and more contaminated the groundwater would be in the western San Joaquin Valley and the more the San Joaquin River would be negatively affected from contaminated seepage and tailwater by operation of the DWB.

The EA fails to provide a map indicating where the sources of the DWB are located, and where the service areas are to which water would be transferred under the DWB.

Two issues concerning water rights are raised by this EA/FONSI:

- **Consolidated Place of Use.** Full disclosure of what the consolidated places of use for DWR and USBR would be, since the permit request to SWRCB will need NEPA coverage. Why is this consolidated place of use sought by the project agencies? Does consolidation mean that each project agency has the other's place of use, effectively a merger of the permits for DWB purposes? If so, the EA should state so. Will the consolidation be a permanent or temporary request be limited to the duration of the governor's emergency declaration or of just the 2009 DWB? When is the 2009 DWB scheduled to sunset? How do the consolidated place of use permit amendments to the

SWP and CVP permits relate to their joint point of diversion? Why doesn't simply having the joint point of diversion in place under D-1641 suffice for the purpose of the DWB?

- **Description of the water rights of both sellers and buyers.** This would necessarily show that buyers clearly possess junior water rights as compared with those of willing sellers. Lack of full disclosure of these disparate rights is needed to help explain the actions and motivations of buyers and sellers in the DWB, otherwise the public and decision makers have insufficient information on which to support and make informed choices.
    - **Sacramento Valley water rights –** correlative groundwater rights, riparian rights and CVP settlement contract rights
    - **San Joaquin Valley water rights –** CVP contract rights only, junior-most contractors within the CVP priority system (especially Westlands Water District).
    - **Priority of allocations among water contractors within the CVP and SWP.**

To establish a proper legal context for these water rights, the Project Action Alternative section of the EA/FONSI should also describe the applicable California Water Code sections about the treatment of water rights involved in water transfers.

Thus, there are many avenues by which the 2009 DWB is a poorly specified program for NEPA and CEQA purposes, leaving assessment of its environmental effects at best murky, and at worst, risky to all involved, especially users of Sacramento Valley groundwater resources.

B. Correcting the EA's poorly specified chains of cause and effect forces consideration of an expanded range of alternatives.

The Proposed Action Alternative need not have sophisticated forecasts of prices for rice and other commodities. Instead, for an adequate treatment of alternatives, the EA should have examined several reasonable scenarios beyond simply the 2009 DWB and a "no action" alternative. Three reasonable permutations would have considered relative proportions of crop idling versus groundwater substitution (e.g., high/low, low/high, and equal proportions of crop idled water and groundwater substitution). Other reasonable drought response alternatives that can meet operational and physical concerns merit consideration and analysis by the Bureau include:

- Planned permanent retirement of upslope lands in the western San Joaquin Valley where CVP-delivered irrigation water is applied to lands contaminated with high concentrations of selenium, boron and mercury, and which contribute to high water table and drainage problems for lowland farmers, wetlands and tributaries of the San Joaquin River. Retirement of these lands would permanently free up an estimated 3 million acre-feet of state and federal water during non-critical water years. Ending irrigation of these lands would also result in substantial human environmental benefits for the San Joaquin River, the Bay-Delta Estuary, and the Suisun Marsh from removal of selenium, boron, and salt contamination. Having such reasonable and pragmatic practices in place would go a long way to eliminate the need for drought water banks in the foreseeable future.

- More aggressive investment in agricultural and urban water conservation and demand management among CVP and SWP contractors even on good agricultural lands, including metering of all water supply hook-ups by all municipal contractors, statewide investment in low-flush toilets and other household and other buildings' plumbing fixtures, and increased capture and reuse of recycled water. Jobs created from such savings and investments would represent an economic stimulus that would have lasting job and community stability benefits as well as lasting benefits for water supply reliability and environmental stabilization.

C. The 2009 DWB EA fails to specify adequate environmental baselines, or existing conditions, against which impacts would be assessed and mitigation measures designed to reduce or avoid impacts.

The 2009 DWB environmental reviews by DWR and the Bureau incorporate by reference for specific facets of their review the 2003 and 2007 Environmental Water Account EIS/R documents. In both cases, these environmental reviews were conducted on a program whose essential purpose is to "provide protection to at-risk native fish species of the Bay-Delta estuary through environmental beneficial changes in State Water Project/Central Valley Project operations at no uncompensated water cost to the Projects' water users. This approach to fish protection involves changing Project operations to benefit fish and the acquisition of alternative sources of project water supply, called the 'EWA assets,' which the EWA agencies use to replace the regular Project water supply lost by pumping reductions."

The two basic sets of actions of the EWA were to:

- Implement fish actions that protect species of concern (e.g., reduction of export pumping at the CVP and SWP pumps in the Delta); and
- Increase water supply reliability by acquiring and managing assets to compensate for the effects of the fish actions (such as by purchasing water from willing sellers for instream flows that compensates the sellers for foregone consumptive use of water).

Without going into further detail on the EWA program, there is no attempt by the EWA agencies to characterize its environmental review as reflective of water transfer programs generally; the EWA was a specific set of strategies whose purpose was protection of fish species of concern in the Delta, not drought aid for junior water right-holding areas of California. One consequence of this attempt to rely on the EWA EIS/R is that it makes the public's ability to understand the environmental baseline of the 2009 Drought Water Bank impossible, because environmental baselines, differing purpose and need for the project, and many relevant mitigation measures are not readily available to the public. This mocks NEPA and CEQA missions to inform the public adequately about the environmental setting and potential impacts of the proposed project's actions. Moreover, a Drought Water Bank is plainly not the same thing as an Environmental Water Account.

Another consequence is that the chains of cause and effect of an EWA versus a DWB are entirely different because of their different purposes. While the presence of water purchases, willing sellers, and requesting buyers is similar, the timing of EWA water flows are geared to enhancing and protecting fish populations; the water was to flow in Delta channels to San Francisco Bay and the Pacific Ocean. In stark contrast, the DWB's water flows focus water releases from the SWP and CVP reservoirs to be exported for deliveries in the July through September period, whereas EWA assets would be "spent" year-round depending on the specific need to protect fish. EWA was about purchasing water to provide instream flows in the Delta, while the DWB is to acquire water to serve consumptive uses outside of the Delta.

Furthermore, to tease out the various ways in which the EWA review—itself a two-binder document consisting of well over 1,000 pages—could be used to provide appropriate environmental compliance for the DWB is not even attempted by DWR and the Bureau which at least has staff that could have been assigned to undertake it; yet they do not. It is therefore well beyond the reach of non-expert decision-makers and the public, and the use of the EWA EIS/R as the basic environmental review for the DWB therefore violates both NEPA and CEQA.

Nor is any attempt made in the EWA EIS/R to characterize the EWA as a "program level" environmental review off of which a DWB-like project could perhaps legitimately tier. In our view, this reliance on the EWA EIS/R obscures the environmental baselines of the DWB from public view, inappropriately conflates the purposes of two distinct environmental reviews, and flagrantly violates of NEPA and CEQA. This could only be redressed by preparation of an EIS/R on the 2009 DWB.

Finally, the most significant baseline condition omitted in the Bureau and DWR's inadequate reporting relates to Sacramento Valley groundwater resources, discussed in the next section.

D. Scientific uncertainties and controversy about Sacramento Valley groundwater resources merit consideration that only an EIS can provide.

There is substantial evidence that the 2009 DWB may have significant impacts on the aquifer system underlying the project and the adjacent region that overlies the Tuscan Formation. This alone warrants the preparation of an EIS.

Additionally, an EIS is necessary where "[a] project['s] … effects are 'highly uncertain or involve unique or unknown risks.'" *Blue Mountains Biodiversity Project*, 161 F.3d at 1213 (quoting 40 C.F.R. §1508.27(b)(5)). Here, the draft EA/FONSI fails to adequately address gaps in existing scientific research on the hydrology of the aquifer system and the extent to which these gaps affect the Bureau's ability—and by logical extension, DWR's ability—to assess accurately the Project's environmental impacts.

1. Existing research on groundwater conditions indicates that the 2009 DWB may have significant impacts on the aquifer system.

The EA fails to describe significant characteristics of the aquifers that the 2009 DWB proposes to exploit. These characteristics are relevant to an understanding of the potential environmental effects associated with the 2009 DWB's potential extraction of up to 340,000 acre feet ("af") of groundwater. Environmental Water Account 2003 EIS/EIR Record of Decision at p. 11; Draft Supplemental Environmental Water Account 2007 EIS/EIR at p. ES-6; 2009 Drought Water Bank addendum 12/17/08 at p. 2, 3, 9; 2009 Drought Water Bank addendum 3/4/09 at p. 2, 3, 9. First, the draft EA/FONSI fails to describe a significant saline portion of the aquifer stratigraphy of the 2009 DWB area. According to Toccoy Dudley, former Groundwater Geologist with the Department of Water Resources and former director of the Butte County Water and Resources Department, saline groundwater aquifer systems of marine origin underlie the various freshwater strata in the northern counties of Butte, Colusa, Glenn, and Tehama ("northern counties"). The approximate contact between fresh and saline groundwater occurs at a depth ranging from 1500 to 3000 feet. (Dudley 2005) (A list of all references cited in these comments can be found at the end of this letter.)

Second, the EA fails to discuss the pressurized condition of the down-gradient portion of the Tuscan formation, which underlies the northern counties Project area. Dudley finds that the lower Tuscan aquifer located in the Butte Basin is under pressure. "It is interesting to note that groundwater elevations up gradient of the Butte Basin, in the lower Tuscan aquifer system, are higher than the ground surface elevations in the south-central portion of Butte Basin. This creates an artesian flow condition when wells in the central Butte Basin are drilled into the lower Tuscan aquifer." (Dudley 2005). The artesian pressure indicates recharge is occurring in the up-gradient portions of the aquifer located along the eastern margin of the Sacramento Valley.

Third, the EA fails to describe the direction of movement of water through the Lower Tuscan Formation that underlies the northern counties. According to Dudley: "From Tehama County south to the city of Chico, the groundwater flow direction in the lower Tuscan is westerly toward the Sacramento River. South of Chico, the groundwater flow changes to a southwesterly direction along the eastern margin of the valley and to a southerly direction in the central portion of the Butte Basin." (Dudley 2005).

Fourth, the draft EA fails disclose that the majority of wells used in the Sacramento Valley are individual wells that pump from varying strata in the aquifers. The draft EA incorrectly asserts that, "Groundwater users in the basin pump primarily from deeper continental deposits." EA at p. 24. Contradicting this assertion, the EA later states that, "Fifty percent of the domestic wells are 150 feet deep or less," for the Natomas Central Mutual Water Company. (EA at p. 30) Why is the information not provided for other areas of the Sacramento Valley? The thousands of domestic wells in the northern counties are as susceptible as the wells in the Natomas Central MWC. The EA expands the discussion regarding Natomas Central MWC on page 39 stating that, "Shallow domestic wells would be most susceptible to adverse effects. Fifty percent of the domestic wells are 150 feet deep or less. Increased groundwater pumping could cause localized declines of groundwater levels, or cones of depression, near pumping wells, possibly causing

effects to wells within the cone of depression. As previously described, the well review data, mitigation and monitoring plans that will be required from sellers during the transfer approval process will reduce the potential for this effect." As the latter statement makes clear, the Bureau hopes that the individual mitigation and monitoring plans will reduce the potential for impact, but there is no assurance in the EA to the thousands of well owners in the Sacramento Valley that it will reduce it to a level of insignificance. The Coalition questions the adequacy of individual mitigation and monitoring plans and suggests that an independent third party, such as USGS, oversee the mitigation and monitoring program. After the fiasco in Butte County during the 1994 Drought Water Bank and with the flimsy, imprecise proposal for mitigation and monitoring in the 2009 DWB, the agencies lack credibility as oversight agencies.

Fifth, the draft EA fails to provide recharge data for the aquifers. Professor Karin Hoover, Assistant Professor of hydrology, hydrogeology, and surficial processes from CSU Chico, finds that, "Although regional measured groundwater levels are purported to 'recover' during the winter months (Technical Memorandum 3), data from Spangler (2002) indicate that recovery levels are somewhat less than levels of drawdown, suggesting that, in general, water levels are declining." According to Dudley, "Test results indicate that the 'age' of the groundwater samples ranges from less than 100 years to tens of thousands of years. In general, the more shallow wells in the Lower Tuscan Formation along the eastern margin of the valley have the 'youngest' water and the deeper wells in the western and southern portions of the valley have the 'oldest' water," adding that "the youngest groundwater in the Lower Tuscan Formation is probably nearest to recharge areas." (Dudley 2005). "This implies that there is currently no active recharge to the Lower Tuscan aquifer system (M.D. Sullivan, personal communication, 2004)," explains Dr. Hoover. "If this is the case, then water in the Lower Tuscan system may constitute fossil water with no known modern recharge mechanism, and, once it is extracted, it is gone as a resource," (Hoover 2008).

All of these aquifer characteristics are important to a full understanding of the environmental impacts of the 2009 DWB because there are numerous indications that other aquifer strata associated with the Lower Tuscan Formation are being operated near the limit of overdraft and could be affected by the 2009 DWB. (Butte County 2007). The Bureau has not considered this important historic information in the draft EA. According to Dudley, the Chico area has a "*long term average decline in the static groundwater level of about 0.35 feet-per-year*." (Dudley 2007) (Emphasis added.) Declining aquifer levels are not limited to the Chico Municipal area. This trend of declining aquifer levels in Chico, Durham and the Cherokee Strip is illustrated in a map submitted with this comment letter. (CH2M Hill 2006).

Declining groundwater elevations have been observed specifically in Butte County. A 2007 Butte Basin Groundwater Status Report describes the "historical trend" in the Esquon Ranch area as showing "seasonal fluctuation (spring to fall) in groundwater levels of about 10 to 15 feet during years of normal precipitation and less than 5 feet during years of drought." The report further notes: "Long-term comparison of spring-to-spring groundwater levels shows a decline of approximately 15 feet associated with the 1976-77 and 1986-94 droughts. (Butte Basin Water

Users Association, 2007.) The 2008 report indicates that, "The spring 2008 groundwater level measurement was approximately three feet higher than the 2007 measurement, however it was still four feet lower than the average of the previous ten spring measurements. Fall groundwater levels are approximately nine feet lower than the averages of those measured during either of the previous drought periods on the hydrograph. At this time it appears that there may be a downward trend in groundwater levels in this well." (Butte Basin Water Users Association, 2008.) Thus, "*it appears that there may be a downward trend in groundwater levels in this well*." *Id.* (emphasis added).

Groundwater elevations in the Pentz sub-area in Butte County also reveal significant historical declines. The historical trend for this sub-area "…shows that the average seasonal fluctuation (spring to fall) in groundwater levels averages about 3 to 10 feet during years of normal precipitation and approximately 3 to 5 feet during years of drought. Long-term comparison of spring-to-spring groundwater levels shows a decline in groundwater levels during the period of 1971-1981, perhaps associated with the 1976-77 drought. Since a groundwater elevation high of approximately 145 feet in 1985 the measured groundwater levels in this well have continued to decline. Recent groundwater level measurements indicate that the groundwater elevation in this well is approximately 15-25 feet lower than the historical high in 1985. *Id.* Water elevations at the Pentz sub-area well have been monitored since 1967. "Since 1985 spring groundwater levels in this well have been declining, and the spring 2008 measurement remained ten feet below historical high levels and continues the downward trend on the hydrograph." *Id.* (Emphasis added.)

Both the Pentz and Esquon Ranch areas are located east of U.S. 99, in the eastern portion of the Tuscan aquifer.

In light of this downward trend in regional groundwater levels, the Bureau's EA should closely analyze replenishment of the aquifers affected by the proposed 2009 DWB. The draft EA fails to provide any in-depth assessment of these issues. For example, the EA fails to discuss the best available estimates of where groundwater replenishment occurs. Lawrence Livermore National Laboratory analyzed the age of the groundwater in the northern counties to shed light on this process: "Utilizing the Tritium (H3) Helium-3 (He3) ratio, the age of each sample was estimated. Test results indicate that the "age" of the groundwater samples ranges from less than 100 years to tens of thousands of years,: (Dudley et al. 2005). As mentioned above, Dudley opines that the youngest groundwater in the Lower Tuscan Formation is probably nearest to recharge areas. (2005).

Are isotopic groundwater data available for other regions in the Sacramento Valley? If so, they would be crucial for all concerned to understand the potential impacts from the proposed 2009 DWB. For example, the EA states, "The WFA area that could be affected by the proposed action includes only the 'North Area' bounded on the north and east by the Sacramento County line, by the Sacramento River on the west, and by the American River on the south." EA at p. 34. If this is the area in Sacramento County that is identified as most vulnerable to groundwater impacts,

yet two major rivers surround it, shouldn't the Bureau understand the hydrologic relationship between the groundwater basin and the rivers? If that understanding exists, where is it presented in the EA? It is well known that the Sacramento River is already a losing river south of Princeton.

The Bureau should prepare an EIS that considers this and other existing research to evaluate the 2009 DWB's anticipated effect on regional hydrology.

2. The 2009 DWB proposes to rely on inadequate monitoring to avoid the acknowledged possibility of significant adverse environmental impacts.

The draft EA relies deflects responsibility of the Bureua and DWR for monitoring to individual "willing sellers." EA at p. 21. This fails to provide the most basic framework for governmental authority to enforce the state's role as trustee of the public's water in California, let alone a comprehensive and coordinated structure, for a very significant program that could transfer up to 389,328 af of water from the Sacramento Valley. (Recall that DWR suggests potential sale of water up to 533,000 AF, and believes it has environmental compliance coverage for up to 600,000 AF of water sales from the Sacramento Valley, including 340,000 AF in groundwater substitution alone.) The draft EA further defers responsibility to local groundwater management plans and ordinances to determine when the effects of the proposed extraction become "adverse." EA at p. 22. "As described in Section 3.2, well reviews and monitoring and mitigation plans will be implemented under the proposed action to minimize potential effects of groundwater substitution. Well reviews, monitoring and mitigation plans will be coordinated and implemented in conjunction with local ordinances, basin management objectives, and all other applicable regulations." EA at p. 10. The draft EA merely provides monitoring direction to "willing sellers" without identifying specific actions, responsible agencies, or funding that will be necessary for this oversight. This is unacceptable.

We propose instead that the Bureau and DWR require at a minimum that local governments select independent third-party monitors, who are funded by surcharges on DWB transfers paid by the buyers, to oversee the monitoring that is proposed in lieu of Bureaus and DWR staff. EA at p. 41-45.

Otherwise, the DWB's proposed monitoring is insufficient and cannot justify the significant risk of adverse environmental impacts. For example, the EA fails to identify standards that would be used to monitor the 2009 DWB's impacts. It fails to identify any specific monitoring protocols, locations (particularly in up-gradient recharge portions of the groundwater basins), and why chosen locations should be deemed effective for monitoring the effects of the proposed groundwater extraction. It also fails to describe how the objectives in the Drought Water Transfer White Paper will be met and by whom. EA at p.43. Moreover, it fails to provide a mitigation strategy for review and comment by the public, but defers this vital mitigation planning effort. EA at p.43. Another example of the inadequacy of the proposed monitoring is

that the draft EA fails to include any plan to monitor stream flow of creeks located in the presumed recharge area for the Lower Tuscan Formation located on the eastern edge of the Sacramento Valley.

Adequate monitoring is vital to limit the significant risks posed by the DWB to the health of the region's groundwater, streams, and fisheries, as discussed below. Moreover, to the extent this Project is conceived as a one-year drought program that will provide knowledge for future groundwater extraction, its failure to include adequate monitoring protocols is even more disturbing and creates the risk of significant long-term and even irreversible impacts from the DWB.

a. The Bureau's assertion that the DWB will be modified or halted in the event of significant adverse impacts to hydrologic resources is an empty promise in light of the wholly inadequate monitoring provided for in the DWB. Knowing that the Bureau and DWR knowingly violated the X2 standard in the Delta in February 2009 does little to instill confidence from the Coalition in non-specific program and mitigation criteria.

The EA repeatedly illustrates that there is potential for significant injury to other groundwater users, water quality, streams, flora and fauna, and the soil profile, EA at p. 36-41. Page 36 alone has numerous examples that illustrate the need for an EIS since there is insufficient, comprehensive planning for, let alone preparation to mitigate, adverse environmental impacts:

- *Crop idling and groundwater substitution transfers under the proposed action could affect groundwater resources. Changes in groundwater levels could cause secondary effects. Declining groundwater levels could result in: 1) increased groundwater pumping cost due to increased pumping depth, 2) decreased yield from groundwater wells due to reduction in the saturated thickness of the aquifer, 3) reduced groundwater in storage, and 4) decrease of the groundwater table to a level below the vegetative root zone, which could result in environmental effects.*
- *Groundwater pumping within the vicinity of a surface water body could change the existing interactions between surface and groundwater, potentially resulting in decreased stream flows and levels, with potential adverse effects to the riparian habitat and downstream users. The pumping of groundwater near wetland habitats could also result in adverse environmental effects.*
- *Excessive groundwater extraction from confined and unconfined aquifers could result in a lowering of groundwater levels and, in confined aquifers, a decline in water pressure. The reduction in water pressure results in a loss of support for clay and silt beds, which subsequently compress, causing a lowering of the ground surface (land subsidence). The compaction of fine-grained deposits, such as clay and silt, is permanent. The possible consequences of land subsidence are 1) infrastructure damage and 2) alteration of drainage pattern.*
- *Changes in groundwater levels or in the prevailing groundwater flow regime could cause a change in groundwater quality through a number of mechanisms. One mechanism is the potential mobilization of areas of poorer quality water, drawn down from shallow*

> *zones, or drawn up into previously unaffected areas. Changes in groundwater gradients and flow directions could also cause (or speed) the lateral migration of poorer quality water. Artificial or enhanced recharge of the aquifer with water of poorer quality, or even different geochemical constituents, could also have an adverse effect on existing conditions. Geochemical differences between the recharged water and groundwater could affect resultant groundwater quality through geochemical processes such as precipitation, bacterial activity, ion exchange, and adsorption.*

The Bureau thus recognizes the potential for significant decline in groundwater levels as a result of the proposed activity. EA at p. 36, 37. This acknowledgement alone is sufficient to require a full EIS. Moreover, as detailed below, the monitoring proposed by the 2009 DWB is so inadequate that there can be no guarantee that adverse impacts will be discovered, or that they will be discovered in time to avoid significant environmental impacts.

Glenn County is noticeably omitted from the list of counties with some local regulatory authority. EA at p. 28-29. Glenn County does have a Groundwater Management Plan (adopted in August 2001), albeit inadequate. The Bureau's own 2008 EA for the GCID Seven Wells Project cautioned that "[s]ince the groundwater management plan is relatively new and not fully implemented, the enforcement and conflict resolution process has not been vigorously tested." Moreover, the Glenn County Groundwater Management Plan does not have any provisions to monitor or protect the environment. The 2009 DWB EA fails to explain why this management plan, as inadequate as it is, is not discussed nor is the absence of local protection mentioned.

b. Monitoring based on the Glenn County Groundwater Management Plan is inadequate. Since the Bureau omitted discussion of the Glenn County Groundwater Management Plan in the 2009 DWB, we refer to the language used in the 2008 Stony Creek Fan EA/FONSI that explained that the existing Glenn County groundwater management plan will ensure the testing project will have no significant adverse effects on groundwater levels: "This Finding of No Significant Impact (FONSI) is based upon the following: … Implementation of the Glenn County Groundwater Management Plan during the aquifer performance testing plan will ensure that the proposed action will not result in any significant adverse effect to existing groundwater levels." Stony Creek Fan EA/FONSI at p. 2.

But the Butte County Department of Water and Resource Conservation explains that local plans are simply not up to the task of managing a regional resource:

> *Glenn County does not have an export ordinance because it relies on Basin Management Objectives (BMO) to manage the groundwater resource, and subsequently to protect third parties from transfer related impacts. Recently, Butte County also adopted a BMO type of groundwater management ordinance. Butte County, Tehama County and several irrigation districts in each of the four counties have adopted AB3030 groundwater management plans. All of these groundwater management activities were initiated prior to recognizing that a regional aquifer system exists that extends over more than one*

> *county and that certain activities in one county could adversely impact another. Clearly the current ordinances, AB3030 plans, and local BMO activities, which were intended for localized groundwater management, are not well suited for management of a regional groundwater resource like that theorized of the Lower Tuscan aquifer system.*

(Butte County DWRC 2007).[4]

c. The EA fails to propose real time monitoring for land subsidence. Third-party independent verification, perhaps by scientists from the U.S. Geological Survey, should be incorporated by DWR and the Bureau into the project description of the 2009 DWB. The draft EA/FONSI relies on very few existing extensometers in the Sacramento Valley that measure land subsidence, and a Global Positioning System land subsidence network established by one county. EA/FONSI at p. 26 and 32. The remaining responsibility is again deferred to the "willing sellers." Unfortunately, voluntary monitoring by pumpers does not strike us as a responsible assurance given the substantial uncertainties involved in regional aquifer responses to extensive groundwater pumping in the Sacramento Valley.

Not only is there a failure to discuss real time monitoring for subsidence, there also is no discussion regarding delayed subsidence that should also be monitored according to the findings of Dr. Kyran Mish, Presidential Professor, School of Civil Engineering and Environmental Science at the University of Oklahoma. Dr. Mish notes: "It is important to understand that *all* pumping operations have the potential to produce such settlement, and when it occurs with a settlement magnitude sufficient enough for us to notice at the surface, we call it *subsidence*, and we recognize that it is a serious problem (since such settlements can wreak havoc on roads, rivers, canals, pipelines, and other critical infrastructure)." (Mish 2008). Dr. Mish further explains that "[b]ecause the clay soils that tend to contribute the most to ground settlement are highly impermeable, their subsidence behavior can continue well into the future, as the rate at which they settle is governed by their low permeability." *Id.* "Thus simple real-time monitoring of ground settlement can be viewed as an *unconservative* measure of the potential for subsidence, as it will generally tend to underestimate the long-term settlement of the ground surface." *Id.* (emphasis added).

d. The 2009 DWB EA fails to require stream flow monitoring, choosing to defer the monitoring and mitigation planning to "willing sellers." We also urge incorporation of frequent and regular streamflow monitoring by either staff of the project agencies or a third, independent party such as the USGS, paid for by DWB transfer surcharges mentioned above. It is clear from existing scientific studies and the EA that the DWB may have significant impacts on the aquifers replenishment and recharging of the aquifers, and the 2009 DWB should therefore require extensive monitoring of regional streams. The radius for monitoring should be large, not the typical two to three miles as usually used by DWR and the Bureau. Though not presented for the

DWB, the *Stony Creek Fan Aquifer Performance Testing Plan, which is a much smaller project,* recognized that there may be a drawdown effect on the aquifer by considering results from a DWR Northern District spring 2007 production well test (EA/FONSI p. 28). However, it did not assess the anticipated scope of that effect—or even what level of effect would be considered acceptable. Moreover, the results from that test well indicate that the recharge source for the solitary production well "is most likely from the foothills and mountains, to the east and north"—which at a minimum is more than fifteen miles away. (DWR, Glenn-Colusa Irrigation District Aquifer Performance Testing Glenn County, California).

The Butte County Department of Water and Resource Conservation has identified streams that must be monitored to determine impacts to stream flows that would be associated with pumping the Lower Tuscan Aquifer. These "[s]treams of interest" are located on the eastern edge of the Sacramento Valley and include: Mill Creek, Deer Creek, Big Chico Creek, Butte Creek, and Little Dry Creek. (The Butte County DWRC 2007). The department described the need and methodology for stream flow gaging:

> *The objective of the stream flow gaging is to determine the volume of surface water entering into or exiting the Lower Tuscan Aquifer along perennial streams that transect the aquifer formation outcropping for characterization of stream-aquifer interactions and monitoring of riparian habitat. Measurement of water movement into or out of the aquifer will allow for testing of the accuracy of the Integrated Water Flow Model, an integrated surface water-groundwater finite differential model developed for the eastern extent of the Lower Tuscan aquifer.*
>
> *Two stream gages will be installed on each of five perennial streams crossing the Lower Tuscan Formation to establish baseline stream flow and infiltration information. The differences between stream flow measurements taking upstream and downstream of the Lower Tuscan Formation are indications of the stream-aquifer behavior. Losses or gains in stream volume can indicate aquifer recharge or discharge to or from the surface waters.*

Id.

As evident in the following conclusory assertions, the draft EA/FONSI narrowly defines the radius of influence associated with the aquifer testing and thus entirely fails to identify potential significant impacts to salmon:

> "Interaction with Surface Water - Pumping close to the Sacramento River, and close to tributaries could reduce channel flows. This reduction in channel flows could adversely affect riparian and aquatic habitats, including wildlife refuge habitat, as well as downstream water users… Groundwater pumping for groundwater substitution transfers could reduce flows in nearby surface water bodies. (EA at p. 38)

Monitoring of flow on streams associated with the Lower Tuscan Formation is particularly important to the survival of Chinook salmon which use these "streams of interest" to spawn and where salmon fry rear. Intensive groundwater pumping would likely lower water table elevations near these streams of interest, decreasing surface flows, and therefore reducing salmon spawning and rearing habitat through dewatering of stream channels in these northern counties. This would be a significant adverse impact of the DWB and is ignored by the EA.

A similar effect has been observed in the Cosumnes River, where "[d]eclining fall flows are limiting the ability of the Cosumnes River to support large fall runs of Chinook salmon." This is a river that historically supported a large fall run of Chinook Salmon. *Id.* Indeed, "[a]n early study by the California Department of Fish and Game . . . estimated that the river could support up to 17,000 returning salmon under suitable flow conditions." *Id.*, citing CDFG 1957 & USFWS 1995. But "[o]ver the past 40 years fall runs ranged from 0 to 5,000 fish according to fish counts by the CDFG (USFWS 1995)," and "[i]n recent years, estimated fall runs have consistently been below 600 fish, according to Keith Whitener." (Fleckenstein, *et al*. 2004). Indeed, "[f]all flows in the Cosumnes have been so low in recent years that the entire lower river has frequently been completely dry throughout most of the salmon migration period (October to December)." *Id.*

Research indicates that "groundwater overdraft in the basin has converted the [Cosumnes River] to a predominantly losing stream, practically eliminating base flows…." (Fleckenstein, *et al*. 2004). And "investigations of stream-aquifer interactions along the lower Cosumnes River suggest that loss of base flow support as a result of groundwater overdraft is at least partly responsible for the decline in fall flows." *Id.* Increased groundwater withdrawals in the Sacramento basin since the 1950s have substantially lowered groundwater levels throughout the county." *Id.*

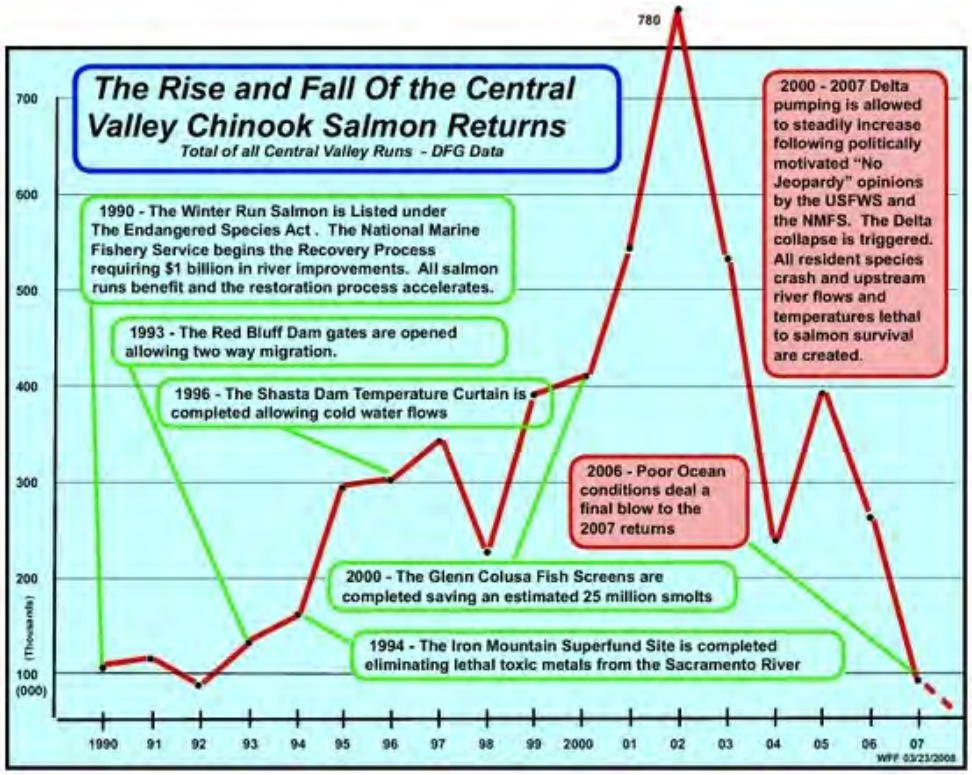
The draft EA acknowledges the potential for impacts to special status fish species from altered river flows and commits to maintaining flow and temperature requirements already in place. (EA at p. 70) The coalition would like to have greater assurance of this commitment after the Bureau and DWR's failure in February 2009 to meet the X2 standard. The Bureau and DWR should make X2 compliance and streams of interest monitoring in real time part of their permit amendment applications to the SWRCB this spring. If stream levels are affected by groundwater pumping, then pumping would cease.

Unfortunately, the draft EA fails to anticipate possible stream flow declines in important salmon rearing habitat in the 2009 DWB area. Mud Creek is located within the 2009 DWB and flows through probable Tuscan recharge zones. While a charged aquifer is likely to add to base flow of this stream, a de-watered aquifer would pull water from the stream. According to research conducted by Dr. Paul Maslin, Mud Creek provides advantageous rearing habitat for out-migrating Chinook salmon. (Maslin 1996). Salmon fry feeding in Mud Creek grew at over twice the rate by length as did fry feeding in the main stem of the Sacramento River. *Id.*

Another tributary to the Sacramento River, Butte Creek, hosts spring-run Chinook salmon, a threatened species under the Endangered Species Act. 64 Fed. Reg. 50,394 (Sept. 16, 1999). Butte Creek contains the largest remaining population of the spring-run Chinook and is designated as critical habitat for the species. *Id*. at 50,399; 70 Fed. Reg. 52,488, 52,590-91 (Sept. 2, 2005). Additionally, Butte Creek provides habitat for the threatened Central Valley steelhead. *See* 63 Fed. Reg. 13,347 (Mar. 19, 1998); 70 Fed. Reg. at 52,518. The Bureau should not overlook the importance of rearing streams, and should not proceed with this Project unless and until adequate monitoring and mitigation protocols are established.

Existing mismanagement of water in California's rivers, creeks, and groundwater has already caused a precipitous decline in salmon abundance. There is no mention of the fall-run salmon numbers in the main stem Sacramento River or its essential tributaries despite the fact that their numbers dropped precipitously in 2007 (see graphic) and 2008. For the second year in a row, the commercial salmon fishery is closed for fear of pushing these fish to extinction. As noted above, the EA casually asserts that maintaining flow and temperature requirements in the main stem will be sufficient to protect aquatic species, but it fails to consider the impacts of up to 600,000 af of water transfers, fallowing, and groundwater substitution on the tributaries. How much additional pumping does the DWB represent, given CVP and SWP contractual commitments, available reservoir supplies, and other environmental restrictions south of the Delta? The EA and DWR's Addendum are silent on this.

Where are the data to support assertions that impacts to aquatic species will be below a level of significance? Habitat values are also essential to many other special status species that utilize the aquatic and/or riparian landscape including, but not limited to, giant garter snake, bank swallow, greater sandhill crane, American shad, etc. Where is the documentation of the potential impacts to these species?



Graphic is courtesy of Dick Pool.

In addition to the direct decline in the salmon populations is the food chain affect that will influence species such as killer whales.

3. The EA fails to address the significant unknown risks raised by the 2009 DWB's proposed groundwater extraction.

The EA fails to identify and address the significant unknown risks associated with this Project. There are substantial gaps in scientists' understanding of how the aquifer system recharges.

While the EA asserts that the Lower Tuscan is an isolated layer in the aquifer, expert opinion and experience suggest otherwise. Professor Karin Hoover from CSU Chico asserts that: "[T]o date there exists no detailed hydrostratigraphic analysis capable of distinguishing the permeable (water-bearing) units from the less permeable units within the subsurface of the Northern Sacramento Valley. In essence, the thickness and extent of the water-bearing units has not been adequately characterized." (p. 1)

Though the Projects fails to disclose the limitations in knowledge of the geology and hydrology of the northern counties, it was disclosed in 2008 in the EA for the *Stony Creek Fan Aquifer Performance Testing Plan* (Testing Plan EA). It revealed that there is also limited understanding of the interaction between the affected aquifers, and how that interaction will affect the ability of the aquifers to recharge. The Testing Plan EA provides:

> *The Pliocene Tuscan Formation lies beneath the Tehama Formation in places in the eastern portion of the SCF Program Study Area, although its extent is not well defined. Based on best available information, it is believed to occur at depths ranging between approximately 300 and 1,000 feet below ground surface. It is thought to extend and slope upward toward the east and north, and to outcrop in the Sierra Nevada foothills. The Tuscan Formation is comprised of four distinct units: A, B C and D (although Unit D is not present within the general project area). Unit A, or Upper Tuscan Formation, is composed of mudflow deposits with very low permeability and therefore is not important as a water source. Units B and C together are referred to as the Lower Tuscan Formation. Very few wells penetrate the Lower Tuscan Formation within the SCF Program study area.*

The Testing Plan EA/FONSI at p. 23 (emphasis added). The Tehama Formation, however, generally behaves as a semi-confined aquifer system and the EA contains no discussion of its relationship with the adjoining formations. Nor is there any discussion of the role of the Pliocene Tehama Formation as "the primary source of groundwater produced in the area." (DWR 2003).

The EA fails to offer any in-depth analysis of which strata in the aquifers will be most likely affected by the 2009 DWB's proposed extraction of groundwater. The EA incorrectly states that, "Groundwater users in the basin pump primarily from deeper continental deposits." EA at p. 24. The majority of wells are in the upper layers of the aquifers since they are for domestic use, which is not even considered in the EA. In addition, the EA provides no assessment of the interrelationship of varying strata in the aquifers in the Sacramento Valley or between the aquifers themselves.

The EA fails to provide basic background information regarding the recharge of groundwater. The documents states, "Groundwater is recharged by deep percolation of applied water and rainfall infiltration from streambeds and lateral inflow along the basin boundaries." EA at p. 24. How was the conclusion reached that applied water leads to recharge of the aquifer? Where are the supporting data? This claim is unsubstantiated by any of the work that has been performed to date. For example, the RootZone water balance model used by a consultant with Glenn Colusa Irrigation District, Davids Engineering, was designed to simulate root zone soil moisture. It balances incoming precipitation and irrigation against crop water usage and evaporation, and whatever is left over is assigned to "deep percolation." Deep percolation in this case means below the root zone, which is anywhere from a few inches to several feet below the surface, depending on the crop. There is absolutely no analysis that has been performed to insure that applied water does, indeed, recharge the aquifer. For example, if the surface soils were to dry out, water that had previously migrated below the root zone might be pulled back up to the surface by capillary forces. In any case, the most likely target of the "deep percolation" water in the Sacramento Valley is the unconfined aquifer and possibly the Sacramento River. The EA has not demonstrated otherwise.

E. Other resource impacts flowing from corrected chains of cause and effect are unrecognized in the EA and should be considered in an EIS instead.

Regarding surface water reservoir operations in support of the 2009 DWB, we have several questions and concerns:

- We do not understand from the EA/FONSI which BiOps will govern the DWB's environmental compliance with the Endangered Species Act. The Bureau's EA is confusing at best on this point. Compare pages 8, 9, 22, and 70. We note that reliance on the 2004 OCAP biological opinions on Delta smelt and anadromous fisheries were declared unlawful by a federal judge in 2008 and should not be relied on.
- CVPIA water transfer rules should be stated as part of the "affected environment." Do they permit transfers to non-CVP urban water districts?

Regarding fisheries, we note that the Bureau intends to comply with the State Water Resources Control Board's Water Rights Orders 90-05 and 91-01 in order to provide temperature control at or below 56 degrees Fahrenheit for anadromous fish, their redds, and hatching wild salmonid fry, and to provide minimum instream flows of 3,250 cubic feet per second (cfs) between September

1 and February 28, and 2,300 cfs between March 1 and August 31. How will the Bureau and DWR comply with Fish and Game Code Section 5937—to keep fish populations below and above their dams in good condition, as they approves transfers of CVP water from willing CVP contractors to willing buyers? We urge this compliance effort be integrated with the streams of interest and groundwater monitoring programs we recommended above.

We also find confusing the EA's treatment of instream flows for fisheries. On one hand, minimum flows and temperature criteria established in the above-mentioned water rights orders is to be adhered to by the Bureau for the Sacramento River. The necessity for April and May storage is not well explained as well as the reasons that surface water releases from Shasta would occur in the July through September period. Why?

Concerning the social and economic effects of the proposed 2009 DWB, we note that UC Davis researcher Richard Howitt and his colleagues predict loss of 60,000 to 80,000 farm-related jobs in the Central Valley due to crop idling from drought effects and curtailed project deliveries for irrigation (though not specifically attributable to EA/FONSI activities). The EA neither identifies nor comments on this seemingly credible finding. Howitt, et al, do reasonably conclude that the bulk of these potential impacts are in the western San Joaquin and Tulare and Kern County areas where water rights for imported supplies are the most unreliable.

(Given the facts that DWB buyer requests exceed water supplies offered by potential sellers, and that the DWB priority criteria favor public health and municipal buyers over agricultural buyers, it does seem to us that the state and federal government should identify and commit to permanent mitigations for these acute economic dislocations resulting from drought. However, we would dispute, as discussed below, that this year's hydrologic conditions constitute a drought.)

On its own terms, the Bureau's EA makes no attempt to establish baseline agricultural crop acreages for each agricultural county offering or seeking DWB water in order to calculate and apply its 20 percent threshold for limiting economic impacts to agriculture in selling counties. Moreover, this 20 percent threshold needs to be incorporated into the description of the Proposed Action Alternative, since it appears to be an integral part of DWB actions.

In general, the 2009 DWB EA/FONSI—and by logical implication, DWR's Addendum—consistently avoids full disclosure of existing conditions and baseline data, rendering their justifications for the 2009 DWB at best incoherent, and at worst, dangerous to groundwater users and resources, and to vulnerable fisheries in tributary streams of the Sacramento River.

F. The 2009 DWB is likely to have a cumulatively significant impact on the environment.

The draft EA/FONSI does not reveal that the current Project is part of a much larger set of plans to develop groundwater in the region, to develop a "conjunctive" system for the region, and to integrate northern California's groundwater into the state's water supply. These are plans that the

Bureau, together with DWR and others, have pursued and developed for many years. Indeed, one of the plans—the short-term phase of the Sacramento Valley Water Management Program—is the subject of an ongoing scoping process for a Programmatic EIS that has not yet been completed.

In assessing the significance of a project's impact, the Bureau must consider "[c]umulative actions, which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact statement." 40 C.F.R. §1508.25(a)(2). A "cumulative impact" includes "the impact on the environment which results from the incremental impact of the action when added to *other past, present and reasonably foreseeable future actions* regardless of what agency (Federal or non-Federal) or person undertakes such other actions." *Id.* §1508.7. The regulations warn that "[s]ignificance cannot be avoided by terming an action temporary or by breaking it down into small component parts." *Id.* §1508.27(b)(7).

An environmental impact statement should also consider "[c]onnected actions." *Id.* §1508.25(a)(1). Actions are connected where they "[a]re interdependent parts of a larger action and depend on the larger action for their justification." *Id.* §1508.25(a)(1)(iii). Further, an environmental impact statement should consider "[s]imilar actions, which when viewed together with other *reasonably foreseeable or proposed agency actions*, have similarities that provide a basis for evaluating their environmental consequences together, such as common timing or geography." *Id.* §1508.25(a)(3) (emphasis added).

As detailed below, instead of assessing the cumulative impacts of the proposed action as part of the larger program that even the Bureau has recognized should be subject to a programmatic EIS (but for which no programmatic EIS has been completed), the Bureau has attempted to separate this program and approve it through an inadequate EA. Further, the Bureau has failed to take into account the cumulative effects of other groundwater and surface water projects in the region, the development of "conjunctive" water systems, and the anticipated further integration of Sacramento Valley surface and ground water into the state water system.

G. The Environmental Assessment Fails to Meet the Requirements of NEPA.

Even if an EIS were not clearly required here, the draft EA/FONSI prepared by the Bureau violates NEPA on its own. As discussed above, the draft EA does not provide the analysis necessary to meet NEPA's requirements and to support its proposed finding of no significant impact. Further, as outlined above, the draft document fails to provide a full and accurate description of the proposed Project, its relationship to myriad other water transfer and groundwater extraction projects, its potentially significant adverse effects on salmon critical habitat in streams of interest tributary to the Sacramento River, and an assessment of the cumulative environmental impacts of the 2009 DWB when considered together with other existing and proposed water programs.

Additionally, the draft EA/FONSI fails to provide sufficient evidence to support its assertions that the 2009 DWB would have no significant impacts on the human or natural environments, neither decision makers nor the public are fully able to evaluate the significance of the 2009 DWB's impacts. These informational failures complicate the Coalition's efforts to provide meaningful comments on the full extent of the potential environmental impacts of the DWB and appropriate mitigation measures. Accordingly, many of the Coalition's comments include requests for additional information.

1. The EA Fails to Consider a Reasonable Range of Alternatives.

NEPA's implementing regulations call analysis of alternatives "the heart of the environmental impact statement," 40 C.F.R. §1502.14, and they require an analysis of alternatives within an EA. *Id.* §1408.9. The statute itself specifically requires federal agencies to:

> *study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning available uses of resources.*

42 U.S.C. §4332(2)(E). Here, because the Bureau's EA considers only the proposed Project and a "No Action" alternative, the EA violates NEPA.

The case law makes clear that an adequate analysis of alternatives is an essential element of an EA, and is designed to allow the decision maker and the public to compare the environmental consequences of the proposed action with the environmental effects of other options for accomplishing the agency's purpose. The Ninth Circuit has explained that "[i]nformed and meaningful consideration of alternatives … is … an integral part of the statutory scheme." *Bob Marshall Alliance v. Hodel*, 852 F.2d 1223, 1228 (9th Cir. 1988) (holding that EA was flawed where it failed adequately to consider alternatives). An EA must consider a reasonable range of alternatives, and courts have not hesitated to overturn EAs that omit consideration of a reasonable and feasible alternative. *See People ex rel. Van de Kamp v. Marsh*, 687 F.Supp. 495, 499 (N.D. Cal. 1988); *Sierra Club v. Watkins*, 808 F.Supp. 852, 870-75 (D.D.C. 1991).

Here, there are only two alternatives presented: the No Action and the Proposed Action. The lack of *any* alternative action proposal is unreasonable and is by itself a violation of NEPA's requirement to consider a reasonable range of alternatives.

Even more significantly, there are numerous other alternative ways to ensure water is allocated reliably when California experiences dry hydrologic years. We described several elements of reasonable alternatives above. These are the alternatives that should have been presented for the Bureau's draft EA/FONSI on the 2009 DWB to comply with NEPA. 42 U.S.C. § 4332(2)(E).

2. The EA Fails to Disclose and Analyze Adequately the Environmental Impacts of the Proposed Action

The discussion and analysis of environmental impacts contained in the EA is cursory and falls short of NEPA's requirements and stems from having an unclear and poorly described narrative for the proposed 2009 DWB. It obscures realistic chains of cause and effect, which in turn prevent accurate and comprehensive accounting of environmental baselines and measurement of the DWB's potential impacts. NEPA's implementing regulations require that an EA "provide sufficient evidence and analysis for determining whether to prepare an [EIS]." 40 C.F.R. §1508.9(a). For the reasons discussed above, the EA fails to discuss and analyze the environmental effects of the water transfers, crop idling, and groundwater substitution proposed by the 2009 DWB. The Bureau must consider and address the myriad of environmental consequences that are likely to flow from this proposed agency action.

Along with our significant concerns about the adequacy of the proposed monitoring, the draft EA/FONSI also fails to explain what standards will be used to evaluate the monitoring data, and on what basis a decision to modify or terminate the pumping would be made. In light of the document's silence on these crucial issues, the draft EA/FONSI's conclusion that there will not be significant adverse impacts withers quickly under scrutiny.

3. The EA Fails to Analyze Cumulative Impacts Adequately.

The Ninth Circuit Court makes clear that NEPA mandates "a useful analysis of the cumulative impacts of past, present and future projects." *Muckleshoot Indian Tribe v. U.S. Forest Service*, 177 F.3d 800, 810 (9th Cir. 1999). Indeed, "[d]etail is required in describing the cumulative effects of a proposed action with other proposed actions." *Id.* The very cursory cumulative effects discussion contained in the EA plainly fails to meet this standard.

As discussed in Part I.C. above, the proposed DWB does not exist in a vacuum, and is in addition to a broader program to develop regional groundwater resources and a conjunctive use system. The 2009 DWB is also only one of several proposed and existing projects that affect the regional aquifers. The existence of these numerous related projects make an adequate analysis of cumulative impacts especially important.

4. The Bureau Has Failed to Consider the Cumulative Impact of Other Groundwater Development and Surface Water Diversions Affecting the Region

In addition to the improper segmentation evident in the draft EA/FONSI, the assessment of environmental impacts is further deficient because the Bureau has failed to consider the cumulative impacts of the proposed groundwater extraction when taken in conjunction with other projects proposed for the development of groundwater and surface water.

The Bureau and its contractors are party to numerous current and reasonably foreseeable water programs that are related to the water transfers contemplated in the DWB including the following:

- Sacramento Valley Integrated Regional Water Management Plan (2006)
- Sacramento Valley Regional Water Management Plan (January 2006)
- Stony Creek Fan Conjunctive Water Management Program
- Sacramento Valley Water Management Agreement (Phase 8, October 2001)
- Draft Initial Study for 2008-2009 Glenn-Colusa Irrigation District Landowner Groundwater Well Program
- Regional Integration of the Lower Tuscan Groundwater Formation into the Sacramento Valley Surface Water System Through Conjunctive Water Management (June 2005)
- Stony Creek Fan Aquifer Performance Testing Plan for 2008-09
- Lower Tuscan Integrated Planning Program, a program funded by the Bureau that will "integrate the Lower Tuscan formation aquifer system into the management of regional water supplies."
- Annual forbearance agreements (2008 had an estimated 160,00 acre feet proposed).

We briefly describe some of their key elements here.

Stony Creek Fan Conjunctive Water Management Program. The SCF Aquifer Plan is part of and in furtherance of the Stony Creek Fan Conjunctive Water Management Program ("SCF Program"). This program is being carried out by GCID, Orland-Artois and Orland Unit Water Association.

The long-term objective of the SCF Program is the development of a "regional conjunctive water management program consisting of a direct and in-lieu recharge component, a groundwater production component, and supporting elements.…" (SVWMA: Project 8A Stony Creek Fan Conjunctive Water Management Program
("SVWMA Project 8A"), at 8A-1). The potential supply from such a program was estimated at 50,000 af per year to 100,000 af per year. *Id.*

The SCF Program has 3 Phases: (1) a feasibility study; (2) a demonstration project; and (3) project implementation. Phase I of the SCF Program has already been completed. The SCF Aquifer Plan described in a draft EA/FONSI is part of Phase II of the larger SCF Program. Phase III of the SCF Program will implement the program's goal of integrating test and operational production wells into the water supply systems for GCID, Orland-Artois, and Orland Unit Water Association for long-term groundwater production in conjunction with surface water diversions.

The Bureau is well aware of the SCF Program, but declined to analyze the environmental effects of the program as a whole, and not simply considered the effects of an isolated component of the larger program. Indeed, the Bureau recently awarded a grant to GCID to fund the SCF Program. The Bureau's grant agreement states that the SCF Program "target[s] the Lower Tuscan

Formation and possibly other deep aquifers in the west-central portion of the Sacramento Valley … as the source for all or a portion of the additional groundwater production needed to meet [the SCF Partners'] respective integrated water management objectives." BOR Assistance Agreement No. 06FG202103 at p. 2. The agreement further provides that provides that "[a]dditional test wells and production wells will be installed within the Project Area." *Id.*

Moreover, the Bureau's own description of the reasons for not choosing the "No Action" alternative indicate the Bureau's recognition that the primary goal of the SCF Aquifer Plan is to realize the objectives of the SCF Program – "increas[ing] reliable water supplies through conjunctive management of groundwater and surface water" at a fast pace. *See* EA/FONSI at p. 5. The Bureau was obligated to assess the potentially significant environmental impacts associated with such conjunctive management of groundwater and surface water, and wholly failed to do so.

There are serious concerns raised by the proposal to engage in conjunctive management of groundwater and surface water that are not addressed in the EA. For example, in 1994, following seven years of low annual precipitation, Western Canal Water District and other irrigation districts in Butte, Glenn and Colusa counties exported 105,000 af of water extracted from the Tuscan aquifers to buyers outside of the area. This early experiment in the *conjunctive use* of the groundwater resources – conducted without the benefit of environmental review – caused a significant and immediate adverse impact on the environment. (Msangi 2006). Until the time of the water transfers, groundwater levels had dropped but the aquifers had sustained the normal demands of domestic and agricultural users. The water districts' extractions, however, lowered groundwater levels throughout the Durham and Cherokee areas of eastern Butte County. (Msangi 2006). The water level fell and the water quality deteriorated in the wells serving the City of Durham. (Scalmanini 1995). Irrigation wells failed on several orchards in the Durham area. One farm never recovered from the loss of its crop and later entered into bankruptcy. Residential wells dried up in the upper-gradient areas of the aquifers as far north as Durham (.

<u>The SCF Program is a Component of the Sacramento Valley Water Management Program.</u> The Sacramento Valley Water Management Program (Phase 8) ("SVWMP") also includes the SCF Program as one of its elements. (SVWMA Project 8A at pp. 8A-1 to 8A-13).

The SVWMP recognizes that the SCF Program "has the potential to improve operational flexibility on a regional basis resulting in measurable benefits locally in the form of predictable, sustainable supplies, *and improved reliability for water users' elsewhere in the state*." *Id.* at p. 8A-2 (emphasis added). By piecemealing this program improperly and analyzing only the small component of the SCF Program, the Bureau has failed to assess the environmental impacts associated not just with the anticipated conjunctive use of the groundwater, but also the effect of the anticipated export of water to other regions of the state.

Additionally, approximately five years ago, on August 5, 2003, the Bureau published a notice in the Federal Register announcing its intention to prepare a programmatic EIS to analyze the short-

term phase of the SVWMP. 68 Fed. Reg. 46218, 46219 (Aug. 5, 2003). Like the SVWMP, this "Short-term Program" for which the Bureau stated its intent to conduct a programmatic EIS included implementation of the SCF Program. *Id.* at 46219, 46220.

The SCF Program is Also a Component of the Sacramento Valley Integrated Regional Water Management Program. The Bureau has been working with GCID and others to realize the Sacramento Valley Integrated Regional Water Management Program ("SVIRWMP"). SVIRWMP is comprised of a number of sub-regional projects, including the SCF Program. *See* SVIRWMP, Appendix A at A-5; BOR Assistance Agreement No. 06FG202103. Here again, even though the SCF Aquifer Plan is clearly a necessary component of the SCF Program – which is in turn a component of the SVIRWMP – the draft EA/FONSI failed to even acknowledge, let alone assess, the cumulative impacts of these related projects.

Most obviously, the draft EA wholly fails to assess the impact of the Bureau's *Sacramento Valley Regional Water Management Plan (2006)* (SVRWMP) and the forbearance water transfer program that the Bureau and DWR facilitate jointly. As noted above, the Programmatic EIS for the 2002 Sacramento Valley Water Management Agreement or Phase 8 Settlement was initiated, but never completed, so the SVRWMP was the next federal product moving the Phase 8 Settlement forward. The stated purpose of the Phase 8 Settlement and the SVRWMP are to improve water quality standards in the Bay-Delta and local, regional, and statewide water supply reliability. In the 2008 forbearance program, 160,000 af was proposed for transfer to points south of the Delta. To illustrate the ongoing significance of the demand on Sacramento Valley water, we understand that GCID alone entered into "forbearance agreements" to provide 65,000 af of water to the San Luis and Delta Mendota Water Association in 2008, 80,000 af to State Water Project contractors in 2005, and 60,000 af to the Metropolitan Water District of Southern California in 2003.

> Less obvious, but certainly available to the Bureau, are the numerous implementation projects that Phase 8 signatories are pursuing, such as Glenn Colusa Irrigation District's (GCID) proposed to divert groundwater pumped from private wells to agricultural interests in the District. *See* Attach. (GCID Proposed Negative Declaration, GCID Landowner Groundwater Well Program for 2008-09). Additionally, the draft EA does not consider the cumulative effect of the Lower Tuscan Integrated Planning Program, a program funded by the Bureau that will "integrate the Lower Tuscan formation aquifer system into the management of regional water supplies." Grant Agreement at 4. This program, as described by the Bureau, will culminate in the presentation of a proposed water management program for the Lower Tuscan Formation for approval and implementation by the appropriate authorities. Clearly, the cumulative impact of this program and the 2009 DWB's proposed groundwater extraction should have been assessed.

Finally, with the myriad projects and programs that are ignored in the EA and have never been analyzed cumulatively, the EA finally discloses that there could be a devastating impact to

groundwater: "The recent reduction in recharge (due to the decrease in precipitation and runoff) in addition to the increase in groundwater transfers would lower groundwater levels. Multi-year groundwater acquisition for other programs in areas that have repeatedly transferred groundwater may also be more susceptible to adverse effects. In these areas groundwater levels may not fully recover following a transfer and may experience a substantial net decline in groundwater levels over several years." (EA at p. 94) While the honesty is refreshing, the lack of comprehensive monitoring, mitigation, and project cessation mechanisms is starling. This alone warrants the preparation of an EIS.

Here again, the document does not discuss or analyze these potential impacts, their potential scope or severity, or potential mitigation efforts. Instead, it relies on the existence of local ordinances, plans, and oversight with the monitoring and mitigation efforts of individual "willing sellers" to cope with any adverse environmental effects. However, as we have shown above, for example, the Glenn County management plan is untested and does not provide adequate protection and monitoring of the region's important groundwater resources. To further clarify the inadequacy of relying on local plans and ordinances, Butte County's Basin Management Objectives have no enforcement mechanism and Chapter 33 requires CEQA review for transfers that include groundwater in Butte County. As one can see, there is very limited local protection for groundwater and no authority to influence pumping that is occurring in a different county.

5. The 2009 DWB is likely to serve as precedent for future actions with significant environmental effects.

As set forth above, this Project is part of a broader effort by the Bureau and DWR to develop groundwater resources and to integrate GCID's water into the state system. For these reasons, the 2009 DWB is likely to "establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration" (40 C.F.R. §1508.27(b)(6)), and should be analyzed in an EIS.

6. The 2009 DWB has potential adverse impacts for a threatened species.

As the Bureau of Reclamation is well aware, the purpose of the ESA is to conserve the ecosystems on which endangered and threatened species depend and to conserve and recover those species so that they no longer require the protections of the Act. 16 U.S.C. § 1531(b), ESA § 2(b); 16 U.S.C. § 1532(3), ESA §3(3) (defining "conservation" as "the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary"). "[T]he ESA was enacted not merely to forestall the extinction of species (i.e., promote species survival), but to allow a species to recover to the point where it may be delisted." *Gifford Pinchot Task Force v. U.S. Fish & Wildlife Service*, 378 F3d 1059, 1069 (9th Cir. 2004). To ensure that the statutory purpose will be carried out, the ESA imposes both substantive and procedural requirements on all federal agencies to carry out programs for the conservation of listed species and to insure that their actions are not likely to jeopardize the continued existence of any listed

species or result in the destruction or adverse modification of critical habitat. 16 U.S.C. § 1536. *See NRDC v. Houston*, 146 F.3d 1118, 1127 (9th Cir. 1998) (action agencies have an "affirmative duty" to ensure that their actions do not jeopardize listed species and "independent obligations" to ensure that proposed actions are not likely to adversely affect listed species). To accomplish this goal, agencies must consult with the Fish and Wildlife Service whenever their actions "may affect" a listed species. 16 U.S.C. § 1536(a)(2); 50 C.F.R. § 402.14(a). Section 7 consultation is required for "any action [that] may affect listed species or critical habitat." 50 C.F.R. § 402.14. Agency "action" is defined in the ESA's implementing regulations to "mean all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States." 50 C.F.R. § 402.02.

The giant garter snake ("GGS") is an endemic species to Central Valley California wetlands. (Draft Recovery Plan for the Giant Garter Snake ("DRP") 1). The giant garter snake, as its name suggests, is the largest of all garter snake species, not to mention one of North America's largest native snakes, reaching a length of up to 64 inches. Female GGS tend to be larger than males. GGS vary in color, especially depending on the region, from brown to olive, with white, yellow, or orange stripes. The GGS can be distinguished from the common garter snake by its lack of red markings and its larger size. GGS feed primarily on aquatic fish and specialize in ambushing small fish underwater, making aquatic habitat essential to their survival. Females give birth to live young from late July to early September, and brood size can vary from 10 to up to 46 young. Some studies have suggested that the GGS is sensitive to habitat change in that it prefers areas that are familiar and will not typically travel far distances. The EA discloses that one GGS study in Colusa County revealed the "longest average movement distances of 0.62 miles, with the longest being 1.7 miles, for sixteen snakes in 2006, and an average of 0.32 miles, with the longest being 0.6 miles for eight snakes in 2007. However, in response to droughts and other changes in water availability, the GGS has been known to travel up to 5 miles in only a few days, but the impacts on GGS survival and reproduction from such extreme conditions are unknown due to the deficiency in data and analysis.

Flooded rice fields, irrigation canals, and wetlands in the Sacramento Valley can be used by the giant garter snake for foraging, cover and dispersal purposes. The draft EA fails to comprehensively analyze the movements and habitat requirements for the federal and state-threatened giant garter snake and yet again defers responsibility to a future time. The Biological Assessment acknowledges the failure of Bureau and DWR to complete the Conservation Strategy that was a requirement of the 2004 Biological Opinion. (BA at p. 19-20) [The BA appears to have no page numbers] What possible excuse delayed this essential planning effort?

The 2009 DWB also proposes to delete or modify other mitigation measures previously adopted as a result of the EWA EIR process to substantially reduce significant impacts, but without showing they are infeasible. For example, the Bureau and DWR propose to delete the 160 acre maximum for "idled block sizes" for rice fields left fallow rather than flooded and to substitute for it a 320 acre maximum. (See 2003 Draft EWA EIS/EIR, p. 10-55; 2004 Final EWA EIS/EIR, Appendix B, p. 18, Conservation Measure # 4.) There is no evidence to support this change. In

light of the agencies failure to complete the required Conservation Strategy mentioned above and the data gathered in the Colusa County study, how can the EA suggest that doubling the fallowing acreage is in any way biologically defensible? The agencies additionally propose to delete the mitigation measure excluding Yolo County east of Highway 113 from the areas where rice fields may be left fallow rather than flooded, except in three specific areas. (See 2004 Final EWA EIS/EIR, Appendix B, p. 18, Conservation Measure # 2.) What is the explanation for this change? What are the impacts from this change?

Deleting these mitigation measures required by the EWA approval would violate NEPA and CEQA's requirements that govern whether, when, and how agencies may eliminate mitigation measures previously adopted under NEPA and CEQA. (See *Napa Citizens for Honest Government v. Napa County Board.*

The 2009 DWB fails to include sufficient safeguards to protect the giant garter snake and its habitat. In order to avoid potentially significant adverse impacts for the snake, additional surveys should be conducted prior to any alteration in water regime or landscape. (Addendum March 4, 2009 at p. 8)

It is conspicuously noticeable that there isn't a claim of a less-than-significant impact for the Giant Garter Snake (*Thamnophis gigas*), in the EA and the BA. There is really no conclusion reached due to the fundamental absence of science for the species. The Bureau should also prepare an EIS because the 2009 DWB will likely have significant environmental effects on the Giant Garter Snake, a listed threatened species under the federal Endangered Species Act and California Endangered Species Act. 40 C.F.R. §1508.27(b)(9).

II. Purpose and Need Issues of the 2009 Drought Water Bank

A. The Purpose and Need Section of the EA/FONSI fails to specify the policy framework upon which the 2009 Drought Water Bank is based.

Exemption of the 2009 DWB from the requirements of the California Environmental Quality Act (CEQA) does not reflect the actual environmental effects of the proposal—which are similar to the proposed 1994 Drought Water Banks and for which a final Program Environmental Impact Report was completed in November 1993. In 2000, the Governor's Advisory Drought Planning Panel report, *Critical Water Shortage Contingency Plan* promised a program EIR on a drought-response water transfer program, but was never undertaken. Twice in recent history, the state readily acknowledged that CEQA review for a major drought water banking program was appropriate. So, this Notice of Exemption reflects an end-run around established water law through the use of water transfers, and is therefore vulnerable to legal challenge under the California Environmental Quality Act.

We question the merits of and need for the 2009 DWB itself. The existence of drought conditions at this point in time is highly questionable and reflects the state's abandonment of a

sensible water policy framework given our state and national economic recession and tattered public budgets. Our organizations believe the Governor's drought emergency declaration goes too far to help a few junior water right holders, and that at bottom the 2009 Drought Water Bank is not needed. The DWB is to directly benefit the areas of California whose water supplies are the least reliable by operation of state water law. Though their unreliable supplies have long been public knowledge, local, state, and federal agencies in these areas have failed to stop blatantly wasteful uses and diversions of water and to pursue aggressive planning for regional water self-sufficiency.

The EA/FONSI's statement of purpose and need states specifically that "the purpose of the proposed action is to help facilitate the transfer of water throughout the State from willing sellers of CVP water upstream of the Delta to buyers that are at risk of experiencing water shortage in 2009." This paragraph omits coherent discussion of need. The purpose and need should also state that this transfer program would be subject to specific criteria for prioritizing transfers, as described on page 6: "It is anticipated that water made available to [potential buyers] from the DWB would be prioritized as flows: existing health and safety domestic needs, municipal supply subject to water shortage contingency plan measures, and agricultural irrigation for existing crops and livestock subject to water shortage contingency plan measures."

The EA/FONSI makes no attempt to place the 2009 Drought Water Bank into the context of the 2005 California Water Plan that the state recently completed. It appears to us that this plan is largely on the shelf now, perhaps because of the state's dire fiscal problems. It does contain many good recommendations concerning increasing regional water self-sufficiency. However, our review of the 2005 California Water Plan reveals no mention of the 2000 Critical Water Shortage Reduction Marketing Program or any overarching drought response plan that the state could have planned for in 2005, but did not. We sadly conclude that the state of California has no meaningful adopted drought response policy, save for gubernatorial emergency declarations to suspend protective environmental regulations. This is not a sustainable water policy for California.

The purpose and need section of the EA/FONSI *and the Governor's own drought emergency declaration* cry out for placing the 2009 Drought Water Bank into a policy framework. What is the state doing otherwise to facilitate regional water self-sufficiency for these areas with the least reliable water rights? How does the 2009 DWB fit into the state and federal government's water and drought policy framework? Instead, the state and federal response to this third consecutive dry year falls back on simply the Drought Water Bank model that ran into environmental and water users' opposition in 1991 and 1992. Is anybody home at our water agencies?

B. The 2009 Drought Water Bank is not needed because the state's current allocation system—in which the federal Bureau of Reclamation participates—wastes water profligately.

The incentive from the state's lax system of regulation of California's State Water Project and Central Valley projects is to deliver the water now, and worry about tomorrow later. Indeed, the State Water Resources Control Board (SWRCB) has been AWOL for decades. In response to inquiries from the Governor's Delta Vision Task Force last fall, the SWRCB acknowledged that while average runoff in the Delta watershed between 1921 and 2003 was 29 million acre-feet annually, the 6,300 active water right permits issued by the SWRCB is approximately 245 million acre-feet. In other words, **water rights on paper are 8.4 times greater than the real water in California streams diverted to supply those rights on an average annual basis.** *And the SWRCB acknowledges that this "water bubble" does not even take account of the higher priority rights to divert held by pre-1914 appropriators and riparian water right holders, of which there are another 10,110 disclosed right holders.* Many more remain undisclosed.

Like federal financial regulators failing to regulate the shadow financial sector, subprime mortgages, Ponzi schemes, and toxic assets of our recent economic history, the state of California has been derelict in its management of scarce water resources here. This in no way justifies suspension of environmental and water quality regulations, for which the Governor's drought emergency declaration calls. We supplement our comments on this matter of wasteful use and diversion of water by incorporating by reference the joint complaint to the State Water Resources Control Board of the California Water Impact Network and the California Sportfishing Protection Alliance on public trust, waste and unreasonable use and method of diversion as additional evidence of a systematic failure of governance by the State Water Resources Control Board, the Department of Water Resources and the U.S. Bureau of Reclamation, filed with the Board on March 18, 2008 (attached).

We question the Governor's contention of continued dry conditions, since the storms of early March have greatly increased reservoir levels throughout California. The Climate Prediction Center of the National Oceanographic and Atmospheric Administration believes the drought will ease by May 2009. Non-state and non-federal reservoirs indicate conditions fast approaching normal for their facilities: Bullard's Bar in Yuba County is at 107 percent of the 15-year average for this time of year, EBMUD's Pardee Lake is at 98 percent of normal, San Francisco's Hetch Hetchy Reservoir on the Tuolumne River is at 169 percent of normal, while Don Pedro Reservoir on the same river is at 90 percent. The CVP's Millerton (101 percent of normal) and Folsom reservoirs (112 percent) exceed the normal storage for this time of year. These two reservoirs must provide water to the agricultural San Joaquin River Exchange Contractors, and who have among the most senior rights on that river. Rice growers in the Sacramento Valley are generally expecting close to full deliveries from the CVP and Yuba River water supplies. The CVP's own New Melones Reservoir on the Stanislaus River, which contributes to Delta water quality as well as to meeting eastern San Joaquin Valley irrigation demands, is at 87 percent of normal for this time of year.

Moreover, the SWP's terminal reservoirs at Pyramid (102 percent of average) and Castaic (99 percent of average) Lakes are right at about normal storage levels for this time of year,

presumably because DWR has been releasing water from Oroville for delivery to these reservoirs.

The fact that reservoirs of the CVP with more senior responsibilities in the water rights hierarchy do well with storage for this time of year suggests that at worst this will be a year of below normal runoff in 2009—hardly a drought scenario. Low storage levels at Oroville, Shasta and San Luis may easily be attributed to redirected releases to terminal reservoirs or groundwater banks in the San Joaquin Valley and Tulare Lake Basin—these latter storage venues and their current performance are not disclosed on DWR's Daily Reservoir Storage levels web site. Still, given what is known, from what these reservoir levels indicate many major cities and most Central Valley farmers are very likely will have enough water for this year.

The ones expecting to receive little water this year do so because of the normal functioning of their water rights—their imported surface supplies are therefore less reliable in dry times. It is the normal and appropriate functioning of California's system of water rights law that makes it so. Among those with more junior water rights, the Metropolitan Water District and the Santa Clara Valley Water District are the wealthiest regions and the agencies most capable of undertaking aggressive regional water self-sufficiency actions. They should be further encouraged and assisted to do so through coherently formulated state and federal water policies and programs.

On the agricultural side, the drought emergency declaration appears to benefit mainly the few western San Joaquin Valley farmers whose contractual surface water rights have always been less reliable than most—and whose lands are the most problematic for irrigation. In excess of 1 million acres of irrigated land in the San Joaquin Valley and the Tulare Lake Basin are contaminated with salts and trace metals like selenium, boron, arsenic, and mercury. These lands should be retired from irrigation to stop wasteful use of precious fresh water resources. This water drains back—after leaching from these soils the salts and trace metals—into sloughs and wetlands and the San Joaquin River carrying along these pollutants. Retirement of these lands from irrigation usage would help stem further bioaccumulation of these toxins that have settled in the sediments of these water bodies.

The 2009 DWB would exacerbate pumping of fresh water from the Delta, which has already suffered from excessive pumping in earlier years of this decade. Pumped exports cause reverse flows to occur in Old and Middle Rivers and can result in entrainment of fish and other organisms in the pumps. Our organizations share the widely held view that operation of the Delta export pumps is the major factor causing the Pelagic Organism Decline (POD) and in the deteriorating populations of fall-run Chinook salmon. 2009 will be the second consecutive year where no commercial fishing of fall-run Chinook fish will be allowed because of this species' population decline. Operation of the DWB at a time when others refrain from taking these fish and other organisms strikes us as a consummate unwillingness on the part of the State of California and the U.S. Bureau of Reclamation to share in the sacrifices needed to help aquatic ecosystems and anadromous fisheries of the Bay-Delta Estuary recover.

New capital facilities should be avoided to save on costly, unreliable, and destructive water supplies that new dams and canals represent. Moreover, these facilities would need new water rights; yet the most reliable rights in California are always the ones that already exist—and of those, they are the ones that predate the California State Water Project and the federal Central Valley Project. We should be applying our current rights far more efficiently—and realistically—than we do now. California should instead pursue a "no-regrets" policy incorporating aggressive water conservation strategies, careful accounting of water use, research and technological innovation, and pro-active investments.[5]

III. Conclusion

The Bureau's EA/FONSI states on page 9:

> *California laws contain numerous protections that apply to water transfers. However, there are three fundamental principles that apply: no injury to other legal users of water, no unreasonable effects to fish, wildlife, or other instream beneficial uses of water, and no unreasonable effects on the overall economy or the environment in the counties from which the water is transferred.*

We unreservedly state to you that the draft EA/FONSI on the proposed 2009 Drought Water Bank appears to describe a project that would fail all three of these tests as currently described. The 2009 Drought Water Bank clearly has the potential to affect the human and natural environments, both within the Sacramento Valley as well as in the areas of conveyance and delivery. It is entirely likely that injuries to other legal users of water, including those entirely dependent on groundwater in the Sacramento Valley, will occur if this project is approved. Groundwater, fishery and wildlife resources are likely also to suffer harm as instream users of water in the Sacramento Valley. And the economic effects of the proposed DWB are at best poorly understood through the EA/FONSI. To its credit, at least the Bureau studied the proposed project, while DWR, with the Governor's assistance, went the route of exempting it from CEQA, thereby enabling the agency to ignore these potential effects.

Taken together, the Bureau and DWR treat these serious issues carelessly in the EA/FONSI, and in DWR's specious reliance for environmental compliance on an emergency exemption and the Environmental Water Account EIS/R of 2003 and 2007. In so doing, they deprive decision makers and the public of their ability to evaluate the potential environmental effects of this Project, and violate the full-disclosure purposes and methods of both the National Environmental Policy Act and the California Environmental Quality Act.

[5] See especially, Pacific Institute, *More with Less: Agricultural Water Conservation and Efficiency in California, A Special Focus on the Delta*, September 2008; Los Angeles Economic Development Corporation, *Where Will We ?Get the Water? Assessing Southern California's Future Water Strategies,* August 2008, and Lisa Kresge and Katy Mamen, *California Water Stewards: Innovative On-farm Water Management Practices,* California Institute for Rural Studies, January 2009.

Our organizations request advance notification of any meetings that address this proposed Project or any other BOR projects in Butte, Colusa, Glenn, or Tehama counties that require consideration of NEPA/CEQA as well as water rights applications that will be needed as the 2009 DWB moves forward. Please add C-WIN, CSPA, BEC, and the Center for Biological Diversity to your basic public notice list on this Project, and send us each any additional documents that pertain to this particular Project.

Sincerely,

Barbara Vlamis
Executive Director
Butte Environmental Council
116 W. Second Street, #3
Chico, CA 95
(530) 891-6424
barbarav@becnet.org

Carolee Krieger
Executive Director
California Water Impact Network
808 Romero Canyon Road
Santa Barbara, CA 93108
(805) 969-0824
caroleekrieger@cox.net

Bill Jennings
Chairman
California Sportfishing Protection Alliance
3536 Rainier Avenue

Stockton, CA 95204
(209) 464-5067
deltakeep@aol.com

Lisa Belenky
Senior Attorney
Center for Biological Diversity
351 California Street, Suite 600
San Francisco, CA
(415) 436-9682
lbelenky@biologicaldiversity.org

References Cited

Bureau of Reclamation 2006. Sacramento Valley Regional Water Management Plan. p. 5-8 to 5-10.

Bureau of Reclamation 2008. Draft Environmental Assessment and Finding of No Significant Impact. Stony Creek Fan Aquifer Performance Testing Plan. Glenn-Colusa Irrigation District.

Butte Basin Water Users Association 2007. *2007 Butte Basin Groundwater Status Report* p. 23 and 30.

Butte Basin Water Users Association 2008. *2008 Butte Basin Groundwater Status Report* p. 26-27 and 32-33.

Butte County 2007. Summary of Spring 07 Levels.

Butte County Department and Resource Conservation 2003. Urban Water Demand Forecast.

Butte County DWRC June 2007. *Tuscan Aquifer Monitoring, Recharge, and Data Management Project*, Draft.

CH2Mhill 2006, *Sacramento Valley Regional Water Management Plan*, Figure 1-4.

Dudley, Toccoy et al. 2005. *Seeking an Understanding of the Groundwater Aquifer Systems in the Northern Sacramento Valley: An Update.*

Dudley, Toccoy 2007. Letter to Lester Snow as presented to the Butte County Board of Supervisors as part of agenda item 4.05.

DWR 2006. *California's Groundwater* – Bulletin 118.

DWR 2008. Addendum to the Environmental Water Account Environmental Impact Statement/Environmental Impact Report

DWR 2009. Addendum to the Environmental Water Account Environmental Impact Statement/Environmental Impact Report

Fleckenstein, Jan; Anderson, Michael; Fogg, Graham; and Mount, Jeffrey 2004. Managing Surface Water-Groundwater to Restore Fall Flows in the Cosumnes River, *Journal of Water Resources Planning and management,* opening page of article.

Friend, Scott 2008. *City of Chico General Plan Update Existing Conditions Report;* Pacific

Municiple Consulting.

Glenn County. Board of Supervisors. California Ordinance No. 1115, Ordinance Amending the County Code, Adding Chapter 20.03, Groundwater Management.

Glenn-Colusa Irrigation District 2008-2009. Initial Study And Proposed Negative Declaration Landowner Groundwater Well Program

Governor's Advisory Drought Planning Panel 2000. Critical Water Shortage Contingency Plan

Hoover, Karin A. 2008. *Concerns Regarding the Plan for Aquifer Performance Testing of Geologic Formations Underlying Glenn-Colusa Irrigation District, Orland Artois Water District, and Orland Unit Water Users Association Service Areas, Glenn County, California*. White Paper. California State University, Chico.

Maslin, Paul E., et. al, 1996. *Intermittent Streams as Rearing Habitat for Sacramento River Chinook Salmon: 1996 Update*.

McManus, Dan; Senior Engineering Geologist, DWR Northern District on August 27, 2007, Personal communication with Jim Brobeck.

Mish, Kyran 2008. *Commentary on Ken Loy GCID Memorandum*. White Paper. University of Oklahoma.

Msangi, Siwa and Howit, Richard E. 2006. *Third Party Effects and Asymmetric Externalities in Groundwater Extraction: The Case of Cherokee Strip in Butte County, California.* International Association of Agricultural Economists Conference, Gold Coast, Australia.

Scalmanini, Joseph C. 1995. *VWPA Substatiation of Damages*. Memo. Luhdorff and Scalmanini Consulting Engineers.

Shutes, Chris et al. 2009. *Draft Environmental Assessment DeSabla – Centerville Project (FERC No. 803)*. Comments. California Sportfishing Protection Alliance.

Spangler, Deborah L. 2002. *The Characterization of the Butte Basin Aquifer System, Butte County, California*. Thesis submitted to California State University, Chico.

Staton, Kelly 2007. *Glenn-Colusa Irrigation District Aquifer Performance Testing Glenn County, California*. California Department of Water Resources.

USFWS. 1999. Draft Recovery Plan for the Giant Garter Snake.

USFWS. 2006. Giant Garter Snake Five Year Review: Summary and Evaluation.

USFWS. 2008 Biological Opinion for Conway Ranch.

California Sportfishing Protection Alliance

"An Advocate for Fisheries, Habitat and Water Quality"

3536 Rainier Avenue, Stockton, CA 95204

T: 209-464-5067, F: 209-464-1028, E: deltakeep@me.com, W: www.calsport.org

28 July 2014

Mr. Ryan Wulff
National Marine Fisheries Service
650 Capitol Mall, Suite 5-100
Sacramento, CA 95814
BDCP.Comments@noaa.gov

VIA: Electronic Submission
Hardcopy if Requested

RE: Comment Letter No. 1: Bay Delta Conservation Plan and Associated EIR/EIS Related to Habitat Restoration and Conservation Measures

Dear Mr. Wulff,

The California Sportfishing Protection Alliance (CSPA) has reviewed the proposed Bay Delta Conservation Plan and associated Environmental Impact Report/Environmental Impact Statement (hereinafter, BDCP) submits the following comments. Comment Letter No. 1 relates to habitat restoration and conservation measures intended to important habitat. This Comment Letter includes an attached report titled *Overview of Delta Habitat Restoration*, which analyzes recent Delta habitat restoration projects and includes an appendix that compares the "Overview" with the habitat assessment in BDCP Appendix 5E and identifies major flaws in the proposed native fish habitat restoration program. We request that both documents be considered and responded to as a single submittal.

CSPA worked closely with the Environmental Water Caucus (EWC) in developing their comments and incorporates by reference into these comments both submittals by the EWC on all issues related to BDCP. We also incorporate by reference the submittal by Michael Jackson on behalf of CSPA, California Water Impact Network and AquAlliance, as well as the individual comments submitted by AquAlliance. We further incorporate by reference the submittals by the County of San Joaquin, South Delta Water Agency, Central Delta Water Agency, Restore the Delta, Earth Law Center and Friends of the River, insofar as they are consistent with these comments.

Summary Overview

As discussed more fully below, the BDCP conservation measures to improve important aquatic communities and habitats in the Delta Plan Area are wholly inadequate to mitigate for the expected effects of the BDCP. BDCP and its associated EIR/EIS fail because they are predicated upon a series of monstrous and demonstrably false premises. Based upon these premises, they serve up a many-thousand page omelet of distortion and half-truth in order to reach their predetermined conclusion.

BDCP peddles a revisionist thesis that the Delta's fisheries collapsed because of the historical loss of the pre-reclamation mosaic of Delta habitat. It asserts that severely degraded fisheries can be significantly improved by simply restoring habitat. It claims that restoration of physical habitat can successfully serve in lieu of flow and does so based upon a conceptual programmatic level document. It asks one to believe that you can deprive an estuary of more than half of its flow, turn its hydrograph on its head and expect that fisheries that evolved over millennia, under the historical flow regime, will prosper. The stark reality is that no estuarine ecosystem in the world has survived such insult.

The facts are: 1) reclamation of Delta islands was completed by the second-to-third decade of the last century; 2) Delta fisheries remained relatively stable until the advent of the state and federal export projects; 3) there is now more habitat in the Delta than existed eighty years ago; 4) physical habitat restoration projects in the Delta have largely failed; and 5) the estuary's ecological collapse and one-to-two magnitude declines in anadromous and pelagic fisheries and lower trophic communities occurred after the projects began exporting millions of acre-feet of water yearly.

Habitat is more than the spatial extent of acreage: an increase in habitat area doesn't ensure increases in habitat quality or functionality. The amount of freshwater inflow to an estuary is a physical and ecological driver that defines the quality and quantity of estuarine habitat. As the U.S. Fish & Wildlife Service testified during the State Water Resources Control Board's 2010 flow hearing, "flow in the Delta is one of the most important components of ecosystem function."

Habitat requires adequate physical (flow, residence time, variability, etc.) and chemical parameters (salinity, temperature, turbidity, chemical constituents, etc.), as well as the nutrients necessary for primary production to support renewable fisheries. The export projects have radically altered the Delta's hydrodynamics, which has resulted in a loss of critical flows, degraded water quality and reduced primary productivity. The yearly export of phytoplankton biomass is equivalent to more than 30% of net primary production. This altered hydrology has allowed myriad invasive non-native species to become entrenched to the detriment of native communities.

BDCP proponents confidently assume that proposed habitat restoration projects will be successful. The fact is the majority of restoration projects in the more than 222,902 acres of existing "conservation lands" scattered throughout the Delta have failed to achieve their forecasted goals. Many of these project areas are now habitat dominated by assemblages of invasive species that compete with and prey upon native species, including those listed pursuant to state and federal endangered species acts. Proposed restoration projects are unlikely to provide anticipated benefits unless the physical and chemical parameters approximating historical levels (i.e., mid-20th Century conditions) necessary for native species are also reestablished.

The consistent flaw of previous restoration efforts in the Delta has been a failure to adequately meet the habit requirements of native fish. The estuary's native species evolved over many

thousands of years in response to prevailing habitat conditions. Successful restoration of native species requires restoring the conditions under which they evolved and prospered. This entails increasing outflows, mimicking the natural hydrograph, improving water quality, protecting the critical low salinity zone (LSZ) and reducing export of primary productivity. However, these are the essential elements BDCP cannot and will not provide.

The critical need for significantly increased Delta outflow is beyond scientific doubt. The State Water Resources Control Board, in its legislatively mandated 2010 report on needed Delta flows declared, "the best available science suggests that current flows are insufficient to protect public trust resources." Substantial increases in Delta outflow were recommended. The California Department of Fish and Wildlife, in a similar legislatively mandated report on necessary biological objectives and flow criteria, found, "recent Delta flows are insufficient to support native Delta fishes in habitats that now exist in the Delta." The San Francisco Estuary Partnership's 2011 State of San Francisco Bay report observed, "scientists now consider poor freshwater inflow conditions to be one of the major causes for the ongoing declines of fish populations observed in the upper Estuary."

Conservation measure CM1 is essentially a water conveyance project masquerading as a conservation measure. It will reduce outflow and exacerbate already poor Delta hydrological habitat that is essential for key fish species and their critical habitats. While presented as a project level analysis, less than ten percent of engineering and even less of the geotechnical investigation has been completed. Yet project proponents brazenly claim that all potential adverse impacts have been identified.

Conservation measures CM 2-21 are only presented and analyzed at a programmatic level, lack assured funding and are highly unlikely to achieve the predicted results. There are no assurances that proposed habitat protections and enhancements will be able to overcome the long-term detrimental effects of excessive Delta water diversions or the proposed new North Delta conveyance facilities with experimental fish screens. Indeed, the programmatic nature of the conservation measures precludes anyone from identifying the number and extent of impacts to biological resources, water quality, and other beneficial uses; let alone determining whether the conservation measures will effectively mitigate impacts.

The conservation measures applicable to securing a take permit for CM-1 (Water facilities and Operation) include: CM-2 (Yolo Bypass Enhancement), CM-3 (Natural Communities Enhancement), CM-4 (Tidal Marsh Creation/Restoration), CM-5 (Seasonal Floodplain Creation/restoration), CM-6 (Channel Margin Enhancement), CM-7 (Riparian Restoration), CM-10 Non-tidal Marsh Restoration), CM-11 (Natural Community Enhancement) and possibly CM-16 (Non-Physical Fish Barriers). Many of these measures were included as Stage 1 Action Items in the 2000 CalFed Record of Decision but were never implemented or were partially and/or unsuccessfully implemented with unintended adverse consequences. Funding is highly speculative, subject to congressional or legislative authorization or bond passage. Implementation can proceed with or without BDCP and these measures should have been required mitigation for adverse impacts created by operation of the present export facilities.

Conservation measure CM-2 (Yolo Bypass Enhancement), and conservation measures CM-12 (Mercury Enhancement), CM-13 (Invasive Vegetation), CM-14 (Stockton Ship Channel O2), CM-15 (Predatory Fish), CM-16 (Non-Physical Fish Barriers), CM-17 (Illegal Harvest Reduction), CM-18 (Hatchery Management), CM-19 (Urban Stormwater), CM-20 (Invasive Species), CM-21 (Non-Project Diversions) are, for the most part, not dependent on BDCP. In varying degrees, these measures have long been necessary, are already underway, being approved, financed and managed by others. They will likely proceed regardless of whether BDCP's conservation measures are approved. BDCP should not be seeking credit for these ongoing activities.

A number of critically important conservation measures are conspicuously absent in BDCP. While CM-1 focuses on experimental fish screens at the north Delta diversions, it ignores requirements in the CalFed Record of Decision to upgrade the existing inadequate 1950s-era fish screens in the south Delta to current screening criteria. The South Delta Fish Facilities Forum ceased development of the new screens in 2005 after the state and federal contractors said they wouldn't pay for them. Between 2000 and 2011, more than 130 million fish were salvaged at project facilities, many of which were lost during collection, handling, trucking and post-release predation, and more than a billion fish were estimated lost due to high predation in and around the export facilities.

There are no conservation measures proposed for San Pablo and San Francisco Bays despite the massive impacts the export projects have had and will have on the Bays. A median of 39% of the estuary's unimpaired runoff is already consumed upstream or diverted. Exports sometimes exceed 50% of inflow. Shifts in the seasonal hydrograph and movement of the low salinity zone (LSZ) upstream have been marked by major declines of native phytoplankton, zooplankton and pelagic fish and huge shifts in biological communities. Construction and operation of CM-1 will intensify these problems. Yet BDCP continues to deny that it has any role in creating or mitigating these impacts.

There are no conservation measures proposed for impacts upstream of the Delta. Despite repeated denials by proponents, construction and operation of CM-1 will necessitate reoperation of upstream reservoirs, with resulting instream impacts. Increased total export capacity, especially in drier years at the north Delta diversion point, opens the door to myriad opportunities to significantly increase water transfers. Water transfers are generally authorized under temporary transfer rules or emergency proclamations and receive little or no environmental analysis. BDCP severs the Delta from the upper and lower segments of the watershed to avoid having to acknowledge or mitigate impacts.

Nor are there any conservation measures proposed for the largest source of pollutant loading to the Delta: discharges from irrigated agriculture. The entire Delta is identified on the 2010 Clean Water Act 303(d) List as impaired and incapable of supporting beneficial uses because of agricultural pollutants. A 2007 Regional Board survey of monitoring data from 313 agricultural sites in the Delta and Central Valley revealed that; toxicity to aquatic life was present at 63% of the sites (50% were toxic to more than one species); pesticides criteria were exceeded at 54% of sites (many for multiple pesticides); metal criteria was violated at 66% of sites; human health standards for bacteria were violated at 87% of sites while more than 87% of the sites exceeded

general parameters (dissolved oxygen, pH, salt, TSS, etc.). By reducing inflow of relatively good quality water (i.e., reducing dilution) and increasing the time for pollutants to interact with the ecosystem, CM-1 will exacerbate existing impacts.

Perhaps the most flagrant omission is the fact that proposed conservation measures do not include protection and enhancement of the most important and affected habitat in the Delta: the low salinity zone (LSZ) and freshwater pelagic habitats of the Delta on which many Delta native fishes including Delta Smelt depend. These habitats are unproductive because they are entrained and exported in drier years and summers of most years at the existing south Delta export facilities and thus lack the necessary residence time, nutrients, and water quality to sustain pelagic fish production.

The West Delta Restoration Opportunity Area (ROA) especially lacks measures to protect important tidal marsh, aquatic shoreline (channel margin), riparian and pelagic open water habitats despite its overall importance and sensitivity to Delta exports. There is no Central Delta ROA and this Delta region's habitat appears to have been largely ignored by BDCP planners for restoration, despite its central location in the area most affected by the North and South Delta exports. Conservation Zone 1 and 2, the center and northern Yolo Bypass, also lack needed measures on non-tidal marsh, riparian, seasonally inundated floodplain and channel margin habitats and are not included in any ROA.

If BDCP proposes to continue massive water supply exports from the Delta, it must propose meaningful measures to replace the millions of acre-feet of pelagic habitat lost each year to the export pumps and prevent native species that depend on that habitat from going extinct. CM1 fails to provide the enhanced outflow that fish agencies, regulators and independent scientists have observed is critical to the restoration of the estuary. Instead BDCP offers less outflow in order to enhance water supply benefits.

Other Summary Points

1. Potential export capacity under CM-1 would increase from the present 11,400 cfs to 15,000 cfs, with the existing array of pumps and the new, "isolated" forebay at Clifton Court. There are no credible measures offered to reduce the millions of acre-feet of pelagic habitat that will be exported from the North and South Delta each year under the BDCP. Increased export of pelagic habitat will exacerbate recent population declines and prevent recovery of pelagic species because of further habitat degradation.
2. CM-1's north Delta fish screens are experimental and will require variances from present fish screen criteria. Screen design was based on laboratory studies and it is unknown if the laboratory studies are representative. Consequently, a number of studies are required to see if the proposed screen design concept will work, will be protective or if the screens can be legally permitted. Half of these studies are proposed post-construction. BDCP rejected requests by NOAA Fisheries and recommendations by the BDCP Fish Facilities Technical Team that construction be phased to see if the first one works before constructing the rest. Delta smelt are present at the diversion point February through June and no screens can prevent

entrainment of eggs and larval Delta smelt, longfin smelt, splittail, striped bass American shad or smaller lamprey ammocoetes.

3. Tidal wetlands are proposed under CM-4 for five ROAs. Three of the five proposed wetlands are Suisun Marsh ROA, Cosumnes/Mokelumne ROA, and Cache Slough ROA. These wetlands will have marginal benefit to key Delta food webs because of isolation from the LSZ and key pelagic habitats. Invasive overbite clams limit food-web production in Suisun Bay and Marsh. Reductions in North and East Delta inflows from proposed North Delta exports would reduce net transport of water and food web contributors from Cache Slough and East Delta. The Cosumnes/Mokelumne ROA will become more isolated from Delta inflows than under present conditions.
4. Suisun Bay LSZ habitat will further deteriorate, as the LSZ moves into the Delta and becomes less productive due to lower Delta outflows predicted under CM-1, especially in drier years. Delta outflow remains the most critical factor in Suisun Bay and the Delta portions of the LSZ nursery areas that are critical to smelt and other pelagic species.
5. CM2 focuses on the Yolo Bypass, Cache Slough, and Sacramento Ship Canal habitats but offers little potential improvement to existing poor water quality conditions (mainly high water temperature and low dissolved oxygen) in these areas, especially during spring and summer when these areas are important salmon and smelt nursery areas. In drier years, spring-summer habitats will suffer from reduced freshwater inflow to Cache Slough from its primary freshwater sources (Miner, Steamboat and Sutter Sloughs) because of the proposed North Delta exports.
6. CM3 lacks focus and actions on West and Central Delta tidal wetland improvements, as large areas of the West Delta tidal wetlands (i.e., West Sherman Island and Big Break) suffer from extensive invasion of non-native submerged aquatic vegetation and deteriorating channel margin habitat (Figure 3.4-27).
7. There is a general lack of focus on the linear shoreline habitats throughout the Delta. Smelt and salmon rearing are far more concentrated in shoreline and nearby open-water habitats than in tidal marshes. CM-6 proposes to restore less than 2% or only twenty of more than seven hundred miles of channel habitat over a thirty-year period.
8. There is a lack of specific restoration strategies regarding habitats, locations, and timing of habitat improvements relative to the needs of each of the listed and soon-to-be-listed native fishes in the Delta
9. There are no credible measures offered to reduce the millions of acre-feet of pelagic habitat that will be exported from the North and South Delta each year under the BDCP.
10. There is no mention of the detailed habitat improvement actions presented in the smelt, salmon, and steelhead state and federal recovery plans.
11. There are repeated references to adaptive management actions that will adjust habitat improvement actions of the BDCP but virtually no details on how adaptive management will actually be implemented or funded. Adaptive management programs have frequently failed throughout the nation, as have decades of adaptive management actions on dozens of failed habitat mitigation projects that were constructed in the Delta.

12. Many of the proposed habitat actions already exist and/or will likely be implemented in the future without the BDCP. These actions should be considered part of the baseline or no-action alternative in the EIR/EIS and not included in BDCP's portfolio of habitat mitigation measures.
13. The proposed restoration projects are insufficient in amount and quality of aquatic habitat to meet the goals and objectives of the BDCP. There is a high degree of uncertainty they will be able to achieve expected goals. Yet, there is no discussion of historical habitat restoration projects, analysis of the results of implementation or why the proposed habitat projects will have different outcomes.
14. CM-1 proposes to operate pursuant to requirements in D-1641 and existing biological opinions. These standards are seriously inadequate as evidenced by the continuing collapse of Delta fisheries. Additionally, the State Water Resources Control Board has failed to take enforcement action against the state and federal projects for thousands of documented violations of D-1641 standards and the fishery agencies have demonstrated a willingness to weaken requirements in the biological opinions at the request of project operators.

The assumptions and conclusions that buttress the BDCP and EIR/EIS conservation strategy and goals are egregiously flawed and technically invalid. Consequently, the analysis of impacts regarding CM1-22 and likelihood of success of the various conservation mitigation measures are seriously deficient and fail to meet minimum CEQA or NEPA standards for environmental review. BDCP must be returned to the drafting table and a new EIR/EIS should be circulated for public review and comment.

Development of the Broad Conservation Goals, Types of Restoration Action Evaluated and Specific Conservation Measures

The BDCP Introduction, Chapter 1, pages 1-2 and 1-3, identifies the broad conservation goals of BDCP's conservancy strategy. The goals are repeated in Chapter 3, Conservation Strategy (3A-2 and 3A-3), which also describes the strategy as being built upon *scientific tenets that reflects the current state of available science* (3A-2, lines 38, 39). Chapter 3, Appendix 3A, page 3A-13, lines 19-32), describes the types of habitat restoration and enhancement actions that were evaluated for inclusion in the conservation strategy. Based upon the evaluation of the *types of habitat restoration and enhancement actions that were evaluated for inclusion in the conservation strategy* and development of the *broad conservation goals,* BDCP offers 22 specific conservation measures to advance the goal of restoring the Delta's ecological functions (Chapter 3, Part 2, Conservation Strategy, 3.4, pages 40-353).

Below are our specific comments on: A) the *broad conservation goals* of BDCP's conservancy strategy; B) the *types of habitat restoration and enhancement actions that were evaluated for inclusion in the conservation strategy* and C) the specific *conservation measures CM 1-21*.

A. Broad Conservation Goals and Strategy

The Broad Conservation Goals and Strategy are discussed in Chapter 1, pages 1-2 and 1-3; and Appendix 3A, pages 3A-2, lines 38-42 and 3A-3, lines 1-21. Goals 1 through 8

and 11 are applicable to fisheries. They include:

1. ***Increase the quality, availability, spatial diversity, and complexity of aquatic habitat in the Delta.***

   CM1-11, if implemented as proposed, would not lead to increased habitat quality and complexity in a timely manner. The main limitation is the lack of potential improvement to pelagic open water habitat under CM1 and lack of the indirect benefits of the other conservation measures to key LSZ pelagic habitats of the West and Central Delta.

2. ***Create new opportunities to restore the ecological health of the Delta by modifying the water conveyance infrastructure.***

   The potential restore ecological health to the Delta is severely restricted by retention of the south Delta export facilities, especially without upgrading them to state-of-the-art standards and current criteria fish screen criteria. The potential for Delta pelagic and shoreline habitats to improve is restricted by the proposed large fine mesh passive screen intake infrastructure in the North Delta.

3. ***Directly address key ecosystem drivers in addition to freshwater flow patterns rather than manipulation of Delta flow patterns alone.***

   Freshwater flow patterns in the Delta under CM1 remain the critical ecosystem driver in the Delta. Enhanced ecosystem inputs from new margin wetland and floodplain habitats will not be of benefit if they cannot contribute to the pelagic habitats of the West and Central Delta. Under the BDCP proposal both Suisun Marsh and Cache Slough Complex would be more isolated from contributing to the LSZ than under present conditions.

4. ***Improve connectivity among aquatic habitats, facilitate migration and movement of covered fish among habitats, and provide transport flows for the dispersal of planktonic material (organic carbon), phytoplankton, zooplankton, macroinvertebrates, and fish eggs and larvae.***

   The proposed North Delta exports will reduce connectivity and create a serious impediment to migration and movement of salmon, smelt, steelhead, sturgeon, and many other important fish of the Central Valley. The North Delta diversions and continuation of South Delta diversions will entrain vast amounts of biological organisms, nutrients, and other essential elements of Bay-Delta productivity.

5. ***Improve synchrony between environmental cues and conditions and the life history of covered fish and their food resources in the upstream rivers, Delta, and Suisun Bay, including seasonal water temperature gradients, salinity gradients, turbidity, and other environmental cues.***

The proposed North Delta exports and continued significant reliance on South Delta exports will further add to reduced synchrony of natural environmental cues to which native fishes are adapted. Food sources will be reduced, water temperatures will increase, salinities will increase, turbidity will be further reduced, and environmental cues will be further disrupted.

6. Reduce sources of mortality, and other stressors, on the covered fish and the aquatic ecosystem in the Delta.

Delta smelt have suffered relentlessly from the direct and indirect effects of past and present levels of exports from the Delta. A switch of exports to the North Delta upstream of the main pelagic habitats of the smelt will simply increase the risk of smelt to South Delta exports and further degrade smelt critical habitat in the West, Central, and North Delta, as well as Suisun Bay. The North Delta intakes will add a significant source of mortality to Sacramento Valley listed salmon and steelhead that does not exist today. Continuation of South Delta exports does little to alleviate existing stressors that are related to fish growth, survival, and reproduction. Freshwater Delta inflow from the Sacramento River will decrease and inflow from the San Joaquin River will increase, thus contributing to even warmer water in the Delta from spring through summer and early fall. LSZ pelagic habitat of Delta Smelt would be drawn upstream into the influence of north Delta diversions and screening systems (which do not protect smelt). Pelagic low-salinity cool water Delta habitat would also suffer under new North Delta exports and continuing South Delta exports to the point where at a minimum no benefits would accrue. (Appendix 5B forecasts little if any benefits from reduced entrainment to Delta Smelt from the BDCP.) As for salmon, there will be more opportunity for the populations from the Sacramento River system to interact with the project screen systems than under the present configuration. Finally, continuation of the south Delta exports will maintain most of the present risks to these populations.

7. Improve habitat conditions for covered fish in the Delta and downstream in the low salinity zone of the estuary in Suisun Bay through the integration of water operations with physical habitat enhancement and restoration.

Major habitat enhancements of the proposed conservation measures are isolated from the LSZ of the estuary. Proposed water operations and infrastructure (including the proposed North Delta export facilities) would further isolate, not integrate, proposed habitat improvements.

11. Emphasize natural physical habitat and biological processes to support and maintain species covered by the Plan (i.e., covered species) and their habitat.

The biological processes and habitats of the LSZ in the West and Central Delta are virtually ignored in the conservation measures. The natural pelagic habitats so important to Delta fishes are virtually ignored in the BDCP.

B. Types of Habitat Restoration and Enhancement Actions That Were Evaluated for Inclusion in the Conservation Strategy

Appendix 3A, page 3A-13, lines 19-32, identifies the types of habitat restoration and enhancement actions that were evaluated for inclusion in the conservation strategy. They include:

1. ***Restoring intertidal habitat to establish vegetated marshes and associated sloughs to increase habitat diversity and complexity, food production, and in-Delta productivity, and rearing habitat for covered species.***

   Most of the tidal marsh restoration proposed is in Suisun Marsh and Cache Slough/Yolo Bypass. Suisun Marsh restoration will be isolated from the low salinity zone upstream in Delta, and subject to modification by invasive clams found in brackish Bay waters. Much of Suisun Marsh ROA is already restored or in managed freshwater marshes (duck clubs and state wildlife areas). Large areas of the Cache Slough ROA are existing functional pelagic habitats adjoining extensive tidal marshes (e.g., Liberty Island, Little Holland Tract, Prospect Island, Sacramento Ship Channel). The Cache Slough ROA is also largely isolated from the LSZ in the Delta in drier years. Furthermore, tidal marshes contribute little productivity to open water pelagic habitats. Special status fish are far more apt to select shoreline habitats adjacent to pelagic waters than tidal marshes.

2. ***Increasing hydraulic residence time and tidal exchange in the Delta sloughs and channels by changing circulation patterns to increase primary productivity and foodweb support and improve turbidity conditions for delta smelt and longfin smelt.***

   Continued reliance on south Delta exports in drier years and late spring and summer of wetter years will continue stressors on pelagic species and their tidal aquatic habitats. LSZ Any shift in the LSZ upstream toward the North Delta intakes could put added pressures on the smelt populations because the screens will not protect larvae and early juvenile smelt whose habitat includes freshwater tidal pelagic habitats.

3. ***Increasing the amount of functional floodplain habitat to increase the quantity and quality of rearing habitat for salmonids and sturgeon and spawning habitat for Sacramento splittail, and generate food resources for pelagic species.***

   The BDCP holds little promise in providing more floodplain habitats that would be inundated by tidal or flood flows especially in the Yolo Bypass (CM2). More floodplain inundation in the East Delta and Yolo Bypass without improved access in CM2 would not significantly benefit salmon growth, survival, and production from the Delta.

4. ***Providing adequate water quality and quantity within the Delta at appropriate times to help conserve resident native fishes and improve rearing and migration habitats***

for salmon moving through the Delta.

Target water quality objectives in the Delta include cooler waters, keeping the LSZ to the west away from the export facilities in both the North and South Delta, increasing the area of the LSZ, keeping the low-productivity reservoir water out of the Delta, and retention of the higher turbidity, higher productivity, low salinity water within the Delta's pelagic habitat. Retaining a salinity gradient and positive downstream flow through the Delta in winter and spring are necessary to improve salmon survival through the Delta. Such conditions are not provided under CM1 or other conservation measures.

C. Specific BDCP Conservation Measures CM 1-22

The specific BDCP conservation measures are proposed at Chapter 3, Part 2, Conservation Strategy, 3.4, pages 40-353 and include: CM1 (Water Facilities and Operation), CM2 (Yolo Bypass Enhancement), CM3 (Natural Communities Enhancement), CM4 (Tidal Marsh Creation/Restoration), CM5 (Seasonal Floodplain Creation/Restoration), CM-6 (Channel Margin Enhancement), CM7 (Riparian Restoration), CM8 (Grassland Restoration), CM9 (Vernal Pool and Alkali Wetland Restoration), CM10 (Non-Tidal Marsh Restoration), CM11 (Natural Community Enhancement), CM12 (Mercury Enhancement), CM13 (Invasive Vegetation), CM14 (Stockton Ship Channel O2), CM15 (Predatory Fish), CM16 (Non-Physical Fish Barriers), CM17 (Illegal Harvest Reduction), CM18 (Hatchery Management), CM19 (Urban Stormwater), CM20 (Invasive Species), CM21 (Non-Project Diversions), CM22 (Avoidance and Minimization Measures).

General Overview of Conservation Measures

The amount of freshwater inflow to an estuary is a physical and ecological driver that defines the quality and quantity of estuarine habitat (Jassby et al. 1995; Kimmerer 2002; 2004 Feyrer et al. 2008, 2010; Moyle and Bennett, 2008; Moyle et al., 2010).

Before construction of most of the major dams on the estuary's tributary rivers (1930-43) an average of 82% of estimated unimpaired flow reached San Francisco Bay. By the 1980's, the percentage had decreased significantly to 60%. The averaged for the 2000s is 49%.

BDCP conservation measures applicable to securing a take permit for CM1 (Water facilities and Operation) include CM2 (Yolo Bypass Enhancement), CM3 (Natural Communities Enhancement), CM4 (Tidal Marsh Creation/Restoration), CM5 (Seasonal Floodplain Creation/restoration), CM6 (Channel Margin Enhancement), CM7 (Riparian Restoration), CM10 Non-Tidal Marsh Restoration) and CM11 (Natural Community Enhancement).

Salmon, steelhead, sturgeon, splittail, striped bass, and other important native and non-native migratory Central Valley fishes significantly depend on the Delta for spawning,

young rearing, or residence during all or parts of their life cycles. Altered habitats and hydrology have greatly hindered native fish communities and favored non-native invasive plants, clams and less nutritional primary producers and predatory and competitive fishes.

Unfortunately, only CM1 has received a project level evaluation and even that evaluation is sadly lacking in specific and necessary details. The lack of project level analysis and disclosure in the other conservation measures effectively piecemeals the project and defers mitigation and assurances in violation of HCP/NCCP permitting requirements. All components should receive the same level of detail.

Of these, CM1 is misleadingly described as a conservation measure. CM1 provides for the construction and operation of new north Delta water conveyance facilities to bring water from the Sacramento River to the existing water export pumping plants in the south Delta, as well as for the operation of the existing south Delta export facilities. Diversion of Sacramento River inflow under the Delta to facilitate the increased export of water cannot be justified as a conservation measure. Nor can it qualify as a HCP or NCCP conservation measure addressing compliance with state and federal endangered species acts.

Further, there is no discussion in either the BDCP or EIR/S as to how conservation measures CM 2-21, which are predicated on uncertain public funding, which may or may not be implemented, which are unlikely to be fully successful and which are only analyzed to a programmatic level of analysis can be employed to mitigate for the impacts of a massive water diversion project that has been analyzed (if inadequately) to a project level of detail. Conservation measures CM 2-21 will need to be analyzed to a project level of detail and funding and implementation will need to be assured in order to qualify for consideration in an HCP or NCCP.

Conservation measures CM 2-21 together comprise a stand-alone publicly funded project to restore the Delta's ecosystem and is not dependent on CM1. In fact, conservation measure CM2 and conservation measures CM 12-21 are not dependent on BDCP and are already underway and, in varying degrees, being approved, financed and managed by others. They will proceed regardless of whether BDCP is approved or not. BDCP should not be seeking credit for these ongoing activities that are not dependent on BDCP or CM1. That said, it should be noted that historical efforts similar to CM 12-21 have already failed to achieve their envisioned or desired results. For that matter, BDCP should not be seeking credit for conservation measures CM 3-11, which will be funded by the public purse and are also not dependent on BDCP or CM1.

Most importantly, none of the conservation measures CM 2-21 are will be as successful as predicted in the BDCP and EIR/S. For example, historical habitat restoration efforts in the Delta have had questionable benefits and frequently provided habitat for undesirable non-native species, predators and noxious vegetation. Numerous commentators have remarked that excessive diversions of water have changed the hydrology of the estuary into something resembling an Arkansas lake. Creating more "Arkansas lake" habitat will not restore the natural ecological processes that supported myriad native species over

millennia. Flow and appropriate salinity levels are major components of pelagic estuarine habitat.

None of the conservation measures address the effects of increased Delta exports on the habitat and aquatic species of San Francisco or San Pablo Bays. This is a glaring omission, as numerous studies have documented the effects of Delta outflow on the circulation, water quality and productivity of San Francisco and San Pablo Bays and further reductions in outflow will exacerbate present adverse impacts caused by excessive upstream diversions.[1] Overall net outflow to San Francisco and San Pablo Bays will decrease under BDCP. The major water supply benefits of the tunnels come in wetter years when freshwater flushes the Bays.

The uncertainty of success of proposed habitat restoration efforts are lavishly documented in comments by the Delta Science Program's Independent Review Panel report on the BDCP Effects Analysis, the Delta Independent Science Board's review of the draft EIR/EIS for BDCP, the Independent Panel Review of BDCP sponsored by American Rivers and the Nature Conservancy, the March 2014 comments submitted by the Pacific Fishery Management Council, the February 2014 comments by the California Advisory Committee on Salmon and Steelhead Trout, as well as numerous earlier comments by the National Research Council on adaptive management and the effects analysis, the red flag and progress comments by the National Marine Fisheries Service, U.S. Fish and Wildlife Service, U.S. EPA, U.S. Corps of Engineers and comments on the EIR/EIS by the State Water Resources Control Board.

The underlying assumptions of habitat restoration are further brought into question by the evaluation of BDCP modeling by MBK Engineers in their presentation before the Delta Stewardship Council, which identified a number of flaws including the use of outdated models, the failure to accurately model climate change, the faulty assumptions of actual reservoir operations, the overrepresentation of outflow and underrepresentation of exports. The failure of BDCP models to accurately reflect anticipated changes in CVP and SWP operations with BDCP bring into serious question the assumptions of habitat restoration.

BDCP modeling demonstrates that, under the proposed alternative, Delta outflow will decrease, exports will increase, X2 will migrate eastward, residence time and pollutant concentration will increase throughout the Delta, salinity levels and violations of present fish and agricultural salinity standards will increase, survival rates of winter-run, spring-run and Sacramento and San Joaquin fall-run salmon smolts will decrease, and concentrations of mercury and selenium in bass and sturgeon will increase.

Comments on Specific Conservation Measures

1. CM1, Water Facilities and Operation, Pages 3.4.1 – 3.4-39.

[1] Cloern, J. E., and A. D. Jassby (2012), Drivers of change in estuarine-coastal ecosystems: Discoveries from four

CM1 is essentially a water conveyance project masquerading as a conservation measure. It will reduce outflow and exacerbate already poor Delta hydrological habitat that is essential for key fish species and their critical habitats. By reducing outflow to San Francisco and San Pablo Bays and drawing X2 further eastward, CM-1 will increase the habitat expanse of *Potamocorbula amurensis*, the saltwater clam that invaded the estuary in the 1980s to the detriment of primary and secondary productivity and fish production. Higher salinities and reduced outflow will also expand the habitat of an array of invasive aquatic vegetation that has expanded throughout the Delta and established itself in recent habitat restoration areas. Invasive aquatic vegetation has reduced productivity and provided habitat for an assortment of non-native predatory fish species. CM1 will increase residence time and will exacerbate already poor water quality conditions and significantly increase the frequency of violations of water quality standards established to protect fish and other beneficial uses of water.

Existing water exports from the south Delta have altered Delta hydrology, degraded water quality, expanded the range of invasive species, reduced plankton productivity, exported primary production, decreased suspended sediment and entrained vast numbers of fish. According to the California Department of Fish and Wildlife's Fall Midwater Trawls, between 1967 (the beginning of SWP exports) and 2013, population abundance indices of striped bass, Delta smelt, longfin smelt, American shad, splittail and threadfin shad have declined 99.6, 95.6, 99.8, 90.9, 98.5 and 97.8%, respectively. During the same period, the Summer Townet Survey reveals that abundance indices for striped bass and Delta smelt declined 98.2 and 94.2%, respectively. Native lower trophic orders and populations of wild winter-run and spring-run Chinook salmon show similar orders of magnitude declines.

The majority of Delta exports will continue to come from the south Delta export facilities. During dry years, south Delta exports will significantly exceed north Delta exports. Yet there is no conservation measure to upgrade the existing 1950s-technology fish screens at south Delta facilities to state-of-the-art screens, as required by the CalFed Record of Decision. It is highly uncertain whether or not the proposed new fish screens in the north Delta will work as envisioned. The new screens will require a variance from present National Marine Fisheries Service (NMFS) and California Department of Fish and Wildlife (DFW) fish screen requirements. BDPC has rejected the recommendations of the NMFS and the Fish Facilities Technical Team to phase in installation of the new screens to see if they work or can be legally permitted.

The assessment models in the CM1 proposed operations include the existing restrictions including operational criteria prescribed in the two OCAP biological opinions and the state's D-1641 water quality standards. However, these are the same restrictions and operating criteria that contributed to many of the present problems, including the Pelagic Organism Decline (POD).

A fundamental problem with CM1 is that it does not enhance Delta outflow, but rather decreases outflow to enhance exports. Outflow is the common denominator of many intertwined processes and influences distribution, condition and abundance of numerous species.[2] The failure to increase outflow will likely undermine any improvements that may occur with other conservation measures.

BDCP is pregnant with uncertainty, as evidenced by comments by the Delta Science Program's Independent Review Panel report on the BDCP Effects Analysis, the Delta Independent Science Board's review of the draft EIR/EIS for BDCP, the Independent Panel Review of BDCP sponsored by American Rivers and the Nature Conservancy, as well as numerous earlier comments by the National Research Council on adaptive management and the effects analysis, the red flag and progress comments by the National Marine Fisheries Service, U.S. Fish and Wildlife Service, U.S. EPA, U.S. Corps of Engineers and comments on the EIR/EIS by the State Water Resources Control Board.

Failing to acknowledge the enormous uncertainties inherent in CM-1 construction and operation and waiting to address uncertainty until sometime later through a vague undefined decision tree and adaptive management process is unacceptable. If is all the more unacceptable because all four decision tree operational alternatives will lead to reduced outflow in the long-term.

Existing water export operations by BDCP project proponents have frequently violated promulgated water quality and flow standards established to protect fisheries and other beneficial uses. These include, San Joaquin River and south and west Delta salinity objectives protective of agriculture, Delta and Suisun Marsh salinity objectives protective of fish and wildlife, Delta outflow objectives, Sacramento and San Joaquin River flow objectives and objectives limiting exports and establishing inflow/export ratios. The State Water Resources Control Board has never taken enforcement action for thousands of documented violations of these water quality standards. There is no discussion or assurances in BDCP regarding compliance with water quality violations or how or whether CM-1 will comply with water quality standards in the future.

Discharges from irrigated agriculture, the largest source of pollutant loading to the Central Valley, the Delta and critical smelt and salmon habitat areas, are completely ignored. Forty-two years after passage of the federal Clean Water Act and forty-five

---

[2] *"Outflow is thus the common denominator among the multitude of intertwined processes. In recognizing this, the Panel is unified in agreeing that the distribution, condition, or abundance of some estuarine organisms are statistically related to outflow and X2 because these two indicators reflect underlying physical and ecological processes that more directly affect the estuarine organisms. In statistical terminology, a number of important ecological factors "co-vary" with outflow and X2 and are more proximal influences on organism distribution, condition, and abundance. For example, some biotic indices may correlate with X2 because their distributions are driven by properties (for example salinity) that co-vary with X2, or because seasonal trends in X2 happen to coincide with inherent reproductive seasonality*." (Workshop on Delta Outflows and Related Stressors Panel Summary Report, May 2014)

years following enactment of California's Porter-Cologne Water Quality Control Act, the State and Regional Water Boards cannot document any reduction in the total mass loading of pollutants from irrigated agriculture and municipal stormwater discharges. For that matter, they cannot document any reduction in the total mass loading of pollutants from municipal and industrial wastewater facilities.

The entire Delta is identified on the 2010 Clean Water Act 303(d) List as impaired and incapable of supporting beneficial uses because of agricultural pollutants. A 2007 Regional Board survey of monitoring data from 313 agricultural sites in the Delta and Central Valley revealed that; toxicity to aquatic life was present at 63% of the sites (50% were toxic to more than one species); pesticides criteria were exceeded at 54% of sites (many for multiple pesticides); metal criteria was violated at 66% of sites; human health standards for bacteria were violated at 87% of sites and more than 87% of the sites exceeded general parameters (dissolved oxygen, pH, salt, TSS, etc.). By reducing inflow of relatively good quality water (i.e., reducing dilution) and increasing the time for pollutants to interact with the ecosystem, CM-1 will exacerbate existing impacts.

Nothing in BDCP and CM1 and associated conservation measures demonstrates or provides assurances that CM1, in conjunction with continued south Delta exports, will alleviate present downward trends, let alone reverse these trends and begin restoration of the Delta ecosystem to meet the requirements of an HCP or NCCP.

2. CM2 Yolo Bypass Fisheries Enhancement, Pages 3.4-40 – 3.4-66.

CM2 is designed to mitigate a long list of identified problems on the Yolo Bypass and Cache Slough that were, in significant measure, created by flood control system projects. The flood control system should mitigate these problems. In any case, a number of these valuable and important activities are already underway, are being financed and managed by others and can move forward with or without CM-1. BDCP should not be latching on to ongoing projects or taking credit for them.

CM-2 is only analyzed at a programmatic level. Many of the proposed projects are highly speculative, may or may not be implemented and have uncertain likelihood of being funded. They cannot comply with HCP or NCCP requirements unless they can demonstrate adequate assurances of funding and implementation.

There is no ROA for 30 miles of the central tidal Bypass and non-tidal northern Bypass where tidal and non-tidal wetlands and seasonal inundated habitat could be added with benefits to young salmon that would be passing into the Bypass via the Fremont Weir. Nor are there proposals to address the many water diversions in the Bypass that entrain salmon and smelt. Many of the diversions in the south end have unscreened tide gates.

The Ship Channel that runs for over 20 miles along the east side of the lower Bypass and the Tule Canal that runs within the east side of the Bypass are important smelt

spawning and early rearing habitats, yet they suffer from poor habitat and water quality conditions. The BDCP fails to address these issues. The entire Bypass, Cache Slough, and the Ship Channel suffer poor water quality from stormwater and agricultural return-flow discharges in winter, spring, and summer that degrade the smelt and salmon habitats. The Bypass also receives significant methylmercury loading that bioconcentrates in fish tissue. These issues have long been known and amply documented but existing regulatory programs have failed to achieve anticipated results. Failure to ensure that these problems are adequately addressed increases the likelihood that many of the CM2 improvements may be wasted or may even be detrimental to overall fish survival and production because fish can be diverted from the Sacramento River into marginal habitat in the ROA.

3. CM3, Natural Communities Protection and Restoration, Pages 3.4-66 – 3.4-115.

CM-3 proposes to provide a mechanism and guidance to establish a reserve system by acquiring lands for protection and restoration to meet biological goals and objectives addressed under the BDCP. However, no specific properties have been identified for acquisition in the BDCP, although Restoration Opportunity Areas (ROAs) have been identified. Goals for establishing habitat include: 27,000 acres of tidal perennial aquatic; 932 acres of tidal mudflat; 6,000 acres of tidal brackish emergent wetland; 24,000 acres of tidal freshwater emergent wetland; 4,300 acres of valley/foothill riparian; 100 acres of non-tidal perennial aquatic; 670 acres of non-tidal freshwater perennial emergent wetland; and unknown acres of other seasonal wetland.

CM-3 is essentially a conceptual wish list. It has only been analyzed to a programmatic level. Specific properties have not been identified and specific plans have not been developed. Potential adverse impacts and possible mitigation measures have not been identified or analyzed. If implementation proceeds, it will lag far behind the construction of CM-1. Funding is not assured and is dependent on future state and federal authorizations. Given the lack of success of numerous previous habitat restoration projects in the Delta, implementation is unlikely to achieve the 100% success rate envisioned by BDCP. Examples of previous restoration projects that failed to meet their objectives include: Decker Island, McCormick Williamson Tract, West Sherman Island, Little Holland Tract, Prospect Island, Kimball Island, Winters Island, Chipps Island, Montezuma Island, Mildred Island, Franks Tract, Big Break, Antioch Point, Donlon Island and Hog Island. Many of these projects are already mitigation sites for Corps dredging and levee projects, DWR water projects (Four Pumps Program, Delta Levees Program, Delta Barriers Program, etc.) or required in the various biological opinions.

Habitat restoration is not simply acres of new terrain or physical structure. Habitat is the quantity and quality of water flowing through terrain. Open water habitat is critically important, especially for pelagic species, but largely ignored in BDCP's conservation measures. It is highly unlikely that conservation measures CM 2-11 can mitigate for the significant reduction in the inflow of relatively good quality water to the estuary caused by the diversion of Sacramento water through tunnels under the

Delta. As previously noted, BDCP modeling demonstrates that those inflow reductions will: decrease outflow; move X2 and the LSZ's crucial habitat for pelagic species eastward; increase the concentration of pollutants and the residence time for pollutants to interact with the ecosystem; reduce smolt survival rates for winter-run, spring-run and Sacramento and San Joaquin fall-run salmon and increase the bioconcentration of mercury and selenium in fish tissue.

Statements of Overriding Consideration for Significant and Adverse Impacts may be approved by a lead agency, pursuant to CEQA. However, such overriding considerations have no place in a Section 7 consultation for an HCP or NCCP, especially when they would not occur in the absence of the project and where adverse impacts affect listed species.

The West Delta ROA contains virtually all the dry year spring-summer-fall critical habitats of the Delta Smelt and much of the winter-spring habitat of rearing salmon in the Delta. These large pelagic habitat units and many miles of shorelines and shoals of the West Delta are critical to the success of these species as well as the BDCP. BDCP documents describe the West Delta as an integral part of the "North Delta Arc of Native Fishes" (Figure 1). Yet, inexplicably, the West Delta ROA is virtually ignored in CM3 and other conservation measures. Over 50 miles of shoreline, half of which is un-leveed and "natural," are completely ignored, as are thousands of acres of important pelagic open-water habitat of the West Delta. These are critical areas heavily used by salmon and smelt in the Delta, especially in dry years when populations are highly stressed by low Delta outflow. In these drier years, the West Delta is especially critical habitat, given the high salinities of Suisun Marsh and the Bay and the fact that the Cache Slough complex in the north Delta is subject to lethal temperatures. At such times the LSZ lies almost entirely within the West Delta. The remaining LSZ habitat is completely ignored, as it is in the Central Delta and does not have an ROA.

The LSZ is supposed to be the most productive and prolific area of an estuary. However, as BDCP acknowledges in Chapter 5 Effects Analysis, primary production in the West Delta ROA is currently the second lowest of the ROAs. BDCP models predict that production will increase but will remain lower than the average of the other ROAs. The BDCP states: "*Tidal habitat restoration in the West Delta ROA could increase local food production for rearing salmonids and splittail*," but virtually no tidal habitat restoration is proposed here. Of course, tidal habitat is already extensive in the western Delta, as virtually the entire area is tidal habitat. Primary productivity does not suffer from lack of tidal habitat. Poor productivity or primary production is a result of the radically altered hydrodynamics, low quality inputs and the export of phytoplankton biomass equivalent to 30% of Delta primary production (Cloern and Jassby, 2012) by the state and federal projects.

Excessive Delta exports literally vacuum the critical LSZ pelagic habitat to the central and south Delta for export to southern California. This important habitat area needs more nutrients, longer residence times, more productive inputs from adjacent ROAs,

and, most critically, less export of its primary production to southern California. High inflows of unproductive "blue" reservoir water during the summer from the Sacramento River, coupled with negative flows in the lower San Joaquin River, draw critical habitat toward the South Delta export facilities. This reduces residence time for primary production and exports critical pelagic habitat. Summer temperatures frequently exceed levels lethal to Delta smelt. Pelagic habitat remaining in the western Delta, during the summer, is largely comprised of unproductive reservoir water feeding the exports.

The new North Delta export facility in CM1 will exacerbate these hydrodynamic problems by reducing lower Sacramento River inflows, increasing reverse flow above Georgiana Slough, altering DCC operations and providing another, closer outlet for LSZ export. Enhancing the pelagic habitat and plankton community of the West Delta ROA would require managing and restoring natural Delta hydrodynamics. Because it fails to manage and restore Delta hydrodynamics, CM-3 cannot mitigate the adverse impacts of CM-1.

4. CM4, Tidal Natural Communities Restoration, Pages 3.4-116 – 3.4-144.

Open water or pelagic habitat is largely missing from the tidal habitat discussion in CM4, as it is in CM3. Open water habitat in the Delta is the key habitat of smelt and other pelagic fishes and clearly part of the Tidal Perennial Aquatic Habitat Community. But CM4 ignores open water habitat and primarily focuses on emergent wetland restoration in the Suisun Marsh and Cache Slough areas. It essentially ignores the potential habitat in the west and central Delta that is critical for salmon and pelagic species in drier years, when threats to salmon and smelt are most severe. In these drier years, the Suisun Marsh and Cache Slough ROAs are less important because the LSZ moves into the west Delta away from Suisun Marsh, while high temperatures and low inflow impact Cache Slough. Implementation of CM1 will exacerbate these impacts.

As one example of misplaced priorities, the entire six miles of shoreline along the north shore of the lower Sacramento River from Collinsville to Rio Vista is un-leveed and bordered by major smelt spawning shoal habitats. Salmon, smelt, splittail and other native fishes often dominate fish catches in this area and smelt surveys have their highest catches in these areas. Unfortunately, adjacent pastures, non-native Arundo riparian shoreline communities and dredging are adversely impacting this area.

Other locations identified in the west Delta ROA for restoration include relatively small acreage in Seventeen Mile Slough, Decker Island, areas around Three-Mile Slough and Big Break. However, potential benefits are undermined by continuation of south Delta exports, which draw water from these areas.

CM4 should serve as a cautionary tale concerning expectations of habitat restoration. This area abounds in failed habitat projects including Decker Island, Big Break,

Kimble Island, PG&E mitigation project near Collinsville, Chips Island, Winter Island and areas of Sherman Island. These areas have become prime habitat for invasive species, noxious weeds and predators. As previously observed, restoring habitat is more than merely acquiring acreage: it requires meeting the physical and chemical parameters under which native species evolved for millennia.

Implementation of CM1 will likely adversely impact the time and space array of quality pelagic habitat in the Delta. In other words, it will likely decrease the amount of quality Delta smelt habitat.

For climate change and sea-level rise comment, please see ISB comments B-52

5. CM5, Seasonally Inundated Floodplain Restoration, 3.4-145 – 3.4-154.

There are several references to seasonal habitat in the Conservation Strategy, Part 1 and 2 of Chapter 3. Other than the potential opportunities for creation and restoration of habitat in the Yolo Bypass/Cache Slough area provide in CM-2, most of which will proceed regardless of CM-1: and in the south Delta, where seasonal floodplain could be incorporated in a bypass on the San Joaquin, there is limited opportunity to enhance floodplain habitat that would seasonally inundate during high flows in most of the Delta. Conceptually, areas such as east-side floodplains and margins of the Delta could provide habitat for salmon rearing and potentially increase Delta productivity. However, with the continued winter-spring closure of the Delta Cross Channel, benefits from the east Delta would likely be minimal, as this water moves directly to the South Delta export pumps when the DCC is closed.

6. CM6, Channel Margin Enhancement, 3.4-155 – 3.4-161.

Channel margin enhancement is the poster-child of BDCP's public relations efforts. Parts 1 & 2 of the Conservation Strategy, as well as the Executive Summary, effusively discuss the virtues of channel margin enhancement to benefit a wide variety of species. Indeed, there are hundreds of miles of channel margin habitat that could be enhanced to the benefit of all Delta native fishes including salmon and smelt. While salmon sometimes use tidal marshes for rearing, salmon, smelt, and other native fishes predominantly use the channel shorelines and shoals adjacent to Delta pelagic habitats.

However, under CM6 only twenty miles of channel margin habitat restoration will occur over thirty-year period. Fifteen miles of restoration will be split between the Sacramento River, Steamboat Slough and Sutter Slough and five miles on the San Joaquin River. The west Delta ROA is ignored, although it would greatly benefit from channel margin enhancement. Of course, like all of the proposed habitat restoration proposals in BDCP, channel margin enhancement is a conceptual wish list: there has been no project level analysis. No specific properties have been identified, no specific plans have been developed, no specific mitigation has been proposed and no assured funding has been identified.

7. CM7, Riparian Natural Community Restoration, 3.4-162 – 3.4-175.

In addition to the riparian habitat of CM6 channel margins, there is also a need to restore large-block riparian communities especially in areas subject to seasonal inundation. The best opportunities for these are in the Yolo Bypass, the Cosumnes/Mokelumne floodplain, and the lower San Joaquin floodplains. The BDCP goes far to state that the Yolo Bypass and Cache Slough complexes are precluded from such restoration by flood control needs. However, it was little more than a decade ago that these areas were in agricultural production protected by levees (e.g., Liberty, Little Holland, Prospect, etc.). Riparian floodplain habitats are simply not a threat to the flood control capacity of these areas that were recently not part of the floodplain at all except possibly in very large floods. Riparian floodplain forest habitats were once a major component of the regional Delta habitat array used by native fishes, especially salmon, and should be restored as much as possible.

10. CM-10, Nontidal Marsh Restoration, 3.4-193 – 3.4-201.

Nontidal marsh restoration is primarily for the benefit of the giant garter snake and greater sandhill crane. Nontidal marsh restoration could also be of benefit to salmon and other native fishes in areas upstream of the Delta such as the upper Yolo Bypass. However, fish are virtually ignored in CM10. Such marshes could also potentially contribute to Delta productivity through the transfer of organic carbon in the form of live and dead organisms and detritus, as well as inorganic nutrients and sediment.

Over 20 miles of the upper Yolo Bypass are not included in the proposed BDCP habitat restoration mosaic. Despite providing for annual streamflow and passage at the Fremont Weir, there is no provision for habitat in the entire upper Bypass that could take advantage of inundation with the new flow. It has been clearly demonstrated that such habitat greatly increase the growth and survival of salmon compared to the adjacent leveed Sacramento River. As compared to open agricultural fields, marshes in such nontidal areas offer significant habitat advantages for native fish spawning, rearing, and migrating. These advantages include increased cover from currents and predatory birds. The same potential occurs upstream of the Delta on other Delta tributaries including the San Joaquin River and its tributaries; this potential is not covered in the CM-10.

11. CM11, Natural Community Enhancement and Management, 3.4-202 – 3.4-256.

CM11 is essentially a conceptual hodgepodge of how the conceptual programmatic habitat restoration projects will be managed in accordance to achieve natural community goals and objectives. What is missing is a serious discussion of why previous restoration projects and management of habitat have utterly failed to reverse the downward spiral of native species in the estuary. Nor, is there any discussion of how the implementation of BDCP conservation measures will be different: why BDCP results are likely to be more successful. If the reviewer of these comments

disagrees with this observation, he or she should provide specific replies on how these proposed efforts will be different from historical or present programs and why a different outcome can be expected.

12. CM12, Methylmercury Management, 3.4-257 – 3.4-264.

The section on Methylmercury Management was completely rewritten following the November 2010 preliminary administrative draft, because the 2010 draft lacked a lacked a clear statement of the problem and specific actions that would help to alleviate it. Those items remain lacking in substance in the current draft. The section leaves out extensive past and present work of the USGS and universities on methylmercury in the Delta and in upstream watershed habitats and ongoing source control programs. The risks from methylmercury in tidal wetlands by ROA are not assessed in the HCP. Instead CM12, as in other CMs with high uncertainty, only offers adaptive management and monitoring to account for the complexities of the system "to ensure that measures implemented at the project scale through CM12 do not conflict with goals for restoration site ecological function." (P. 3.4-264).

13. CM13, Invasive Aquatic Vegetation Control, 3.4-266 – 3.4-284.

The measure is focused on ongoing and emerging risks posed by invasive aquatic vegetation throughout the Plan Area and builds heavily on the existing state program, managed by the California Department of Boating and Waterways, to continue aquatic vegetation control using chemical methods. Despite the recognized "major concern with the use of herbicides over large areas and the potential for toxic effects" (p. 3.4-273), the program focuses on this costly and ecologically degrading process instead of the root problem. The root of IAV problems are species-and-location specific but have an over-riding theme of disturbed physical habitats and lack of flow.

The huge areas of the West and Central Delta infested with Egeria including Franks Tract, Big Break, and West Sherman are large breached formerly-reclaimed islands that lack circulation and turbidity that normally limit such rooted invasive plants. All the shallow margins of these areas are infested (see Figures 3.4-27, 28) and their adjoining vast pelagic habitats suffer terribly. Rooted invasives like Egeria collect suspended plankton and sediment thus reducing turbidity, and compete for nutrients with pelagic phytoplankton.

The root cause of the predominance of invasive vegetation in these critical areas is lack of primary plankton productivity in the pelagic foodweb; this in turn is caused by exports and high inflows of reservoir water to meet export demand, in combination with the unnatural physical state of deep breached former leveed agricultural islands. Another example of a disturbed habitat is Seventeen Mile Slough (connecting to the San Joaquin River and Three Mile Slough in the Central Delta). It is infested with water hyacinth because its circulation was cut off by a road-crossing blockage at its east end. Boating and Waterway treatments result in seventeen miles

of channel clogged with dead water hyacinth (and dead habitat). The appropriate treatment is restoration of tidal circulation by removing the barrier at the east end of the slough and the removal of dead hyacinth. Control of extensive IAV infestations of backwater habitat also requires a reduction in water depth so that native tules can recover.

14. CM14, Stockton Ship Channel Dissolved Oxygen Levels, 3.4-285 – 3.4-292.

Comments regarding CM-14 can be found in CSPA's Comment Letter No. 2: Bay Delta Conservation Plan and Associated EIR/EIS Related to Water Quality and in the technical comments prepared by Dr. G. Fred Lee that are attached to those comments.

15. CM15, Localized Reduction of Predatory Fishes, 3.4-293 – 3.4-312.

Like many of the CMs, CM15 Localized Reduction of Predatory Fishes was completely rewritten following the November 2010 preliminary administrative draft. The current version of this measure claims to have been developed with extensive input from fish agency staff and claims to be focused on research and adaptive management to better understand the role of fish predation as a driver of covered fish species distribution, behavior, survival/abundance, and population status in the Plan Area.

Despite the staff effort to improve this measure, BDCP again proposes to rely on research and monitoring to address this long-standing problem brought about by the associated habitat effects of exports and the high Delta inflows of reservoir water to meet export demand. The real problem is that the state and federal exports have created habitat conditions that favor non-native predators over native species. The Delta is, in many respects, like an "Arkansas lake" full of "Arkansas" predator fish; such as largemouth bass, bluegill, crappie, and channel catfish.

The only control of this problem is to restore and replicate the natural Delta habitats under which native species evolved over thousands years and to remove, alter, or isolate habitats that favor non-native predators. No measure of predator removal will resolve this problem.

The measure proposes a limited suite of initial implementation actions with substantial investments in research prior to developing a full field implementation of the measure. In reality, Delta scientists already know why these species occur and how to control them. Predator removal at "hotspots" has been on-going for decades. However, fishermen and scientists have noted the futility of this approach as a predator removal action.

16. CM-16, Nonphysical Fish Barriers, 3.4-313 – 3.4-317.

The Nonphysical Fish Barriers program is still in the experimental stage after several decades of research, monitoring, and adaptive management. It remains focused on

increasing the survival of juvenile covered fishes (primarily salmonids) by discouraging them from entering channels known to result in higher mortality than other viable migration routes. The efforts have focused on prime cross-Delta channels that carry juvenile salmon to South Delta export fish salvage facilities.

Such efforts recognize the serious nature of such non-natural migratory behavior, but ignore the real cause of the problem and past/present lack of treatment. First, exports and associated altered Delta hydrology cause the problem. Ineffective salvage facilities in the South Delta fail to treat the problem. Closure of barriers such as the Delta Cross Channel and Head of Old River Barrier simple make the problem worse. Research has shown such barriers (e.g., bubble "screens") are ineffective and may even attract predators. Even if they were effective, there are presently no accurate methods to quantify improved survival.

17. CM-17, Illegal Harvest Reduction, 3.4-318 – 3.4-321.

CM17 Illegal Harvest Reduction is focused on increasing the enforcement of fishing regulations in the Delta and bays with the goal of reducing illegal harvest of covered salmonids and sturgeon (and non-native predatory sportfish). The CM focuses on the lack of game wardens to "police" the problem. Such harvest is "illegal" under state laws and adequate enforcement should be the responsibility of the State not the BDCP. Furthermore the BDCP should not take credit for any effort for the State policing its problem. There is nothing in the EIR/EIS to indicate that this CM will be different than present programs or be more effective in addressing the issue.

18. CM-18, Conservation Hatcheries, 3.4-322 – 3.4-325.

CM18 Conservation Hatcheries was completely rewritten following the November 2010 preliminary administrative draft. The current version of this measure was developed with extensive input from USFWS staff familiar with the existing and proposed Delta and longfin smelt conservation hatchery programs. The CM is focused on providing refugial hatchery populations and fish suitable for use in research actions. The Delta smelt population is noted as continuing to decline and at high risk of extinction in its present population state, and thus would seem to benefit from a conservation hatchery funded by BDCP. This whole conservation hatchery seems to come from a sense of desperation, yet the BDCP offers no real actions that would improve the plight of the wild Delta smelt population or its critical habitats.

The BDCP admits entrainment and salvage losses would not decline, and that the habitat improvements proposed would provide minimal if any benefit to the smelt population. The BDCP fails to focus on specific improvements to crucial LSZ habitat area and the proposed new North Delta diversion is likely to move it further upstream into more unsuitable areas. What is the point of stocking hatchery smelt if BDCP provides less favorable habitat conditions for them.

The history of trying to maintain or restore salmonid populations with hatcheries is fraught with problems that exemplify problems likely to confront a similar approach to smelt or other species. Stocking smelt not accustomed to natural habitat and predators may cause more predators to seek out wild smelt. Wild smelt may inbreed with inferior hatchery smelt. Key genetic information could be altered or even lost in the wild population from breeding with hatchery smelt. Collecting wild smelt for the conservation hatchery has its own effects. Simply breeding the captive population could have serious consequence to the genetic state of the captive stock that could be a threat to the wild population.

19. CM-19, Urban Stormwater Treatment, 3.4-326 – 3.4-332.

Nearly the entire Delta aquatic habitat array is surrounded by agricultural and urban basins protected by levees. All of these basins route storm and/or agricultural return water back to Delta waters via hundreds of large and small pumping plants. Damage to the water quality of Delta habitats from this process is immense. The Cache Slough, Yolo Bypass, and Ship Channel habitats of the Cache Slough ROA are especially influenced by such blatant water pollution. An argument could be made that some pollution is good and contributes to productivity and high turbidity so much welcomed in the Delta pelagic habitats, but too much pollution is pollution. Many of these "stormwater" inputs are "allowed" under state waiver programs for small stormwater and agricultural systems, and violations of Basin Standards occur. High water temperature, low dissolved oxygen, and excessive salts and chemicals degrade many important rearing habitats including nearly 40 miles of the Tule Canal in the Yolo Bypass and 20 miles of the Ship Channel, areas heavily used by smelt for spawning and early rearing. Warning signs not to eat the fish are found throughout these areas. Heavy spring inputs of such pollution threaten the survival of salmon, smelt, and other Delta native fishes. Water quality protection and enhancement should be an important part of the BDCP habitat restoration program.

21. CM-21, Non-project Diversions, 3.4-339 – 3.4-344.

In fall 2011, DWR directed that the BDCP include screening of non-project water diversions as a conservation measure. There are literally thousands of such diversions in the Delta, with many in prime rearing habitats of Delta smelt. The largest would include Delta power plants owned by Mirant and built by PG&E located at Antioch and Pittsburg right in the heart of the smelt distribution range. (Note: the BDCP attempts to include these plants in the BDCP HCP, despite the projects having their own approved HCP.)

Though technically screened, the screens on these fossil fuel burning plants' cooling water intakes have a mesh too large to keep out larval smelt. Larger smelt are at great risk to screen impingement mortality if caught by inflows. "Remediation of these non-project diversions could eliminate or reduce this entrainment or impingement, and improve Delta ecosystem health by reducing the diversion of plankton and other nutritional resources, thereby benefiting all covered fishes" (p.

3.4-339). (Note: unlike project diversions these power plant diversions are not consumptive and pass water, albeit too warm for smelt, back to the Delta.)

Thousands of smaller agricultural and duck club intakes are unscreened in Suisun Marsh, Delta, and Yolo Bypass. Total Delta unscreened diversion volume likely equals several thousand cfs and potentially causes entrainment and impingement losses. While the CM21 focuses on screening remediation at diversion intakes it includes, "[e]liminating those non-project diversions with the greatest risk of entrainment to delta smelt." This would involve extremely costly land and/or water purchases/leases and involve the loss of high-valued, productive agricultural lands. Such an approach ignores the "…diversions with the greatest risk of entrainment to delta smelt:" the state and federal project pumps.

22. CM-22. Avoidance and Minimization Measures, 3.4-345 – 3.4-353.

CM22 Avoidance and Minimization Measures was not previously identified as a potential conservation measure, but was designated to recognize that there are many avoidance and minimization measures to reduce the risk of incidental take that must be implemented in the course of implementing conservation actions, including construction of water facilities and construction of natural community restoration sites. Of special note is the inclusion of the effects of water facilities (tunnel intakes) and Adaptive Management and Monitoring in this conservation measure. Within the BDCP process these two subjects are far too important to be buried in CM22. These are fundamental elements of the BDCP process that should be assessed and described in detail in their own stand alone sections of the BDCP.

The BDCP conservation measures are essentially the proposed mitigation for the tunnels, continued operation of South Delta exports, and their associated effects on Bay-Delta hydrology. There is little mention in the BDCP plan or EIR/EIS of Avoidance and Minimization Measures for the proposed North Delta tunnel intakes or for the continued operation of South Delta intakes, or for their effects on Bay-Delta hydrology under operating criteria limits of D-1641 water quality standards or present biological opinions. One of the most critical topics that must be addressed is how the two diversions would avoid and minimize effects on Delta smelt in dry and critical years.

Concluding Observations

The Public Policy Institute of California published a June 2012 report titled, *Where the Wild Things Aren't, Making the Delta a Better Place for Native Species.* The report[3] promotes a "*Reconciled Delta - a coherent, robust, and dynamic portfolio of habitats and flows that support desired ecosystem functions and conditions.*"

Despite a relatively negative prognosis for the future of the Delta, these authors state,

[3] http://www.ppic.org/main/publication.asp?i=1053

> "*physical habitats and flows can be managed, where possible, to provide conditions that native estuarine species need at different stages in their lives…. In our vision for a reconciled Delta ecosystem, habitats in different parts of the Delta would be specialized to foster improved conditions for native fishes. All forms of habitat cannot be at all locations, so we propose a strategy in which different habitat types are available and connected to support each desirable species at the appropriate season, taking advantage of existing ecological differences among different regions of the Delta. Area specialization can provide the ecosystem diversity and variability that native fishes (and other organisms) need, while supporting continued human uses of Delta land and waters.*"

These statements portray the basic problem with the BDCP: it lacks specifics as to habitats, flows, and timing to meet the needs of the target native fishes in the Delta. Specifically BDCP needs to identify the critical areas in the Delta for anadromous and pelagic species and then analyze and discuss the problems with these habitat areas. Only then, can it develop and propose specific, effective and implementable measures to improve habitats and fish populations.

The complete lack of discussion of pelagic habitat and the LSZ of the Delta estuary is an illustrative example of what is missing from BDCP. It is as if BDCP forgot the purpose of habitat conservation plans and why its proponents are proposing one. The purpose of HCPs should be to increase the likelihood that listed species will survive recovery, consistent with the purposes of state and federal endangered species acts.

If BDCP proposes to continue massive water supply exports from the Delta, it must propose meaningful measures to replace the millions of acre-feet of pelagic habitat lost each year to the export pumps and prevent native species that depend on that habitat from going extinct. CM1 fails to provide the enhanced outflow that fish agencies, regulators and independent scientists have observed is critical to the restoration of the estuary. Instead BDCP offers less outflow in order to enhance water supply benefits.

If we have learned one thing, over the past several decades in the Bay-Delta, it is that regime shifts and population crashes occur in drier years. Yet we continue to relax standards in dry years and focus protection in wetter years. The smelt population has yet to recover from 1981. Striped bass have yet to recover from 1987-1992. We killed modest smelt recoveries in 2001-2002, 2007-2009, and 2012-2014. BDCP will increase problems in dry years because the plan retains large south Delta exports during these years. A start toward recovery of Delta smelt would be a realistic plan to save what little habitat occurs in dry years when the LSZ pelagic habitat lies within the west and central Delta. That measure should be addressed in CM1 and not reside in conceptual and uncertain programmatic measures to be implemented sometime in the future. Determining how the system should work after the infrastructure is constructed and operating is a recipe for further disaster.

BDCP highlights the importance of Cache Slough ROA to target species especially delta smelt. It fails to mention the importance of tidal freshwater inputs from the areas major freshwater sources: Sutter and Steamboat sloughs. It fails to mention key stressors like warm

water, agricultural diversions and waste discharges, North Bay Aqueduct exports, and lack of dry year flows (importance of Fremont Weir notch), etc. Likewise, it fails to discuss key stressors in the Sacramento Ship Channel, such as, propeller entrainment from cargo ships and how the channel gets its freshwater inflow. The gates at the upper entry to the Sacramento Ship Channel are rusted shut. Consequently, a high percentage of freshwater inflow comes from West Sacramento's storm-sewer system and local agricultural drainage.

BDCP fails to recognize the importance of outflow in maintaining location, productivity, and water quality of the LSZ, especially through the summer. It retains the illusion, expressed in the USFWS biological opinions that smelt are not in the Delta during summer because they, X2 and the LSZ are in Suisun Bay. The fact is that, under modern hydrodynamic conditions in the Delta, the LSZ and X2 are in the Delta most summers, especially in drier years.

BDCP equally fails to realistically discuss Suisun Marsh and its main channel, Montezuma Slough. Little discussion is provided regarding the role, or potential use, of the Salinity Control Structure at the upper end of Montezuma Slough, how important maintaining freshwater inflow and low salinity is to the ecology of the slough and marsh, or how important this area is, or could be, to the production of nearly all the native Bay-Delta fish. Lack of Delta outflow in spring and summer of drier years results in the loss of this important nursery and the production of many of its native fishes each year. This critical habitat loss, following expansion of Delta exports in the 1970's, was a major factor in the decline of many native and non-native Bay-Delta fish. Coupled with the massive degradation of Delta pelagic habitats, there is little fish production capacity left in the Bay-Delta's open waters.

BDCP not only fails to address these fundamental problems, it actually proposes to exacerbate these problems with additional outflow reductions, introduction of a massive new diversion on the lower Sacramento River, higher exports, and further degradation of the LSZ pelagic habitats.

In the final analysis, BDCP is not a program intended to restore habitat and fisheries: it is simply a project to maximize the export of water from the Delta. More insidiously, it proposes to do so by diverting 2.5 MAF of freshwater inflow via tunnels under a Delta that is already grievously suffering from a lack of freshwater flow. The other conservation measures are simply window dressing: conceptual in nature, lacking in specific details, analyzed at a programmatic level, facing uncertain public funding, and highly unlikely to achieve the unrealistically predicted results. BDCP is not restoration; it is a death sentence for an estuary.

The assumptions and conclusions that buttress the BDCP and EIR/EIS conservation strategy and goals are egregiously flawed and technically invalid. Consequently, the analysis of impacts regarding CM1-22 and likelihood of success of the various conservation mitigation measures are deficient and fail to meet minimum CEQA or NEPA standards for environmental review. BDCP must be returned to the drafting table and a new EIR/EIS should be circulated for public review and comment.

Thank you for considering these comments. If you have questions or require clarification, please don't hesitate to contact us.

Sincerely,

Bill Jennings, Executive Director
California Sportfishing Protection Alliance

Attachment: Overview of Delta Habitat Restoration

California Sportfishing Protection Alliance

"An Advocate for Fisheries, Habitat and Water Quality"

3536 Rainier Avenue, Stockton, CA 95204

T: 209-464-5067, F: 209-464-1028, E: deltakeep@me.com, W: www.calsport.org

28 July 2014

Mr. Ryan Wulff
National Marine Fisheries Service
650 Capitol Mall, Suite 5-100
Sacramento, CA 95814
BDCP.Comments@noaa.gov

VIA: Electronic Submission
Hardcopy if Requested

RE: Comment Letter No. 2: Bay Delta Conservation Plan and Associated EIR/EIS Related to Water Quality

Dear Mr. Wulff,

The California Sportfishing Protection Alliance (CSPA) has reviewed the proposed Bay Delta Conservation Plan and associated Environmental Impact Report/Environmental Impact Statement (hereinafter, BDCP or EIR/EIS) and submits the following comments related to water quality. Our comments include the attached review from Dr. G. Fred Lee and Dr. Anne Jones-Lee and we request that both documents be considered and responded to as a single submittal.

CSPA worked closely with the Environmental Water Caucus (EWC) in developing their comments and incorporates by reference into these comments both submittals by the EWC on all issues related to BDCP. We also incorporate by reference the submittal by Michael Jackson on behalf of CSPA, California Water Impact Network and AquAlliance, as well as the individual comments submitted by AquAlliance. We further incorporate by reference the submittals by the County of San Joaquin, South Delta Water Agency, Central Delta Water Agency, Restore the Delta, Earth Law Center and Friends of the River.

CSPA asked Dr. Lee and Dr. Jones-Lee to review Chapter 8 and Chapter 25 of the EIR/EIS and evaluate whether the approach in analyzing potential impacts to water quality and public health was technically valid and reliable. Their assessment of Chapter 8 is that,

> *"The approach used does not adequately or reliably consider the range of water quality impacts caused by the wide variety of potential pollutants present in the various Delta channels, that can be expected to result from the removal of large amounts of high-quality Sacramento River water from the Delta by this project."* and *"As it stands now Chapter 8 of this EIR/EIS does not reliably inform the public or decision-makers about the magnitude of the errors in estimates and conclusions inherent in the BDCP analysis of the impact of the diversions on Delta water quality/beneficial uses."*

Drs. Lee and Jones-Lee's assessment of the technical validity of Chapter 25 is that the,

> *"…approach is not technically valid for identifying all the constituents that need to be considered in evaluating potential water quality and public health impacts of the proposed BDCP."*

Table 31-1, page 31-9, Summary of Significant and Unavoidable Adverse Impacts, identifies six impacts to surface water quality. Three (concentrations of bromide, chloride and electrical conductivity) result from facilities operations and maintenance (CM1) and three (concentrations of mercury, organic carbon and pesticides) result from implementation of CM2-CM22. Perhaps, nothing more graphically illustrates the fundamental inadequacy of the EIR/EIS than the fact that it only identifies three water quality adverse impacts resulting from the diversion of another 2.5 million acre feet of water from an estuary already grievously suffering from lack of flow.

Our specific concerns are enumerated below followed by our comments.

1. A Word of Caution

We offer a word of caution. The Delta is an incredibly complex estuarine ecosystem and only in our hubris do we believe we understand the intricacies of its hydrological, chemical and biological tapestry. Virtually every previous environmental document prepared for hydro-modification projects in this estuary have promised benign or beneficial results. All exacerbated existing conditions. Almost every significant physical change of the environment by humankind has been accompanied by unintended consequences. Adaptive management must be an integral component of any Delta Plan. But, adaptive management is difficult to implement. As the National Research Council put it:[1]

> *"Numerous attempts have been made to develop and implement adaptive management strategies in environmental management, but many of them have not been successful, for a variety of reasons, including lack of resources; unwillingness of decision makers to admit to and embrace uncertainty; institutional, legal, and political preferences for known and predictable outcomes; the inherent uncertainty and variability of natural systems; the high cost of implementation; and the lack of clear mechanisms for incorporating scientific findings into decision making."*

Adaptive management has a long and checkered history in this estuary. Taken together, the suite of water quality control plans and water rights decisions by the State Water Resources Control Board (SWRCB or State Water Board) from D-990 (1961) through D-1641 (2000) to the adoption of the present Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (2006) constitutes adaptive management. The array of biological opinions issued over the years by the U.S. Fish and Wildlife Service and National Marine Fisheries Service comprises adaptive management. CalFed was an elaborate structured water planning and adaptive management program, as is the Long-Term Operational Criteria and Plan (OCAP) for coordination of the State Water Project and Central Valley Project, with its Water Operations Management Team (WOMT) and various technical working groups.

All of the reasons identified by the National Research Council, as to why adaptive management frequently fails, presently exist in this estuary. Managers and decision makers have routinely rejected the "adaptive" recommendations made by scientists, biologists and technical review teams. Resource and regulatory agencies have failed to adopt and implement recommended criteria and failed to enforce existing criteria. Financial resources have been lacking. Adaptive management has not only failed to reverse the downward spiral of native species in the estuary, it has chaperoned them to the brink of extinction. For adaptive management to play a meaningful role, scientists must have the authority to "adapt."

We can find nothing in the thousands of pages of BDCP's plan or EIR/EIS that provides any evidence that adaptive management is likely to succeed. Adaptive management remains subject to political pressure and the approval of the state and federal contractors. If the reviewer of these

---

[1] National Research Council, *A Review of the Use of Science and Adaptive Management in California's Draft Bay Delta Conservation Plan*, 2011, p. 6.

comments has a different opinion, please provide some support for the view that "adaptive management" will be different this time.

Over mere decades, construction and operation of the Central Valley and State Water Projects have deprived the Delta estuary of half its flow; turned the natural hydrograph on its head, reduced temporal and spatial variability; eliminated crucial habitat, complexity and diversity and deprived the estuary of dilution necessary to assimilate increased pollutant mass loading. It is not surprising that an ecosystem that developed and prospered under a state of nature has been brought to the brink of destruction. No estuarine ecosystem in the world has survived this level of abuse. If the reviewer can identify an estuary somewhere in the world that is suffering from lack of freshwater flow and that has been restored by depriving it of additional millions of acre-feet of flow, please provide the information to us.

Water quality and quantity are flip sides of the same coin; changes in flow change assimilative capacity, residence time and the fate and transport of contaminants. Hydrologic changes modify constituent concentration and bioavailability, which in turn can adversely impact the aquatic ecosystem and other beneficial uses.

Water from the Sacramento River is significantly less polluted than water flowing into the estuary from other tributaries, especially the San Joaquin River. Sacramento River water drawn across the Delta to the export pumps is a major reason water quality in the South Delta is better than it would otherwise be. Diversion of approximately 2.5 million acre feet (MAF) of this relatively good quality water around the Delta will increase the concentration of existing constituents in the surface water remaining in the Delta. It will also increase the residence time of water in the Delta, thereby enhancing the opportunity for bioaccumulation and oxygen depletion to occur. This is exacerbated in tidal environments where pollutants tend to move back and forth with the tides. The EIR/EIS and Delta Plan fail to contain a technically defensible analysis and discussion of the likelihood and extent of degradation and adverse impacts to Delta water quality caused by alternative conveyance or increased exports.

Previous efforts to evaluate potential water quality impacts from proposed projects to modify the hydrology of the Delta have either ignored water quality, with the exception of salt, or relied upon models that track "particles" to evaluate water quality. However, the majority of pollutants identified as impairing the estuary are non-conservative dissolved forms of pesticides, mercury, nutrients or oxygen demand constituents. Conservative constituents like salt are unacceptable surrogates for the universe of chemical constituents and pathogens degrading and impairing Delta waters.

CalSim II and various particle-tracking models, like DSM2, are unable to model potential impacts to water quality from non-conservative constituents. Different constituents respond differently to changes in flow and residence time. Consequently, any credible environmental review should evaluate the impacts of potential hydrologic modifications on a pollutant-by-pollutant basis. Unfortunately, BDCP fails to avail itself of the many water quality models that are routinely employed in NPDES permitting and expressly designed to address the fate and transport of chemical constituents in the environment.

The pollutants identified as causing impairments on the 303(d) list are only the tip of the iceberg. There are water quality impairments in the Delta attributable to total organic carbon, nutrients and other contaminants for which there are no federal or state water quality criteria. In addition to a lack of promulgated water quality criteria for many common water pollutants, there are situations in which the current water quality criteria/standards are well recognized as not being protective of aquatic life resources. For example, the water quality criterion for selenium in the SJR and Delta is not protective of some aquatic life.[2]

Furthermore, existing water criteria fails to address many issues that must be considered in considering impacts on aquatic life. For example:

- Existing criteria fails to consider additive and synergistic properties of regulated chemicals that occur in concentration below criteria. For example, Delta water frequently contains a cocktail of as many as 15 pesticides, many of which interact additively or synergistically.
- Adverse impacts to sensitive species, such as zooplankton, were not included in the development of many criteria.
- There is limited information on chronic exposure to sublethal impacts of chemicals and mixtures of chemicals. Numerous studies in the scientific literature demonstrate adverse effects of chemical exposure well below water quality criterion.
- Water quality criterion fail to address the chronic effects of multiple stressors acting on an already weakened aquatic ecosystem.
- Chemical degradants (or products of chemical breakdown in the environment) are little understood but frequently are highly toxic.
- Water quality criteria have been developed for only a small subset of the chemicals found in these waters. Of the approximately 100,000 chemicals registered for use in the United States, only about 200 are regulated with respect to water quality. The Priority Pollutant List is an artifact of a legal settlement several decades ago, has never been peer-reviewed and is an inadequate surrogate for the maelstrom of chemicals found in waterways today. These include pharmaceuticals and personal care products, industrial chemicals and other potentially hazardous constituents that have been identified as carcinogens, reproductive toxins, endocrine disruptors and immune suppressors, etc.
- Criteria are frequently insufficiently protective for pollutants that bioconcentrate and/or bioaccumulate in tissue.
- Many drinking water criteria are economically based and not health risk based.

As noted above, relocation of export facilities to the Sacramento River will increase residence time in the Delta. This increased residence time may encourage the growth of toxic blue-green algae, which has become a serious problem in recent years. Bioaccumulating constituents like selenium and methyl-mercury or pollutants like DDT and dioxin will have more opportunity to work their way up the food chain. Increases in the concentration of mercury in fish tissue would

[2] US EPA, as part of endangered species consultations for the California Toxics Rule, agreed to have the US Geological Survey model the fate and transport of selenium in the Bay-Delta Estuary and the information would serve as the basis for revised water quality criteria. USGS completed the study in December 2010 and it indicated that the Bay-Delta standards should be lowered from 5 ug/l to 1 ug/l or less, depending on the residence time of selenium. The study can be found at: www.epa.gov/region9/water/ctr

further threaten the health of the Delta's large subsistence fishing community. Longer residence times will increase the timeframe for oxygen demanding constituents to reduce oxygen levels in channels already identified as impaired because of low dissolved oxygen.

An alternative conveyance facility and reduction in Sacramento inflow will impact dissolved oxygen levels in the Mokelumne River and Stockton Deep-Water Ship Channel. Presently, flow from the Sacramento is diverted through the cross-channel into the Mokelumne and San Joaquin River as it is drawn to the south Delta pumping facilities. The presence of better quality Sacramento River water in the central Delta and the reverse flows in the San Joaquin at Stockton served to somewhat ameliorate oxygen depletion in the reach below Stockton.

Presently, some part of the pollutant load in the San Joaquin River is drawn to the pumps via Old River, Middle River, Turner Cut and Columbia Cut and exported or "siphoned" south. Any reduction of this "siphon" mechanism would also affect nutrients and numerous other pollutants in the eastern and southeastern Delta. It would likely increase the spatial distribution of water quality impacts into the Central Delta. For example, it could increase nutrient loading to the ship channel exacerbating dissolved oxygen problems. Selenium concentrations might increase in the Delta to levels comparable to those found in wildlife in Suisun Bay. EC impairment might expand into the eastern Delta.

Alternative conveyance and reduction of dilution and outflow will significantly increase the concentration of salt in channels further impacting the yield of Delta agriculture. It will also reduce salinity variability and encourage the spread of certain undesirable invasive species. BDCP has been referred to as a habitat expansion plan for the overbite clam *Potamocorbula amurensis.*

To summarize, the Delta and its tributary streams are formally identified as impaired by a broad suite of pollutants. Water quality criteria have been developed for only a very small subset of the chemicals found in these waters. These criteria fail to adequately consider additive/synergistic, bioaccumulative and chronic/sublethal effects or multiple stressors acting on an already weakened aquatic ecosystem. Increased diversion or routing of good quality dilution flows around the estuary will result in increased concentration and residence time of pollutants. Increased residence time exacerbates the effects of toxic and bioaccumulative pollutants. Reduced diversion and increased Delta flow enhances flushing of pollutants and decreases pollutant concentration.

The BDCP and its EIR/EIS fail to comprehensively analyze and address potential impacts to fish, wildlife and human health from reduced water quality caused by loss of dilution, increased residence time and modified channel hydrology. They also fail to include a comprehensive antidegradation analysis required by the federal Clean Water Act and California's Porter-Cologne Water Quality Control Act.

2. BDCP's Analysis of Water Quality is Technically Invalid and Inconsistent with Prevailing Standards.

"All Models are Wrong, Some are Useful." Statistician E. P. Box

The approach to identifying impacts to water quality is fundamentally and technically flawed. Properly calibrated and verified, comparative models are useful in distinguishing relative differences between alternatives. However, comparative models like CalSim II or DSM2 are not designed and are unable to make credible short-term predictions. There are a number of predictive water quality models that have been designed, peer-reviewed and approved for assessing water quality – but these readily available models were not used.

The BDCP misuses tiered comparative models in an attempt to evaluate potential exceedances of one-hour and four-day water quality criteria that are based upon a not-to-be-exceeded more than once-in-three years standard. More frequent occurrences could, in and of themselves, lead to 303(d) listings of impairment that would be significant impacts. This misuse of modeling appears to be an ill-disguised attempt to minimize and deflect attention from the obvious impacts of diverting 2.5 MAF of freshwater around a severely polluted Delta that is already suffering from a chronic lack of flow. As such, it seriously understates the number and magnitude of adverse impacts.

Models are complex simulations that, at their best, only represent an idealization of actual field conditions. Models can be a black box with a "trust us" outcome. They must be used with extreme caution to ensure that the underlying model assumptions hold for the site-specific situations being modeled. Subtle changes in coefficients, assumptions or input data can dramatically alter output. It is crucial that models be properly calibrated and verified. The design parameters, assumptions, input data, calibration and validation must be transparent in order to be able to meaningfully evaluate the ability to accurately project values.

A critical problem arises when decision makers attribute more precision to modeling results than is warranted and where a model's output is misused to make definitive comparisons and predictions. While models can be employed to inform analysis, they cannot provide near-certain conclusions that significant environmental effects will or will not occur or will or will not be mitigated, especially where common sense and existing knowledge indicate otherwise.

The EIR/EIS, Table 4-1. Overview of BDCP EIR/EIS Modeling Tools, shows that several models were used to simulate water quality projections for the various project alternatives:

- *Artificial Neural Network (ANN) for CALSIM II An ANN has been developed for CALSIM II that attempts to mimic the flow-salinity relationships in the Delta, as simulated in DSM2. The ANN attempts to statistically correlate the salinity results from a particular DSM2 model run to the various peripheral flows (Delta inflows, exports and diversions), gate operations and an indicator of tidal energy.*
- *CALSIM II simulates operations of the SWP, CVP and areas tributary to the Sacramento-San Joaquin Delta. The model, based on inputted priorities and constraints, determines monthly river flows and diversions, Delta flows and exports, reservoir storage, deliveries to project and non-project users, and controls on project operations. CALSIM II results are used to determine water quality, hydrodynamics, and particle tracking in the DSM2 model.*

- *Delta Simulation Model II (DSM2) DSM2 is a one-dimensional mathematical model that simulates hydrodynamics, water quality, and particle tracking throughout the Delta based on flow data generated from CALSIM II outputs. It describes the existing conditions in the Delta as well as performs simulations for the assessment of incremental environmental effects caused by facilities and operations. The model can be used to calculate stages, flows, velocities, mass transport processes for conservative constituents, and transport of individual particles. HYDRO provides the flow input for QUAL and PTM. QUAL simulates one-dimensional fate and transport of conservative water quality constituents given a flow field simulated by HYDRO. PTM simulates pseudo three-dimensional transport of neutrally buoyant particles based on the flow field simulated by HYDRO.*
- *Particle Tracking Model (PTM) PTM simulates fate and transport of conservative and non-conservative water quality constituents throughout the Sacramento-San Joaquin Delta given a flow field simulated by HYDRO. The model uses velocity, flow, and stage output from DSM2-HYDRO. Outputs are used to estimate the effects of hydrodynamic changes on the fate and transport of larval fish, other covered species, and toxics through the Delta, as well as entrainment of larval fish at various locations. It allows assessment of particle fate, transport, and movement rate from numerous starting points to numerous end points. It provides information on movement of planktonic larval fish, such as delta and longfin smelt, in a tidal environment and is used extensively in Central Valley fishery assessments.*
- *DSM2-HYDRO is a one-dimensional hydraulic model used to predict flow rate, stage, and water velocity in the Delta and Suisun Marsh at a 15-minute timestep.*
- *DSM2-QUAL simulates multiple conservative and non-conservative constituents including dissolved oxygen, carbonaceous BOD, phytoplankton, organic nitrogen, ammonia nitrogen, nitrate nitrogen, organic phosphorus, dissolved phosphorus, TDS and temperature. The model is used to predict water temperature, dissolved oxygen, and salinity in the Delta and Suisun Marsh at a 15-minute timestep.*

All of the DSM2 models require data provided by CalSim II.

The Review of the Draft BDCP EIR/EIS and Draft BDCP conducted by the Delta Independent Science Board (15 May 2014) observed,

> *"As noted for other chapters in the DEIR/DEIS, a concise and informative summary of the chapter would be extremely useful to readers and reviewers. This chapter, covering water quality impacts of the different Alternatives, is not very informative because of its reliance on a few modeling approaches, most notably CALSIM and DSM2, without an explanation of the limitations of these models. There is a noted lack of emphasis on validating model outputs with observational data, as well as a lack of any presentation or discussion of the uncertainties associated with the models."* Page B-22.
>
> *As stated above, there is an over-reliance on model outputs, both to describe existing conditions as well as to project the effects of Alternatives on water*

quality constituents. There do not seem to be either a) attempts to compare model outputs for existing conditions to existing water quality data, or b) calls for monitoring of future conditions in order to inform adaptive management of Draft BDCP implementation. Because models will always be incorrect, such observational data are obviously required. Moreover, models were run for only certain constituents and not others; this needs to be clarified and the reasons for selective applications of models should be explained. Page B-23.

3. BDCP's Inappropriate Use of CalSim II.

CalSim II is like Aladdin's Lamp; it grants wishes to whoever rubs it. CalSim II can be manipulated to produce desired results. Even properly operated it is only as accurate as the data and assumptions that are plugged into the model. It has previously been used to project a false certainty that impacts will be minor. For example, it has been used to show that salmonid mortality will increase by a specific percentage and discussion of possible error or of ranges of possible outcomes has been entirely absent. The model cannot possibly produce such certainty. At best it can predict, given a certain set of data and assumptions, a range of possible outcomes, with some outcomes potentially more probable than other, and with all predictions limited by both known and unknown sources of error.

CalSim II is a highly complex simulation model of a complex system that requires significant expertise to run and understand. Consequently, only a few individuals concentrated in the Department of Water Resources, U.S. Bureau of Reclamation and several consulting firms understand the details and capabilities of the model. State Water Resources Control Board (SWRCB) staff cannot run the model. To the extent CalSim II is relied upon, the EIR/EIS must be transparent and clearly explain and justify all assumptions made in model runs. It must explicitly state when findings are based on post processing and when findings are based on direct model results. And results must include error bars to account for uncertainty and margin of safety.

As an optimization model, CalSim II is hardwired to assume perfect supply and perfect demand. The notion of perfect supply is predicated on the erroneous assumption that groundwater can always be obtained to augment upstream supply. However, the state and federal projects have no right to groundwater in the unadjudicated Sacramento River basin. Operating under this assumption risks causing impacts to ecosystems dependent upon groundwater basins in the areas of origin. The notion of perfect demand is also problematic, as it cannot account for the myriad of flow, habitat and water quality requirements mandated by state and federal statutes. Perfect demand assumes water deliveries constrained only by environmental constraints included in the code. In other words, CalSim II never truly measures environmental harm beyond simply projecting how to maximize deliveries without violating the incorporated environmental constraints.

As a monthly time-step model, CalSim II cannot determine weekly, daily or instantaneous effects; i.e., it cannot accurately simulate actual instantaneous or even weekly flows. It follows that CalSim II cannot identify real-time impacts to objectives or requirements. Indeed, DWR admits, "CalSim II modeling should only be used in 'comparative mode,' that is when comparing

the results of alternate CalSim II model runs and that 'great caution should be taken when comparing actual data to modeled data.'"[3] Since CalSim II results are employed as boundary conditions by subsequent water quality models, like DSM2, those limitations undermine efforts by subsequent models to accurately evaluate specific exceedances of water quality criteria or impacts to water quality.

CalSim II assumes foresight and compliance by project operators. However, this cannot satisfy CEQA/NEPA's mandates to analyze and disclose the full spectrum of potential environmental impacts caused by a project vis-à-vis a no-project and other alternatives. A report produced by the National Heritage Institute summarizes this flaw by "call[ing] into question the use of CalSim II as a tool for environmental impact assessment, since it is changes in the environment associated with specific projects and the satisfaction of arbitrary constraints which is the critical focus of environmental review."[4]

A formal peer-review of CalSim II was highly critical and detailed numerous inadequacies in the model. Among these was the opinion that CalSim II "has not yet been calibrated or validated for making absolute prediction values."[5]

The Department of Civil Engineering University of California at Davis conducted a comprehensive survey of members of California's technical and policy-oriented water management community regarding the use and development of CalSim II in California. Detailed interviews were conducted with individuals from California's water community, including staff from both DWR and USBR (the agencies that created, own, and manage the model) and individuals affiliated with consulting firms, water districts, environmental groups, and universities.[6]

The results of the survey, which was funded by the CalFed Science Program and peer-reviewed, should serve as a cautionary note to those who make decisions based on CalSim II. The report cites that in interviewing DWR and USBR management and modeling technical staff: "*Many interviewees acknowledge that using CALSIM II in a predictive manner is risky and/or inappropriate, but without any other agency-supported alternative they have no other option.*" The report continues that: "All users agree that CalSim II needs better documentation of the model, data, inputs, and results. CalSim II is data-driven, and so it requires numerous input files, many of which lack documentation," and "There is considerable debate about the current and desirable state of CalSim II's calibration and verification," and "Its representation of the SWP and CVP includes many simplifications that raise concerns regarding the accuracy of results." It

---

[3] Answering Brief for Plaintiff-Intervenor-Appellee California Department of Water Resources, Appeal from the United States District Court for the Eastern District of California, No. 1:09-cv-407, Case: 11-15871, 02/10/2012, ID: 8065113, page 15.

[4] Payne, J. and Purkey, D. 2005. An Environmental Review of CalSim-II: Defining "Full Environmental Compliance" and "Environmentally Preferred" Formulations of the CalSim-II Model." Page 14.

[5] Close, A, et al. 2003. A Strategic Review of CALSIM II and its Use for Water Planning, Management, and Operations in Central California, Submitted to the California Bay Delta Authority Science Program, Association of Bay Governments, Oakland, California. 4 December 2003. Page 9.

[6] Ferreira, Ines C., et al. 2005. Musings on a Model: CalSim II in California's Water Community, published in San Francisco Estuary & Watershed Science. March 2005. 13 Pages.

reported, "Many interviewees are concerned that CalSim II's monthly time step cannot capture hydrologic variability adequately and thus does not compute water exports and export capacity accurately, both of which are significant factors in system operations," and, "The model's inability to capture within-month variations sometimes results in overestimates of the volume of water the projects can export from the Sacramento- San Joaquin Bay-Delta and makes it seem easier to meet environmental standards than it is in real operations." The study concluded by observing, "CalSim II is being used, and will continue to be used, for many other types of analyses for which it may be ill-suited, including in absolute mode."

More recently, Walter Bourez of MBK Engineers made a presentation on BDCP operations modeling at the 17 January 2014 meeting of the Delta Independent Science Board.[7] The presentation concluded:

- *Incorporation of climate change contains errors and does not incorporate adaptation measures.*
- *BDCP's "High Outflow Scenario" is not sufficiently defined for analysis.*
- *BDCPs simulated operation of the dual conveyance, coordinating proposed North Delta diversion facilities with existing South Delta diversion facilities, is inconsistent with the project description.*
- *BDCP models do not accurately reflect anticipated changes in CVP and SWP operations with BDCP.*
- *Independent modeling of the BDCP revealed differences in CVP and SWP operations and water deliveries from the analysis disclosed for the Draft EIR/EIS. Total exports would increase about 200 TAF and Delta outflow would decrease approximately 200 TAF while the North Delta intake would divert 680 TAF more and the South Delta intakes would divert 460 TAF less than projected in BDCP modeling.*

A reduction of Delta outflow coupled with an even larger reduction in the inflow of better quality Sacramento River water into the Central Delta would exacerbate water quality problems. This reduction on outflow and increase in exports, plus the failure to accurately model climate change and CVP and SWP operations, undermines DSM2's assessment of water quality conditions and resulting impacts from operation of BDCP, since DSM2 relies on modeling results generated by CalSim II.

A consortium of water agencies including Contra Costa Water District, East Bay Municipal Utility District, Friant Water Authority, Northern California Water Association, North Delta Water Agency, San Joaquin River Exchange Contractors Water Authority, San Joaquin Tributaries Authority and Tehama Colusa Canal Authority asked MBK Engineers to review the CalSim II modeling studies performed as part of the BDCP. A 29-page report, supported by a 72 page technical appendix, summarized their analysis of the BDCP model. MBK Engineers found that:

[7] Can be found at, http://deltacouncil.ca.gov/sites/default/files/documents/files/BDCP_Review_ISB_2014_01_17Final_sent.pdf

"There are three basic reasons why the BDCP Model cannot be used to determine the effects of the BDCP: 1) the no action alternatives do not depict reasonable operations due to climate change assumptions, 2) operating criteria used in the BDCP Alternative 4 result in unrealistic operations, and 3) updates to CalSim II since the BDCP modeling was performed almost 4 years ago alter model results." (P. 3)

"The CalSim II model is the foundational model for analysis of the BDCP, including the effects analysis in the Draft BDCP and the impacts evaluation in the Draft EIR/EIS. Results from CalSim II are used to examine how water supply and reservoir operations are modified by the BDCP, and the results are also used by subsequent models to determine physical and biological effects, such as water quality, water levels, temperature, Delta flows, and fish response. Any errors and inconsistencies identified in the underlying CalSim II model are therefore present in subsequent models and adversely affect the results of later analyses based on those subsequent models." (P. 10)

"Hydrologic modeling of BDCP alternatives using CalSim II has not been refined enough to understand how BDCP may affect CVP and SWP operations and changes in Delta flow dynamics. Better defined operating criteria for project alternatives is needed along with adequate modeling rules to analyze how BDCP may affect water operations." (P. 27)

Flow Science Inc., at the request of the Sacramento Regional County Sanitation District, reviewed documents and model results associated with the BDCP environmental review process in order to determine how the proposed BDCP alternatives might impact Sacramento River temperatures at Freeport. In a 23 April 2014 Technical Memorandum, they stated:

"As noted above, the corrections to the DSM2 temperature boundary conditions have a substantial effect on the temperatures at Freeport. In additions, the methodology for determining the temperature boundary conditions (for both the original and corrected boundary conditions) is questionable because the same set of temperature boundary conditions are used for all BDCP alternatives. Changes in boundary conditions between scenarios reflect only climate change effects and not different BDCP or upstream reservoir operations. That is, all ELT simulations used the same temperature boundary conditions for all BDCP alternatives, and all the LLT simulations used the same temperature boundary conditions for all BDCP alternatives. Clearly, with this approach the modeling will predict no (or minimal) impacts of the BDCP on the temperature at Freeport, since Freeport is located close to the boundary. However, the various BDCP alternatives are likely to result in substantially different river flows at different times of the year (e.g., whether or not Fall X2 is implemented may cause substantially different reservoir releases and river flows)." (P. 2)

Flow Science recommended, *"that SRCSD comment the EIR does not contain information - and the modeling data upon the EIR is based are insufficient – to support any conclusions about how*

Sacramento River temperatures at Freeport may change in the future." (P. 7) The same flaws identified by Flow Science would extend to evaluating the potential impacts resulting from various BDCP temperature scenarios on water quality constituents and fisheries.

The Review of the Draft BDCP EIR/EIS and Draft BDCP conducted by the Delta Independent Science Board (15 May 2014) observed,

> *"The major analytical problem is the gap between CALSIM-II modeling of the water-supply system and actual operations. The State Water Project and Central Valley Project account for only a part of the water management decisions and impacts in this vast system. DWR and USBR modeling has improved considerably in recent decades but remains centered on the SWP and CVP. This limited modeling therefore largely ignores or oversimplifies most water management decisions in California, which are those taken by local and regional governments and water users. The limited modeling thus seems inadequate for impact analysis of a system governed largely by local agencies."* Page A-24.

4. BDCP's Inappropriate Use of DSM2

As described in the BDCP EIR/EIS (5A-A34), DSM2 is a one-dimensional hydrodynamics, water quality and particle tracking simulation model used to simulate hydrodynamics, water quality, and particle tracking in the Sacramento-San Joaquin Delta. It is a data-intensive DWR model that runs for a limited period (only 16 years) and has never been peer-reviewed. Several of its modules have only received limited validation and calibration. For example, its particle tracking module has been severely criticized.[8] The EIR/EIS describes its limitations, at 5A-A49-50, as:

> *DSM2 is a 1D model with inherent limitations in simulating hydrodynamic and transport processes in a complex estuarine environment such as the Sacramento – San Joaquin Delta. DSM2 assumes that velocity in a channel can be adequately represented by a single average velocity over the channel cross-section, meaning that variations both across the width of the channel and through the water column are negligible. DSM2 does not have the ability to model short-circuiting of flow through a reach, where a majority of the flow in a cross-section is confined to a small portion of the cross-section. DSM2 does not conserve momentum at the channel junctions and does not model the secondary currents in a channel. DSM2 also does not explicitly account for dispersion due to flow accelerating through channel bends. It cannot model the vertical salinity stratification in the channels.*
>
> *It has inherent limitations in simulating the hydrodynamics related to the open water areas. Since a reservoir surface area is constant in DSM2, it impacts the stage in the reservoir and thereby impacting the flow exchange with the adjoining channel. Due to the inability to change the cross-sectional area of the reservoir*

[8] Panel Review of the CA Department of Fish and Game's Quantifiable Biological Objectives and Flow Criteria for Aquatic and Terrestrial Species of Concern Dependent on the Delta, A2: Discussion of the DSM2 PTM, 2010, P. 17 - 19.

inlets with changing water surface elevation, the final entrance and exit coefficients were fine tuned to match a median flow range. This causes errors in the flow exchange at breaches during the extreme spring and neap tides. Using an arbitrary bottom elevation value for the reservoirs representing the proposed marsh areas to get around the wetting-drying limitation of DSM2 may increase the dilution of salinity in the reservoirs. Accurate representation of RMA's tidal marsh areas, bottom elevations, location of breaches, breach widths, cross-sections, and boundary conditions in DSM2 is critical to the agreement of corroboration results.

For open water bodies DSM2 assumes uniform and instantaneous mixing over entire open water area. Thus it does not account for the any salinity gradients that may exist within the open water bodies. Significant uncertainty exists in flow and EC input data related to in-Delta agriculture, which leads to uncertainty in the simulated EC values. Caution needs to be exercised when using EC outputs on a sub-monthly scale. Water quality results inside the water bodies representing the tidal marsh areas were not validated specifically and because of the bottom elevation assumptions, preferably do not use it for analysis.

The Review of the Draft BDCP EIR/EIS and Draft BDCP conducted by the Delta Independent Science Board (15 May 2014) observed,

> *"DSM2 used for salinity-flow analysis is a one-dimensional model having inherent limitations in simulating open water areas, flow in bends and small channel, inlet/outlets and three-dimensional turbulent mixing, particularly with sea level decimeters higher than today's."* Page A-12

In other words, in an exceedingly complex Delta with myriad meandering small channels and constantly changing flows, DSM2 modeling output inadequately accounts for varying velocities and secondary currents, channel junctions and open waters, stratification, fluctuating channel beds, turbulent mixing, surface waves, sediment resuspension and agricultural inputs and diversions. And, as previously discussed, DSM2 is dependent on flawed CalSim II output data regarding flows and boundary conditions.

For example, fluctuating channel beds directly affect water quality. In the renewal of the NPDES permit for Sacramento Regional County Sanitation District's NPDES permit, it was found that the bed of the Sacramento River fluctuates as much as six feet near the outfall diffuser. Modeling revealed that bottom contours had a direct effect on whether constituent plumes from the diffuser exceeded water quality standards. Discharges from the Stockton Wastewater Treatment facility experienced a somewhat different problem. Because of an abrupt turn in the river below the outfall, pollutants tended to concentrate along one bank and had the potential to exceed water quality standards. Consequently, Stockton was unable to qualify for a mixing zone. Another example is the relatively recent sediment buildup blocking flow into the head of Steamboat Slough, which has reduced the depth of the entrance from approximately nineteen feet to ten feet. While not hindering boating navigation, the underwater barrier certainly affects fish migration, flow and potentially water quality. Sediment buildup and

scouring in channels is a constant in the Delta. The failure to continually update information on channel bathymetry undermines DSM2's ability to accurately model hydrology and water quality.

While the EIR/EIS discusses the limitations of DSM2, it fails to account for and disclose the uncertainty of model results There are few, if any, error bars attached to predictions and comparisons to indicate to makers and the general public the relative confidence level in the results. The EIR/EIS is deficient without discussion of the degree of uncertainty in results.

Whatever the merits of DSM2 for comparative analysis, it is fundamentally unable to model or identify specific violations of water quality criteria or other impacts to water quality. The EIR/EIS acknowledges that the North Delta diversion facility will increase the percentage of more polluted San Joaquin River water in the Delta. It also acknowledges that BDCP will increase the residence time of water in the East, South, West and North Delta over existing conditions (Table 5C.5.4-14, p. 5C.5.4-84, BDCP). The diversion of two and a half MAF of Sacramento River water will inevitably change the constituent composition and hydrology of the estuary. Changes in hydrology affect the fate and transport of contaminants, which in turn, affect beneficial uses.

As previously discussed, water quality criteria for aquatic life are established on a one-hour or four-day basis not to be exceeded more than once in three years. Exceedances of these criteria cause direct adverse impacts to listed species and other aquatic life. Exceedances of human health criteria can have direct adverse impacts to people. Exceedances of criteria protecting other identified beneficial uses of water will adversely impact those who rely on the beneficial use. For example, multiple exceedances of a pollutant within a waterway would qualify the waterway for listing as an impaired waterbody on the CWA 303(d) list. Such a listing would have enormous financial implications for the municipalities and business discharging wastewater and stormwater into the Delta. NPDES permits and Waste Discharge Permit requirements would become more stringent entailing expensive facility upgrades and enhanced management practices.

The data and models relied upon by BDCP in this EIR/EIS are incapable of evaluating and predicting the potential adverse impacts by the project on water quality. They may confirm common sense: that the removal of 2.5 MAF of freshwater from the Delta will inevitably increase the concentration and residence time of salinity and a number of conservative constituents in the Delta. However, they cannot credibly predict or quantify exceedances of specific water quality criteria for the universe of constituents, especially non-conservative constituents, which exist and interact in the estuary. Consequently, they are unsuitable for analyzing and unable to make the effects determinations described in Chapter 8, Section 8.4.2.3, pp. 8-75 & 8-76. A vast discretionary project with potential to cause great harm that will certainly have major unintended consequences should not proceed until the significant impacts of that project on water quality can be conclusively identified and addressed.

5. BDCP's Inappropriate Use of "Best" Professional Judgment.

Professional judgment is frequently employed but not defined in the EIR/EIS. Chapter 8, Section 8.4.2.1, Screening Analysis and Results, page 8-173, states:

> *This water quality analysis assessed the potential effects of implementing the various alternatives on 182 constituents (or classes of constituents). The initial analysis of water quality effects, referred to as the "screening analysis" in the Methods of Analysis section (above) resulted in the following findings. Of the 182 constituents, 110 were determined to have no potential to be adversely affected by the alternatives to an extent to which adverse environmental effects would be expected. Historical data for these constituents showed no exceedances of water quality objectives/criteria in the major Delta source waters, were not on the State's 303(d) list in the affected environment, were not of concern* ***based on professional judgment*** *or scoping comments, and had no potential for substantial long-term water quality degradation. Consequently, no further analyses were performed for these 110 constituents. Conversely, further analysis was determined to be necessary for 72 constituents. Of these, 15 are addressed further in the Screening Analysis itself in Appendix 8C because they did not warrant alternative-specific analyses, and 1 - temperature - is addressed in Chapter 11, Fish and Aquatic Resources. The remaining 56 constituents are addressed in the Environmental Consequences section, and are contained in the sections noted in Table 8-61.*

Through every step in the screening and evaluative process, professional judgment was used in determining whether a constituent had the potential to exceed thresholds of significance, should be carried forward for further assessment, was a 'constituent of concern,' whether it should be addressed qualitatively or quantitatively and whether the project could result in significant impacts to specific constituents. Of the 182 constituents that were analyzed, detailed assessments were performed on 24 and of those, 8 were assessed quantitatively (modeling, ratios) and 16 were assessed qualitatively (professional judgment).

Unfortunately, the EIR/EIS does not indicate whether professional judgment followed a rigorous step-by-step formal process, if an Ouija board, crystal ball or fortune-teller was involved or if conclusions were simply pulled from someone's arse. It fails to adequately discuss the methodology, science, criteria or analysis used to add, remove or modify constituent inclusion in the screening analysis or to determine the degree of impact significance. There is no discussion of why limited data sets were relied upon or why the more extensive data sets from regulatory programs were ignored. Inadequate data limits professional judgments. There is no discussion justifying the reliance on boundary water quality conditions and the exclusion of the extensive pollutant loading that occurs in the Delta in reaching conclusions. There is no discussion on the use of average or median constituent concentrations or the 95^{th} or average percentile for assessing the potential to violate one-hour or four-day criteria that should not be violated more than once in three years. There is no discussion or attempted quantification regarding the uncertainty of conclusions. Nor is there any discussion of how heavily criticized comparative models, used outside their temporal, spatial and resolution limits, may or may not be sufficient

for making explicit determinations regarding the potential effects of BDCP on constituents and impacts to water quality standards caused by a modified hydrology, reduced dilution and increased residence time.

It is the responsibility of those who rely on professional judgment, in the absence of conclusive information, to hold paramount the safety, health and welfare of the public and the environment. Professional judgment must the predicated on ethics and conformance with the respective codes or standards of professional conduct. Professional judgment requires information sufficient to achieve an acceptable degree of accuracy, a working knowledge of the science and criteria, and a degree of synthesis and depth of knowledge necessary to make sound judgment without harm to the environment. An intelligent evaluation of the criteria and a thorough engineering analysis is critical to professional judgment. Professional judgment cannot reside in a black box, but has a responsibility to the public's trust. Professional judgment cannot serve as a substitute for the failure to collect and evaluate adequate data. Professional judgment must disclose a transparent process where explanation of the factors involved, how conclusions were arrived at and the uncertainty of those conclusions is weighed or evaluated. There must be an attempt to quantify uncertainty with error bars or detailed discussion. Whatever professional judgment is, the abject and pervasive failure in the EIR/EIS to acknowledge, quantify and discuss the uncertainty of conclusions is not professional judgment: it is an appalling display of amateurism.

Neither the plan nor EIR/EIS comport with prevailing standards for technical analysis, which is why BDCP's documents are inappropriate, technically invalid and fail to meet the fair disclosure requirements of CEQA and NEPA.

6. Reliance Upon a Truncated and Inadequate Data Set to Screen, Evaluate and Predict Impacts to Water Quality is Technically Indefensible.

Appendix 8C describes the screening analysis. Section 8C.1.1, P. page C-1, Data Sources, states,

> *"This section describes sources for data used in the screening analysis. Water quality data in the Delta has been collected by a myriad of public and private organizations. However, for consistency and due to data availability concerns, the input data for the screening analysis was limited to two data sets that were publically available via the web and managed by a public agency (i.e., data from the DWR Water Data Library and the Bay Delta and Tributaries Project [BDAT])."*

Both data sets are extremely limited. The Bay Delta and Tributaries Project (BDAT) data set is relatively old and is not even presently available on the DWR web site. The DWR data set ignores an enormous quantity of data collected, pursuant to stringent protocols, by other agencies, as evidenced by the extremely few samples of numerous constituents collected. A number of priority pollutants were never sampled or sampled only a few times.

The selection of sites arbitrarily limited the amount and kinds of ambient data that was collected and excluded numerous toxic constituents identified as carcinogens, reproductive toxins, endocrine disruptors and immune suppressors. One, of many, examples is Bis(2-

ethylhexyl)phthalate (DEHP), frequently known as Di(2-ethylhexy)phthalate. Bis(2-ethylhexyl)phthalate is discussed below under its own heading. Regulatory sampling in the Central Valley reveals its presence in both ambient waters and wastewater effluent at concentrations exceeding water quality criteria.

Section 8C.1.1.1, Table SA-1, page 8C-2, identifies the source water locations where data was collected on the upstream Sacramento River, upstream San Joaquin River and Chipps -Mallard – Suisun areas representing the Delta west boundary. It states,

> *"Interior Delta sites were not considered, because modeling performed in support of the Environmental Consequences impact assessments assumed no new sources of water quality constituents and, therefore, water quality concerns are assumed to arise primarily through altered mixing of Delta source waters."*

The assumption that there are "no new sources of water quality constituents" in the Delta illustrates the inadequacies of BDCP modeling or the determination of proponents to only accept facts that support their desired outcome. There are enormous sources of water quality constituents within the Delta. These sources include: municipal wastewater and stormwater discharges from Lodi, Stockton, Manteca, Lathrop, Tracy, Mountain House, Discovery Bay, Brentwood, Iron House Sanitary District, Rio Vista, Isleton and unincorporated areas; industrial and construction stormwater discharges; enormous return flows from irrigated agriculture and dairy operations; discharges from marinas and on-the-water recreational activities; illegal dumping; pesticide drift from aerial spray operations for agriculture and vector control, as well as extensive application of pesticides to control aquatic weeds; and ballast discharges from shipping and spills from bulk loading operations at the ports, among others. Indeed, the permitted waste discharge limits of municipal wastewater treatment plants within the Delta (excluding Sacramento), is over 100 MGD and is almost a third more flow than is flowing in the San Joaquin River at Vernalis, as of this writing.

Failure to consider and analyze the extensive mass loading of an astonishing array of contaminants within the Delta not only renders the screening analysis technically insufficient, it renders all of the subsequent assessments of water quality impacts technically invalid.

Table SA-6, pages 8C-22-27, identifies all constituents (182) measured at the boundary stations, number of times analyzed and detected, and minimum and maximum values reported in the data set.

Because of the extremely limited data set, many of the priority pollutants were not sampled or sampled infrequently. For example, aluminum was not sampled, although the NPDES permit for Sacramento Regional Wastewater Treatment Plant reveals that ambient aluminum in the Sacramento River exceeds the acute water quality criteria for freshwater aquatic life more than tenfold. Cadmium has only one data point on the San Joaquin and 25 (12 dissolved, 13 total) on the Sacramento. The average cadmium concentration on both rivers exceeds the acute and 4-day criteria for aquatic life, adjusted for hardness. The arbitrary selection of screening sampling sites eliminated extensive NPDES and other data sets that would have permitted a more defensible and accurate assessment of potential adverse impacts.

Table SA-11, Step 6 Water quality constituents (totaling 72) for which detailed assessment were performed, page BC-39, identifies which constituents were carried forward for further analysis and which assessments were conducted quantitatively and which were assessed qualitatively. Nine constituents were addressed quantitatively (i.e., modeling) and 63 were assessed qualitatively (i.e., best professional judgment). However, there is virtually no discussion in Appendix 8C or Chapter 8 of what constitutes a quantitative evaluation, the methodology employed, threshold levels and how conclusions were reached. The lack of transparency fails to comply with minimal professional standards for an EIR/EIS for a major water development project.

Chapter 8, Water Quality, Section 8.2.2.1, page 8.27, describes water quality monitoring program and sources of data. Noticeable absent are the vast data sets of the Regional Water Board's NPDES permitting program and Irrigated Lands Program.

Table 8-6, page 8-31, Locations Selected to Represent Existing Water Quality in the Delta, includes only three sites in the interior Delta: San Joaquin River at Buckley Cove, Franks Tract at Russo's Landing and Old River at Rancho del Rio. The data sources were identified as BDAT, again an old data set not currently available on the web. The use of only three sites to represent potential impacts to water quality in an 841 square mile Delta containing 700 miles of meandering waterways is technically indefensible and renders any assessment of impacts to water quality invalid.

Table 8-33, Median Metal Concentrations for Selected Sites, May 1988-September 1993, page 8-105, shows the total and dissolved concentration of the priority pollutants arsenic, cadmium, copper, lead and zinc at San Joaquin River at Buckley Cove, Sacramento River at Green's Landing, Sacramento River above Point Sacramento, San Joaquin River at Antioch Ship Channel, Old River at Rancho Del Rio, Suisun Bay at Bulls Head, Franks Tract and the San Joaquin River at Vernalis. Of these, Buckley Cove, Franks Tract and Old River are within the central Delta. All of the metals are hardness dependent but no hardness data was presented.

Taking the San Joaquin River at Buckley Cove as an example, we found that the lowest ambient hardness in the San Joaquin below the Stockton Wastewater Treatment Plant was 30 mg/l. Buckley Cove is only a few miles downriver from the Stockton Treatment Plant outfall. Table 8-33, shows that the mean ambient concentrations for copper, cadmium and lead (expressed as both dissolved and total recoverable) are 5 ug/l. Adjusting for hardness, per US EPA and SWRCB requirements, the concentrations of all three metals at Buckley Cove are potentially toxic to aquatic life. The hardness adjusted median dissolved or total concentrations of all three metals exceed the acute one-hour and chronic four-day toxicity criteria. As these metal concentrations are median values, the highest recorded concentrations of these metal would potentially be more toxic. The San Joaquin River in the Delta is already listed as impaired for unknown toxicity. Other examples could have been used, as we found relatively low hardness values elsewhere in the Delta; e.g., 36 & 39 mg/l at the Delta pumping plant headworks at Banks.

This issue is discussed more fully in comments on hardness dependent metals below, but it illustrates that the EIR/EIS is deficient in not analyzing the potential adverse impacts caused by the diversion of 2.5 MAF of Sacramento River water and the resulting loss of dilution and increased residence time on water quality and beneficial uses in the eastern Delta. Loss of dilution and increase in residence are recipes for water quality degradation. The EIR/EIS's claims are counterintuitive and without a detailed explanation of how conclusions were arrived at or inclusion of sufficient data to verify conclusions, the EIR/EIS is technically invalid and legally inadequate.

7. The Failure to Evaluate Numerous Toxic Constituents is Unacceptable.

As discussed above, failure to evaluate toxic chemicals because the arbitrarily selected data sets omitted analysis of those chemicals is unacceptable. Bis(2-ethylhexyl)phthalate (DEHP) is an example of a number of chemicals that are known to be highly toxic and for which monitoring data exists. Yet, because these constituents were not included in the very limited data sets used in evaluating impacts for BDCP, there is no analysis of the project's impacts for these constituents.

On 30 December 2009 the US EPA issued a press release announcing an *Action Plan* (a series of actions) on four chemicals raising serious health or environmental concerns, including phthalates. The Action Plan was to address the manufacturing, processing, distribution, and use of these chemicals. One of the phthalates listed is bis(2-ethylhexyl)phthalate, also commonly called di-(2-ethylhexyl)phthalate and abbreviated DEHP. Bis(2-ethylhexyl)phthalate is an organic compound and is produced on a massive scale by many companies. Phthalates were detected in greater than 75% of approximately 2,540 urinary samples collected from participants of the National Health and Nutrition Examination Survey (NHANES). Exposure in the United States to diethyl phthalate, dibutyl phthalate or diisobutylphthalate, benzyl butyl phthalate, and di-(2-ethylhexyl)phthalate is widespread.

Water quality standards for bis(2-ethylhexyl)phthalate were first established in California under the December 1992 National Toxics Rule (NTR), which was amended in 1999. On 18 May 2000, US EPA adopted the California Toxics Rule (CTR). The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that were applicable in the state. Despite the current regulation under the CTR, US EPA has revised their recommended Ambient Criteria for bis(2-ethylhexyl)phthalate to a significantly lower number. This new lower criteria for bis(2-ethylhexyl)phthalate would result in more wastewater discharges being regulated to keep this plasticizer out of California's waterways.

EPA's existing regulation of bis(2-ethylhexyl)phthalate is based on human consumption of water and fish. EPA has also issued new information regarding the impacts to aquatic life:

> *"Of the 8 phthalates, BBP, DEHP, and DBP elicit the most toxicity to terrestrial organisms, fish, and aquatic invertebrates (EC, 2008a, Staples et al. 1997). Ecotoxicity studies with these phthalates showed adverse effects to aquatic organisms with a broad range of endpoints and at concentrations that coincide with measured environmental concentrations. Toxic effects were observed at*

environmentally relevant exposures in the low ng/L to µg/L range (Oehlmann et al. 2008).”

Sacramento Regional Wastewater Treatment Plant NPDES Permit includes the statement:

> “*The CTR includes a criterion of 1.8 µg/L for bis(2-ethylhexyl)phthalate for the protection of human health for waters from which both water and organisms are consumed… The maximum effluent concentration (MEC) for bis(2-ethylhexyl) phthalate was 8.1 µg/L out of 87 samples while the maximum observed upstream receiving water concentration was 0.58 µg/L out of 55 samples.*”

A CSPA review of phthalates in the Central Valley revealed that 27 wastewater treatment plants had levels of bis(2-ethylhexyl)phthalate in the discharge that presented a reasonable potential to exceed criteria. Receiving water levels in a number of tributaries to the Delta also exceeded criteria, including: Clear Creek (7 ug/l); Yolo Bypass (9 ug/l); Upper Sacramento near Red Bluff (10 ug/l); Deer Creek, tributary to the Yuba River (4 ug/l); Yuba River near Yuba City (10 ug/l); and the San Joaquin River near Turlock (12.3 ug/l) and near Stockton (8.1 ug/l).

Despite the concern by US EPA in issuing an Action Plan for bis(2-ethylhexyl)phthalate, widespread human exposure, the fact that bis(2-ethylhexyl)phthalate has been regulated in California since 1992, sampling is required as a condition of NPDES permits and bis(2-ethylhexyl)phthalate has been detected at levels exceeding criteria in both wastewater discharges and receiving waters that are tributary to the Delta; the EIR/EIS simply concludes that bis(2-ethylhexyl)phthalate is not of concern, is only found in low concentrations and analytical tools have only recently been developed.

The EIR/EIS Chapter 8, page 8-58, states that:

> “*In 2006, CCWD participated in a study to examine the toxicological relevance of EDCs and PPCPs in both raw source and treated water (Contra Costa Water District 2009). Of the 62 compounds analyzed, only five were detected in the treated water: sulfamethoxazole (pharmaceutical), meprobamate (pharmaceutical), atrazine (herbicide—endocrine disruptor), triclosan (pharmaceutical), and dioctyl phthalate (used to make plastics—endocrine disruptor). <u>The study concluded that detection occurred at low concentrations and should not pose any health threats</u>*.” (Emphasis added)

And Appendix 8C, page 15, states that:

> “*Examples of EDCs include natural plant and animal steroid hormones, metals (e.g., arsenic, cadmium, lead, and mercury), dioxins, PAHs, pesticides, pharmaceuticals and personal care products (PPCPs), and PCBs. Sources of anthropogenic EDCs include wastewater treatment plants, private septic systems, urban stormwater runoff, industrial effluents, landfill leachates, discharges from fish hatcheries and dairy facilities, runoff from agricultural fields and livestock enclosures, and land amended with biosolids or manure. Constituents of emerging*

concern (CECs) include the following classes of chemicals: perfluoranated compounds (e.g., PFOS, PFOA), polybrominated diphenyl ethers (PBDEs), PPCPs, and phthalates. These chemicals are generally found in such low concentrations in the environment that only recently have analytical tools been developed to detect and quantify these concentrations." (Emphasis added)

However, the EIR/EIS, in discussing the 2006 Contra Costa Water District Report, failed to consider other significant factors that may have biased the conclusions. Chapter 8, page 8-57, also observes:

"In 2001 and 2002, a survey of raw and treated drinking water from four water filtration plants in San Diego County showed the occurrence of several PPCPs including phthalate esters, sunscreens, clofibrate, clofibric acid, ibuprofen, triclosan, and DEET (Loraine and Pettigrove 2006). This is important because on average, roughly a third of the water in San Diego County originates from the Delta via conveyances of the SWP. According to the study, occurrence and concentrations of these compounds were highly seasonally dependent, and reached maximums when the flow of the San Joaquin River was low and the quantity of imported water was high. The maximum concentrations of the PPCPs measured in the raw water were correlated with low-flow conditions in the Delta that feed the SWP."

For example, 2006 was an extremely wet year in both the Sacramento and San Joaquin river basins, while the preceding year (2005) was above normal in the Sacramento basin and wet in the San Joaquin basin. Had the CCWD study occurred during a drought, results might have been very different. The San Diego County study demonstrates that dry years and reduced dilution are correlated with constituent concentration. The EIR/EIS is deficient for failing to address phthalates and the array of other constituents that were excluded from analysis because of the data set selected.

8. Failure to Adequately Account for Changes in Dilution Undermines Water Quality Impact Analyses.

The EIR/EIS acknowledges that the SWP/CVP water diversions "…reduce the amount of water available for dilution and assimilation of contaminant inputs…" Chapter 8, page 8-14, lines 14-17) Table 8-38, Summary of Methodologies Used for Water Quality Impact Analyses, page 8-14 of Chapter 8, identifies the methodologies and tools employed for impact analyses. CalSim2 served as input to the DSM2 model. DSM2 addressed EC and DOC concentrations and flow fractions. Mass Balance, using flow fractions and constituents addressed the other constituents quantitatively, other than EC and DOC (apparently 6 constituents). Qualitative analysis addressed the remaining parameters (apparently 16 constituents) through a varied approach based on constituent and location but "attempted to estimate concentration changes attributable to the Alternatives."

CalSim II is a heavily criticized large-scale comparative model that runs in 30-day time steps. DSM2 is a heavily criticized, comparative, never-peer-reviewed model that takes CalSim II

output and attempts to track particles, representing conservative constituents, through the myriad twisted channels of the Delta. Neither model is sufficient for addressing constituents that are toxic in low micrograms or nanograms with respect to one-hour and four-day criteria that are predicated upon a standard not to be exceeded more than once in three years. Professional judgment, as used in this document, embraces black-box conclusions based on extremely limited data sets collected from few locations and that ignores constituent loading in a heavily polluted estuary. This is not a recipe for making technically valid conclusions regarding available dilution or changes in dilution.

It is an undeniable fact that concentrations of constituents in the Sacramento River are considerably lower than concentrations of equivalent constituents in the San Joaquin River. It is an undeniable fact that removing 2.5 MAF of Sacramento River water decreases dilution and assimilative capacity and increases the residence time for constituents to interact with the environment in the Delta. It is an undeniable fact that many constituents in the Delta exceed applicable water quality criteria and numerous other constituents are extremely close to exceeding criteria. It is an undeniable fact that the Delta is part of a tidal estuary where constituents slosh back and forth with incoming and ebbing tides. It is an undeniable fact that the loss of dilution and increase in residence time in a tidal environment will increase the concentration of constituents. It is an uncontestable fact that this will increase degradation and violations of water quality standards. Yet, through sheer sophistry, magical modeling and black-box conclusions, the EIR/EIS blatantly proclaims that there will be no adverse impacts from the maelstrom of toxic pollutants that currently plague the Delta.

In the previous section on limited data sets, we discussed the San Diego County water filtration plant study that showed that occurrence of PPCP increased during periods when the plants received increased water supplies from the Delta. Chapter 8, page 8-57. It noted that,

> *According to the study, occurrence and concentrations of these compounds were highly seasonally dependent, and reached maximums when the flow of the San Joaquin River was low and the quantity of imported water was high. The maximum concentrations of the PPCPs measured in the raw water were correlated with low-flow conditions in the Delta that feed the SWP."*

Droughts are a normal condition in California. According to DWR, there have been 10 multi-year droughts of large-scale extent in the last 100 years, spanning 40 years or 40% of the time. The increase of an average of 2.5 MAF of water diverted under the Delta will, in effect, create more drought conditions experienced in the Delta regardless of actual weather occurring. It will exacerbate the impacts of drought on water quality. As global warming reduces Delta inflow, the project impacts will be substantially greater because of the tunnels.

The EIR/EIS, Chapter 8, page 8-449, lines 19-31, states in addressing nitrate that,

> *"When dilution is necessary in order for the discharge to be in compliance with the Basin Plans (which incorporate the 10 mg/L-N MCL by reference), not all of the assimilative capacity of the receiving water is granted to the discharger. Thus, limited decreases in flows are not anticipated to result in systemic exceedances of*

the MCLs by these POTWs. Furthermore, NPDES permits are renewed on a 5-year basis, and thus, if under changes in flows, dilution was no longer sufficient to maintain nitrate below the MCL in the receiving water, the NPDES permit renewal process would address such cases."

This statement confirms a basic lack of understanding of the NPDES permitting process in the Central Valley by the EIR/EIS. The Central Valley Regional Board has granted dischargers the entire assimilative capacity of a stream on a number of occasions. For example, the September 2006 NPDES Permit for Linda County Water District Wastewater Treatment Plant (NPDES No. CA0079651) granted the full assimilative capacity of the Feather River for EC to Linda County. Further, the Regional Board frequently issues NPDES permits without requiring an antidegradation analysis that would identify how much authorized but presently unused assimilative capacity has been granted and how much assimilative capacity remains for future allocation. Additionally, the Regional Board never requires watershed wide or basin wide antidegradation analyses. Consequently, there are a number of watersheds where more assimilative capacity has been authorized than remains and other waterways where assimilative capacity is presently exceeded but have not yet been placed on the 303(d) list. The suggestion that lack of assimilative would be addressed in subsequent NPDES renewal processes relies on a regulatory requirement that is not followed or enforced in practice.

9. The Assessment of Hardness Dependent Metals is Wrong and Leads to Significant Errors of Analysis.

The EIR/EIS's analysis of the family of hardness dependent metals is technically wrong. The discussion below is focused on copper but the comments are equally applicable to cadmium, lead, silver and zinc. In fact, even with the extremely limited data set, use of the proper methodology reveals that the San Joaquin River at Vernalis has the potential to exceed both the acute and chronic criteria for copper, cadmium, lead, zinc. The Sacramento River has the potential to exceed both the acute and chronic criteria for copper, cadmium and the chronic criteria for lead. Even using average concentrations and the 5th percentile of hardness reveals potential to exceed some criteria. Silver was not sampled in the data sets provided.

Table 8N.1, Appendix 8N, Trace Metals, page 8N-1, Table 1, Concentration of dissolved copper in primary source waters to Delta, shows the maximum dissolved copper concentrations in the Sacramento River (9.5 ug/l), San Joaquin River, (8.0 ug/l) and San Francisco Bay (2.6 ug/l).

Chapter 8, Water Quality, page 8-170, Table 8-58, Water Quality Criteria and Objectives for Trace Metals (µg/L), presents the dissolved water quality standards for copper as 13 ug/l (acute, 1-hour average) and 9 ug/l (chronic, 4-day average).

Chapter 8, page 8-169, lines17-18, states, "*Criteria were calculated based on each source waters average and 5th percentile hardness.*" The toxicity of hardness dependent metals was based on average (58 mg/l) and the 5th percentile hardness (39 mg/l, Sacramento River, appendix 8N6, table 11) rather than the lowest observed hardness (16 mg/l). Hardness dependent metals exhibit greater toxicity at lower hardness. Ambient criteria for acute values are applicable to short periods of time, acute 1-hour average concentrations and chronic 4-day average concentrations.

The Water-Quality Assessment of the Sacramento River Basin, California Water-Quality, Sediment and Tissue Chemistry, and Biological Data, 1995-1998 (Open-File Report 2000- 91) by the United States Geological Survey found the hardness of the Sacramento River at Freeport to be 19 mg/l as CaCO3, on 6 January 1997.[9] The USGS is a reliable source of information and there is no reason not to use the lowest reported hardness of 19 mg/l.

Page F-65 of Central Valley Regional Board Order No. R5-2010-0114-01, NPDES NO. CA0077682, for the Sacramento Regional Wastewater Treatment Plant states: "For the receiving water, the applicable copper chronic criterion is 3.0 µg/L and the applicable acute criterion is 4.0 µg/L, as total recoverable, based on a hardness of 26 mg/L (as CaCO3), using USEPA default translators. The maximum observed upstream total copper concentration was 20.4 µg/L, based on data from 1992-2008."

The rationale in the EIR/EIS for using the average and 5th percentile data points rather than the simple worst-case hardness is not presented. There is certainly no indication that a four-day average would be properly represented by an average of data points collected over a 24 year period. The worst-case conditions and the worst-case potential for toxicity have not been evaluated for hardness dependent metals. As can be seen from the Sacramento Regional NPDES permit, the regulatory agency responsible for water quality in most of the Delta, the Central Valley Regional Water Quality Control Board, assessed the applicable receiving water criteria using the lowest observed hardness of 26 mg/l. The permit was appealed because of its use of an elevated hardness value, among other things.

The procedures described in US EPA's *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses* indicate that, except possibly where a locally important species is very sensitive, (freshwater or saltwater) aquatic organisms and their uses should not be affected unacceptably if the four-day average concentration of (name of material) does not exceed (the Criterion Continuous Concentration) µg/L more than once every three years on the average and if the one-hour average concentration does not exceed (the Criterion Maximum Concentration) µg/L more than once every three years on the average. The use of an average or 95th percentile hardness would potentially allow the criteria for hardness dependent metals to exceed the water quality criteria each time a hardness higher than the lowest recorded hardness is used to calculate the hardness. This in turn allows for exceedance of the criteria more than once in three years, the level EPA suggests would unacceptably affect aquatic life.

US EPA adopted new copper criteria in 2007 based on the biotic ligand model (BLM) which is a metal bioavailability model based on recent information about the chemical behavior and physiological effects of metals in aquatic environments. The EIR/EIS, page 8-171, explains that:

> "*The BLM criteria account for the aggregate effect of several different water quality parameters on copper toxicity in addition to hardness (e.g., dissolved organic carbon, pH, and various salt concentrations), with the protective*

[9] http://ca.water.usgs.gov/sac_nawqa/Publications/ofr_2000-391/data_sw/Freeport/freefld.html

criterion being sensitive to DOC concentrations in water. When calculated based on the average of all necessary parameters and the 5th percentile DOC, copper BLM-based criteria were higher (i.e., less sensitive) than the corresponding non WER-adjusted copper criteria presented in Table 8-59. Therefore, the calculated hardness-based CTR copper criteria are found to be adequately protective of fish olfaction."

However, the EIR/EIS again uses average and 95th percentile values for the input values into the BLM model resulting in the situation where water quality is not protected during periods when low hardness occurs.

Using a hardness of 25 mg/l results in dissolved copper criteria of 2.7 ug/l (4-day average) and 3.6 ug/l (1-hour average) which is significantly more protective than the 9 ug/l and 13 ug/l, respectively, developed and used in the EIR/EIS. Using the worst-case hardness of 19 mg/l, as measured by the USGS results in even more restrictive criteria than that required by the Central Valley Regional Board. The EIR/EIS's conclusion on page 8-171 that "*the calculated hardness-based CTR copper criteria are found to be adequately protective of fish olfaction"* is simply misleading, wrong, non-protective and technically deficient.

10. The Analysis of Aluminum is Deficient.

Aluminum is identified as a water quality constituent for which a detailed assessment is performed (Table 8-61, p. 8-174), identified as a constituent carried forward in the screening analysis (Table SA-9, p. 8C-37) and subjected to qualitative analysis (Table SA-11, p. 8C-40). However, water quality data for aluminum is not included in the detailed table of constituents measured at boundary stations (Table SA-6, p. 8C-22) and there is no discussion of aluminum in Chapter 8.

The Sacramento River maximum aluminum concentrations are over 8,000 µg/L (Sacramento Regional Wastewater Treatment Plant NPDES Permit, page F-43, Order No. R5-2010-0114-021). The US EPA water quality criteria for the protection of freshwater aquatic life are four-day average (chronic) and one-hour average (acute) for aluminum are 87 ug/*l* and 750 ug/*l*, respectively. The drinking water standard (maximum contaminant level (MCL)), both state and federal, for aluminum is 200 ug/l. The draft EIR/EIS (8-764, Trace Metals) is quite simply wrong in stating that the primary source of aluminum in the Delta is due to wastewater discharges. As is stated above the background concentration of aluminum in the Delta, above the Sacramento Regional WWTP, was almost 92 times higher than EPA's chronic criteria for aluminum and more than ten times above the acute criteria which is necessary to protect aquatic life. This measured concentration of aluminum in the Delta also exceeds the drinking water standard by 40 times.

The failure to address aluminum in the Water Quality section is a serious omission causing the EIR/EIS to be incomplete and not in compliance with CEQA and/or NEPA.

11. Impacts on Existing Mixing Zones are Ignored.

The Central Valley Regional Water Quality Control Board has issued numerous NPDES permits that allow for mixing zones for numerous constituents in ambient waters. Mixing zones are controversial and only allowed following detailed analysis and modeling that defines the specific dimensions of a zone of initial dilution. Mixing zones are especially difficult in tidal areas as incoming and outgoing tides cause constituents to slosh back and forth: this tidal-action essentially re-doses the area. There must always be a zone of passage, because a mixing zone cannot legally prevent passage of aquatic life. The EIR/EIS does not identify, discuss or provide maps of existing mixing zones in the Delta.

Altering the flow regime in a waterbody would impact the hydraulic and perhaps the constituent assimilative capacity available for mixing zones. Failure to reevaluate and modify mixing zones within the Delta could have significant adverse impacts to the beneficial uses of receiving waters. Mixing zones were also issued based in part on the economic impact to wastewater dischargers to fully treat their wastestream to meet end-of-pipe limitations. The impacts of Alternative 4 to mixing zones, beneficial uses, the associated economics and a requirement for reissuing NPDES permits that contain mixing zones should be evaluated and discussed.

12. Additive and Synergistic Impacts are Not Considered.

The EIR/EIS identifies the Delta as being listed as impaired by numerous pollutants including unknown toxicity. It is reasonable to assume that additive or synergistic effects of the many listed constituents could be contributing to toxicity within the Delta. It is more than reasonable to believe that a massive hydrologic project that proposes to deprive an estuary of more than 2.5 MAF of freshwater, thereby altering the existing flow regime, increasing residence time and affecting the fate and transport of pollutants in a highly degraded Delta, will likely have an impact on additive and synergistic toxicological interactions. However, in reviewing the EIR/EIS, we could only find one sentence mentioning additive or synergistic effects in the 791 pages of Chapter 8, Water Quality, no mention in Appendix 8C, Screening Analysis and only one passing sentence in the 3,055 pages of Chapter 11, Fish and Aquatic Resources, Parts 1 & 2.

If two or more constituents are present together in water, they may exert a combined effect to aquatic life, which can be additive, antagonistic or synergistic. For example: zinc and cadmium are additive in toxicity; copper is more than additive with chlorine, zinc, cadmium and mercury, while it decreases the toxicity of cyanide. The toxicity to mayflies of phenol and ammonia at low concentrations is additive, but at higher concentrations is more than additive. Organophosphate pesticide mixtures frequently exhibit additive or synergistic effects, as do pyrethroid and organophosphate mixtures. Temperature, pH, hardness, salinity and dissolved oxygen levels can exacerbate toxic effects. Acute toxicity to aquatic life can occur even when none of the individual constituents in a mixture exceed a water quality standard. Loss of dilution or increases in residence time enhances toxicity. As many as fifteen different pesticides have been identified in a single sample of Delta waters.

US EPA and the Environmental Research Laboratory published a study of acute and chronic toxicity tests that were conducted to determine the effects of metals combined as mixtures at proposed water quality criteria concentrations and at multiples of the LC50 and obtained from tests on six metals with three aquatic species. Arsenic, cadmium, chromium, copper, mercury and lead caused nearly 100% mortality in rainbow trout and daphnids (*C dubia*) during acute exposure. These results point out the need for additional studies to determine the type and degree of interaction of toxicants because single chemical water quality criteria may not sufficiently protect some species when other toxicants are present concurrently. (http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=91005B2N.txt)

The Central Valley Basin Plan,[10] *Implementation, Policy for Application of Water Quality Objectives* requires that:

> *"Where multiple toxic pollutants exist together in water, the potential for toxicologic interactions exists. On a case by case basis, the Regional Water Board will evaluate available receiving water and effluent data to determine whether there is a reasonable potential for interactive toxicity. Pollutants which are carcinogens or which manifest their toxic effects on the same organ systems or through similar mechanisms will generally be considered to have potentially additive toxicity."* Implementation, page IV-17.00-18.00.

The section provides the specific methodology to be followed to determine additive toxicity.

The EIR/EIS is grievously deficient in failing to acknowledge or adequately address how the project's hydrological modifications and resulting changes in flow, residence time, dilution and the fate, transport and mixing of pollutants will affect aquatic species.

13. Analysis of Potential Impacts Related to pH is Deficient.

Appendix 8C, Section 8C.1.5.7, pH, Page 8C-19, states, in part, the following with regard to pH:

> "*Because pH is a fundamental property of water, it affects the chemistry of numerous other constituents within the water, and thus, in addition to having potential direct effects on beneficial uses (such as municipal and domestic water supply and aquatic organisms), can also affect beneficial uses indirectly by altering the chemistry and toxicity of other constituents in the water.*
>
> *Within the affected environment, pH is typically between 6.5 and 8.5. The pH within the affected environment is controlled primarily by natural factors, such as alkalinity from natural weathering of minerals and carbon dioxide concentrations controlled by algae and bacterial respiration. Figure 8C- 1 shows exceedance probabilities of historical pH data from 1975 to 2009 in the Sacramento River at Freeport/Greene's Landing, the San Joaquin River at Vernalis, and San Francisco Bay at Martinez. The data indicate that the Sacramento River and San*

[10] http://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/index.shtml

Francisco Bay are within the Basin Plan objective range of 6.5 to 8.5 >95% of the time, while the San Joaquin River is between the limits >90% of the time. As water moves from these locations to areas within the Delta, pH changes as a result of natural factors, and therefore the pH at any given location within the Delta may have no correlation to the source waters that contribute water to that location. Given this, and given that the alternatives do not include components that would directly depress or elevate pH, it is not expected that pH would change substantially upstream of the Delta, within the Delta, or in the SWP and CVP Service Area under the alternatives, relative to Existing Conditions and (for Alternatives 1A–9) the No Action Alternative. Any negligible changes in pH that may occur in the water bodies of the affected environment would not be of frequency, magnitude and geographic extent that would adversely affect any beneficial uses or substantially degrade the quality of these water bodies, with regards to pH."

The quote graphically illustrates the inadequacies of the EIR/EIS's method of assessing pH. It only considers pH loading from tributary rivers to the exclusion of in Delta inputs. Review of the annual monitoring reports from the San Joaquin County and Delta Irrigated Lands Coalition reveals numerous exceedances of pH criteria, as do the annual reports submitted pursuant to the General Industrial and Construction Stormwater Permit program. There are many other sources including illegal dumping (the Delta is a favorite place to dump old batteries) and spills from bulk loading of petroleum coke, sulfur and other fertilizers at the Port of Stockton. The EIR/EIS fails to address how hydrologic modification and increased residence time in Delta channels affects pH impacts on water quality.

For drinking water, pH levels are important due to corrosive effects and adverse impacts to water treatment processes. For aquatic life, the pH range from 6.5 to 9 is considered nontoxic, however the toxicity of many constituents can be affected by changes in pH. Where pH levels are outside the 6.5 to 9.0 range, fish suffer adverse physiological effects increasing in severity until lethal levels are reached. The degree of dissociation of weak acids or bases is affected by changes in pH, which is important since the toxicity of several compounds is affected by the degree of dissociation. US EPA criteria recommend that rapid pH fluctuations should be avoided. The Central Valley Basin Plan water quality objective for pH limits shifts to no more than 0.5 pH units outside the 6.5 to 8.5 range.

The final page of Appendix 8C is Figure 8C-1, Probability of Exceedance for pH for Sacramento River at Freeport/Greene's Landing, San Joaquin River at Vernalis, and San Francisco Bay at Martinez for 1975-2009, shows that the Sacramento River and San Francisco Bay are below the 6.5 objective approximately 5% of the time and the San Joaquin River is below the pH objective almost 10% of the time. The EIR/EIS speaks as if this is a good record of compliance. It is not when one considers the potentially toxic impacts to aquatic life. US EPA Water Quality Criteria procedures are described in *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses* and indicate that, except possibly where a locally important species is very sensitive, (freshwater or saltwater) aquatic organisms and their uses should not be affected unacceptably if the four-day average concentration of (name of material) does not exceed (the Criterion Continuous Concentration) µg/L more than once every

three years on the average and if the one-hour average concentration does not exceed (the Criterion Maximum Concentration) µg/L more than once every three years on the average. While pH is not measured as a concentration, surely exceeding the objective 5 or 10% of the time is not an acceptable compliance record when other potentially toxic constituents are present.

The EIR/EIS states that "natural factors" will alter pH levels and any changes in pH would not be of frequency, magnitude and geographic extent that would adversely affect any beneficial uses or substantially degrade the quality of these water bodies. However, there is no information in the EIR/EIS supporting this claim. To the contrary, any exceedance of a water quality objective should be considered serious. As water is withdrawn from the Delta, water from the San Joaquin River would have a proportionally greater impact on the Delta waters under all scenarios of Alternative 4. This could lead to an increase in overall pH violations of the water quality objective for pH. The EIR/EIS fails to discuss pH shifts, which have the potential to increase toxicity and violate the Basin Plan objective for pH.

14. The Assessment of Pesticides Fails to Meet Minimal Requirements for a Disclosure Document.

The impacts of CM1 on pesticides is addressed at: Pesticides (Impact WQ-21: Effects on Pesticide Concentrations Resulting from Facilities Operations and Maintenance (CM1), pp. 8-463 – 8-467. The assessment of pesticide impacts is a largely qualitative analysis based upon best professional judgment. We could find no discussion of the analysis that would justify the subjective conclusion that, "These modeled changes in source water fractions are not of sufficient magnitude to substantially alter the long-term risk of pesticide-related toxicity to aquatic life, nor adversely affect other beneficial uses of the Delta." (P. 8-465, lines 30-33)

BDCP Appendix 8D, Source Water Fingerprinting Results, reveals that the distribution and mixing of Delta source water would significantly change. Modeling shows that for Alternative 4 H4, relative to the Existing Conditions Alternative, the source water fraction of San Joaquin River water at Rock Slough would increase 15-22% during September through March (11-15% during drought periods). At Contra Costa PP No. 1, the fraction would increase 15-23% during September through March (11-15% during October and November of droughts). At Franks Tract, the San Joaquin fraction would increase 11-16% during October through April and February through June. At Buckley Cove, the fraction would increase 11% in July and 16% in August during droughts. The other scenarios resulted in different fractions, as did comparisons with the No Action Alternative. For example, relative to the No Acton Alternative, the fraction of San Joaquin water at Buckley Cove would increase 16-17% in July (31-34% in drought conditions) and 24-25% in August (47-49% during droughts). Delta agricultural fractions are also projected to increase up to 8%, depending on location.

Not only will the San Joaquin River comprise a greater percentage of volume in eastern and southern Delta channels but the increase in residence time ensures that the suite of pesticides and other pollutants flowing down the river will have a longer period in which to mix with local municipal, industrial and agricultural inputs of pesticides and other pollutants and to interact with the environment.

We could find no credible discussion of the suite of pesticides present in these waters. It appears that limited data sets were used that ignored much of the pesticide monitoring data that has been acquired in recent years, especially monitoring by municipalities and agricultural coalitions. We could find no credible discussion regarding the potential effects of increased residence time on pesticide concentration and potential for bioaccumulative effects in the Delta. Despite the San Joaquin River and Delta being listed as impaired by various pesticides and unknown toxicity, we could find no discussion of the concentration, frequency and synergistic and additive effects of the universe of pesticides found in local waters.

For example, diazinon and chlorpyrifos are additive in toxicity, as are diazinon and esfenvalerate. Carbamate and organophosphate insecticides interact synergistically. There is an expansive literature on the toxicity and sublethal effects of pesticide mixtures.

Addressing pesticides, the Delta Independent Science Board in their Review of the Draft BDCP EIR/EIS and Draft BDCP (15 May 2014) observed,

> "Despite the acknowledged difficulty in predicting water quality impacts of the project, caused by lack of observational field data, as far as we could see there was no call for enhanced monitoring of pesticides in the Delta. As stated above, reliance on model outputs without their validation by comparison to observational data is a flawed approach, especially for assessing the effects of water quality constituents with high levels of uncertainty surrounding them, such as pesticides. In the section on pesticides, it was also remarkable that there was no mention of recent investigations showing very significant synergism between carbamate and organophosphate insecticides." Page B-24.

Apparently, source waters plus local inputs plus increased residence time plus additive/synergistic effects were not modeled or assessed. CM13 herbicide application was found to have significant and unavoidable impacts but we could not find a discussion where the impacts of CM13 were integrated into consideration of potential impacts of CM1. There is no antidegradation analysis that quantifies the degree of degradation, even if degradation fails to exceed a water quality standard. How much degradation or how many toxic events must occur in order to meet a "sufficient magnitude" threshold?

15. The Evaluation of Salinity and Electrical Conductivity is Deficient.

The SWRCB's 2010 Integrated Report, Clean Water Act Section 303(d) List/305(b) Report identifies vast areas of the Delta as impaired and incapable of supporting identified beneficial uses because of electrical conductivity (EC). The EIR/EIS states:

> "*The Region 5 Basin Plan specifies EC objectives for the Sacramento River, Feather River, and San Joaquin River; it also contains EC objectives for the Delta, which have been superseded by the 2006 Bay-Delta WQCP… impairment by elevated EC levels, as follows: (a) southern, northwestern, and western channels in the Delta; (b) Delta export area; (c) Grasslands drainage area, Mud Slough, and Salt Slough in the San Joaquin River valley; (d) San Joaquin River*

from Bear Creek to Delta boundary; and (e) Suisun Marsh (State Water Resources Control Board 2011)." (P. 8-55)

The EIR/EIS acknowledges that:

> *"In the Plan Area, Alternative 4, Scenarios H1-H4, would result in an increase in the frequency with which Bay-Delta WQCP EC objectives are exceeded for the entire period modeled (1976–1991): in the Sacramento River at Emmaton (agricultural objective; 17–19% increase) in the western Delta, and in the San Joaquin River at San Andreas Landing (agricultural objective; 2–3% increase) and Prisoners Point (fish and wildlife objective; 14–25% increase), both in the interior Delta; and in Old River near Middle River and at Tracy Bridge (agricultural objectives; up to 2% increase), both in the southern Delta. Average EC levels at Emmaton would increase by <1–14% for the entire period modeled and 8–13% during the drought period modeled. Average EC levels at San Andreas Landing would increase by 0–9% during for the entire period modeled and 7–13% during the drought period modeled."* (P. 8-440)

Consequently, operation of CM1 results in a significant adverse impact (P. 8-440). Since, the effectiveness of mitigation measures is uncertain, the impacts are termed significant and unavoidable.

With respect to the potential impacts on EC from implementation of CM2-22, the EIR/EIS acknowledges the CM4 would increase the magnitude of daily tidal water exchange and alter other hydrodynamic conditions in adjacent Delta channels. However, the DSM2 modeling included "assumptions regarding possible locations of tidal habitat restoration areas, and how restoration would affect Delta hydrodynamic conditions and thus the effects of this restoration measure on Delta EC were included in the assessment of CM1 facilities operations and maintenance." (P. 8-442, lines 27-30) Consequently, implementation "would not be expected to adversely affect EC levels in the affected environment" and the effects are determined, "to not be adverse." (P. 8-442, lines 31-34) Please explain how CM4 could be evaluated with CM1, which was found to have significant and unavoidable impacts, but that CM4 will not be expected to have adverse effects, especially, as CM4 is only evaluated at a programmatic level. The CEQA conclusion of no adverse impacts is equally baffling. It assumes that the substitution of agricultural lands with habitat will offset any increased tidal effects and, consequently, there will be no adverse impacts and no mitigation is required. (P. 8-442, lines 35-43; P. 8-443, lines 1-2) Since the specific extent and location of habitat has not been determined, on what basis and methodology does the EIR/EIS conclude that CM2-CM22 would not cause significant impacts and that no mitigation will be required?

The EIR/EIS Section 8.2.3.7 Salinity and Electrical Conductivity, beginning on page 8-52 states:

> "*Concern about salinity involves three main issues: drinking water, crop irrigation, and biota/habitat… In addition, industrial processes that require low-salinity water can be negatively affected. Salt removal during the water purification process (for either drinking or process water) is presently very expensive.*"

"*When salinity concentrations in irrigation water are too high, yields for salt-sensitive crops may be reduced*." (Page 8-53)

"*Incorporated into the BDCP, as set forth in EIR/EIS Appendix 3B, Environmental Commitments, a separate, non-environmental commitment to address the potential increased water treatment costs that could result from EC concentration effects on municipal, industrial and agricultural water purveyor operations*."

Agricultural crop yields reductions will occur as salinity in the irrigation water increases, not just for salt sensitive crops but also for more tolerant plant species. (Irrigation with Reclaimed Municipal Wastewater, a Guidance Manual, SWRCB Report No. 84-1 wr, Chapter 3 and Table 3-1) The anticipated reduction in crop yield as EC levels increase is not presented. A methodology for determining crop yield reductions is not presented. The proposed commitment to address "increased water treatment costs" does not address crop yield reductions and the associated lower profits earned since it is unlikely that irrigation water would be treated. In any case, the project does not fully protect the identified beneficial use of irrigated agriculture.

Industrial uses of water can be the most limiting water quality objectives for salinity as shown in Water Quality Criteria (McKee and Wolf, SWRCB 1963) Chapter 5. It is currently not uncommon for industries to use reverse osmosis (RO) system to remove salts prior to use in cooling towers and boiler systems. The EIR/EIS should document how many systems are in place for industrial uses to account for elevated salt levels within the use area. How many additional salt treatment and removal systems will need to be installed to account for the increased EC levels projected by the project? The existing and future costs associated with the EIR/EIS alternatives have not been accounted for. In any case, the project fails to full protect the identified beneficial use of municipal and industrial supply.

The Delta currently exceeds the water quality standard for EC and Alternative 4 will exacerbate this situation. The EIR/EIS essentially states that we will "look at it later" and attempt to mitigate by reimbursing for losses. There is no assessment of the current crop yield losses or those expected to occur due to implementation of the various options. There is no assessment of the current and anticipated impacts to industry or other from increased salinity and modified hydrology. There is no quantification of the actual costs to agriculture, industry, local communities or individuals that may occur due to increasing salinity levels. Mitigation must be feasible: have funds been committed to repay those who experience losses? It's easy to say there will be a commitment to offset the costs when those costs have not been assessed and a mechanism for injured parties to file claims to recover those costs has not been developed. However, this should be analyzed as a part of the EIR/EIS.

The EIR/EIS makes several conclusory, unsupported statements concerning increased EC loading in the future, including:

There could be increased discharges of EC-elevating parameters in the future in water bodies upstream of the Delta as a result of urban growth and increased runoff and wastewater discharges. The state has begun to aggressively regulate

point-source discharge effects on Delta salinity-elevating parameters, capping dischargers at existing levels, and is expected to further regulate EC and related parameters upstream of and within the Delta in the future as salt management plans are developed. Based on these considerations, EC levels (highs, lows, typical conditions) in the Sacramento River and its tributaries, the eastside tributaries, or their associated reservoirs upstream of the Delta would not be expected to be outside the ranges occurring under Existing Conditions or the No Action Alternative. (8-436, lines 9-17)

However, with the implementation of the adopted TMDL for the San Joaquin River at Vernalis and the ongoing development of the TMDL for the San Joaquin River upstream of Vernalis and its implementation, it is expected that long-term EC levels will improve. Based on these considerations, substantial changes in EC levels in the San Joaquin River relative to Existing Conditions or the No Action Alternative would not be expected of sufficient magnitude and geographic extent that would result in adverse effects on any beneficial uses, or substantially degrade the quality of these water bodies, with regard to EC. (8-436, lines 29-35)

CSPA routinely reviews municipal and industrial NPDES permits and has filed numerous appeals with the SWRCB over the Regional Board's failure to comply with CWA regulations regarding EC loading. Several of the Regional Board-issued permits have been or are in litigation. CSPA recently submitted comments on the renewal of Waste Discharge Requirements (WDRs) for the Grasslands Bypass Project. We were involved in the development of TMDLs and have unsuccessfully sought to persuade the Regional Board to comply with SWRCB direction to move the salinity compliance point upstream from Vernalis. We authored the legislation that sunset the original agricultural waiver of Waste Discharge Requirements (WDRs), were deeply involved in the development of the replacement conditional waivers and litigated each one of them. We currently have appeals pending before the SWRCB of the recently adopted agricultural WDRs for the Eastside and Westside San Joaquin Valley, San Joaquin County/Delta and the Sacramento Valley. CSPA maintains a rotating docket of 30-35 enforcement cases against industrial violators of the General Industrial Stormwater Permit. We have no evidence and do not believe there is any documented, quantifiable evidence that the mass loading of EC has stabilized, been reduced or that there is significant likelihood of reductions in the near future. If the authors of EIR/EIS believe otherwise, they should provide the documented quantifiable evidence. If not, they should eliminate or modify the unsupported conclusions referenced above.

The SWRCB has refused to enforce water quality standards it adopted in 1995 and incorporated into water rights permits in 2000. For example, between April of 2007 and December 2013, there were 868 documented days of noncompliance with the D-1641 EC standards at the Old River near Tracy Boulevard Bridge compliance point. In 2013 EC standards at Emmaton were ignored, as the SWRCB informed DWR and USBR that it would not seek enforcement. This year, the SWRCB simply waived existing standards. Based on past enforcement history, there is no reasonable basis to assume that EC standards will be enforced in the future. Consequently, the EIR/EIS conclusions that salinity levels are likely to be consistent with levels projected in the EIR/EIS are in error. If the authors of the EIR/EIS have reason to believe that future

enforcement or compliance will be substantially different that it has been in the past, please provide it.

As previously noted, the EIR/EIS completely ignores the federally promulgated salinity standards at 40 CFR 131.37. Those standards include estuarine habitat criteria for salinity at Chipps Island, Roe Island and Suisun Marsh plus a criteria of 0.44 micro-mhos between 1 April and 31 May for striped bass and splittail spawning and migration on the San Joaquin River at Jersey Point, San Andreas Landing, Prisoners Point, Buckley Cove, Rough and Ready Island, Brandt Bridge, Mossdale and Vernalis when the San Joaquin Index is greater than 2.5 MAF and at Jersey Point, San Andreas landing and Prisoners Point when the San Joaquin Index is less than 205 MAF. The EIR/EIS must discuss, analyze and address the project's impacts and compliance with currently applicable USEPA federally promulgated criteria for the Delta.

Chapter 8 (Water Quality) and Chapter 11 (Fish and Aquatic Resources, Parts 1 & 2) largely ignore the water quality and habitat needs of striped bass and splittail in the eastern Delta and lower San Joaquin River. The studies US EPA relied upon in establishing salinity criteria protective of the migration and spawning beneficial uses of striped bass and splittail are still applicable.[11]

Neither, Chapter 8 (Water Quality) and Chapter 11 (Fish and Aquatic Resources, Parts 1 & 2) adequately surveys, analyzes or discusses the impacts of EC and other contaminants, or the impacts of modified hydrology and increased residence time on freshwater invertebrates (especially their egg and sensitive stages) in the eastern and southern Delta and lower San Joaquin River. Zooplankton is a critical source of food to numerous fish species. Different zooplankton species tend to inhabit freshwater, low salinity zones or high salinity zones. Native Copepod and Mysid species have plummeted. The same applies to the phytoplankton community.

With respect to native aquatic and adjacent riparian plant species, the EIR/EIS acknowledges that field surveys were limited by continuing legal challenges to efforts to obtain entry permits. In reviewing Chapter 8, we could find little discussion or analysis on the potential salinity and other water quality impacts to aquatic and riparian plants, with the exception of assessments on the effects of CM2-22 herbicide and pesticide use. The problem here is not an inadequate analysis

[11] Turner, J.L., Striped Bass Spawning in the Sacramento and San Joaquin Rivers in Central California from 1963 to 1972. Calif. Fish and Game, 62(2):106-118, 1972: Turner, J.L. and Harold K Chadwick, Distribution and Abundance of Young-of-the-Year Striped Bass, Morone saxatilis, in Relation to River Flow in the Sacramento-San Joaquin Estuary. Anadromous Fisheries Branch, CDFG, 1972: Fraley, T.C., Striped bass, Roccus Saxatilis, Spawning in the Sacramento-San Joaquin Rivers During 1963 and 1964, 1966: Radtke, L.D. and Jerry L. Turner, High Concentrations of Total Dissolved Solids Block Spawning Migration of Striped Bass, Roccus saxatilis, in the San Joaquin River, California. Transactions of the American Fisheries Society. 96:4, 405-407, 1967: Radtke, L.D., Distribution of Adult and Subadult Striped Bass, Roccus Saxatilis, in the Sacramento-San Joaquin Delta, 1966: Turner J.L and Timothy C. Farley, Effects of Temperature, Salinity, and Dissolved Oxygen on the Survival of Striped Bass Eggs and Larvae. Calif. Fish and Game 57(4):268-273. 1971: See also, SWRCB, Draft Water Quality Control Plan for Salinity, San Francisco Bay/Sacramento-San Joaquin Delta Estuary, 1988 and SWRCB, Water Quality Control Plan for Salinity, San Francisco Bay/Sacramento-San Joaquin Delta Estuary, 1991.

of the impacts of salinity and other contaminants to riparian and channel vegetation communities in the South Delta or San Joaquin River, but that there is virtually no analysis.

The Delta was historically dominated by freshwater and the estuary was where the mixing of fresh and salt waters occurred. There are several natural divisions within the Delta and lower San Joaquin River system. Historically, the Southern and Eastern Delta was dominated by freshwater conditions and once supported myriad native freshwater species. A few of these species include common tules (*Scirpus acutus, S. californicus*), cattails (*Typha spp.),* common reed (*Phragmites communis*), swamp knotweed (*Polygonum coccineum*), marsh bindweed (*Calystegia sepium*), bur-reed (*Sparganium eurycarpum*), cinquefoil (*Potentilla anserina*), twinberry (*Lonicera involucrata*), dogwood (*Cornus stolonifera*), buttonwillow (*Cephalanthus occidentale*), and willows (*Salix lasiolepis, S. lucida*). This wetland community was once very common and remnants of these communities still can be found on numerous channel islands and along the waterside of levees. Others grow in the water itself. A number of these species, like twinberry (*Lonicera involucrate*), are extremely sensitive to salt. The EIR/EIS must examine potential impacts of increased salinity levels and residence time to native aquatic and riparian plants.

16. The Discussion of the Narrative Toxicity Objective and the Potential for Emerging or Legacy Pollutants to Violate Criteria and Beneficial Uses is Inadequate.

The EIR/EIS Table 8.5, Receptors Affected by Water Quality-Characterized by the Designated Beneficial Uses of the Study Area (p.8-29) identifies emerging pollutants (ECs/PPCPs) as having the potential to affect water quality. The Central Valley Regional Board Basin Plan contains a narrative toxicity objective that prohibits: ***"****Toxic substances to be present, individually or in combination, in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life."*

Constituents of Emerging Concern (CECs) clearly have potential to violate the Basin Plan's narrative toxicity objective. There is an extensive and rapidly expanding body of scientific literature discussing emerging pollutants.

> The increasing production and use of pharmaceuticals and personal care products (PPCPs) – some of which may be endocrine disrupting compounds (EDCs) – have led to a growing concern about the occurrence of these compounds in the environment. Recent studies have reported the occurrence worldwide of EDCs, PPCPs, and other organic wastewater contaminants (OWCs) – collectively referred to as "constituents of emerging concern" (CECs) or "emerging constituents" (ECs) – in wastewater treatment plant (WWTP) effluents, surface waters used as drinking water supplies, and in some cases, finished drinking waters. Of the 126 samples analyzed for the project, one sample (American River at Fairbairn drinking water treatment plant [DWTP] intake collected in April 2008) had no detectable levels of any EDCs, PPCPs, or OWCs. All other samples had one or more analytes detected at or above the corresponding MRLs. The five most frequently detected PPCPs were caffeine, carbamazepine, primidone, sulfamethoxazole, and tri(2-chloroethyl) phosphate (TCEP). At the sample sites upstream of WWTP discharges in all three watersheds, the concentrations of selected PPCPs, except for

caffeine, were low (i.e., ≤ 13 ng/L), pointing to WWTP discharges as the main source of most PPCPs and OWCs in the environment. (Source, Fate, and Transport of Endocrine disruptors, Pharmaceuticals, and Personal Care Products in Drinking Water Sources in California, National Water Research Institute Fountain Valley, California, May 2010)

Over the last 10 years, reports of feminized wildlife have fueled chilling headlines. Most of these reports have focused on the many ways that estrogen in sewage effluent can distort normal male development. Now a new study reveals one way that the hormone pollutant can affect females: Too much estrogen causes subtle changes in female fish's courting behavior, which could alter a population's genetic makeup (Environ. Sci. Technol., DOI: 10.1021/es101185b).

Increase in intersex fish downstream from WWTP possibly associated with endocrine-active contaminants. (Boulder Colorado, Colorado University, 2008)

Skewed sex ratio downstream from WWTP possibly associated with endocrine-active contaminants. (Boulder Colorado, Colorado University, 2006)

Fluoxetine (FLX), Sertraline (SER) and their degradants NFLX, and NSER were the primary antidepressants in brain tissue samples. Little or no venlafaxine (VEN), the dominant antidepressant in both water and bed sediment, was present. Degradates were measured at higher concentrations in brain samples than parent compounds. (Boulder Creek, Colorado & Fourmile Creek, Iowa, the College of Wooster, 2010)

SAR sites (with WWTP or urban runoff influent) males had significantly lower Testosterone (T) than the reference site males. Males from SAR sites had significantly higher17β-estradiol (E2) than reference site. Females from SAR sites had significantly lower E2 than the reference site females. (USGS, Santa Ana River (SAR) SAR sites, 2009)

"Several recent studies have documented endocrine disruption in Delta fish. One of the biomarkers of EDCs is intersex fish, fish with both male and female reproductive organs. A recent histopathological evaluation of delta smelt for the Pelagic Organism Decline found 9 of 144 maturing delta smelt (6%) collected in the fall were intersex males. This study provides evidence that delta smelt are being exposed to EDCs. Brander and Cherr (2008) observed choriogenin induction in male silversides from Suisun Marsh. Riordan and Adam (2008) reported endocrine disruption in male fathead minnows following in-situ exposures below the Sacramento Regional Treatment Plant. Lavado, et al. (in press) conducted studies in 2006 and 2007 to evaluate the occurrence and potential sources of EDCs in Central Valley waterways. In their study, estrogenic activity was repeatedly observed at 6 of 16 locations in the Bay-Delta watershed, including in water from the Lower Napa River and Lower Sacramento River in the Delta. Further studies are needed to identify the compounds responsible for the observed estrogenic activity and their sources." (Alameda County Water District, Alameda County Flood Control and Water Conservation District, Zone 7, Metropolitan Water District of Southern California, San Luis

& Delta-Mendota Water Authority, Santa Clara Valley Water District, State Water Contractors, June 1, 2010)

A 2008 study of the maternal transfer of xenobiotics and effects on larval fish in the estuary documented that offspring of fish caught in the Delta had undeveloped brains, inadequate energy supplies and dysfunctional livers. An array of compounds known to cause myriad problems in both young and adult fish, including skeletal and organ deformities and dysfunction; changes in hormone function and behavior were identified in fish tissue. A two-year DWR funded study of sublethal factors that might be contributing to the decline of pelagic fish in the Bay-Delta assessed the health status of larval, juvenile and adult female striped bass collected in the Delta using morphometric, histopathological, otolith and biochemical metrics. It concluded that a wide-array of contaminants were significant stressors on the vast majority of juvenile striped bass causing severe physiological stress, morbidity and likely compromised immune systems. Findings of abnormal disease and parasitism were found in juvenile fish in all years studied and were considered to have a significant impact on the health of the fish and the population. In addition, the data suggested that adult striped bass are also likely adverse affected by the bioaccumulation of contaminants, such as PBDE's, and that such contaminant effects need to be considered a significant stressor that is affecting the decline of striped bass and are likely causing population level effects in early life stages. Both studies can be found accessed at https://sites.google.com/site/drdavidostrach/about-david-ostrach.

A recent study by the Toxic Substances Hydrology Program of the U.S. Geological Survey (USGS) shows that a broad range of chemicals found in residential, industrial, and agricultural wastewaters commonly occurs in mixtures at low concentrations downstream from areas of intense urbanization and animal production. The chemicals include human and veterinary drugs (including antibiotics), natural and synthetic hormones, detergent metabolites, plasticizers, insecticides, and fire retardants. One or more of these chemicals were found in 80 percent of the streams sampled. Half of the streams contained 7 or more of these chemicals, and about one-third of the streams contained 10 or more of these chemicals. This study is the first national-scale examination of these organic wastewater contaminants in streams and supports the USGS mission to assess the quantity and quality of the Nation's water resources. A more complete analysis of these and other emerging water-quality issues is ongoing. Knowledge of the potential human and environmental health effects of these 95 chemicals is highly varied; drinking-water standards or other human or ecological health criteria have been established for 14. Measured concentrations rarely exceeded any of the standards or criteria. Thirty-three are known or suspected to be hormonally active; 46 are pharmaceutically active. Little is known about the potential health effects to humans or aquatic organisms exposed to the low levels of most of these chemicals or the mixtures commonly found in this study. ("Pharmaceuticals, hormones, and other organic wastewater contaminants in U.S. streams, 1999-2000: A national reconnaissance," an article published in the March 15, 2002 issue of Environmental Science & Technology, v. 36, no. 6, pages 1202-1211. Data are presented in a companion USGS report, "Water-quality data for pharmaceuticals, hormones, and other organic wastewater contaminants

in U.S. streams, 1999-2000" (USGS Open-File Report 02-94). These and other reports, data, and maps can be accessed on the Internet at http://toxics.usgs.gov.)

PPCPs are found where people or animals are treated with drugs and people use personal care products. PPCPs are found in any water body influenced by raw or treated sewage, including rivers, streams, ground water, coastal marine environments, and many drinking water sources. PPCPs have been identified in most places sampled. The U.S. Geological Survey (USGS) implemented a national reconnaissance to provide baseline information on the environmental occurrence of PPCPs in water resources. You can find more information about this project from the USGS's What's in Our Wastewaters and Where Does it Go? (http://toxics.usgs.gov/highlights/whatsin.html). PPCPs in the environment are frequently found in aquatic environments because PPCPs dissolve easily and don't evaporate at normal temperature and pressures. Practices such as the use of sewage sludge ("biosolids") and reclaimed water for irrigation brings PPCPs into contact with the soil. (http://www.epa.gov/ppcp/faq.html#iftherareindeed)

From the recent scientific investigations and literature, it is reasonable to conclude that CECs are present in the Delta at levels that cause toxicity in violation of the narrative toxicity objective. It is also reasonable to conclude that wastewater discharges into the Delta contain CECs in concentrations that at a minimum threaten to violate the Receiving Water Limitation for toxicity, which prohibits toxic substances to be present in concentrations that produce detrimental physiological responses in human or aquatic life.

US EPA has compiled a database; *Treating Contaminants of Emerging Concern A Literature Review Database* (August 2010). Local wastewater treatment system design engineers have also been testing treatment system capabilities for removing CECs. There appear to be treatment technologies that are capable of removing significant levels of CECs.

With respect to CEC's, the Delta Independent Science Board in their Review of the Draft BDCP EIR/EIS and Draft BDCP (15 May 2014) observed,

> *"Very optimistic descriptions of CECs and their removal from wastewater by WWTPs are given, but no acknowledgment is made of many other CECs that are shown to be highly recalcitrant to such removals. Such demonstrations of unfamiliarity with the subjects covered do not engender confidence in the analysis."* Page B-22.

With respect to pollutants that bioaccumulate, the Delta Independent Science Board observed,

> *"Also, in regard to bioaccumulation, mercury and selenium appear to be the only constituents that were evaluated for their bioaccumulative properties. A range of organic contaminants (e.g., PAHs, dioxins, some endocrine disrupting compounds) also bioaccumulate, but this was not acknowledged or addressed in the DEIR/DEIS document."* Page B-24.

The EIR/EIS does not sufficiently assess the current state of water quality within the Delta or compliance with the narrative toxicity objective. The Delta is 303d listed as impaired for unknown toxicity. CECs, legacy and bioaccumulating pollutants present more than a reasonable potential to be causing and/or contributing to this toxicity.

17. There is no Defensible Antidegradation Analysis.

There is a fundamental flaw in the EIR/EIS in the analysis regarding Water Quality. Individual constituents were analyzed and discussed based on the potential for exceedance of federal water quality criteria or state water quality objectives or if the constituent was on the state's Clean Water Act Section 303(d) list. A cornerstone of the State Water Board and Regional Water Board's regulatory authority is the Antidegradation Policy (Resolution 68-16), which is included in the Basin Plans as an appendix. However, the EIR/EIS fails to discuss or analyze constituents which will "degrade" water quality unless they pose a threat to exceed a water quality standard.

Section 101(a) of the Clean Water Act (CWA), the basis for the antidegradation policy, states that the objective of the Act is to "restore and maintain the chemical, biological and physical integrity of the nation's waters." Section 303(d)(4) of the CWA carries this further, referring explicitly to the need for states to satisfy the antidegradation regulations at 40 CFR § 131.12 before taking action to lower water quality. These regulations (40 CFR § 131.12(a)) describe the federal antidegradation policy and dictate that states must adopt both a policy at least as stringent as the federal policy as well as implementing procedures.

The CWA requires the **full** protection of identified beneficial uses. The Federal Antidegradation Policy, as required in 40 CFR 131.12 states, "The antidegradation policy and implementation methods shall, at a minimum, be consistent with the following: (1) Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected." EPA Region 9's guidance on implementing antidegradation policy states, "All actions that could lower water quality in Tier II waters require a determination that existing uses will be fully maintained and protected." (EPA, Region 9, Guidance on Implementing the Antidegradation Provisions of 40 CFR 131.12, page 7) The Delta is classified as a Tier II, "high quality," waterbody by US EPA and the SWRCB.

California's Antidegradation Policy is composed of both the federal antidegradation policy and the State Board's Resolution 68-16 (State Water Resources Control Board, Water Quality Order 86-17, p. 20 (1986) ("Order 86-17); Memorandum from Chief Counsel William Attwater, SWRCB to Regional Board Executive Officers, "Federal Antidegradation Policy," pp. 2, 18 (Oct. 7, 1987) ("State Antidegradation Guidance")). As a state policy, with inclusion in the Water Quality Control Plan (Basin Plan), the antidegradation policy is binding on all of the Regional Boards (Water Quality Order 86-17, pp. 17-18).

The BDCP will require a number of waste discharge permits from the SWRCB or Regional Water Quality Control Board for construction and operation of the project. It will require a CWA Section 401 Water Quality Certification, which is necessary for any "federal license or permit to conduct and activity…[that] may result in any discharge into navigable waters." (33 U.S.C. § 1341(a)(1).) In order to obtain a 401 certification, a project must meet CWA

requirements to meet water quality requirements CWA Section 303 (33 U.S.C. § 1341(d)) BDCP will require a CWA Section 404 permit from the U.S Army Corps of Engineers, which will trigger the 401 certification process. The state cannot issue a Section 401 certification if there is no reasonable assurance that the project will meet water quality standards. As confirmed by the U.S. Supreme Court, CWA Section 401 certification considers the impacts of the entire activity and not simply the impacts of a particular discharge that triggers Section 401. (*PUD No. 1 of Jefferson County v. Washington Department of Ecology*, 511 U.S. 700 (1994)) Since water quality standards consist of both the water quality criteria and the designated uses of the navigable waters involved, an antidegradation analysis is required to ensure that the "existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected." (40 CFR 131.12)

California's Antidegradation Policy (Resolution 68-16) requires that:

- Existing high quality water will be maintained until it has been demonstrated that any change will be with the maximum benefit to the people of the State.
- The change will not unreasonably affect present and anticipated beneficial uses.
- The change will not result in water quality less than prescribed in the policies.
- Any activity which produces a waste or increased volume or concentration will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that a pollution or nuisance will not occur and the highest water quality with maximum benefit to the people of the state will be maintained.

Implementation of the state's antidegradation policy is guided by the State Antidegradation Guidance, SWRCB Administrative Procedures Update 90-004, 2 July 1990 ("APU 90-004") and USEPA Region IX, "Guidance on Implementing the Antidegradation Provisions of 40 CFR 131.12" (3 June 1987) (" Region IX Guidance"), as well as Water Quality Order 86-17. The Regional Board must apply the antidegradation policy whenever it takes an action that will lower water quality (State Antidegradation Guidance, pp. 3, 5, 18, and Region IX Guidance, p. 1). Application of the policy does not depend on whether the action will actually impair beneficial uses (State Antidegradation Guidance, p. 6). The proposed project, as defined by the alternatives described in the EIR/EIS, will result in reduced flows and lower water quality in the Delta for some constituents.

The State Board's APU 90-004 specifies guidance to the Regional Boards for implementing the state and federal antidegradation policies and guidance. The guidance establishes a two-tiered process for addressing these policies and sets forth two levels of analysis: a simple analysis and a complete analysis. A simple analysis may be employed where a Regional Board determines that: 1) a reduction in water quality will be spatially localized or limited with respect to the waterbody, e.g. confined to the mixing zone; 2) a reduction in water quality is temporally limited; 3) a proposed action will produce minor effects which will not result in a significant reduction of water quality; and 4) a proposed activity has been approved in a General Plan and has been adequately subjected to the environmental and economic analysis required in an EIR. A complete antidegradation analysis is required if discharges would result in: 1) a substantial increase in mass emissions of a constituent; or 2) significant mortality, growth impairment, or

reproductive impairment of resident species. Regional Boards are advised to apply stricter scrutiny to non-threshold constituents, i.e., carcinogens and other constituents that are deemed to present a risk of source magnitude at all non-zero concentrations. If a Regional Board cannot find that the above determinations can be reached, a complete analysis is required.

Even a minimal antidegradation analysis would require an examination of: 1) existing applicable water quality standards; 2) ambient conditions in receiving waters compared to standards; 3) incremental changes in constituent loading, both concentration and mass; 4) treatability; 5) best practicable treatment and control (BPTC); 6) comparison of the proposed increased loadings relative to other sources; 7) an assessment of the significance of changes in ambient water quality and 8) whether the waterbody was a ONRW. A minimal antidegradation analysis must also analyze whether: 1) such degradation is consistent with the maximum benefit to the people of the state; 2) the activity is necessary to accommodate important economic or social development in the area; 3) the highest statutory and regulatory requirements and best management practices for pollution control are achieved; and 4) resulting water quality is adequate to protect and maintain existing beneficial uses.

The EIR/EIS, page 8-408 states in part that:

> "*Effects of the Alternative on Delta Hydrodynamics Under the No Action Alternative and Alternatives 1–9, the following two primary factors can substantially affect water quality within the Delta:*
>
> - *Within the south, west, and interior Delta, a decrease in the percentage of Sacramento River sourced water and a concurrent increase in San Joaquin River-sourced water can increase the concentrations of numerous constituents (e.g., boron, bromide, chloride, electrical conductivity, nitrate, organic carbon, some pesticides, selenium). This source water replacement is caused by decreased exports of San Joaquin River water (due to increased Sacramento River water exports), or effects of climate change on timing of flows in the rivers. Changes in channel flows also can affect water residence time and many related physical, chemical, and biological variables.*
> - *Particularly in the west Delta, sea water intrusion as a result of sea level rise or decreased Delta outflow can increase the concentration of salts (bromide, chloride) and levels of electrical conductivity. Conversely, increased Delta outflow (e.g., as a result of Fall X2 operations in wet and above normal water years) will decrease levels of these constituents, particularly in the west Delta.*"

BDCP will reduce flows and result in lower water quality for a number of constituents, including boron, bromide, chloride, electrical conductivity, nitrate, organic carbon, some pesticides and selenium. The Delta is currently impaired for many of the constituents that will increase under the proposed alternative. While California's Antidegradation Policy requires that, "[t]he change will not unreasonably affect present and anticipated beneficial uses and the change will not result in water quality less than prescribed in the policies," the Federal Antidegradation Policy requires a "determination that existing uses will be fully maintained and protected." EPA, Region 9, Guidance on Implementing the Antidegradation Provisions of 40 CFR 131.12, page 7.

The proposed project will result in a substantial increase in mass emissions of constituents that already exceed water quality standards. This does not comply with the Policies set forth in the Basin Plan. Massively exceeding a water quality standard – any water quality standard - does not fully protect present and anticipated beneficial uses. Impacts to the existing impaired water for unknown toxicity and specifically mortality, growth and reproduction of resident species have not been thoroughly discussed or analyzed for toxic constituents. Nor have impacts to native zooplankton and phytoplankton communities that comprise the base of the food chain web been analyzed.

A complete Antidegradation analysis must be conducted to determine: incremental changes in constituent loading, both concentration and mass; the significance of changes in ambient water quality; whether such degradation is consistent with the maximum benefit to the people of the state; whether the activity is necessary to accommodate important economic or social development in the area; and whether the resulting water quality is adequate to fully protect and maintain existing beneficial uses.

18. The Analysis and Discussion of Pathogens is Fundamentally Flawed.

The EIR/EIS (8.2.3.12) identifies the beneficial uses impacted by pathogens as municipal and domestic supply, water contact recreation, shellfish harvesting, and commercial and sport fishing. Missing from this list is irrigated agriculture. Pathogens have not been evaluated for Agricultural Supply water. California Code of Regulations, Title 22, is mentioned in the EIR/EIS specifically with regard to pathogens and protecting Contact Recreational beneficial uses. However, Title 22 equally addresses agricultural irrigation and the acceptable levels of pathogens. From a regulatory point of view, Title 22 requirements are only directly applicable to reclaimed water; however, the science used to determine a protective level for pathogens is directly applicable for protecting irrigated agriculture and recreational activities. The potential impacts to irrigated agriculture and the ingestion of food crops irrigated with water exceeding the recommended levels for pathogens presents at least the same level of concern as does recreational activity in that same water. The impacts to Irrigated Agriculture from pathogens, nitrates, constituents of emerging concern (CECs) and phthalates have not been assessed. The EIR/EIS is therefore incomplete.

This Section of the EIR/EIS, page 8-80 states that: "*Viruses also can be removed effectively through chlorine or ozone oxidation.*" This statement is incorrect; while chlorination may be effective at rendering some limited number of viruses inactive, it removes none. For the most part, viruses and protozoa have a moderate to high tolerance to chlorine. (CDC, Effect of Chlorination on Inactivating Selected Pathogens, 21 March 2012) It is also fairly well documented in Civil Engineering texts that viruses and parasites are best removed by filtration and chlorination is generally accepted as ineffective. Going back to the requirements contained in CCR Title 22, filtration is required to remove pathogens, and one will note that disinfection with chlorine is not a requirement. Tertiary treatment, consisting of chemical coagulation, sedimentation, and filtration, has been found to remove approximately 99.5% of viruses. Filtration is an effective means of reducing viruses and parasites from the waste stream, not disinfection with chlorine.

The EIR/EIS is also incorrect in stating that pathogens experience rapid die off in the natural environment. The latest science shows that pathogens can survive for lengthy time periods and the indicator tests used to identify pathogens may not be reliable:

A. *"Previous research had raised questions about whether E. coli O157:H7 outlasts indicator bacteria in the environment. So Michael Jenkins and his colleagues at the U.S. Department of Agriculture's Agricultural Research Service decided to test the reliability of the EPA's method by measuring the survival rates of E. coli O157:H7 and four species of indicator bacteria. In one experiment, they injected the E. coli strain and the indicator bacteria into small, porous chambers and then suspended the chambers in test ponds in northeast Georgia. By varying the chambers' depth in the water, the scientists could monitor the microbe's survival rate under different levels of solar radiation. In another experiment, they placed inoculated pond water in bottles in an outdoor laboratory. The researchers then measured bacteria levels at regular intervals. Both experiments exposed the bacteria to predation by other microorganisms—a common fate of microbes in the environment.*

*They found that in both experiments, the indicator bacteria died off significantly more quickly than E. coli O157:H7 did. For example, in the outdoor lab experiments, most cells of fecal Enterococcus—an indicator species—died in less than five days. But it took between seven and 18 days for most of the E. coli O157:H7 to die. The virulent strain appeared to be more resistant than indicator bacteria to solar radiation and to predation by other microorganisms. The findings suggest that the dangerous E. coli could be present in water even when tests for fecal indicator bacteria are negative, Jenkins says. "We need to develop methods that are going to be able to quantify the pathogens themselves," he says." (*Chemical & Engineering News, ISSN 0009-2347)

B. *"In general, many different kinds of viruses can persist in and on environmental media, including liquid and solid media and in the airborne state, with half-lives of hours, days, weeks or even months. The extent of persistence depends on the type of virus, it physical state (dispersed, aggregated, cell-associated, membrane-bound, adsorb to other solids, etc.), the medium in which it is present (faeces, respiratory secretions, tissues, other liquids or solids, air, etc. and prevailing environmental conditions that influence virus survival. The environmental conditions influencing virus survival generally include: temperature; pH and other physical and chemical properties of the medium in which the viruses are present, such as moisture content, organic matter, particulates, salt concentration, protective ions, and antiviral chemicals such as proteolytic enzymes; antiviral microbial activity, and light. On environmental surfaces and in aerosols additional environmental factors also influence virus survival, such as relative humidity and physico-chemical forces at air-water and air-water-solid interfaces."* (WHO Virus Survival Report, Virus Survival in the Environment with Special Attention to Survival in Sewage Droplets and Other Environmental Media of Fecal or Respiratory Origin, August 21, 2003)

C. *"Three enteroviruses — polioviruses, echoviruses and coxsackieviruses — were used to contaminate soil and vegetables; their survival times, under various storage*

conditions, were then recorded (2). The concentration of the viruses employed varied from 1 x 104-5 to 1 x 105-5 CCID50/ml. Depending on soil type, moisture content, pH and temperature, the viruses survived for 150 to 170 days in soil. When added to uncooked vegetables and stored under household conditions, the viruses survived for as long as 15 days." (Rev. sci. tech. Off. int. Epiz., 1991, 10 (3), 733-748, Virus survival in the environment)

Pathogens and their longevity are important in the context of multiple beneficial uses. Below, we describe how many of these uses affect and are affected by pathogens, and how these effects, of and on, these uses should have been analyzed

Recreational Waters Criteria and Beach Closures

In most areas of California, the current water quality criterion for bacteria in recreational waters is based on fecal coliform organisms:

- In waters designated for contact recreation (REC-1), the fecal coliform concentration based on a minimum of not less than five samples for any 30-day period shall not exceed a geometric mean of 200/100 ml, nor shall more than ten percent of the total number of samples taken during any 30-day period exceed 400/100 ml.

US EPA's evaluation of the bacteriological data indicated that using the fecal coliform indicator group at the maximum geometric mean of 200/100 ml would cause an estimated 8 illnesses per 1,000 swimmers at marine beaches (*Ambient Water Quality Criteria for Bacteria – 1986).* US EPA now recommends the addition of criteria for E. coli (126/100 ml) and enterococci (33/100 ml) based on the same "acceptable" illness rate of 8 illnesses per 1,000 swimmers at marine beaches.

Even at the "acceptable" illness rate of 8 out of every 1,000 swimmers; the National Resources Defense Council (NRDC) in 2008 issued a press release interpreting EPA's data that beach closures were at their highest level in 18 years. In 2002, the Centers for Disease Control and Prevention (CDC) concluded that the incidence of waterborne infections from recreational water use has steadily increased over the last several decades. Despite the beach closures and the increase in reported sewage-related illnesses, in a healthy population, most of the illnesses resulting from exposure to inadequately treated sewage are relatively minor (respiratory illness; ear, nose, or throat irritation; and especially gastroenteritis) and go unreported. Even if such illnesses are reported to doctors, there is seldom an attempt to find or track an environmental source.

Another complicating issue is inadequate data on the occurrence of sewer spills or overflows. The State Water Board has only begun requiring reporting of sewer spills into its new sanitary sewer overflow (SSO) database and reporting compliance rates are mixed. The lack of data regarding sewer spills and the under-reporting of illnesses makes it difficult to definitively estimate the incidence of diseases caused by exposure to sewage-contaminated waters. The number of reported cases is a small subset of the actual number of illnesses caused by sewage exposure or waterborne pathogens.

The Delta is a recreational magnet, attracting many thousands of water enthusiasts, including boaters, swimmers, water-skiers, windsurfers, fishermen and others who routinely come into contact with the water. The Delta is also home to thousands of people who permanently live on boats, many of which do not always follow proper sanitation protocols. During warmer weather, many people anchor boats for extended periods of time in attractive anchorages, without always returning to pump-out facilities empty marine sanitation devices. A large homeless population lives in the Delta and along urban tributary streams and lack even rudimentary sanitation facilities.

CSPA staff and members have spent thousands and thousands of days on Delta waters and are acutely aware of the numerous cases of gastrointestinal illnesses and seriously infected cuts experienced by individuals following exposure to the water. Few of these illnesses are formally report to health authorities. We are aware that urban stormwater monitoring reveals that, following rainfall, stormwater discharges and local receiving waters far exceed water quality standards for pathogens.

The EIR/EIS fails to identify how many exceedances of bacteria standards were recorded during the period analyzed, discuss or estimate the number of illnesses typically occurring or that are projected to occur or identify recreational closures.

Beneficial Uses of the Receiving Water

By memorandum, dated September 28th 2000, Jeff Stone, California Department of Health Services (DHS), Office of Drinking Water, Recycled Water Unit, to Regional and District Engineers wrote that: "Federal Standards for water quality where recreational bathing may occur were developed for freshwaters which are not directly influenced by sewage discharges (treated or untreated)." The memorandum goes on to state that the Department does not believe that the federal criteria are protective if the source of water is domestic wastewater and cites the "Uniform Guidelines" prepared by the Department.

Irrigated Agriculture

Although the discussion of pathogens has largely been limited to recreational uses, Irrigated Agriculture is a designated beneficial use of most inland waters. Outbreaks of bacteria-contaminated food have made headlines over the past few years. California Department of Public Health, Regulations, CCR Title 22, Section 60303, require that for the irrigation of Food Crops, including edible root crops, reclaimed water be tertiary treated water disinfected to 2.2 MPN/100 ml (total coliform organisms). Obviously, 2.2 MPN total coliform is significantly less than the 200 MPN fecal coliform bacteria criteria established for recreational waters.

Undiluted surface water can be and is used to irrigate food crops. The science used to develop the bacteria limitation in the Title 22 Reclamation Criteria for the irrigation of food crops is applicable to surface waters even though the Title 22 regulatory requirements do not apply. By Memorandum to Regional Water Boards, dated August 18, 1992, the then Department of Health Services, Office of Drinking Water, issued the *Uniform Guidelines for the Disinfection of*

Wastewater (Uniform Guidelines). The Uniform Guidelines recommend that for agricultural uses where there is less than a twenty-to-one dilution of wastewater within the receiving stream, that a tertiary level of treatment be required with a 2.2 MPN/100 ml limitation for total coliform organisms. A footnote for this situation states that where there is no dilution, the water reclamation criteria shall apply. The Uniform Guidelines further recommend that: when there is dilution available in the receiving stream of at least 20-to-1 the wastewater be treated to a secondary level and disinfected to a 23 MPN/100 ml; and when there is dilution available of at least 100-to-1 the wastewater be treated to a secondary level and disinfected to a 240 MPN/100 ml.

Municipal (Drinking) and Domestic

The Uniform Guidelines recommend that for drinking water uses where there is less than a twenty to one dilution of wastewater within the receiving stream, no domestic wastewater discharges be allowed. Tertiary treated, 2.2 MPN/100 ml, wastewater could only be allowed to a receiving stream with a drinking water beneficial use if greater than a twenty-to-one dilution reliably exists.

Contact Recreation

The Uniform Guidelines and the Reclamation Criteria of CCR Title 22 require that for unrestricted recreational uses that wastewater be tertiary treated and disinfected to 2.2 MPN/100 ml (total coliform organisms), unless a 20 to 1 in stream dilution exists then the wastewater may be secondary treated and disinfected to 23 MPN/100 ml. This recommendation for contact recreational uses is directly comparable to the US EPA recommended bacteria criteria.

Domestic Wastewater Treatment

As stated above, the California Department of Public Health, formerly the Department of Health Services, does not support the Federal Criteria as being protective if the source of water in the receiving stream is domestic wastewater (treated or untreated).

Domestic wastewater discharges are regulated under Federal NPDES permits issued by the State and Regional Boards. The federal Clean Water Act, Section 101(a)(2), states: “it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and for recreation in and on the water be achieved by July 1, 1983.” Federal Regulations, developed to implement the requirements of the Clean Water Act, create a rebuttable presumption that all waters be designated as fishable and swimmable. Federal Regulations, 40 CFR Sections 131.2 and 131.10, require that all waters of the State regulated to protect the beneficial uses of public water supply, protection and propagation of fish, shell fish and wildlife, recreation in and on the water, agricultural, industrial and other purposes including navigation.

The diversion of approximately 2.5 MAF of relatively good dilution flow from the estuary will increase the relative percentage of water from the San Joaquin River in the eastern and southern Delta. This will inevitably increase the relative concentration of human and agricultural wastes

in these waters, including dairy and livestock wastes that have been identified as sources of pathogens. It will also increase the residence time of pathogens and increase the potential to impact those who come in contact with the water. It will increase the opportunity for pathogens to affect irrigated food crops and domestic water supplies. The EIR/EIS is deficient because it fails to adequately and accurately consider the potential adverse effects of pathogens on human health

19. The Analysis of Water Temperature is Deficient.

The Water Quality section of the EIR/EIS states that: "*Because the primary concern of water temperature is effects on fish and aquatic organisms, temperature is addressed in Chapter 11, Fish and Aquatic Resources.*" Any discussion of Water Quality is incomplete without including temperature. There are water quality objectives for temperature in the Basin Plan; Water Quality Objectives (Page III-8.00, Sacramento and San Joaquin Basins), and the Water Quality Control Plan for Temperature (Thermal Plan, an appendix to the Basin Plan). Elevated temperature is a pollutant and compliance with objectives is a relevant discussion with regard to water quality. Also, temperature directly affects the toxicity of other constituents such as ammonia. Temperature also impacts dissolved oxygen concentrations and may impact compliance with the DO objective. Strictly in terms of compliance with objectives and the impacts to other constituents, a thorough discussion of temperature must be included in the Water Quality section of the EIR/EIS. The Water Quality section must be amended to discuss temperature, compliance with limitations, protection of beneficial uses and the impacts from the various alternatives described in the EIR/EIS.

The temperature objectives in the Basin Plan and the Thermal Plan are principally based on antidegradation (changes in temperature) and not necessarily on the direct protection of beneficial uses of receiving water or the Delta. The Delta is home to numerous species of Coldwater fish and all life stages. Maximum temperatures for the protection of Coldwater fish species are well documented; and the Central Valley Regional Board has included specific temperature regimes in NPDES permits, such as for the Cities of Lincoln and Placerville. Any discussion of temperatures must not be limited to regulatory compliance with objectives but must also discuss the temperatures necessary to assure a productive population of Coldwater aquatic life.

20. Color is Inadequately Addressed.

CCR Title 22, Chapter 15, Article 16, Secondary Water Standards, Section 64449, states, in part, that: "The secondary MCLs shown in Tables 64449-A and 64449-B shall not exceed in the water supplied to the public by community water systems." Table 64449-A contains a MCL for color of 15 units.

Drinking water MCLs are included in the Central Valley Basin Plan by direct reference under the Chemical Constituents Objective; therefore the MCLs are applicable water quality standards.

The EIR/EIS (Section 8C.1.5.2) incorrectly states that: "*Color in water has a secondary MCL of 15 color units. Secondary MCLs are established <u>only as guidelines</u> to assist public water systems*

in managing their drinking water for aesthetic considerations." In California the secondary MCL for color is a regulatory requirement and an applicable water quality standard.

The EIR/EIS (Section 8C.1.5.2) continues:

> "*To the degree that color itself is a concern from an aesthetic standpoint, conventional drinking water treatment removes many of the constituents that cause high color levels in water. Coagulation/flocculation and filtration remove metals like iron, manganese and zinc. Aeration removes iron and manganese. Granular activated carbon removes most of the contaminants which cause color (U.S. EPA 2012b). Color in the three major source waters to the Delta does not vary considerably (see Step 1, Table SA-6). The average in the Sacramento River at Freeport/Greene's Landing is approximately 22 units, while San Francisco Bay at Martinez and San Joaquin River at Vernalis average approximately 30 units. The standard deviations at these locations are 22–37 units, indicating that substantial variability exists at all three locations, and no specific source waters is consistently highest in color. The Delta is not 303(d) listed for color and thus no beneficial use impairment due to its current levels is occurring."*

The total portions of iron, manganese and zinc may be removed by coagulation, flocculation and filtration; however, the dissolved segment will likely pass through such treatment systems. The EIR/EIS does not present any information regarding the total and/or dissolved speciation of these metals.

It makes no engineering sense that aeration would remove iron and manganese from a water column. Aeration is a process where air is added to a treatment process; this may remove volatile constituents to the atmosphere, but not metals.

The EIR/EIS clearly shows that color exceeds the water quality standard throughout the Delta where the average levels of 22 units and 30 units clearly exceed the 15 unit standard. The fact that the 303(d) list has not been modified to include color does not indicate that the water quality standard is not being exceeded.

The State Water Resources Control Board's Policy, Resolution No. 88-63, "Sources of Drinking Water" states that All surface and ground waters of the State are considered to be suitable, or potentially suitable, for municipal or domestic water supply and should be so designated by the Regional Boards…" Drinking water quality must be maintained within the waters of the State not just following extraction and treatment.

The drinking water beneficial use is impaired by color within the Delta; the EIR/EIS clearly documents this case by showing average color levels, which exceed the drinking water MCL. The EIR/EIS is not only deficient with regard to the discussion of color, but it is misleading and simply incorrect.

In closing, the EIR/EIS is seriously misleading, grossly inadequate, technically deficient and fails, in multiple ways, to meet the minimal CEQA and NEPA requirements for an environmental review document.

Thank you for considering these comments. If you have questions or require clarification, please don't hesitate to contact us.

Sincerely,

Bill Jennings, Executive Director
California Sportfishing Protection Alliance

Attachment: Comments on Bay Delta Conservation Plan (BDCP) Draft EIR/EIS Chapter 8 – Water Quality, Chapter 25 – Public Health, G. Fred Lee, PhD, PE, BCEE, F.ASCE and Anne Jones-Lee, PhD

Comments on Bay Delta Conservation Plan (BDCP) Draft EIR/EIS
Chapter 8 – Water Quality
Chapter 25 – Public Health

G. Fred Lee, PhD, PE, BCEE, F.ASCE and Anne Jones-Lee, PhD
G. Fred Lee & Associates
El Macero, California

July 25, 2014

The following comments are offered in response to the request for public comment on the Bay Delta Conservation Plan (BDCP) Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) (http://baydeltaconservationplan.com/PublicReview.aspx). According to published information (http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library/Highlights_of_the_Draft_EIR-EIS_12-9-13.sflb.ashx),

> *"The proposed Bay Delta Conservation Plan (BDCP) is a comprehensive conservation strategy that intends to address the critical issues in the Delta using an ecosystem-based approach. The Plan would help to restore fish and wildlife species in the Delta and to improve reliability of water supplies, while minimizing impacts on Delta communities and farms."*
>
> *"The Draft EIR/EIS is intended to analyze and disclose the potential impacts on the human environment from the proposed action and alternatives."*

These comments address Chapter 8 of the draft EIR/EIS, which is devoted to Delta Water Quality as impacted by the preferred alternative plan described thus: (http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library/Draft_BDCP_Highlights_12-9-13.sflb.ashx):

> *"The proposed BDCP project includes three new intakes along the Sacramento River in the north Delta and twin underground main tunnels through the Delta, approximately 30 miles long, to carry water under the Delta to the CVP* [Central Valley Project] *and SWP* [State Water Project] *pumping plants. A forebay would be needed near the intakes to collect water diverted from the river, then gravity flow would move water supplies through the tunnels."*
>
> *"The twin tunnels would be lined with concrete segments and capable of moving a maximum of 9,000 cubic feet per second (cfs). The gravity-flow system requires two 40-foot-diameter tunnels to convey the needed flows and overcome friction losses to keep water moving through the system."*

These comments also address additional aspects of public health impacts of the proposed project as included in Chapter 25 of the draft EIR/EIS, which is described thus (Chapter 25 page 1):

> *"This chapter focuses on issues related to human health and safety that could potentially be affected by implementation of the BDCP alternatives, particularly with respect to water quality, the potential to cause or worsen water borne illness, the potential to create habitat for vectors that may carry diseases; and to address potential health related concerns from additional electric transmission lines needed under most of the alternatives."*

Overall Assessment

Overall, the draft BDCP EIR/EIS and approaches used in its development are inadequate in scope and reliability for evaluating the potential impacts of diverting substantial amounts of Sacramento River water around or through the Delta on chemical constituents and water quality in Delta channels. The draft EIR/EIS basically used model output of expected changes in the concentrations of a few water quality parameters that have not been found to exceed a water quality objective at a few selected locations in the Delta as was done for this draft EIR/EIS. The approach used does not adequately or reliably consider the range of water quality impacts caused by the wide variety of potential pollutants present in the various Delta channels, that can be expected to result from the removal of large amounts of high-quality Sacramento River water from the Delta by this project.

As discussed herein the existing database on chemical contaminants contributed to the Delta, the impacts of sources of flow and changes in those sources on contaminant concentration, distribution, and impact within the Delta, and Delta channel water quality overall is too limited to make a sufficiently reliable assessment of the impacts of a project as extensive, expensive, and far-reaching as that proposed. Further, the level of uncertainty inherent in the existing modeling of Delta channel flows, and the Sacramento River component of those flows, renders it insufficiently reliable to adequately estimate the change in channel flow and character that will be expected to result from the massive diversion of Sacramento River flow around or through the Delta as proposed, much less the influence on those flow alterations on the concentrations, distribution, and impacts of chemical contaminants in the Delta.

As discussed in these comments there are a number of issues that should have been, but were not adequately, considered in assessing the water quality impacts of the existing Sacramento River flow into the Delta as well as the impacts of significantly reducing that flow. An area of the Delta of importance and with which Dr. Lee is particularly familiar is the Central Delta where the Sacramento River mixes with the San Joaquin River below Columbia Cut. As found in his studies of that area, and discussed in his reports that are on Drs. Lee and Jones-Lee's website, [www.gfredlee.com in the San Joaquin River Delta section at http://www.gfredlee.com/psjriv2.html] the amount of Sacramento River in the San Joaquin River channel is dependent on the amount of south Delta water that is pumped from the Delta by the CVP and SWP; the Sacramento River is drawn through the Delta by and toward the export pumps While the export pumps for those two projects will continue to draw south Delta water from the Southern Delta with half of total exports will coming from the north Delta facilities and, in the long-term alternative 4 will lead to increased exports and reduced outflow. These issues as well as others discussed herein need to be defined and evaluated before further consideration is given to the proposed BDCP diversion project.

A properly developed EIR/EIS would have included a detained analysis of potential errors in predicting constituent concentrations in the various Delta channels and in predicting the changes in flow and associated impacts on constituent concentrations, distribution, and effects. As it stands now Chapter 8 of this EIR/EIS does not reliably inform the public or decision-makers about the magnitude of the errors in estimates and conclusions inherent in the BDCP analysis of the impact of the diversions on Delta water quality/beneficial uses.

Background to Comments

Dr. G. Fred Lee has been involved and pioneered in graduate-level teaching, research, laboratory direction, consulting, and professional service in a myriad aspects of sources, fate, transport, and public health and environmental quality impacts of chemicals in natural waters (including lakes, reservoirs, rivers, estuaries, and nearshore marine waters) since the early 1960s; he has published nearly 1000 professional papers and reports on his work. Information on Drs. Lee and Jones-Lee's experience in these areas and publications are available on their website, www.gfredlee.com; their involvement in, and publications concerning, the Sacramento San Joaquin River Delta specifically are addressed at http://www.gfredlee.com/psjriv2.html.

Drs. Lee and Jones-Lee began working on Delta water quality issues in the summer of 1989 when he was a Distinguished Professor and she was Associate Professor of Engineering at the New Jersey Institute of Technology. At that time they were contracted by Delta Wetlands, a proposed private project to develop water supply reservoirs in the Delta, to evaluate the expected water quality in the proposed reservoirs based on their more than 25 years of work on reservoir water quality in the USA and many other areas of the world. Their project involved collecting and reviewing existing Delta water quality and related data and assessing the anticipated water quality in the proposed Delta reservoirs for water supply and other beneficial uses, since it was to be Delta water that would be used to fill the proposed reservoirs.

Beginning in 2002 Drs. Lee and Jones-Lee became technical advisors to the San Joaquin River Deep Water Ship Channel (DWSC) Low-DO (dissolved oxygen) TMDL Steering Committee. That involvement led to their being appointed principal investigators (PIs) for a $2-million CalFed project to investigate the causes of the low-DO problems in the DWSC. As project PIs they coordinated the studies of 12 investigators and developed synthesis reports for the project. In addition, they published additional papers and reports discussing the study findings and their significance and implications for water quality in Delta. Appendix A to these comments provides a brief description and citations with URLs for many of those writings; additional papers and reports on Delta water quality issues are available in the San Joaquin River & Delta section of their website (http://www.gfredlee.com/psjriv2.html). The SJR DWSC low DO TMDL project led to the development of,

> Lee. G. F., and Jones-Lee, A., "Synthesis and Discussion of Findings on the Causes and Factors Influencing Low DO in the San Joaquin River Deep Water Ship Channel near Stockton, CA: Including 2002 Data," Report Submitted to SJR DO TMDL Steering Committee/Technical Advisory Committee and CALFED Bay-Delta Program, G. Fred Lee & Associates, El Macero, CA, March (2003). http://www.gfredlee.com/SJR-Delta/SynthesisRpt3-21-03.pdf
>
> Lee, G. F. and Jones-Lee, A., "Supplement to Synthesis Report on the Low-DO Problem in the SJR DWSC," Report of G. Fred Lee & Associates, El Macero, CA, June (2004). http://www.gfredlee.com/SJR-Delta/SynthRptSupp.pdf

and a number of other papers and reports on these studies. Further information on these studies is presented below.

Following the completion of the SJR DWSC DO TMDL synthesis report developed,

Lee, G. F. and Jones-Lee, A., "Overview of Sacramento-San Joaquin River Delta Water Quality Issues," Report of G. Fred Lee & Associates, El Macero, CA (2004). http://www.gfredlee.com/SJR-Delta/Delta-WQ-IssuesRpt.pdf

Lee, G. F., and Jones-Lee, A., "Overview—Sacramento/San Joaquin Delta Water Quality," Presented at CA/NV AWWA Fall Conference, Sacramento, CA, PowerPoint Slides, G. Fred Lee & Associates, El Macero, CA, October (2007). http://www.gfredlee.com/SJR-Delta/DeltaWQCANVAWWAOct07.pdf

The Lee and Jones-Lee (2004) Delta water quality report was the first comprehensive report on Delta water quality issues that examined the water quality implications of violations of water quality objectives in the Delta channels.

A major finding discussed therein was that the flow through the Delta channels impacted the location and magnitude of violations of water quality objectives in a Delta channel. While the importance of channel flow was impacting water quality/beneficial uses of the channel, it was pointed out that there was very little concrete understanding of how altering the channel flow impacted the water quality.

Of particular note with respect to addressing issues of the draft EIR/EIS Chapter 25 is Dr. Lee's BA and MSPH degrees in public health and his PhD in environmental engineering with a minor with public health. Much of his work during his five-decades-long profession career has been in water quality research and consulting activities that address public health and water quality aspects of chemical and biological contaminants in the environment and drinking water.

In summary these comments on the adequacy of the BDCP draft EIR EIS to adequately and reliably present information on the impact of proposed diversion of 9,000 cfs of Sacramento River around the Delta began in 1989. Since then we have been active in review of Delta water quality issues including developing over 90 reports/papers on these issues. Further information on this experience is in

Lee, G. F., and Jones-Lee, A., "Experience in Reviewing Delta Water Quality Issues," G. Fred Lee & Associates, El Macero, CA, April 3 (2011). http://www.gfredlee.com/SJR-Delta/GFLAJL-Delta-EXP-REV.pdf

Specific Comments on Draft EIR/EIS BDCP "Chapter 8 Water Quality"

"8.1 Readers' Guide

Chapter 8, Water Quality, describes the environmental setting and potential impacts of the BDCP on water quality in and upstream of the Sacramento-San Joaquin Delta. The chapter provides the results of the evaluation of the effects of implementing the BDCP conservation measures on water quality constituents under a no action alternative and 15 different project alternatives."

Pages 8-15&16 Table 8-1 lists the beneficial uses of the Delta. An issue that needs to be acknowledged and understood is that Sacramento River flow into and through the Delta plays an important part in reducing the water quality impacts of regulated and unrecognized/unregulated pollutants added to Delta water, both by its dilution of pollutant concentration and by decreasing

the pollutant residence times in the Delta. The reduction in Sacramento River flow into and through the Delta that will result from the proposed plan will be expected to increase the water quality and public health significance of unrecognized/unregulated pollutants in the Delta waters. These issues were discussed in the following presentations and writings:

Lee, G. F., and Jones-Lee, A., "Enhanced Delta Flows Needed to Help Control Water Quality Impacts of Delta Pollutants," Testimony for CA State Water Resources Control Board Public Workshop: Comprehensive (Phase 2) Review & Update to Bay-Delta Plan Workshop 1: Ecosystem Changes and the Low Salinity Zone, Sacramento, CA, September 5, 2012, Report of G. Fred Lee & Associates, El Macero, CA, August 17 (2012).
http://www.gfredlee.com/SJR-Delta/Lee_Testimony_BayDelta_Workshop_1.pdf

Lee, G. F., and Jones-Lee, A., "Discussion of Water Quality Issues That Should Be Considered in Evaluating the Potential Impact of Delta Water Diversions/Manipulations on Chemical Pollutants on Aquatic Life Resources of the Delta," Report of G. Fred Lee & Associates, El Macero, CA, February 11 (2010).
http://www.gfredlee.com/SJR-Delta/Impact_Diversions.pdf

Lee, G. F., and Jones-Lee, A., "Comments on Water Quality Issues Associated with SWRCB's Developing Flow Criteria for Protection of the Public Trust Aquatic Life Resources of the Delta," Submitted to CA State Water Resources Control Board as part of Public Trust Delta Flow Criteria Development, by G. Fred Lee & Associates, El Macero, CA, February 11 (2010).
http://www.gfredlee.com/SJR-Delta/Public_Trust_WQ.pdf

The proposed BDCP diversion of Sacramento River water around the Delta rather than continuing to allow river water to flow through the Delta to the CVP and SWP diversions will be detrimental to Delta water quality.

Section 8.2.1.8 beginning on Page 8-25 presents a review of "water quality constituents of concern," and makes mention of some of the unrecognized pollutants. That section, however, does not adequately address this issue. There are many more unregulated and unrecognized potential pollutants that could be impacting Delta water quality beneficial uses; these issues are reviewed in:

Lee, G. F., and Jones-Lee, A., "Unrecognized Environmental Pollutants," Water Encyclopedia: Surface and Agricultural Water, Wiley, Hoboken, NJ pp 371-373 (2005).
http://www.gfredlee.com/SurfaceWQ/WileyUnrecognizedPollutants.pdf

Volume 13 Number 1, January 12, 2010 - Topics: Impacts of unmonitored, unregulated, and unrecognized chemicals in the aquatic systems.
www.gfredlee.com/Newsletter/swnewsV13N1.pdf

As noted, above the proposed BDCP diversion of Sacramento River water around the Delta will be adverse to beneficial uses of the Delta due by enhancing the water quality impacts of unregulated and unregulated potential pollutants.

Page 8-26 lines 16-17 states, *"Excess nutrients can cause blooms of nuisance algae and aquatic*

vegetation, and their decay can result in depleted DO." The draft does not adequately address the at least equally, and in some areas, more significant impacts of aquatic macrophytes on aquatic life (fish) habitat and recreational use (boating) in the Delta.

Page 8-36 lines 20-22 state, *"Nutrient concentrations currently in the Delta are high enough that they are probably not a true limiting factor for overall algal growth, and therefore increases in ammonia generally will not lead to an increase in algal growth (Jassby et al. 2002:1)."* It should be noted that the Central Valley Regional Water Quality Control Board (CVRWQCB) recently established a limit on the release of ammonia in city of Stockton wastewater discharges to the SJR on the belief that that ammonia is significant in stimulating the growth of algae in Southern California water supply reservoirs, causing tastes and odors in the water supply.

Page 8-47 presents a discussion of PCB-pollution of the Delta. That discussion is highly deficient in that it fails to mention the large amount of work that has been done on PCB accumulation in fish in the Delta and Delta tributaries. In 2002 Dr. Lee reviewed the extensive data on PCBs in fish of the Central Valley on behalf of the State Water Resources Control Board (SWRCB)/CVRWQCB. From that work, Lee and Jones-Lee developed the following reports:

Lee, G. F. and Jones-Lee, A., "Organochlorine Pesticide, PCB and Dioxin/Furan Excessive Bioaccumulation Management Guidance," California Water Institute Report TP 02-06 to the California Water Resources Control Board/Central Valley Regional Water Quality Control Board, 170 pp, California State University Fresno, Fresno, CA, December (2002). http://www.gfredlee.com/SurfaceWQ/OClTMDLRpt12-11-02.pdf

Lee, G. F., and Jones-Lee, A., "Update of Organochlorine (OCl) 'Legacy' Pesticide and PCB Concentrations in Delta and Central Valley Fish," Report of G. Fred Lee & Associates, El Macero, CA, September 10 (2007). http://gfredlee.com/SurfaceWQ/UpdateLegacyPestCVFish.pdf

As discussed in those reports, the PCB-pollution of Delta and Delta tributary fish is a major water quality issue in the Central Valley waterways, sufficient to render the consumption of some large game fish such as largemouth bass hazardous to human health. While the California Office of Environmental Health Hazard Assessment (OHHEA) has reported that the levels of legacy chlorinated hydrocarbon pesticides such as DDT/DDE in fish tissue has been decreasing, the PCB content of Central Valley fish has not decreased.

Pages 8-51&52 present some information on the low-DO situation in the SJR DWSC. That discussion is deficient, however, in that it fails to discuss how manipulation of SJR DWSC flow has been, and still can be, a major factor in causing low-DO conditions in the DWSC. As discussed in reports cited in the Background section of these comments and Appendix A, the export of Delta waters by the CVP and SWP is a major contributor to low DO in the DWSC. The draft EIR/EIS fails to adequately discuss the current situation concerning the low DO in DWSC. As written, it misleads a reader to believe that the installation and operation an aeration system will control the low-DO situation in the DWSC. It also fails to discuss that there are no funds available to operate an aeration system in a manner to control the low DO that can result from the residual oxygen demand contributed from agricultural sources. Agricultural sources contribute algal nutrients to the upstream SJR waters; those nutrients support the growth of algae

that cause significant oxygen demand in the DWSC especially under low-flow conditions in the SJR DWSC. The loss of Sacramento River water in the ship channel will potentially expand the downstream range of dissolved oxygen problems. Information on the current low-DO situation in the SJR DWSC is available in the following reports:

Lee, G. F., Comments on SJR DWSC Low-DO issues discussed at March 28, 2012 BDCP meeting. Comments submitted to J. Grindstaff, Executive Officer, Delta Stewardship Council, by G. Fred Lee & Associates, El Macero, CA, April 28 (2012). http://www.gfredlee.com/SJR-Delta/Comments_SJR_DO_Issues_DSC.pdf

Lee, G. F., and Jones-Lee, A., "Background Information on SJR Upstream Oxygen Demand Control Issues," Prepared for San Joaquin River Technical Work Group, Report of G. Fred Lee & Associates, El Macero, CA, July 11 (2010). http://www.gfredlee.com/SJR-Delta/Bkgrnd-SJR-DO.pdf

Lee, G. F., and Jones-Lee, A., "Issues in Controlling the Residual Oxygen Demand in the SJR DWSC That Leads to DO WQO Violations," Report of G. Fred Lee & Associates, El Macero, CA, November 3, 2010; updated February 6 (2011). http://www.gfredlee.com/SJR-Delta/Residual-Ox-Demand-DWSC.pdf

As discussed in those reports, algal nutrients discharged by irrigated agriculture in the Grasslands Project area needs to be controlled in order to control algal growth in the SJR that contributes to the residual oxygen demand in the DWSC that can lead to low-DO conditions. The control of that source is especially important under the proposed plan that would divert Sacramento River water around the Delta, in order to mitigate the impact of the loss of Sacramento River on the low-DO situation in the SJR DWSC. The control of algal nutrients upstream in the SJR could greatly reduce, if not eliminate, the need for an aeration system.

Page 8-52 lines 36-37 states, *"EC and TDS values tend to be highly correlated because the majority of chemicals that contribute to TDS are charged particles that impart conductance of water."* It is incorrect to describe ions that contribute to electrical conductivity as "charge particles." The ions are not particles.

Pages 8-69 through 8-74 are devoted to "Nitrate/Nitrite and Phosphorus" in the Delta. That discussion is significantly deficient as it does not adequately discuss problems with the Gilbert discussion of N/P ratios as factor in influencing fish populations in the Delta. While those issues were discussed in an earlier section of the draft EIR/EIS, they are not discussed in the section that focuses on these issues on pages 8-70 and 8-71. When Gilbert first proposed to rely on N/P ratios, we developed the paper cited below to address the unreliability of that approach.

Lee, G. F., and Jones-Lee, A., "Comments on the Adequacy of C. Dahm's Discussion of Delta Eutrophication Issues & Delta N/P Rations as a Cause of Adverse Impact on Delta Fish," Comments to Delta Stewardship Council, Report of G. Fred Lee &Associates, El Macero, CA, November 17 (2011). http://www.gfredlee.com/SJR-Delta/DSC-Comments-Dahm-Eutroph.pdf

Lee, G. F., and Jones-Lee, A., "Comments on P. Glibert Defense of N/P Ratios as Major Influence on Aquatic Ecosystems Composition in Delta," Report of G. Fred Lee & Associates, El Macro, CA, September 17 (2012).
http://www.gfredlee.com/SJR-Delta/Comments_Glibert_NPRatio.pdf

The BDCP draft EIR/EIs Water Quality Chapter 8 should have discussed the findings presented in Dr. Erwin van Nieuwenhuyse's professional workshop presentation and publication concerning the response in average summer chlorophyll concentration in the Delta to an abrupt and sustained reduction in phosphorus discharge from the Sacramento Regional Wastewater Treatment Plant. His presentation slides are available at http://www.cwemf.org/workshops/DeltaNutrientsWrkshp/VanNieuwenhuyse.pdf and his published paper is:

vanNieuwenhuyse, E., "Response of Summer Chlorophyll Concentration to Reduced Total Phosphorus Concentration in the Rhine River (Netherlands) and the Sacramento– San Joaquin Delta (California, USA)," Can. J. Fish. Aquatic, Sci. 64(11):1529-1542 (2007). [http://www.ingentaconnect.com/content/nrc/cjfas/2007/00000064/00000011/art00006]

His presentation and paper provided important information on the impact of phosphorus discharges from that facility on planktonic algae in the Delta. He found that the changes in the fish production and ecosystem in Delta that occurred was more likely a result of the decrease in phosphorus discharged rather than of a change in N/P ratios.

Another issue that was not properly addressed in the draft EIR/EIS is that particulate inorganic phosphorus is largely not available to support algal growth. This issue has been reviewed in a number of publications including:

Lee, G. F., "A Proposal for Assessing Algal-Available Phosphorus Loads in Runoff from Irrigated Agriculture in the Central Valley of California," Report of G. Fred Lee & Associates, El Macero, CA, November (2006).
http://www.gfredlee.com/Nutrients/AlgalAssayAvailP.pdf

Lee, G. F., "Assessing Algal Available Phosphorus," Submitted for Inclusion in the Proceedings of US EPA Science Symposium: "Sources, Transport, and Fate of Nutrients in the Mississippi River and Atchafalaya River Basins," Minneapolis, MN, November 7-9 (2006).
http://www.gfredlee.com/Nutrients/AvailPEPASymp06.pdf

Lee, G. F., and Jones-Lee, A., "Assessing the Water Quality Significance of N & P Compound Concentrations in Agricultural Runoff," Invited Paper Presented at Agrochemical Division, American Chemical Society National Meeting, San Francisco, CA, September (2006).
http://www.gfredlee.com/Nutrients/N-PRunoffACS.pdf

It is the algal-available P load to the Delta –soluble ortho P as well as algal-cell phosphorus – that needs to be the focus of phosphorus control programs to control excessive algal growth in Delta waters.

Pages 8-162 & 8-163 present a discussion of organic carbon. That discussion should include the findings reported in:

Lee, G. F., "Synopsis of G. Fred Lee and Anne Jones-Lee's Work on Domestic Water Supply Water Quality, and TOC Issues in the Sacramento/San Joaquin River Delta," Report of G. Fred Lee & Associates, El Macero, CA (2004).
http://www.gfredlee.com/SJR-Delta/GFL-DeltaTOCWork.pdf

Lee, G. F. and Jones-Lee, A., "Issues that Need to Be Considered in Evaluating the Sources and Potential Control of TOC that Leads to THMs for Water Utilities that Use Delta Water as a Water Supply Source," Report of G. Fred Lee & Associates, El Macero, CA, May (2003).
http://www.gfredlee.com/SJR-Delta/TOC_update.pdf

Pages 8-164 devoted to pesticides fails to mention the comprehensive review of the organochlorine legacy pesticides such as DDT that are still present in Delta tributary soils and sediments and contribute to the presence of some of these pesticides in some fish in the Delta and Delta tributaries in concentrations that represent a threat to human health. These issues are reviewed in:

Lee, G. F. and Jones-Lee, A., "Organochlorine Pesticide, PCB and Dioxin/Furan Excessive Bioaccumulation Management Guidance," California Water Institute Report TP 02-06 to the California Water Resources Control Board/Central Valley Regional Water Quality Control Board, 170 pp, California State University Fresno, Fresno, CA, December (2002).
http://www.gfredlee.com/SurfaceWQ/OClTMDLRpt12-11-02.pdf

Lee, G. F., and Jones-Lee, A., “Update of Organochlorine (OCl) ‘Legacy’ Pesticide and PCB Concentrations in Delta and Central Valley Fish,” Report of G. Fred Lee & Associates, El Macero, CA, September 10 (2007).
http://gfredlee.com/SurfaceWQ/UpdateLegacyPestCVFish.pdf

While OEHHA has been finding that DDT concentrations in Central Valley fish are decreasing they remain sufficiently high in some fish to be of human health concern.

Lee, G. F. and Jones-Lee, A., "Organochlorine Pesticide, PCB and Dioxin/Furan Excessive Bioaccumulation Management Guidance," California Water Institute Report TP 02-06 to the California Water Resources Control Board/Central Valley Regional Water Quality Control Board, 170 pp, California State University Fresno, Fresno, CA, December (2002).
http://www.gfredlee.com/SurfaceWQ/OClTMDLRpt12-11-02.pdf

Lee, G. F., and Jones-Lee, A., “Update of Organochlorine (OCl) ‘Legacy’ Pesticide and PCB Concentrations in Delta and Central Valley Fish,” Report of G. Fred Lee & Associates, El Macero, CA, September 10 (2007).
http://gfredlee.com/SurfaceWQ/UpdateLegacyPestCVFish.pdf

Page 8-166 devoted to phosphorus fails to discuss key issues concerning the importance of phosphorus in impacting Delta water quality discussed above. Of particular importance is the work of vanNieuwenhuyse (2007) that found that when the phosphorus load to the Delta was decreased, the phytoplankton concentrations also decreased.

Page 8-173 begins Section 8.4.2 Determination of Effects. The comments presented below concerning this section focus on the BDCP's assessment of the impacts of the proposed BDCP diversion of Sacramento River water around the Delta on Delta water quality as presented in 8.4.3.9 Alternative 4 – Dual Conveyance with Modified Pipeline/Tunnel and Intakes 2, 3, and 5 (9,000 cfs; Operational Scenario H) that begins on page 8-407. These comments are also applicable to the other identified alternatives identified in the document.

Page 8-173Section 8.4.2.1 Screening Analysis and Results beginning on line 16 states:
"This water quality analysis assessed the potential effects of implementing the various alternatives on 182 constituents (or classes of constituents). The initial analysis of water quality effects, referred to as the "screening analysis" in the Methods of Analysis section (above) resulted in the following findings. Of the 182 constituents, 110 were determined to have no potential to be adversely affected by the alternatives to an extent to which adverse environmental effects would be expected. Historical data for these constituents showed no exceedances of water quality objectives/criteria in the major Delta source waters, were not on the State's 303(d) list in the affected environment, were not of concern based on professional judgment or scoping comments, and had no potential for substantial long-term water quality degradation. Consequently, no further analyses were performed for these 110 constituents."

The approach described for excusing particular constituents from further consideration of impact was imprudent. Such disregard may well result in not considering water quality parameters that are present in one or more of the Delta channels at concentrations just under current water quality criteria/standards/objectives and may well be of concern once the Sacramento River flow is reduced as proposed, and under future revisions of the US EPA water quality criteria, state of California water quality objectives, and regional boards' basin plan objectives. Further it is well-recognized that some of the current water quality criteria, state standards, and Basin Plan objectives are not protective of the beneficial uses of water. Also the BDCP approach for selecting the chemical constituents for analysis of impacts of diverting Sacramento River flow ignores the well established facts of additive and syngistic impacts of chemical where two or more chemicals that exist at less than toxic concentrations can be combined to cause toxicity.

As summarized in writings referenced in Appendix A, Dr. Lee has extensive experience in developing water quality criteria and state standards, and in their implementation in discharge limits for the protection of beneficial uses of waterbodies. On numerous occasions he has been asked to serve as an independent technical peer-reviewer of federal and state water quality criteria and standards. He and Dr. Jones-Lee have published several papers and reports on their work and findings in these areas including:

Lee, G. F., and Jones-Lee, A., "Clean Water Act, Water Quality Criteria/Standards, TMDLs, and Weight-of-Evidence Approach for Regulating Water Quality," Water Encyclopedia: Water Law and Economics, Wiley, Hoboken, NJ, pp 598-604 (2005). http://www.gfredlee.com/SurfaceWQ/WileyCleanWaterAct.pdf

Lee, G. F. and Jones-Lee, A., "Appropriate Use of Numeric Chemical Water Quality Criteria," Health and Ecological Risk Assessment, 1:5-11 (1995). http://www.gfredlee.com/SurfaceWQ/chemcri.pdf

Lee, G. F., Jones, A., and Newbry, B., "Water Quality Standards and Water Quality," Journ. Water Pollut. Control Fed. 54(7):1131-1138 (1982).
http://www.gfredlee.com/SurfaceWQ/WQStds-WaterQuality.pdf

The draft BDCP EIR/EIS discussion of anticipated water quality impacts of the proposed plan did not appropriately or adequately address the fact that the concentrations and distribution/locations of regulated and unregulated/inadequately regulated chemicals, whether or not they have or are presently known to exceed regulatory limits, will be expected to be altered by the diversion of large amounts of Sacramento River water around the Delta. This will be expected to affect the water quality impacts of regulated and unregulated/inadequately regulated chemicals in Delta waters. The BDCP's dismissing from further analysis of potential water quality effects, constituents that it concluded based on inadequate evaluation and without appropriate attention to the impact of the loss of Sacramento River water to the system, had not exceeded water quality objectives/criteria in the major Delta source waters, were not on the State's 303(d) list in the affected environment, or were not of concern, renders the draft EIR/EIS fundamentally flawed. That flaw alone is sufficiently significant to merit the denial of certification of this draft EIR/EIS.

As discussed in our review of the Delta Water Quality report cited below, as part of SWRCB water rights decision D-1641, several agencies, through the Interagency Ecological Program (IEP), conduct an Environmental Monitoring Program (EMP) that is supposed to provide information on the impacts of Delta water exports to central and Southern California on Delta resources and water quality.

Lee, G. F. and Jones-Lee, A., "Overview of Sacramento-San Joaquin River Delta Water Quality Issues," Report of G. Fred Lee & Associates, El Macero, CA (2004).
http://www.gfredlee.com/SJR-Delta/Delta-WQ-IssuesRpt.pdf

A critical review of the IEP EMP, however, shows that it falls short of adequately defining the full range of water quality impacts of the export of Delta water by the federal project (Central Valley Project – CVP) and state project (State Water Project – SWP). In 2004 Dr. Lee was a member of the peer-review panel that reviewed the adequacy of the IEP water quality monitoring program. In that forum he pointed out that that program was highly deficient in providing the information needed to evaluate the impacts of the SWP diversions on Delta water quality. His comments were ignored, and even today large amounts of money continue to be spent on Delta monitoring but are not directed to the stated purpose of the D-1641 water rights decision that allowed the SWP to divert large amounts of water from the Delta.

The CVRWQCB and SWRCB have been trying for several years, without success, to develop a comprehensive Delta water quality monitoring program. The basic problem is a lack of funding for such a program. If the BDCP-proposed Delta diversion project is allowed to be implemented, those benefiting from the project should be required to fund a comprehensive water quality monitoring program to adequately define the impacts of that diversion on Delta water quality.

Page 8-407 begins the discussion of Section 8.4.3.9, Alternative 4 – Dual Conveyance with Modified Pipeline/Tunnel and Intakes 2, 3, and 5 (9,000 cfs; Operational Scenario H). This

section states, “Alternative 4 would comprise physical/structural components similar to those under Alternative 1A, however, there are notable differences. Alternative 4 would convey up to 9,000 cfs of water from the north Delta to the south Delta and that Alternative 4 would include an operable barrier at the head of Old River. Diverted water would be conveyed through pipelines/tunnels from three screened intakes (i.e., Intakes 2, 3 and 5) located on the east bank of the Sacramento River between Clarksburg and Courtland. Alternative 4 would include a 245 acre intermediate forebay at Glannvale Tract. Clifton Court Forebay would be dredged and expanded by approximately 690 acres to the southeast of the existing forebay. Water supply and conveyance operations would follow the guidelines described as Scenario H1, H2, H3, or H4, which variously include or exclude implementation of fall X2 and/or enhanced spring outflow. Conservation Measures 2–22 would be implemented under this alternative, and would be the same as those under Alternative 1A.”

The subsection, “Effects of the Alternative on Delta Hydrodynamics,” begins on page 408 with: *“Under the No Action Alternative and Alternatives 1–9, the following two primary factors can substantially affect water quality within the Delta:*

- *Within the south, west, and interior Delta, a decrease in the percentage of Sacramento River-sourced water and a concurrent increase in San Joaquin River-sourced water can increase the concentrations of numerous constituents (e.g., boron, bromide, chloride, electrical conductivity, nitrate, organic carbon, some pesticides, selenium). This source water replacement is caused by decreased exports of San Joaquin River water (due to increased Sacramento River water exports), or effects of climate change on timing of flows in the rivers. Changes in channel flows also can affect water residence time and many related physical, chemical, and biological variables.*

- *Particularly in the west Delta, sea water intrusion as a result of sea level rise or decreased Delta outflow can increase the concentration of salts (bromide, chloride) and levels of electrical conductivity. Conversely, increased Delta outflow (e.g., as a result of Fall X2 operations in wet and above normal water years) will decrease levels of these constituents, particularly in the west Delta.”*

As discussed in these comments, not only would the concentrations of the mentioned constituents increase with increases in the proportion of San Joaquin River water but also the concentrations of many other known pollutants as well as unregulated, unrecognized and inadequately regulated pollutants be increased. For some constituents the concentrations would be expected to increase in some Delta channels to levels in excess of water quality objectives and in some cases significantly impact Delta water quality. The draft EIR/EIS is deficient in that it fails to address this issue. Also, decreases in the amount of Sacramento River water in the Delta will result in changes in the areas in which adverse impacts on Delta channel water quality occur.

The draft EIR EIS fails to mention that increasing the concentrations of pollutants that are already causing water quality objectives is a violation of SWRCB/CVRWQCB antigradation issues that preclude degrading existing water quality of causing a degradation of water quality that causes and water quality objective violation.

Page 8-432 lines 39-43 and page 8-433 lines 1-2 state,

"Amounts of oxygen demanding substances present (e.g., ammonia, organics) in the reservoirs and rivers upstream of the Delta, rates of photosynthesis (which is influenced by nutrient levels/loading), and respiration and decomposition of aquatic life is not expected to change sufficiently under Alternative 4 to substantially alter DO levels relative to Existing Conditions or the No Action Alternative. Any minor reductions in DO levels that may occur under this alternative would not be expected to be of sufficient frequency, magnitude and geographic extent to adversely affect beneficial uses, or substantially degrade the quality of these water bodies, with regard to DO."

That assessment ignores the importance of Sacramento River water currently drawn into the Delta by the current export projects, CVP and SWP, in the existing DO levels in the Delta, and the effect on DO that the reduction of that flow as proposed would have. As discussed in the synthesis report cited below, the flow of the Sacramento River water through the Delta limits the downstream extent of the low-DO conditions in the SJR DWSC to Turner Cut. With the reduced Sacramento River flow into the Central Delta as proposed, the lower SJR DWSC could experience low-DO conditions.

> Lee. G. F., and Jones-Lee, A., "Synthesis and Discussion of Findings on the Causes and Factors Influencing Low DO in the San Joaquin River Deep Water Ship Channel near Stockton, CA: Including 2002 Data," Report Submitted to SJR DO TMDL Steering Committee/Technical Advisory Committee and CALFED Bay-Delta Program, G. Fred Lee & Associates, El Macero, CA, March (2003). http://www.gfredlee.com/SJR-Delta/SynthesisRpt3-21-03.pdf

As discussed in our reports the current operation of the CVP and SWP draws SJR water that enters the DWSC to the export pumps at Turner Cut. This has important implications for the homing of Chinook Salmon to SJR watershed spawning waters since there is no homing signal as the fish enter San Francisco Bay/Delta to guide them to their home stream waters. We have discussed this issue in,

> Lee, G. F., and Jones-Lee, A., "Need for SJR Watershed Water to Reach San Francisco Bay," Comments submitted to Delta Stewardship Council, Sacramento, CA by G. Fred Lee & Associates, El Macero, CA, May 22 (2011).
> http://www.gfredlee.com/SJR-Delta/NeedSJRtoSFBay.pdf

Page 8-433 lines 13 through 21 state,
Under all operational scenarios of Alternative 4, minor DO level changes could occur due to nutrient loading to the Delta relative to Existing Conditions and the No Action Alternative (see WQ-1, WQ-15, WQ-23). The state has begun to aggressively regulate point-source discharge effects on Delta nutrients, and is expected to further regulate nutrients upstream of and in the Delta in the future. Although population increased in the affected environment between 1983 and 2001, average monthly DO levels during this period of record show no trend in decline in the presence of presumed increases in anthropogenic sources of nutrients (see Table 4.4-15 in the ES/AE section). Based on these considerations, excessive nutrients that would cause low DO levels would not be expected to occur under any operational scenario of Alternative 4.

Based on Dr. Lee's more than five decades of experience assessing the impacts of nutrients on DO in waterbodies throughout the world and his 25 years of experience in investigating nutrient

sources and impacts in the Delta watershed and within the Delta, it is misleading to characterize the current SWRCB efforts in developing nutrient objectives as having *"begun to aggressively regulate"* nutrient discharges. It will be many years before reliable and workable nutrient objectives will be available that can be used to regulate nutrient discharges from agricultural sources in the Delta watershed. As discussed above the major cause of the residual oxygen demand and low-DO in the SJR DWSC is nutrient input from upstream agricultural sources that stimulates the growth of algae in the DWSC which because of the flow-related residence time, are able to decompose in the DWSC where their bacterial decomposition exerts greater oxygen demand than can be assimilated.

We have developed several paper/reports on the impact of and controlling nutrients in SJR watershed including.

Lee, G. F., and Jones-Lee, A., "Potential Water Quality Impacts of Agriculture Runoff/Discharges in the Central Valley of California," Presented at Central Coast Agricultural Water Quality Coalition's 2007 National Conference on Agriculture & the Environment, Monterey, CA, PowerPoint Slides, G. Fred Lee & Associates, El Macero, CA, November (2007).
http://www.gfredlee.com/SJR-Delta/SJRAgImpactsMontereyNov2007.pdf

Lee, G. F., and Jones-Lee, A., "Synopsis of CWEMF Delta Nutrient Water Quality Modeling Workshop – March 25, 2008, Sacramento, CA," Report of G. Fred Lee & Associates, El Macero, CA, May 15 (2008). http://www.gfredlee.com/SJR-Delta/CWEMF_WS_synopsis.pdf

"Overview of Delta Nutrient Water Quality Problems: Nutrient Load – Water Quality Impact Modeling," Agenda for Technical Workshop sponsored by California Water and Environmental Modeling Forum (CWEMF), Scheduled for March 25, 2008 in Sacramento, CA (2008).
http://www.gfredlee.com/SJR-Delta/CWEMF_Workshop_Agenda.pdf

An issue that needs to be addressed by the SWP is the low-DO situation that occurs in the southern-most part of Old River channel in the South Delta in the vicinity of the Tracy Boulevard Bridge. The SWP export pumping of South Delta water resulted in major flow problems in the South Delta. The temporary barriers constructed to try maintain the water levels in the South Delta channels to enable agriculture to continue to pump irrigation water from the channel have restriced the flow in the southern-most part of Old River channel sufficiently to allow large-scale algal growth and die-off leading to low DO in the channel. As part of an extension of the SJR DWSC Low-DO TMDL project, we organized a boat tour of the South Delta channels on August 5, 2004. The DeltaKeeper (Bill Jennings) made available a DK boat and crew that enabled several members of the CVWQCB and CalFed staff to accompany Lee on this tour. During the tour the evidence of a large fish kill that had occurred the evening before was observed near the Tracy Blvd Bridge; hundreds of dead fish were observed floating on the surface of the water. The DWR maintains a DO monitoring station in the region of the fish kill, which showed that the previous night the DO in the channel dropped to near-zero. A report on that tour and the fish kill is presented in,

Lee, G. F.; Jones-Lee, A. and Burr, K., "Results of the August 5, 2003,Tour of the South Delta Channels," Report of G. Fred Lee & Associates, El Macero, CA, February (2004).

http://www.gfredlee.com/SJR-Delta/South-Delta-Tour.pdf

Lee, G. F., "Comments on SWRCB Review of South Delta Channel Water Quality," Report of G. Fred Lee & Associates, El Macero, CA, January 15 (2011). http://www.gfredlee.com/SJR-Delta/SoDeltaWQ1-11.pdf

Review of the data from the DWR monitoring station at that location shows frequent DO water quality objective violations occurred in this channel. That situation has been occurring for many years. It is clear that DWR as part of the SWP should be required to eliminate the low-DO problems that occur in the South Delta as a result of the operation of the SWP.

The low DO in the Old River channel is the result of high nutrient and algal lows in SJR that enters Old River at the Head of Old River and the lack of adequate flow of the channel due to the barrier constructed to maintain water levels in the Old River Channel.

Page 8-435 lines 17-20 states with regard to NEPA Effects:
"CM2–CM22 would not be expected to contribute to adverse DO levels in the Delta. The increased habitat provided by CM2–CM11 could contribute to an increased biochemical or sediment demand, through contribution of organic carbon and the action of plants decaying. However, similar habitat exists currently in the Delta and is not identified as contributing to adverse DO conditions."

Dr. Lee has considerable experience in examining the character of water discharged from wetlands; he conducted some of the first work done on the impacts of wetlands on water quality, which was discussed in the following paper:

Lee, G. F., Bentley, E., and Amundson, R., "Effects of Marshes on Water Quality," IN: Ecological Studies 10, Coupling of Land and Water Systems, Springer-Verlag, New York, pp. 105-127 (1975). http://www.gfredlee.com/SurfaceWQ/MarshesBentleyAmundson.pdf

Based on the monitoring programs and studies that have been conducted in the Delta, it is inappropriate to use the range of DO found in low-flow channels that receive predominately tidal flow from wetlands. The development of wetlands as part of establishing addition shallow habitat as part of the proposed BDCP Delta improvement.

Page 8-435 lines 25-27 states:
"CM14, an oxygen aeration facility in the Stockton Deep Water Ship Channel to meet TMDL objectives established by the Central Valley Water Board, would maintain DO levels above those that impair fish species when covered species are present."

As discussed elsewhere in these comments, the implementation of an aeration facility in the SJR DWSC to eliminate DO water quality objectives since the funding for construction and operation is not available. Further there is significant questions about whether the proposed aeration facility can prevent DO depletions below the water quality objective especially in the near bottom waters of the DWSC so that there are no more than one violation of the DO objective in any amount more than once every three years.

Page 8-440 lines 44-45 and page 8-441 lines 1-3 states:
"In addition to and to supplement Mitigation Measure WQ-11, the BDCP proponents have incorporated into the BDCP, as set forth in EIR/EIS Appendix 3B, Environmental Commitments, a separate, non-environmental commitment to address the potential increased water treatment costs that could result from EC concentration effects on municipal, industrial and agricultural water purveyor operations."

While it may be possible to pay water utilities and agricultural interests as compensation for impact of increased salinity due to the diversion of Sacramento River around the Delta, an issue that needs to be considered is the impact of increased salinity in domestic waters on the recharge of domestic wastewaters. An increase in the salinity in a municipality's water supply can lead to restrictions on the recharge of its domestic wastewaters as part of groundwater replenishment projects. This is already an issue in the use of Delta waters as a water supply for some Southern California municipalities. It can be very expensive to treat a domestic wastewater to achieve groundwater recharge limits.

Page 8-447-261. The section on the Effects of Nitrate Concentrations Resulting from Facilities Operations and Maintenance (CM1) that begins on line 13 needs to be expanded to include the impact of the CVRWQCB's recent adoption of reduced nitrate loads to the SJR and Delta from the Stockton waste water treatment plant.

Page 8-407 line 32 begins the presentation of Section 8.4.3.9 Alternative 4 – Dual Conveyance with Modified Pipeline/Tunnel and Intakes 2, 3, and 5 (9,000 cfs; Operational Scenario H). Many of the issues discussed above in reference to Alternative 4 are applicable to all of the alternatives involved in diversion of Sacramento River water around the Delta. While the relative reduction in the amount of diversion could be expected to lessen or increase the magnitude of some of the impacts, those impacts would still need to be better defined.

Page 8-700 line 28 begins the discussion of 8.4.3.16 Alternative 9—Through Delta/Separate Corridors (15,000 cfs; Operational Scenario G). The diversion of Sacramento River water through the Delta via isolated facilities would lead to many of the same adverse impacts noted above for diversion of Sacramento River water around the Delta via tunnels and or canals.

Page 8-771 line 15 begins a list of references for this draft EIR/EIS. While the list of references is voluminous, as noted in these comments there are a number of key, pertinent papers and reports not included in this list that should have been reviewed, discussed, and referenced in a certifiable EIR/EIS for the proposed BDCP project. The exclusion of those sources contributed to the deficiencies discussed in these comments.

Additional Comments
The limitations of the ability of DWR to provide reliable information on flow of water in Delta channels occurred when we were trying to understand the flow of Sacramento River and the San Joaquin River through the Central Delta as part of our work on SJR DWSC Low-DO TMDL project. We were unable to obtain from DWR modeling staff the respect flows in the Central Delta channels as a function of SJR, Sacramento River, Old River flows and export pumping by the CVP SWP. This situation still exists today. This is the type of information that is needed to

begin to reliably evaluate the impact of diversion of Sacramento River flow around or through the Delta.

MBK Engineers conducted a detailed review of BDCP modeling; Walter Bourez of MBK Engineers presented to the DISB his findings on one of the models used in the BDCP draft EIR/EIS which differed from those presented by BDCP. (He used a 2013 version of the model, rather than the 2009 model BDCP used.)

MBK Engineers concluded in its presentation to the Delta Independent Science Board (2014), *"An initial review led the Reviewers to conclude that the BDCP Model, which serves as the basis for the environmental analysis contained in the BDCP Environmental Impact Report/Statement (EIR/S), provides very limited useful information to understand the effects of the BDCP. The BDCP Model contains erroneous assumptions, errors, and outdated tools, which result in impractical or unrealistic Central Valley Project (CVP) and State Water Project (SWP) operations. The unrealistic operations, in turn, do not accurately depict the effects of the BDCP."*
MBK Engineers presentation to Delta Independent Science Board (2014)

The Delta Independent Science Board (DISB) is required by the Delta Reform Act of 2009 to review the BDCP draft EIR/EIS and to submit its comments to the Delta Stewardship Council and the Department of Fish and Game. In its May 15, 2014 cover letter transmitting its comments pursuant to that requirement [http://deltacouncil.ca.gov/sites/default/files/documents/files/Attachment-1-Final-BDCP-comments.pdf], the DISB acknowledged the monumental task faced by the preparers of the draft EIR/EIS but expressed the following conclusion:
"We find, however, that the science in this BDCP effort falls short of what the project requires. We highlight our concerns in the attached report. The report, in turn, draws on our detailed responses to charge questions from the Delta Stewardship Council (Appendix A) and on our reviews of individual chapters in the DEIR/DEIS (Appendix B). Our concerns raise issues that, if not addressed, may undermine the contributions of BDCP to meeting the co-equal goals for the Delta."

The DISB report transmitted by that letter, cited below, begins with the following summary:

"Summary of Major Concerns
Does the Bay Delta Conservation Plan (BDCP) Draft EIR/EIS (DEIR/DEIS) use the best available science in analyzing project alternatives and their effects? That is, do the analyses use science that is good enough, and use it well enough, for a project that is so large, complex, expensive, long-lasting, and important?

We find that the DEIR/DEIS currently falls short of meeting this "good enough" scientific standard. In particular:
1. Many of the impact assessments hinge on overly optimistic expectations about the feasibility, effectiveness, or timing of the proposed conservation actions, especially habitat restoration.
2. The project is encumbered by uncertainties that are considered inconsistently and incompletely; modeling has not been used effectively to bracket a range of uncertainties or to

explore how uncertainties may propagate.
3. The potential effects of climate change and sea-level rise on the implementation and outcomes of BDCP actions are not adequately evaluated.
4. Insufficient attention is given to linkages and interactions among species, landscapes, and the proposed actions themselves.
5. The analyses largely neglect the influences of downstream effects on San Francisco Bay, levee failures, and environmental effects of increased water availability for agriculture and its environmental impacts in the San Joaquin Valley and downstream.
6. Details of how adaptive management will be implemented are left to a future management team without explicit prior consideration of (a) situations where adaptive management may be inappropriate or impossible to use, (b) contingency plans in case things do not work as planned, or (c) specific thresholds for action.
7. Available tools of risk assessment and decision support have not been used to assess the individual and combined risks associated with BDCP actions.
8. The presentation, despite clear writing and an abundance of information and analyses, makes it difficult to compare alternatives and evaluate the critical underlying assumptions."

Delta Independent Science Board, "Review of the Draft EIR/EIS and Draft BDCP," Report to the Delta Stewardship Council and California Department of Fish and Wildlife, May 15 (2014).

Comments made to the Delta Stewardship Council by Dr. Alex Parker of the California Maritime Academy and a member of the independent science review panel of the BDCP's Effects Analysis established at the request of the Department of Water Resources and the Bureau of Reclamation concerning the technical aspects of the plan were quoted in a June 3, 2014 posting on: http://mavensnotebook.com/2014/06/03/reviewing-the-science-of-the-bay-delta-conservation-plan/. That posting stated:
"Dr. Parker said he would just provide the highlights of their analysis and the major themes that emerged as a result of their review. 'We are heartened to see that the Delta Independent Science Board review of the draft BDCP and the EIR/EIS echoed a lot of our concerns, and I think that probably highlights for folks the areas where attention needs to be paid.'

He said there were four themes that emerged for the panel: [two of which are quoted here:]

- *The first is a real disconnect between the assessments of scientific certainty or uncertainty that is reflected in the Effects Analysis chapter versus what is in technical appendices, he said. 'This was a concern to us because we know that with a set of documents this vast, most people are going to read the Effects Analysis and not the technical appendices. There's a real concern that the effects analysis doesn't adequately address that level of uncertainty around virtually all of the conclusions that are made.'*
- *The implementation of the BDCP and its effects are highly uncertain, so the way to address this is through adaptive management, he said. 'It is part of the plan; however the Effects Analysis needs to really clearly articulate the uncertainty in order to have an effective adaptive management process and at present, that simply doesn't exist within the main document.'"*

"Another place where this [a lack of a whole ecosystem approach in the BDCP effects analysis] is clear to us is with respect to hydrodynamics modeling, Dr. Parker said. 'Hydrodynamics is

basically the movement of water, and this is a master variable in the system,' he said. 'If we want to have any conversation about circulation patterns, temperatures, submerged aquatic vegetation, contaminants, nutrients – we need to have reasonable modeling of the hydrodynamic system, and because we don't know where the restoration opportunity areas are necessarily defined in all cases – these are places where major conservation and restoration activities will take place – they were limited in what they could model in terms of hydrodynamics. That wasn't adequately acknowledged throughout, and again, raises high level of uncertainty in the ultimate analysis.' He also noted there were some counterintuitive results from some of the hydrodynamic modeling that was done there, but there wasn't sufficient information to really understand where those results came from."

Those conclusions concerning the lack of a reliable database and Delta flow information to develop a credible EIR/EIS for the BDCP for assessing the impacts of the diversion of Sacramento River water around or through the Delta, are in keeping with a number of the specific comments made by us independently above.

Comments on Chapter 25 – Public Health

Page 25-1 line 3 states, *"This chapter focuses on issues related to human health and safety that could potentially be affected by implementation of the BDCP alternatives, particularly with respect to water quality, the potential to cause or worsen water borne illness, the potential to create habitat for vectors that may carry diseases; and to address potential health related concerns from additional electric transmission lines needed under most of the alternatives."*

Page 25-1 lines 20-22 states, *"This chapter does not duplicate the information provided in other sections of the EIR/EIS, but rather focuses the discussion on potential impacts on human health of implementing the BDCP action alternatives."* Our comments on those bioaccumulating constituents in Chapter 8 are also applicable to the same constituents covered in Chapter 25.

Page 25-4 lines 9-11 states, *"Please see Chapter 8, Water Quality, Section 8.1.3.13, Pesticides and Herbicides, for a detailed discussion on the prior use of legacy pesticides in the Plan Area."* As discussed in our comments on those sections of Chapter 8, the BDCP draft EIS EIR is deficient as it fails to adequately discuss the readily available compilation data of organochlorine pesticides and PCBs in Delta and Central Valley water and fish developed and discussed by Lee and Jones-Lee.

Page 25-6 presents information on some of the sources of mercury in the Delta watershed. In addition to those mentioned, another tributary source of mercury is the Putah Creek. The findings of Lee and Jones-Lee's study of the current situation regarding mercury in Putah Creek have been published as,

Lee, G. F., and Jones-Lee, A, "LEHR Superfund Stormwater Runoff and Putah Creek Mercury Issues," *Journal Remediation*, **19(2)**:123-134, Spring (2009). http://www.gfredlee.com/SJR-Delta/LEHRrunoffHgRemediation.pdf

Lee, G. F., and Jones-Lee, A., "Summary of Slides – Putah Creek Mercury Water Quality Issues," Report of G. Fred Lee & Associates, El Macero, CA, Presented to Delta Tributaries Mercury Council, December 2 (2008).

http://www.gfredlee.com/SJR-Delta/PutahHgMineSummary.pdf

Lee, G. F., and Jones-Lee, A., "Runoff of Mercury from UCD/DOE LEHR Superfund Site – Putah Creek Mercury Issues," PowerPoint Slides for Presentation to Delta Mercury Tributaries Council, Sacramento River Watershed Program [http://www.sacriver.org/issues/mercury/dtmc/], December 2 (2008). http://www.gfredlee.com/SJR-Delta/PutahHgMinesli.pdf

As discussed in those papers and reports, soils along Putah Creek are polluted with mercury that accumulates in fish tissue. The source of that mercury is mercury mines in the creek's watershed. Before the Lake Berryessa dam was constructed, stormwater runoff from the Putah Creek watershed transported mercury from former mercury mines to the Putah Creek flood plain. It will be very difficult to remediate the mercury-polluted soils along Putah Creek, and thus difficult to reduce the Putah Creek as source of mercury for the Delta.

Page 25-7 section on PCBs makes reference to deVlaming (2008). More reliable sources of information on PCBs in Delta tributaries and Delta water and fish are those included in the reports:

Lee, G. F., and Jones-Lee, A., "Update of Organochlorine (OCl) 'Legacy' Pesticide and PCB Concentrations in Delta and Central Valley Fish," Report of G. Fred Lee & Associates, El Macero, CA, September 10 (2007). http://gfredlee.com/SurfaceWQ/UpdateLegacyPestCVFish.pdf

Lee, G. F., "Need for Funding to Support Studies to Control Excessive Bioaccumulation of Organochlorine 'Legacy' Pesticides, PCBs and Dioxins in Edible Fish in the Central Valley of California," Report of G. Fred Lee & Associates, El Macero, CA, July (2003). http://www.gfredlee.com/Runoff/OCl_Support.pdf

Lee, G.F, and Jones-Lee, A., "Developing TMDLs for Organochlorine Pesticides and PCBs," Presented at the American Chemical Society Environmental Chemistry Division national meeting in San Diego, California, April (2001). http://www.gfredlee.com/Runoff/sandiego_030801.pdf

Lee, G. F. and Jones-Lee, A., "Excessive Bioaccumulation of Organochlorine Legacy Pesticides & PCBs in CA Central Valley Fish," PowerPoint Slides made available at US EPA National Fish Contaminant Forum, San Diego, CA, January (2004). http://www.gfredlee.com/Runoff/OCl-slides-SanDiego.pdf

Page 25-7 devoted to Legacy Pesticides failed to reference the reports of Lee's comprehensive review of legacy pesticides in Delta and Central Valley fish on behalf of the SWRCB and CVRWQCB; those reports were referenced in the comments above on draft EIR/EIS Chapter 8.

Page 25-8 lines 17-21 states, *"In March 2004, the U.S. Food and Drug Administration (FDA) issued recommendations for the consumption of fish or shellfish for women who might become pregnant, women who are pregnant or nursing, and young children (no other sensitive receptors were identified). While FDA states fish and shellfish are an important part of a healthy diet,*

nearly all fish and shellfish contain trace amounts of mercury (U.S. Food and Drug Administration 2011). However, some species contain higher amounts of the toxicant, and thus it is not recommended that women who might become pregnant, women who are pregnant or nursing, or young children eat shark, swordfish, king mackerel, or tilefish. None of these species are commonly found in the Delta. Further, local advisories should be checked for the safety of locally caught fish and if these advisories are unavailable, the weekly consumption of fish or shellfish species should be limited." As discussed in US EPA guidance referenced below, it is highly inappropriate to compare Delta or other waterbody fish tissue concentration to FDA tissue limits for the purpose of assessing the health hazard associated with consuming those fish.

US EPA, "Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume 1 Fish Sampling and Analysis, Third Edition," EPA 823-B-00-007, US EPA Office of Water, Washington, DC, November (2000).
USEPA_2000_Guidance_Document_volume2.pdf

As stated in the above-referenced US EPA guidance,
"EPA and FDA have agreed that the use of FDA Action Levels for the purpose of making local advisory determinations is inappropriate. in letters to all states, guidance documents, and annual conferences, this practice has been discouraged by EPA and FDA in favor of EPA's risk-based approach to derive local fish consumption advisories."

"FDA action levels and tolerances are indicators of chemical residue levels in fish and shellfish that should not be exceeded for the general population who consume fish and shellfish typically purchased in supermarkets or fish markets that sell products that are harvested from a wide geographic area, including imported fish and shellfish products. However, the underlying assumptions used in the FDA methodology were never intended to be protective of recreational, tribal, ethnic, and subsistence fishers who typically consume larger quantities of fish than the general population and often harvest the fish and shellfish they consume from the same local waterbodies repeatedly over many years."

The US EPA guidelines or the California Office of Environmental Health Hazard Assessment (OEHHA) fish consumption advisory values should be used to determine the potential public health hazards associated with consumption of contaminated fish.

Page 25-24 lines 33-34 states, *"The CWA sets water quality standards for all contaminants in surface waters. In California, such responsibility has been delegated to the State, which administers the CWA through the Porter-Cologne [Water Quality Control] Act (Water Code, Section 13000 et seq.)."* As discussed in reviews cited below, the Clean Water Act establishes the approach for establishing water quality criteria that can be developed into state water quality standards. Contrary to the BDCP's statement quoted above, the CWA does not "set water quality standards for all contaminants."

G. Fred Lee and Anne Jones-Lee Expertise and Experience in Water Quality Standards and NPDES Permits Development and Implementation into NPDES Permitted Discharges
http://www.gfredlee.com/exp/wqexp.htm

Lee, G. F., and Jones-Lee, A., "Clean Water Act, Water Quality Criteria/Standards, TMDLs, and Weight-of-Evidence Approach for Regulating Water Quality," Water Encyclopedia:

Water Law and Economics, Wiley, Hoboken, NJ, pp 598-604 (2005).
http://www.gfredlee.com/SurfaceWQ/WileyCleanWaterAct.pdf

Page 25-36 lines 6-8 states, discussed in Chapter 8, Water Quality (Section 8.1.1.6), numerical water quality objectives and standards have been established to protect beneficial uses, and therefore represent concentrations or values that should not be exceeded. “That statement is not accurate in that water quality objectives and standards can be exceeded once every three years.

Page 25-36 Section 25.3.1.3 Constituents of Concern and Water Quality again describes the approach used for the draft BDCP EIR/EIS to identify the constituents of concern, that is limiting the constituents considered to those that have been found to be present in concentrations above a water quality object or other standard. As discussed in our comments on Chapter 8 above, this approach is not technically valid for identifying all the constituents that need to be considered in evaluating potential water quality and public health impacts of the proposed BDCP.

As discussed above in the overall assessment, there is insufficient valid information to reliably evaluate the impact of diverting Sacramento River around or through the Delta on water quality/beneficial uses of the Delta.

Appendix A

The following professional papers, reports, and presentations provide examples of Drs. Lee and Jones-Lee's experience in reviewing Delta water quality issues.

Lee, G. F., "New & Updated Presentations/Publications on Delta and SJR Water Quality Issues," Comments to J. Grindstaff, Director CALFED, Sacramento, CA, G. Fred Lee & Associates, El Macero, CA, October 2 (2007).
http://www.gfredlee.com/SJR-Delta/PubsPresentsDeltaSJR.pdf

Lee, G. F., and Jones-Lee, A., "Delta Nutrient-Related Water Quality Problems," PowerPoint Slides Presented at CALFED Science Conference, Sacramento, CA, October 24 (2008).
http://www.gfredlee.com/SJR-Delta/CALFED_SciConf10-08.pdf

Lee, G. F., and Jones-Lee, A., "San Joaquin River Water Quality Issues,"(PowerPoint Slides) Invited Paper Presented at Great Valley Conference, "At the Tipping Point," Sacramento, CA, Sponsored by Great Valley Center, Modesto, CA, May 11 (2006).
http://www.gfredlee.com/SJR-Delta/SJR-April2006.pdf

Lee, G. F., Jones-Lee, A., "San Joaquin River Water Quality Issues," Report of G. Fred Lee & Associates, El Macero, CA, June (2006).
http://www.gfredlee.com/SJR-Delta/sjr-WQIssues.pdf

In recent years the State Water Resources Control Board (SWRCB) and CA Department of Fish and Game have conducted reviews of the impact of altering Delta flows into and through Delta channels on impacting Delta aquatic life resources. Drs. Lee and Jones-Lee have been asked to prepare comments on these issues. This has led to development of several reports and professional presentations on these issues including:

Lee, G. F., and Jones-Lee, A., "Comments on Delta Stewardship Council Staff May 14, 2012 Draft of the Delta Plan," Comments to Delta Stewardship Council by G. Fred Lee & Associates, El Macero, CA, June 13 (2012).
http://www.gfredlee.com/SJR-Delta/DSC-Comments-May2012-StaffDraft.pdf

Lee, G. F., and Jones-Lee, A., "Comments on the DSC Staff Fifth Draft of Chapter 6 Devoted to Delta Water Quality Issues in the Delta Plan," Comments Submitted to Delta Stewardship Council, Sacramento, CA, by G. Fred Lee & Associates, El Macero, CA, August 21 (2011).
http://www.gfredlee.com/SJR-Delta/DeltaPlan5DraftCh6Comm.pdf

Lee, G. F., and Jones-Lee, A., "Comments on Revised Delta Plan Staff Draft Chapter 6 'Improve Water Quality to Protect Human Health and the Environment' as Presented in the Fourth Staff Draft of the Delta Plan," Comments Submitted to Delta Stewardship Council, Sacramento, CA, by G. Fred Lee & Associates, El Macero, CA, June 14 (2011).
http://www.gfredlee.com/SJR-Delta/DeltaPlan4DraftCh6Comm.pdf

Lee, G. F., and Jones-Lee, A., "Discussion of Water Quality Issues That Should Be Considered in Evaluating the Potential Impact of Delta Water Diversions/Manipulations on Chemical Pollutants on Aquatic Life Resources of the Delta," Report of G. Fred Lee & Associates, El

Macero, CA, February 11 (2010).
http://www.gfredlee.com/SJR-Delta/Impact_Diversions.pdf

Lee, G. F., and Jones-Lee, A., "Comments on Water Quality Issues Associated with SWRCB's Developing Flow Criteria for Protection of the Public Trust Aquatic Life Resources of the Delta," Submitted to CA State Water Resources Control Board as part of Public Trust Delta Flow Criteria Development, by G. Fred Lee & Associates, El Macero, CA, February 11 (2010).
http://www.gfredlee.com/SJR-Delta/Public_Trust_WQ.pdf

Lee, G. F., and Jones-Lee, A., "Review of Need for Modeling of the Impact of Altered Flow through and around the Sacramento San Joaquin Delta on Delta Water Quality Issues," and "Summary: Water Quality Modeling Associated with Altered Sacramento River Flows in & around the Delta," Report to CWEMF Stormwater Committee, by G. Fred Lee & Associates, El Macero, CA, March (2009). http://www.gfredlee.com/SJR-Delta/Model-Impact-Flow-Delta.

Lee, G. F., and Jones-Lee, A., "Synopsis of CWEMF Delta Nutrient Water Quality Modeling Workshop – March 25, 2008, Sacramento, CA," Report of G. Fred Lee & Associates, El Macero, CA, May 15 (2008). http://www.gfredlee.com/SJR-Delta/CWEMF_WS_synopsis.pdf

"Overview of Delta Nutrient Water Quality Problems: Nutrient Load – Water Quality Impact Modeling," Agenda for Technical Workshop sponsored by California Water and Environmental Modeling Forum (CWEMF), Scheduled for March 25, 2008 in Sacramento, CA (2008).
http://www.gfredlee.com/SJR-Delta/CWEMF_Workshop_Agenda.pdf

Drs. Lee and Jones-Lee have also submitted comments on Delta water quality issues to BDCP, Delta Stewardship Council, including:
Lee. G. F., "Comments on the CVRWQCB Review of Delta Water Quality Issues," Comments submitted to K. Longley, Chair Central Valley Regional Water Quality Control Board, by G. Fred Lee & Associates, El Macero, CA, March (2008).
http://www.gfredlee.com/SJR-Delta/DeltaIssuesLongleyMarch08.pdf

Lee, G. F., and Jones-Lee, A., "Comments on Strategy 3.5 of the 'Volume 2: Delta Vision Strategic Plan - Fifth Staff Draft Version 5.5,'" Comments submitted to P. Isenberg, Chair, Delta Vision Blue Ribbon Task Force, Sacramento, CA. Report of G. Fred Lee & Associates, El Macero, CA, October 17 (2008).
http://www.gfredlee.com/SJR-Delta/DeltaVisionStaffDraft5.pdf

Lee, G. F., and Jones-Lee, A., "Comments on September 19, 2008 Delta Vision Task Force Meeting Discussion of Nutrient-Related Water Quality Problems in the Delta," Comments submitted to P. Isenberg, Chair, Delta Vision Blue Ribbon Task Force, Sacramento, CA. Report of G. Fred Lee & Associates, El Macero, CA, October 14 (2008).
http://www.gfredlee.com/SJR-Delta/DeltaVisionCom9-19-08.pdf

Lee, G. F., and Jones-Lee, A., "Comments on the DSC Staff Fifth Draft of Chapter 6 Devoted to Delta Water Quality Issues in the Delta Plan," Comments Submitted to Delta Stewardship Council, Sacramento, CA, by G. Fred Lee & Associates, El Macero, CA, August 21 (2011).

http://www.gfredlee.com/SJR-Delta/DeltaPlan5DraftCh6Comm.pdf

Lee, G. F., and Jones-Lee, A., “Comments on Revised Delta Plan Staff Draft Chapter 6 ‘Improve Water Quality to Protect Human Health and the Environment’ as Presented in the Fourth Staff Draft of the Delta Plan," Comments Submitted to Delta Stewardship Council, Sacramento, CA, by G. Fred Lee & Associates, El Macero, CA, June 14 (2011).
http://www.gfredlee.com/SJR-Delta/DeltaPlan4DraftCh6Comm.pdf

As well as a number of other comments on Delta management issues that are on Drs. Lee and Jones-Lee’s website.

California Sportfishing Protection Alliance

"An Advocate for Fisheries, Habitat and Water Quality"

3536 Rainier Avenue, Stockton, CA 95204

T: 209-464-5067, F: 209-464-1028, E: deltakeep@me.com, W: www.calsport.org

28 July 2014

Mr. Ryan Wulff
National Marine Fisheries Service
650 Capitol Mall, Suite 5-100
Sacramento, CA 95814
BDCP.Comments@noaa.gov

VIA: Electronic Submission
Hardcopy if Requested

RE: Comment Letter No. 3: Bay Delta Conservation Plan and Associated EIR/EIS Related to Delta Smelt and Summer Outflow Protection

Dear Mr. Wulff,

The California Sportfishing Protection Alliance (CSPA) has reviewed the proposed Bay Delta Conservation Plan and associated Environmental Impact Report/Environmental Impact Statement (hereinafter, BDCP) submits the following comments. Comment Letter No. 3 relates to Delta smelt and summer outflow protection and includes a report, included below, titled *Delta Smelt on the Scaffold*, and an attached report titled, *The Summer of 2013, The demise of Delta smelt under D-1641 Delta Water Quality Standards.* The three documents constitute our comments on juvenile Delta smelt and we request that all three be considered and responded to as a single submittal.

CSPA worked closely with the Environmental Water Caucus (EWC) in developing their comments and incorporates by reference into these comments both submittals by the EWC on all issues related to BDCP. We also incorporate by reference the submittal by Michael Jackson on behalf of CSPA, California Water Impact Network and AquAlliance, as well as the individual comments submitted by AquAlliance. We further incorporate by reference the submittals by the County of San Joaquin, South Delta Water Agency, Central Delta Water Agency, Restore the Delta, Earth Law Center and Friends of the River.

The BDCP and the EIR/EIS inexplicable fail to acknowledge, analyze or discuss the presence of juvenile Delta smelt in the western Delta during summer and fail to acknowledge, analyze or discuss the preferred Alternative's potential adverse impacts on juvenile Delta smelt in July and August. Consequently, the BDCP and EIR/EIS are deficient and fail to comply with minimum CEQA and NEPA requirements for an environmental review document.

Since the start of Delta export pumping by the State Water Project in 1967, California Department of Fish and Wildlife (CDFW) Fall Midwater Trawl abundance indices for Delta smelt, striped bass, longfin smelt, American shad and threadfin shad have declined 95.6, 99.6, 99.8, 90.9, 98.5, 97.8 percent, respectively. The five-year abundances between 1967-1971 and

2009-2013 for Delta smelt, striped bass, longfin smelt, American shad and threadfin shad have declined 89.8, 98.8, 99.4, 87.7 and 98.1 percent, respectively. The abundance indices of CDFW's Summer Townet Survey for Delta smelt and striped bass declined 94.2 and 98.2 percent, respectively, between 1967 and 2013 and the five year average decline between 1967-1971 and 2009-2013 for Delta smelt and striped bass was 93.8 and 98.1 percent, respectively.

Of these pelagic species, Delta smelt are likely at serious risk of short-term extinction. Last year the Fall Midwater Trawl abundance index for Delta smelt was the second lowest in history, indistinguishable from the lowest. This year CDFW's 20-mm Survey 9 collected the fewest Delta smelt in history. Inexplicably, the BDCP and EIR/EIS virtually ignore the critical juvenile life-stage of Delta smelt in the summer months.

While there is extensive discussion of the impacts of entrainment (understating risks to eggs and sensitive life stages and impingement), predation (ignoring the project's creation of habitat favoring predators) and habitat area (based upon flawed optimistic projections of expanded habitat acreage) we could find no discussion regarding the significant impacts of near-lethal or lethal July-August temperatures and low June-August Delta outflows, with respect to juvenile life stages of Delta smelt. We also could not find substantial discussion of effects of low outflow during drier years and how low outflow, coupled with water exports, draws the low salinity zone (LSZ) into the western Delta. This omission is apparently based on the assumption that, since habitat conditions in the western Delta during the summer are not good for Delta smelt, they aren't there. Almost twenty years of 20-mm surveys demonstrate that this is simply not true. Low outflow conditions, coupled with exports, draw the LSZ and Delta smelt into the western Delta. At times, the majority of juvenile Delta smelt is in the western Delta in late June and early July.

The EIR/EIS acknowledges that outflow will decrease in summer months. Chapter 11, Fish and Aquatic Resources, Section 11.0.2.8, Alternative 4-Summary of Effects, states,

> *"SWP and CVP exports in summer months would increase and result in lower outflow under all four scenarios compared to No Action Alternative."* Page 11-52, lines 23-25.

The four evaluated operating scenarios of the preferred alternative included or excluded enhanced flows in spring or fall. Protective summer outflows were essentially ignored.

The Chapter 11, beginning on page 11-1289 describes the differences between the four scenarios of Alternative 4 as:

> *"Scenario H1 – Does not include enhanced spring outflow or Fall X2 requirements.*
>
> *Scenario H2 – includes enhanced spring outflow, but not Fall X2 requirements. This scenario lies within the range of the other scenarios.*

Scenario H3 – Does not include enhanced spring outflow, but includes Fall X2 requirements 16 (similar to Alternative 2A). This scenario lies within the range of the H1 and H4 scenarios.

Scenario H4 – Includes both enhanced spring outflow requirements, and Fall X2 requirements."
Page 11-1290, Lines 13-18.

In discussing Impact AQUA-4: Effects of Water Operations on Spawning and Egg Incubation Habitat for Delta Smelt, the EIR/EIS states,

*"**CEQA Conclusion**: As described above, operations under Alternative 4 would not reduce abiotic spawning habitat availability or change water temperatures for spawning delta smelt under any of the proposed flow scenarios. Consequently, the impact would be less than significant, and no mitigation is required."* Page 11-1295, lines 29-32

However, we could find no discussion regarding summer juvenile rearing impacts, except for a brief mention in the EIR/EIS's discussion of Impact AQUA-5; Effects of Water Operation on Rearing Habitat for Delta Smelt, which states,

"They also concluded that water temperature was not a predictor of delta smelt presence in the fall, although it has been shown to be important during summer months (Nobriga et al. 2008)." Page 11-1296, Lines 11-13.

Chapter 5 of BDCP Effects Analysis seems to imply that Delta smelt cannot by found in areas of the Delta where key habitat attributes are not met. It states;

"During summer, water temperatures can reach stressful if not lethal levels in parts of the estuary (Nobriga et al. 2008), a trend that is anticipated to worsen given projected climate warming (Brown et al. 2013). Further, the interaction of water temperature and prey density is a widely agreed-upon constraint on delta smelt (Kimmerer 2008; Mac Nally et al. 2010; Maunder and Deriso 2011; Miller et al. 2012; Rose et al. 2013a, 2013b). However, low water salinity and transparency contribute to delta smelt's occurrence at Liberty Island and the adjacent reach of the Sacramento Deep Water Shipping Channel in the Cache Slough subregion (e.g., Nobriga et al. 2005). ***In addition, the trawl survey sampling grids are large enough to have robustly documented that delta smelt cannot be expected to occur in large numbers where the key abiotic habitat attributes (low salinity/low turbidity, and low water temperature in the summer) are not met*** *(Feyrer et al. 2007; Nobriga et al. 2008; Kimmerer et al. 2009; Feyrer et al. 2011; Sommer and Mejia 2013)."* Page 5.5.1-19, lines 14-24.

The assumption that significant numbers of Delta smelt are not expected to be in waters that potentially jeopardizes their existence apparently is the basis for the U.S. Fish and Wildlife (USFWS) Biological Opinion that provides no protection for Delta smelt in July and August and

why the State Water Resources Control Board (SWRCB), with the concurrence of state and federal agencies, reduced Delta outflow requirements in July of this year and allowed the salinity compliance point at Emmaton to be moved upstream to Three Mile Slough. Unfortunately, as we document below, it's simply not accurate.

This belief is apparently why the U.S. Fish and Wildlife (USFWS) Biological Opinion provides no protection for Delta smelt in July and August and why the State Water Resources Control Board (SWRCB), with the concurrence of state and federal agencies, reduced Delta outflow requirements in July of this year and allowed the salinity compliance point at Emmaton to be moved upstream to Three Mile Slough. This belief is apparently why BDCP and the EIR/EIS virtually ignored and failed to discuss juvenile Delta smelt and the impacts of lethal temperatures and low outflow during summer periods and failed to consider protective outflows in summer.

Given the decades-long collapse of smelt populations amid the astonishing array of biological opinions, water quality control plans, water rights decisions and adaptive management programs and habitat restoration projects; no professional deference can be accorded to the agencies involved in the planning, management, analysis or approval of BDCP. These agencies have literally escorted Delta smelt to the brink of extinction. And no deference or benefit-of-doubt can be accorded to the speculative claims and assurances that habitat restoration projects and adaptive management efforts will be more successful and result in different outcomes this time around. Especially, given agency's historical track record of failure.

Contrary to the assumptions of BDCP and the EIR/EIS, large percentages of Delta smelt juveniles are in the western Delta in late June and early July and probably August, especially in drier years. In fact, 100% of the Delta smelt identified in the recently completed Survey 9 of the 20-mm survey, are at the southern end of Sherman Island and not in Suisun Bay where the BDCP and the EIR/EIS seem to assume they are. In 2013, more than 60% of Delta smelt juveniles were in the western Delta.

Over centuries, Delta smelt evolved within salinity parameters for various life stages. They can't magically change their habitat needs simply because it inconveniences water exporters. Low Delta outflow, coupled with excessive water exports, shifts the low salinity zone (LSZ) and juvenile Delta smelt eastward into the western Delta where smelt are exposed to near-lethal and lethal water temperatures during heat waves similar to what occurred in July 2013 and is occurring in July 2014.

The attached CSPA report titled *The Summer of 2013, the demise of Delta smelt under D-1641 Delta Water Quality Standards*, chronicles conditions in 2013 when Delta outflow was suddenly reduced and water exports by the state and federal project facilities dramatically increased. The LSZ and juvenile Delta smelt were drawn into the western Delta where they encountered lethal water temperatures. As predicted, the 2013 Fall Midwater Trawl Delta smelt Index plunged to its second lowest on record, statistically indistinguishable from the lowest.

Delta Smelt on the Scaffold, included below, contains;

- CSPA developed indexes that reveal that, based on CDFW 20-mm survey data, abundances of juvenile Delta smelt reached their lowest level in history in late June and

early July 2014. Survey 9, of the 20-mm Survey collected only two Delta smelt in 141 separate trawls at 40 locations stretching from Cache Slough to San Pablo Bay.

- Examination of the startling difference between the calculated Net Delta Outflow Index (NDOI), relied upon by the SWRCB, USBR, DWR to measure compliance with D-1641 outflow requirements, and the actual tidally filtered data collected by the U.S. Geological Survey's (USGS) stations at Rio Vista, Three Mile Slough, San Joaquin River at Jersey Point and Dutch Slough. The USGS gaged results of Delta outflow better correlate with salinity intrusion that the NDOI.

- Late June and early July 20-mm surveys for Delta smelt between 1998 and 2014.

Together, they establish, contrary to conclusions in the BDCP and the EIR/EIS, that juvenile Delta smelt are in the western Delta during June, July and potentially August, where they are at risk from lethal temperatures. They also establish that the NDOI relied upon to determine compliance with water quality and flow standards established by the SWRCB are flawed and overestimate actual outflow.

Consequently, any assumptions, analyses, conclusions or determinations contained in the BDCP or the EIR/EIS that rely on the NDOI as representing actual Delta outflow are inaccurate. Likewise, any assumptions, analyses or conclusions that compliance with D-1641's flow and water quality standards are protective of identified beneficial uses are similarly flawed.

BDCP and the EIR/EIS are inadequate and violate CEQA and NEPA by failing to disclose these facts and analyze the project's potential adverse impacts to juvenile Delta smelt in summer.

Thank you for considering these comments. If you have questions or require clarification, please don't hesitate to contact us.

Sincerely,

Bill Jennings, Executive Director
California Sportfishing Protection Alliance

Enclosed: CSPA, No. 3, Exhibit 1: Delta Smelt on the Scaffold
Attachment: CSPA, No. 3, Exhibit 2: The Summer of 2013, The demise of Delta smelt under D-1641 Delta Water Quality Standards

Delta Smelt on The Scaffold

Juvenile Delta Smelt Abundance Levels at All-Time Low

Thomas Cannon
Bill Jennings

California Sportfishing Protection Alliance

July 2014

During the summer of 2013, reductions in outflow, coupled with increased water exports, drew the low salinity zone (LSZ) and Delta smelt eastward into the western Delta where smelt encountered lethal water temperatures. That situation was chronicled in a California Sportfishing Protection Alliance (CSPA) report titled *The Summer of 2013, the demise of Delta smelt under D-1641 Delta Water Quality Standards,* which predicted that the smelt population would plunge.[1] As we predicted, the following Fall Midwater Trawl's Delta smelt abundance index was the second lowest level on record, statistically indistinguishable from the absolute lowest.

In 2014, the State Water Resources Control Board has significantly relaxed flow and water quality standards protecting the estuary. Delta outflow is below levels in recent memory. Exports and water transfers are being approved with little environmental review because state and federal agencies claim that Delta smelt are not in the Delta in late June and July. As we show below, this is simply not true. Low outflows have drawn Delta smelt into the Delta where they're at risk from lethal temperatures. Further, outflows are significantly less than being reported by the agencies. Delta smelt populations are headed for new record lows. The point of no return, i.e., the level where the population cannot recover, is unknown. But, that point is likely approaching.

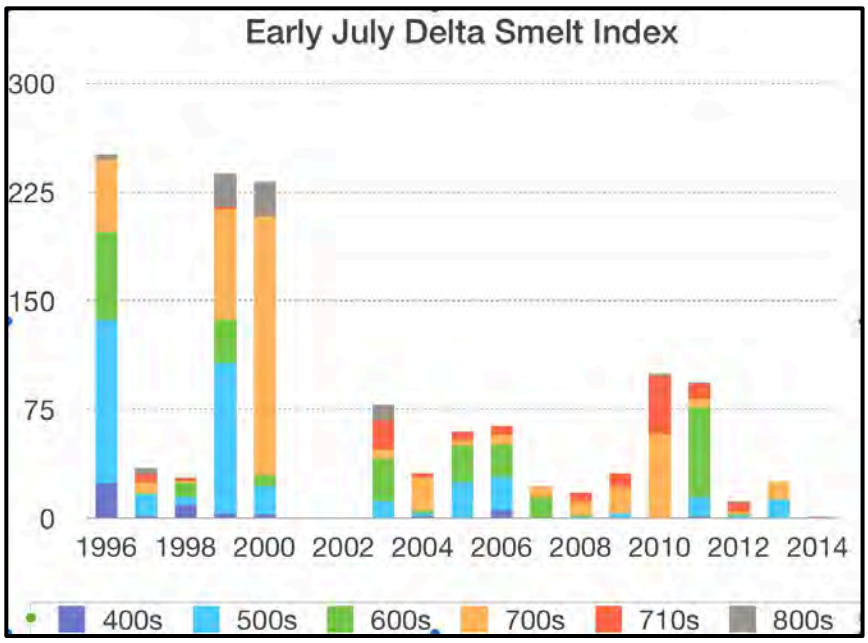
The California Department of Fish and Wildlife (DFW) conducts four primary surveys of Delta smelt in the Bay-Delta: Smelt Larval Survey, 20-mm Survey, Summer Townet and Fall Midwater Trawl. Each survey provides an annual index of abundance for specific life stages of Delta smelt. The 20-mm survey monitors post-larval-juvenile Delta smelt and comprises nine separate surveys. However the 20-mm index is based on initial surveys in March/April and do not reflect conditions in late June and early July, as smelt are drawn into the Delta by low outflow and export pumping and exposed to high temperatures. DFW's Smelt larval & 20-mm survey indices are not published.

Because DFW's 20-mm index doesn't reflect what happens to Delta smelt in June and July, CSPA took DFW's 20-mm survey data and developed indices for early June, late June and early July between 1996-2014. Our method simply stacks average densities from survey areas for each survey on a bar graph to derive an index. Our index demonstrates changes over the three survey periods and the relative contribution of the six different Delta regions. It is not weighted by the area or volume of the regions and includes the northern population of smelt and includes stations in Cache Slough and the Sacramento Deep Water Ship Channel that were added to the 710s group in the past decade.

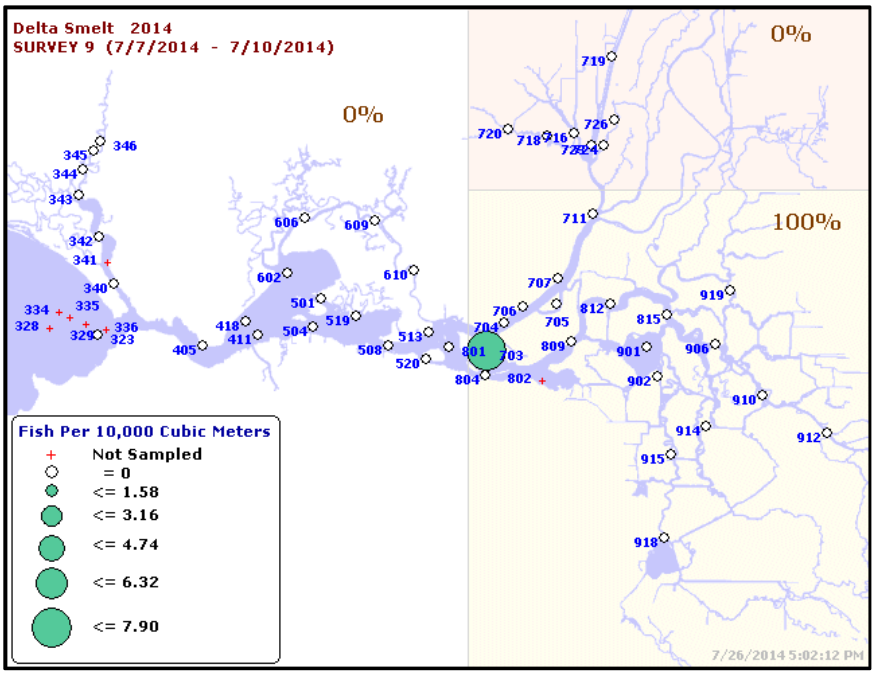
The two methods provide similar indices and patterns of indices over the years. The early June smelt index was the second lowest in history but the late June and early July indexes were, by a significant margin, the lowest in history. Astonishingly, DFW's early July 2014 20-mm survey managed to capture only 2 smelt in 147 separate trawls. The early July index pattern over the years is also similar to the Fall Midwater Trawl Indices, which is an alarming indication of likely results from this fall's upcoming FMWT index.

Following are the CSPA Delta smelt indexes for June and July 2014, DFW's June/July 2014 survey results, a discussion concerning the inadequacies of DWR, USBR Delta outflow calculations and the DFW 20-mm surveys between 1996 and 2014.

[1] http://calsport.org/news/wp-content/uploads/CSPA-Cannon-Summer-2013-6.pdf

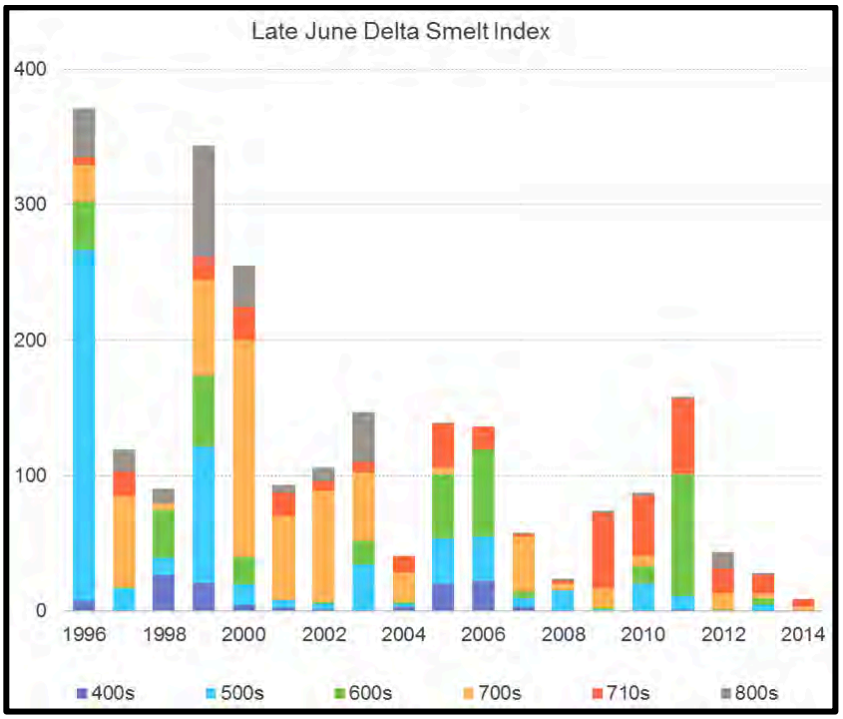


CSPA Index by Catch and Sampled Area, 20mm DFW Survey 8, Early July, no survey 2001-2002
Note: 400s = West Suisun Bay; 500s = East Suisun Bay; 600s = Montezuma Slough; 700s = Lower Sacramento River; 710s = Cache Slough/Sacramento Ship Channel; 800s = Lower San Joaquin River



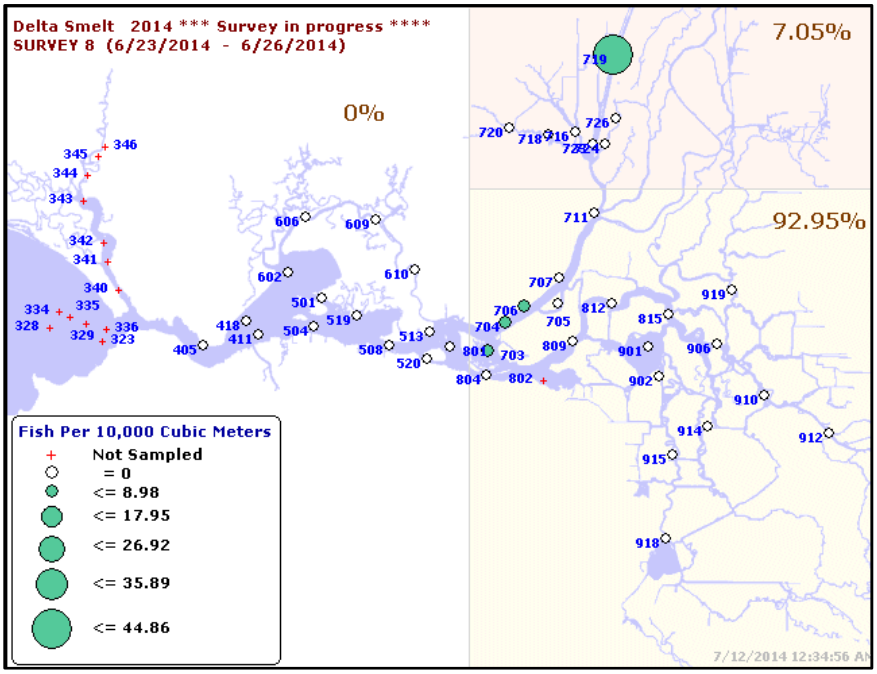
California Department of Fish and Wildlife 20mm Delta Smelt Survey 9, 7-10 July 2014 Chart weighted by volume of area sampled.[2]
Only 2 Delta smelt were collected in 141 trawls (3 trawls at each of 47 locations).

[2] http://www.dfg.ca.gov/delta/data/20mm/CPUE_map.asp



CSPA Index by Catch and Sampled Area, 20mm DFW Survey 8, Late June

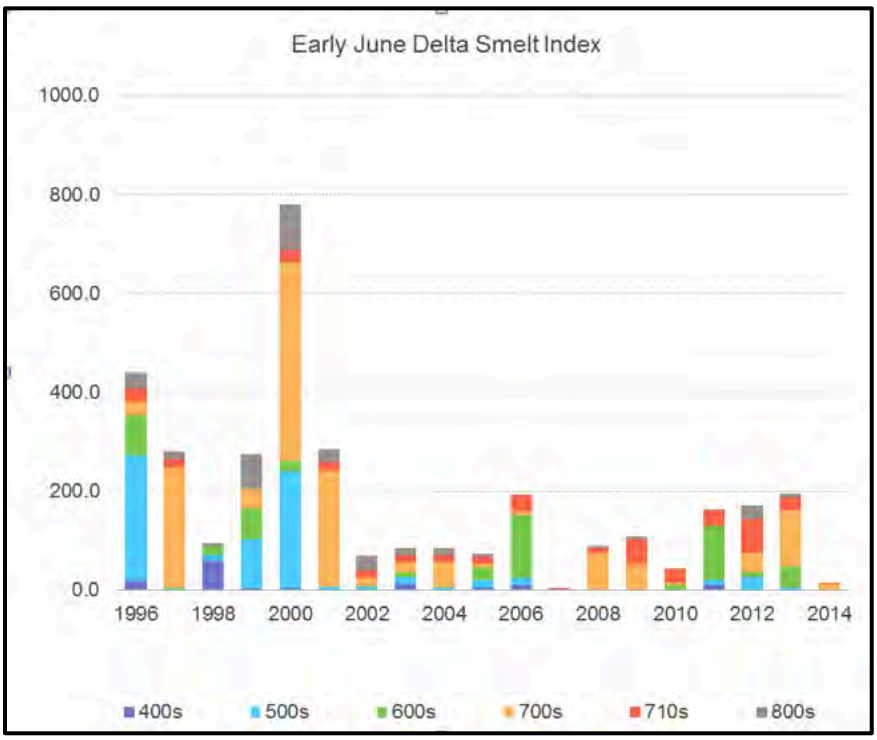
Note: 400s = West Suisun Bay; 500s = East Suisun Bay; 600s = Montezuma Slough; 700s = Lower Sacramento River; 710s = Cache Slough/Sacramento Ship Channel; 800s = Lower San Joaquin River



California Department of Fish and Wildlife 20mm Delta Smelt Survey 8, 23-26 June 2014 Chart weighted by volume of area sampled.[3]

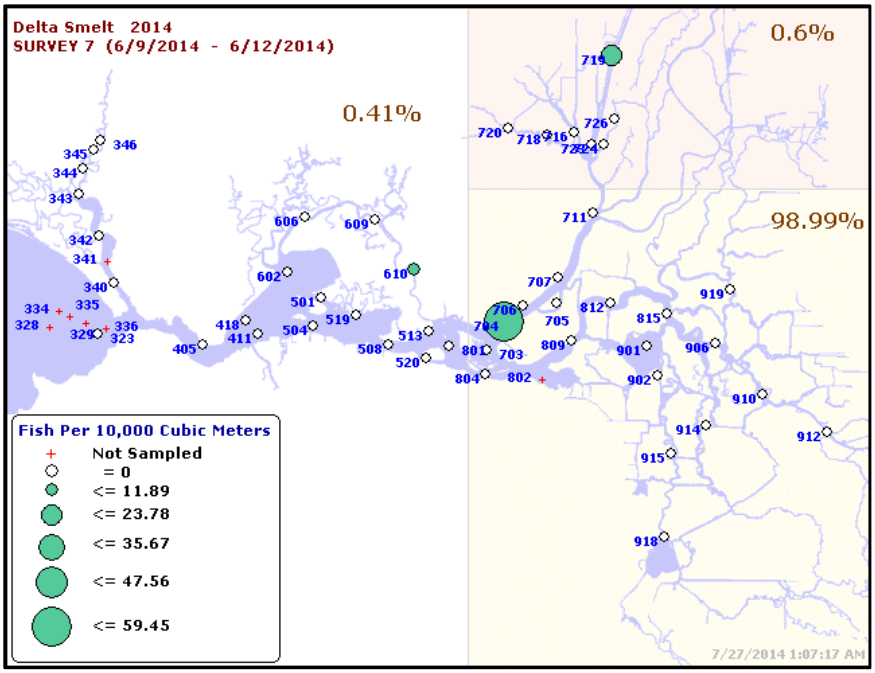
Only 18 Delta smelt were collected in 120 trawls (3 trawls at each of 40 locations).

[3] http://www.dfg.ca.gov/delta/data/20mm/CPUE_map.asp



CSPA Index by Catch and Sampled Area, 20mm DFW Survey 8, Early June

Note: 400s = West Suisun Bay; 500s = East Suisun Bay; 600s = Montezuma Slough; 700s = Lower Sacramento River; 710s = Cache Slough/Sacramento Ship Channel; 800s = Lower San Joaquin River

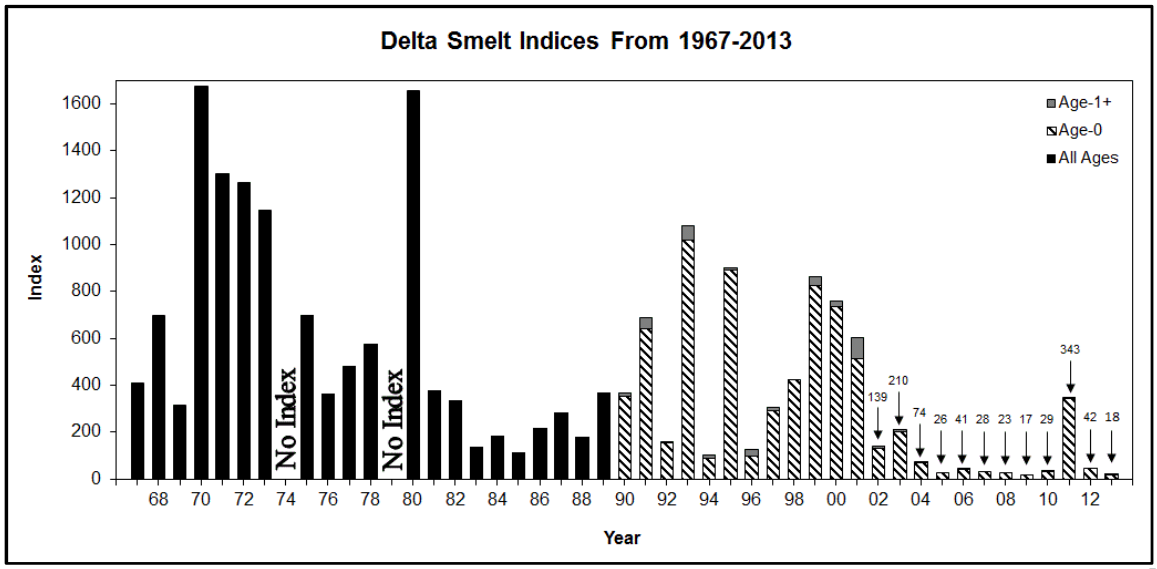


California Department of Fish and Wildlife 20mm Delta Smelt Survey 8, 6-12 June 2014 Chart weighted by volume of area sampled.[4]

Only 24 Delta smelt were collected in 141 trawls (3 trawls at each of 47 locations).

[4] http://www.dfg.ca.gov/delta/data/20mm/CPUE_map.asp

This pattern is replicated in the annual abundance indices of the Fall Midwater Trawl, which illustrates the continued decline of Delta smelt since the State Water Project began exporting water in 1967.



California Department of Fish and Wildlife: Delta Smelt Fall Midwater Trawl Indices 1967-2013.[5]

The decline of Delta fisheries is not limited to Delta smelt but encompasses the entire range of pelagic species.[6]

Pelagic Fisheries Have Collapsed
Percent Decline in Delta Fish Population Abundance Indices

Fall Midwater Trawls

Species	1967 v. 2013	Five Year Average 67-71 v. 09-13
Striped Bass	-99.6%	-98.8%
Delta Smelt	-95.6%	-89.8%
Longfin Smelt	-99.8%	-99.4%
American Shad	-90.9%	-99.4%
Splittail	-98.5%	-87.7%
Threadfin Shad	-97.8%	-98.1%

Summer Townet Survey

Species	1967 v. 2013	Five Year Average 67-71 v. 09-13
Striped Bass	-98.2%	-98.1%
Delta Smelt	-94.2%	-93.8%

Native lower trophic orders reflect similar magnitude declines.

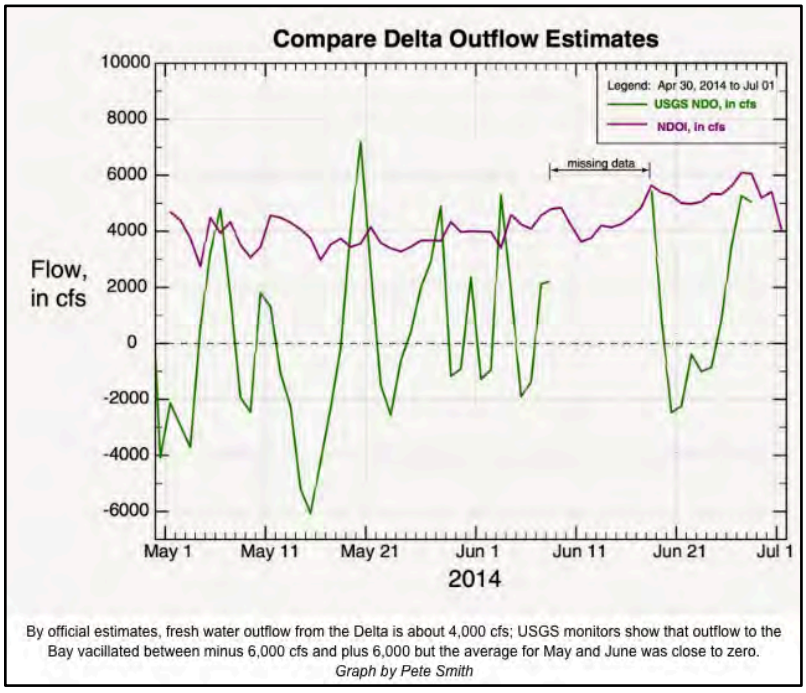
[5] http://www.dfg.ca.gov/delta/projects.asp?ProjectID=FMWT
[6] http://calsport.org/news/wp-content/uploads/St-Bd-Drought-Wkshp1.pdf

The problem has been exacerbated in recent years by excessive water exports from the Delta coupled with extremely low outflow to the Bay and relaxed or ignored flow and water quality standards. This combination low flow and exports draws the crucial low salinity zone (LSZ) into the Delta where pelagic species are subjected to entrainment in the massive export pumps and lethal summer water temperatures. Last year was bad as a combination of low outflows and high exports hammered Delta smelt.[7] This year is likely to be much worse and Delta smelt are literally on the brink of extinction.

The Estimates of Delta Outflow by USBR and DWR are Simply Wrong!

U.S. Bureau of Reclamation (USBR) and California Department of Water Resources (DWR) claim that net Delta outflow (NDOI) averaged 3170 cubic feet per second (cfs) between I July and 11 July 2014.[8] However, the NDOI, which is a complicated computation that guesses at net Delta channel depletion, is simply wrong.

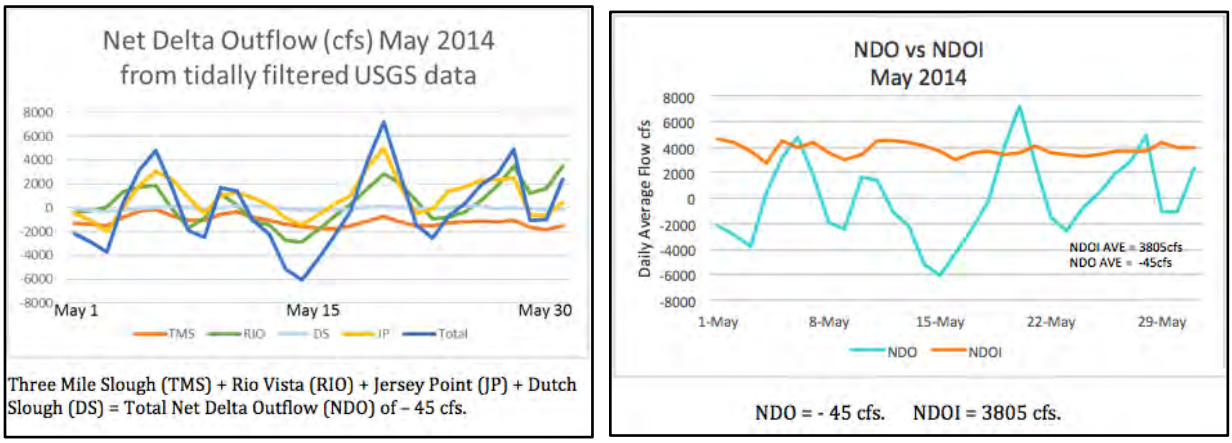
The U.S. Geological Survey (USGS) maintains four state-of-the-art UVM flow gages on the Sacramento and San Joaquin Rivers and Three-mile and Dutch Sloughs that, cumulatively, record total Net Delta Outflow (NDO). Examination of tidally filtered outflow data from these gages reveals that the outflows reported by USBR and DWR are seriously inflated in low water conditions.



Retired USGS Engineer, Pete Smith, prepared the above comparison of NDO versus NDOI that was recently reported in the California Spigot.[9]

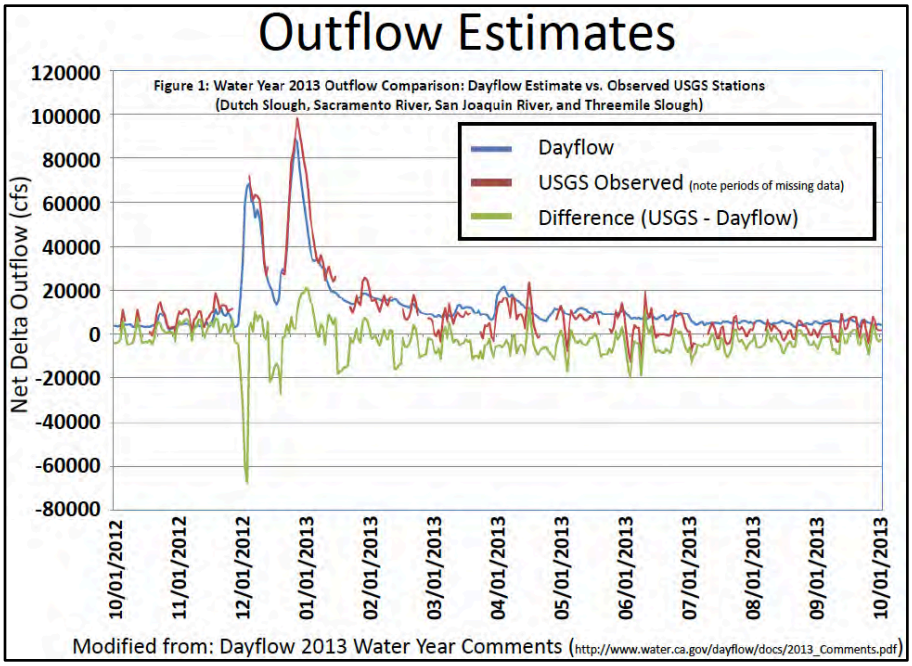
[7] http://calsport.org/news/wp-content/uploads/CSPA-Cannon-Summer-2013-6.pdf
[8] http://www.usbr.gov/mp/cvo/vungvari/doutdly.pdf
[9] http://www.californiaspigot.blogspot.com

CSPA fishery consultant and biostatistician, Thomas Cannon, also prepared an assessment for CSPA that analyzed the NDOI index and discovered that it seriously overestimates actual Delta outflow. Mr. Cannon calculated that the actual Delta outflow in May 2014 was a minus 45 cfs, instead of the positive 3805 cfs claimed by USBR and DWR. He also discovered that DWR had long aware been of the discrepancy.[10]



Thomas Cannon: Net Delta Outflow in May 2014 and NDO vs. NDOI.

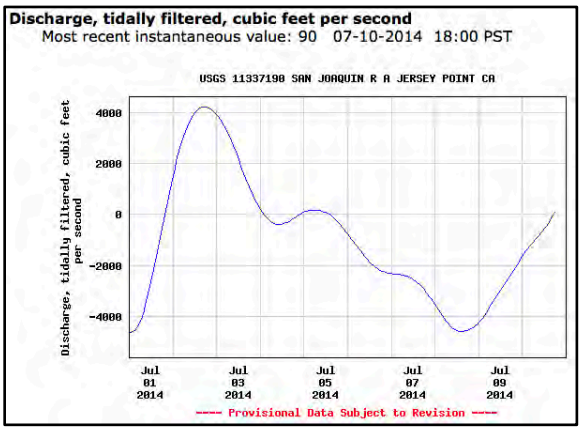
Dr. Michael L. MacWilliams, of Delta Modeling Associates, in a presentation to the Delta Science Program's workshop on Delta outflows and related stressors, observed that NDOI estimates during the fall of 2013 were more than double the USGS measured outflows.



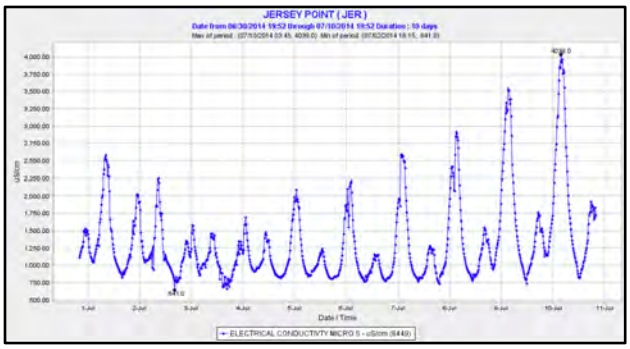
[10] http://calsport.org/news/wp-content/uploads/CSPA-NDO-v-NDOI-2.pdf

Dr. MacWilliams testified that, based on measured data for salinity intrusion and X2, the NDOI estimates appeared to be clearly incorrect.[11]

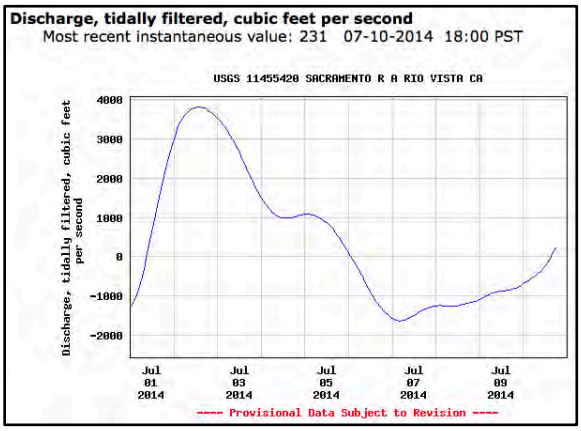
During the first ten days of July 2014, the NDOI was reported as a positive outflow averaging 3170 cfs. However, examination of the four USGS tidally filtered stations at Rio Vista, Threemile Slough, Jersey Point and Dutch Slough reveals that outflow had become negative, beginning around 4/5 July. Inflow from the Bay approached 7000 cfs by 8 July. This was reflected in sharply increasing salinity (EC) levels in the Delta, which could not have occurred under a positive NDOI outflow.



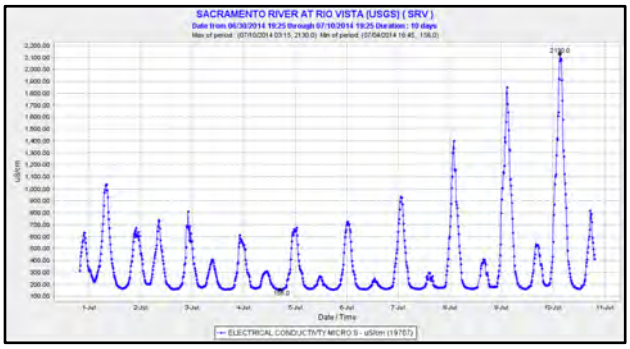
USGS Jersey Point Flow (11337190)



CDEC Jersey Point EC (JER)

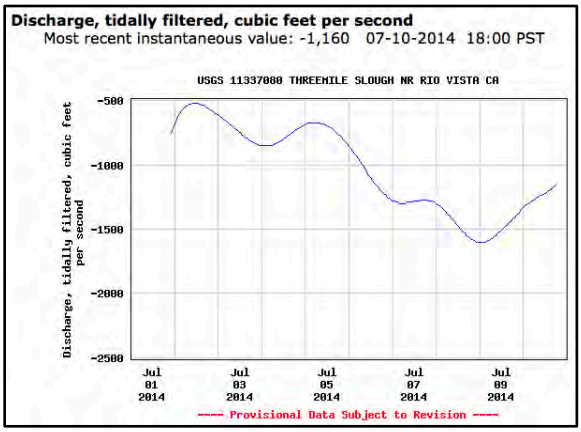


USGS Rio Vista Flow (11455420)

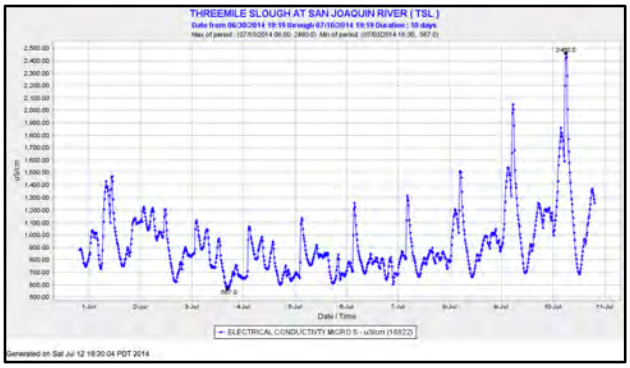


CDEC Rio Vista EC (SRV)

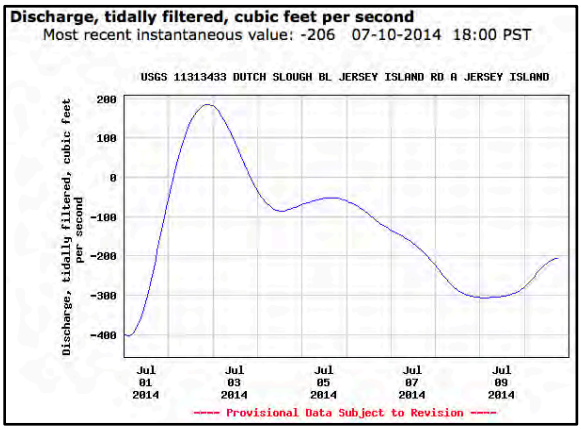
[11] http://deltacouncil.ca.gov/sites/default/files/documents/files/10-Outflow-Workshop-MacWilliams-02-10-14-Final.pdf



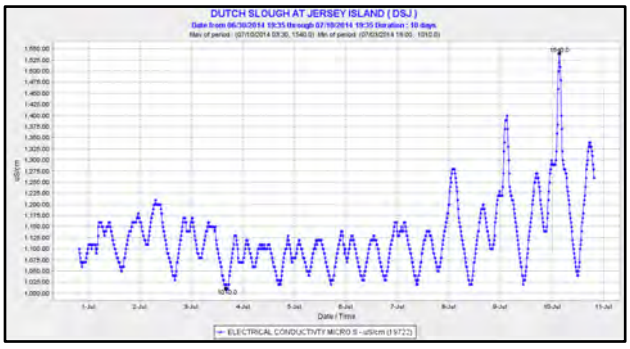
USGS Threemile Slough Flow (11337080)



CDEC Threemile Slough EC (SJJ)



USGS Dutch Slough Flow (11313433)



CDEC Dutch Slough EC (DSJ)

Real time data from the USGS[12] and California Data Exchange Center (CDEC)[13] can be accessed online.

The final report of the expert panel observed that, "Although a precise estimate of the accuracy of the measured outflow is not known, the measured values should be more accurate than the NDOI as long as the four monitoring stations used in the calculations are operating properly." The panel asked, "why the measured outflows (rather than NDOI) aren't used for the specific outflow standards during the July-to-January period, and also why they aren't used as the alternative flow compliance option in the springtime X2 standard."[14]

The California Spigot quoted State Water Resources Control Board engineer, Rick Satkowski, as saying, in light of these findings, the State Board will be looking at, "possible changes in determining outflow.

[12] http://waterdata.usgs.gov/ca/nwis/current/?type=flow&group_key=basin_cd

[13] http://cdec.water.ca.gov/staMeta.html

[14] http://deltacouncil.ca.gov/sites/default/files/documents/files/Delta-Outflows-Report-Final-2014-05-05.pdf

USBR and DWR have long known of the difference between measured net delta outflow and the calculated net delta outflow index. They have long known that they do not have reliable data on in Delta channel depletions. They have long known that not all inflow into the Delta from tributary streams is accurately gaged. But they are also aware that if NDO, instead of the NDOI, is used as the standard of net delta outflow, more water will have to be directed to outflow and less to exports, especially in dry years.

USBR and DWR are committed to maximizing water deliveries to contractors, even if it sends the Delta smelt, once the most abundant fish in the Delta, toward extinction. That is unacceptable!

Contrary to USBR and DWR Claims, Delta Smelt are in the Delta in June, July and August

The USFWS Biological Opinion for Delta smelt provides no protection in July and August because the service claims that there are no Delta smelt in the Delta during those months. On that basis, USBR and DWR, with USFWS concurrence, provided no protection for smelt during water transfers. Earlier this year, the State Water Board, again with USFWS concurrence, lowered the Delta outflow criteria, contained in D-1641, from 4000 cfs to 3000 cfs during the months of May and July. However, they are simply wrong!

Last year, as chronicled in CSPA's report titled *The Summer of 2013, the demise of Delta smelt under D-1641 Delta Water Quality Standards*,[15] reductions in outflow, coupled with increased water exports, drew Delta smelt into the western Delta where they encountered lethal water temperatures. Abundance levels plunged.

Delta smelt are in the Delta. They shouldn't be. During late June and July, Delta smelt should be in the LSZ in Suisun Bay, protected from the lethal 76-77 degrees water temperatures frequently found in the Delta during summer. However, a combination of low outflow and excessive exports draws the LSZ and Delta smelt into the Delta during drier years.

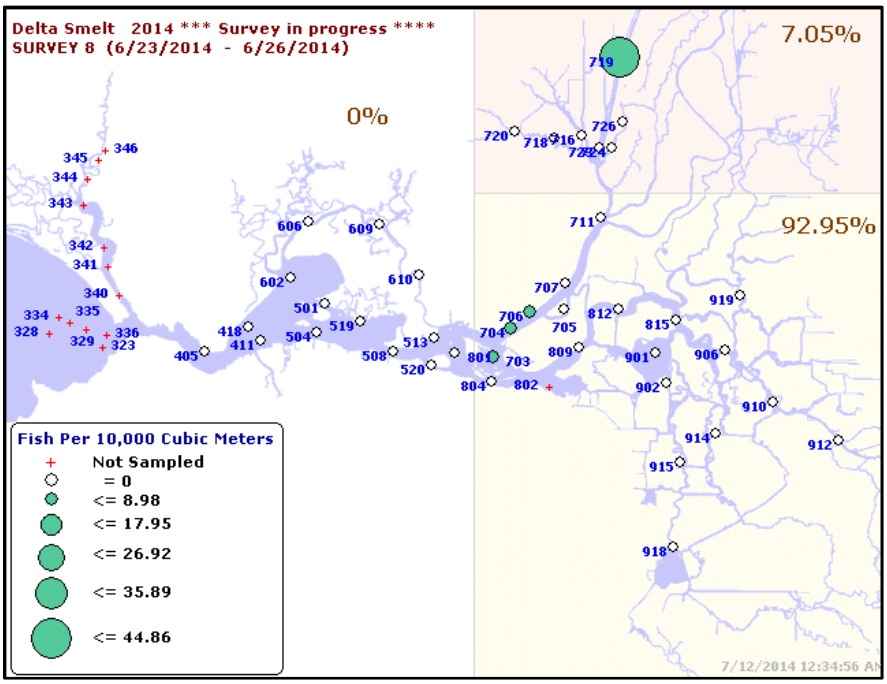
There is also a small population of smelt that spawn in the Cache Slough-Sacramento Ship Channel area. However, they become trapped and unable to migrate back to the LSZ and seek to survive in the stratified waters of the deep water in the ship channel. Extended heat waves pose a severe threat to that population, as the coldwater pool will ultimately dissipate. In 2009, the California Department of Fish and Wildlife (CDFW) conducted supplemental monitoring at six sites in the ship channel and found that smelt populations decreased through July and virtually disappeared by August. The USFWS's 2008 Biological Opinion does not suggest that the Cache Slough-Sacramento Ship Channel area provides a viable temperature refuge for Delta smelt when their only recognized habitat – the LSZ in the Delta – has been rendered unsuitable for survival.

Below are the CDFW's late June and early July 20mm Delta smelt surveys from 1996 to 2014. The 20mm surveys are comprised of three separate trawls conducted at 40 sites in the Delta. They demonstrate that in all but the wettest years, Delta smelt are in the Delta during late June and early

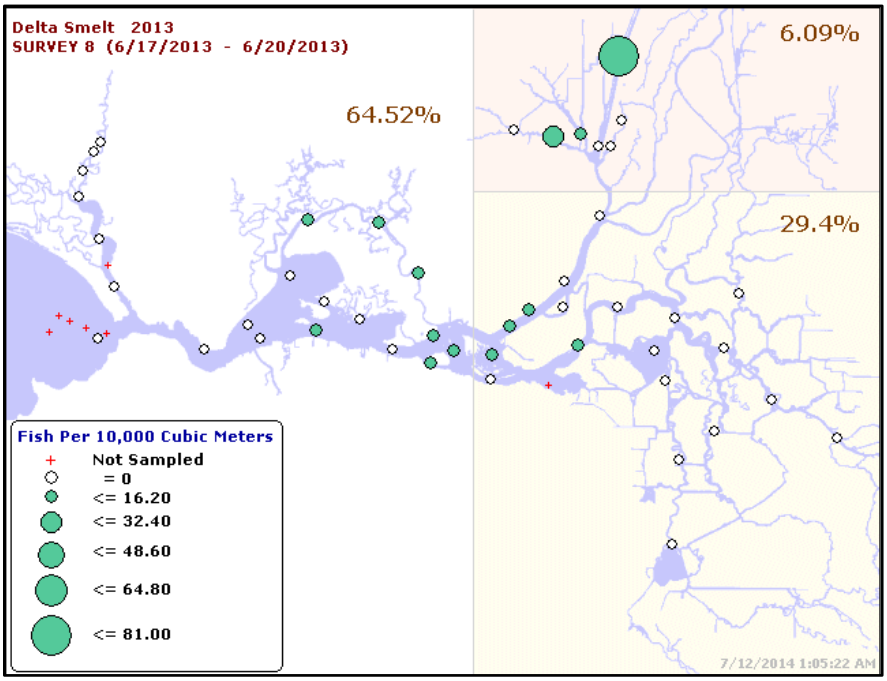
[15] http://calsport.org/news/wp-content/uploads/CSPA-Cannon-Summer-2013-6.pdf

July. In drier years, a significant percentage of Delta smelt, perhaps the majority of juveniles, are in the Delta.

CDFW: 20mm Delta Smelt Surveys, Late June 1996-2014 (with percentages)[16]

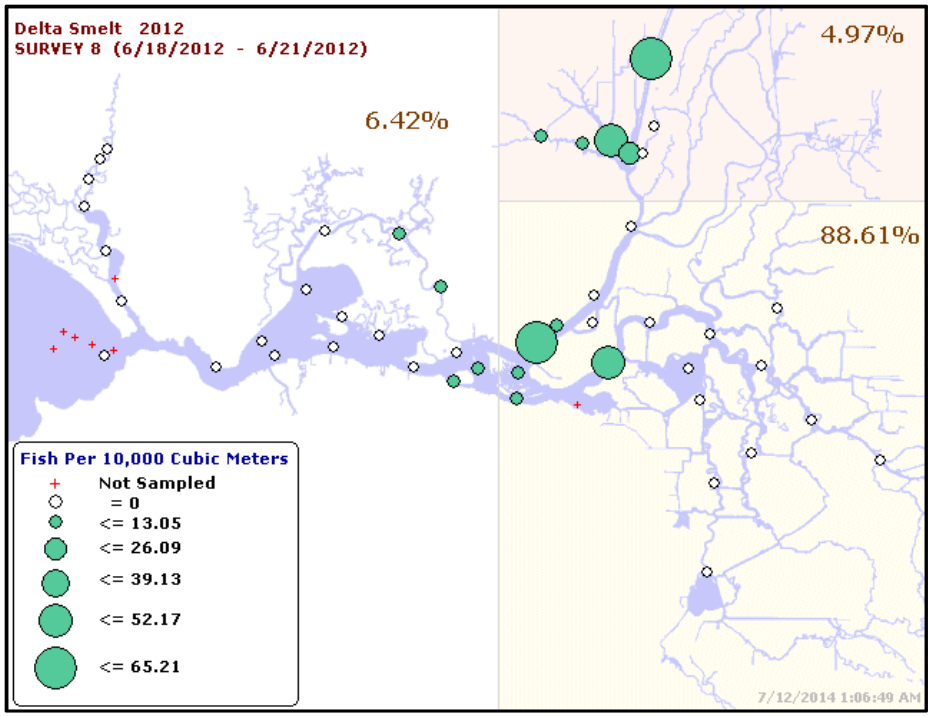


2014 Water Year: Sacramento = Critical; SJR = Critical

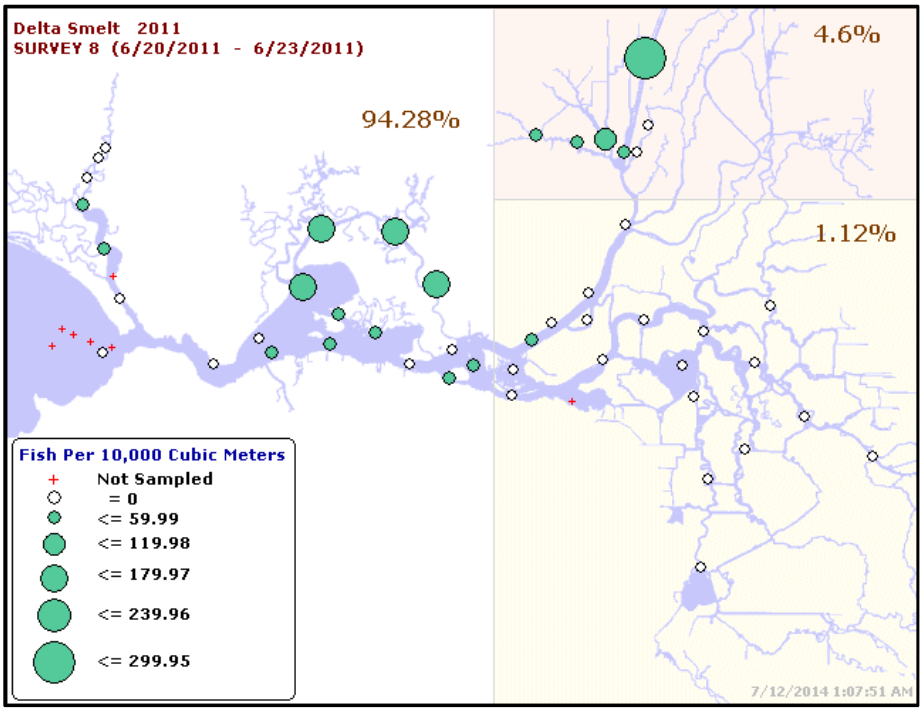


2013 Water Year: Sacramento = Dry; SJR = Critical

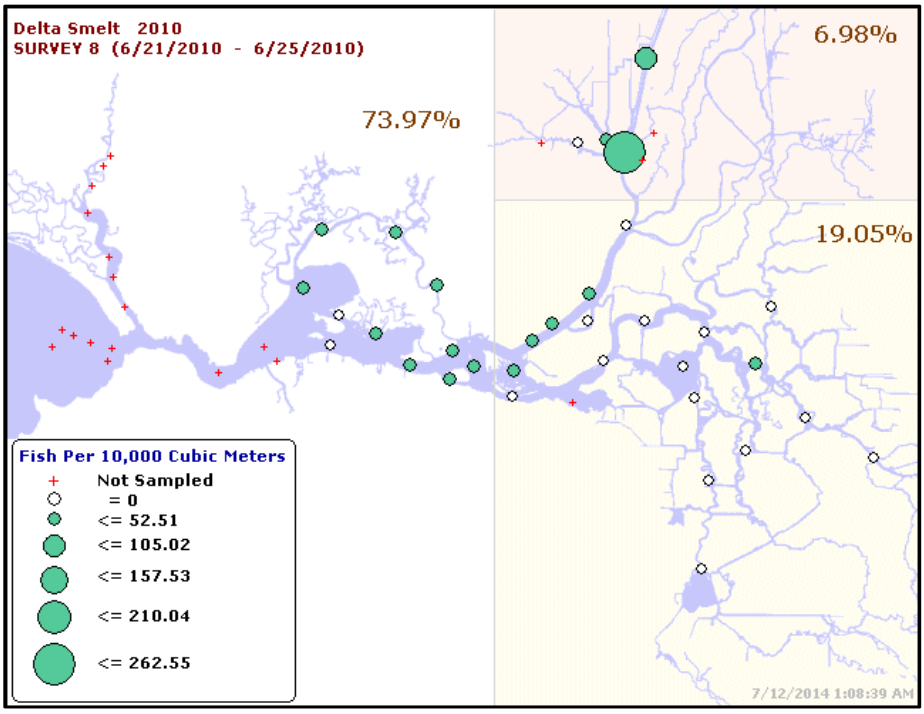
[16] http://www.dfg.ca.gov/delta/data/20mm/CPUE_map.asp



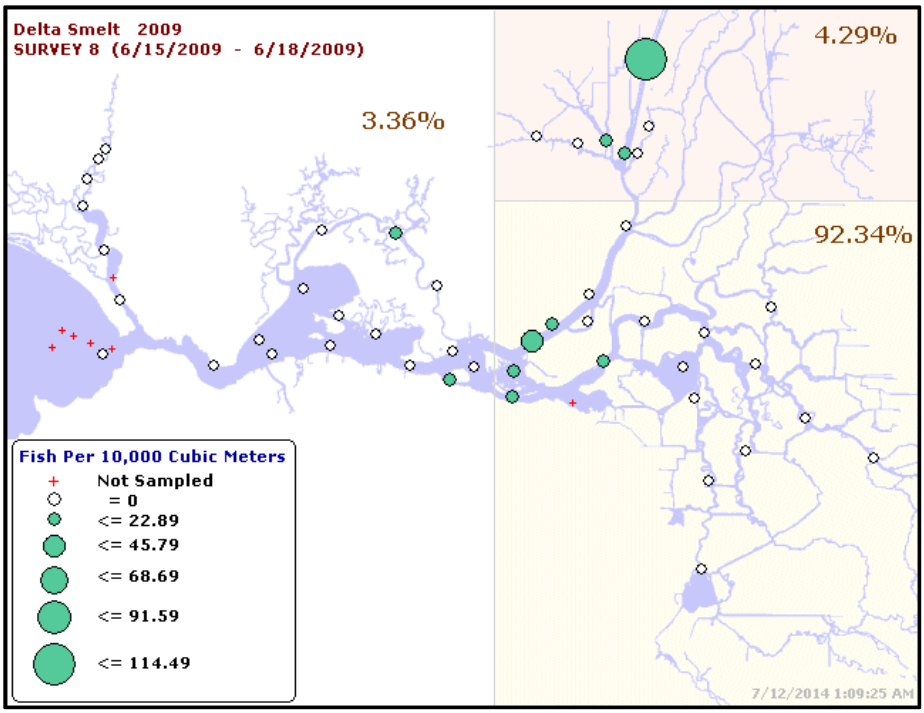
2012 Water Year: Sacramento = Below Normal; SJR = Dry



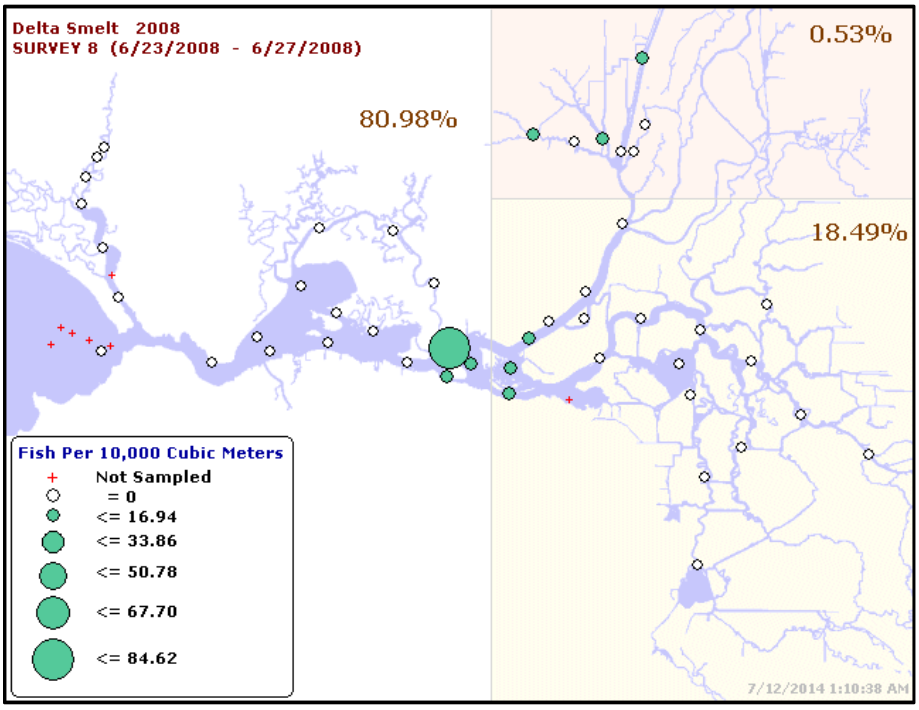
2011 Water Year: Sacramento = Wet; SJR = Wet



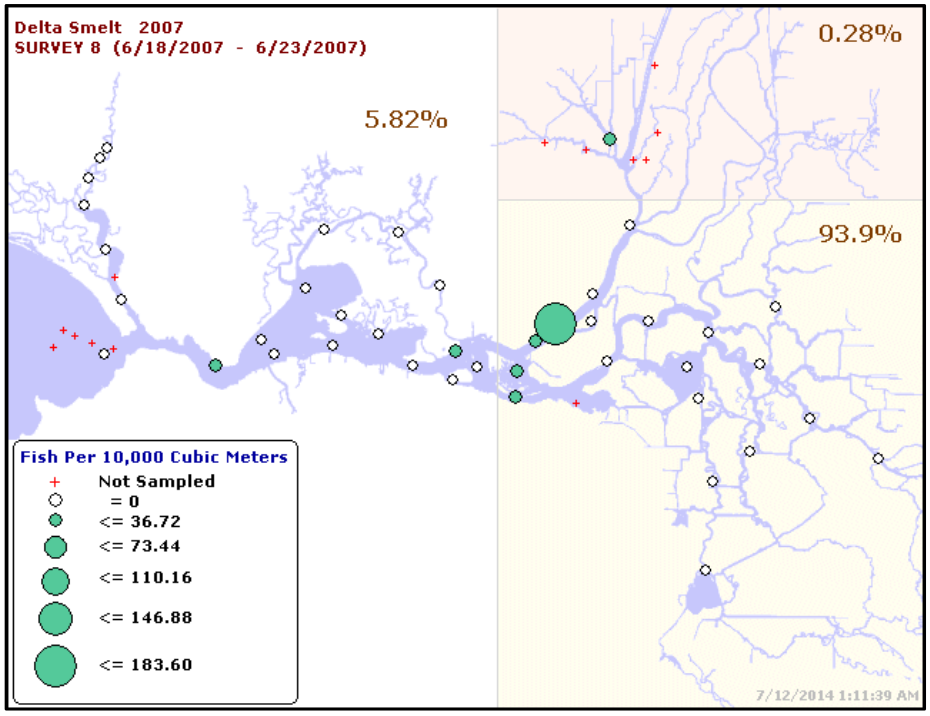
2010 Water Year: Sacramento = Below Normal; SJR = Above Normal



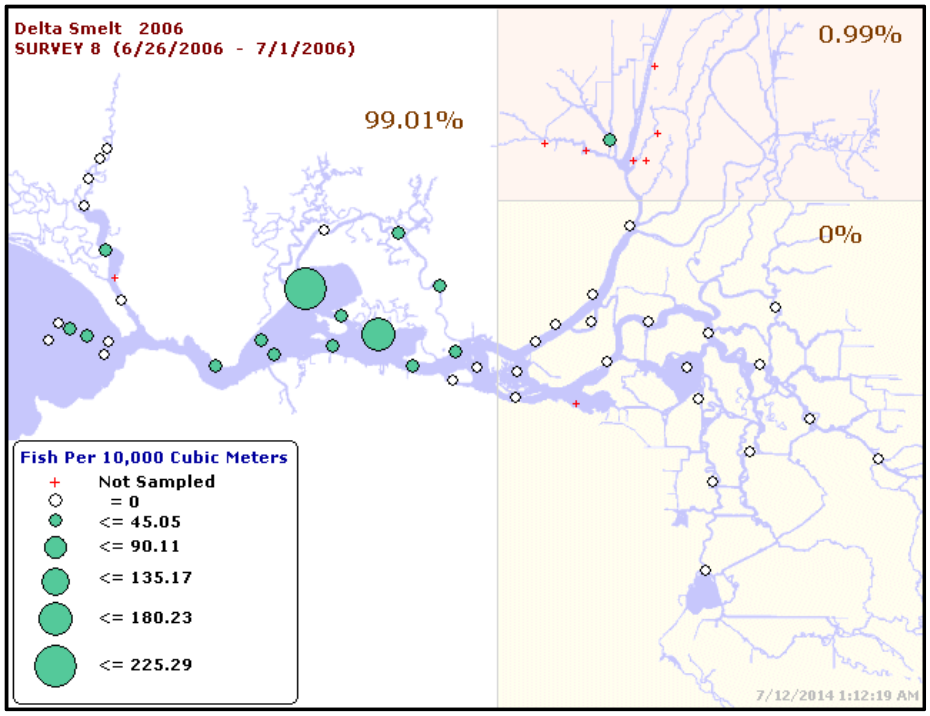
2009 Water Year: Sacramento = Dry; SJR = Dry



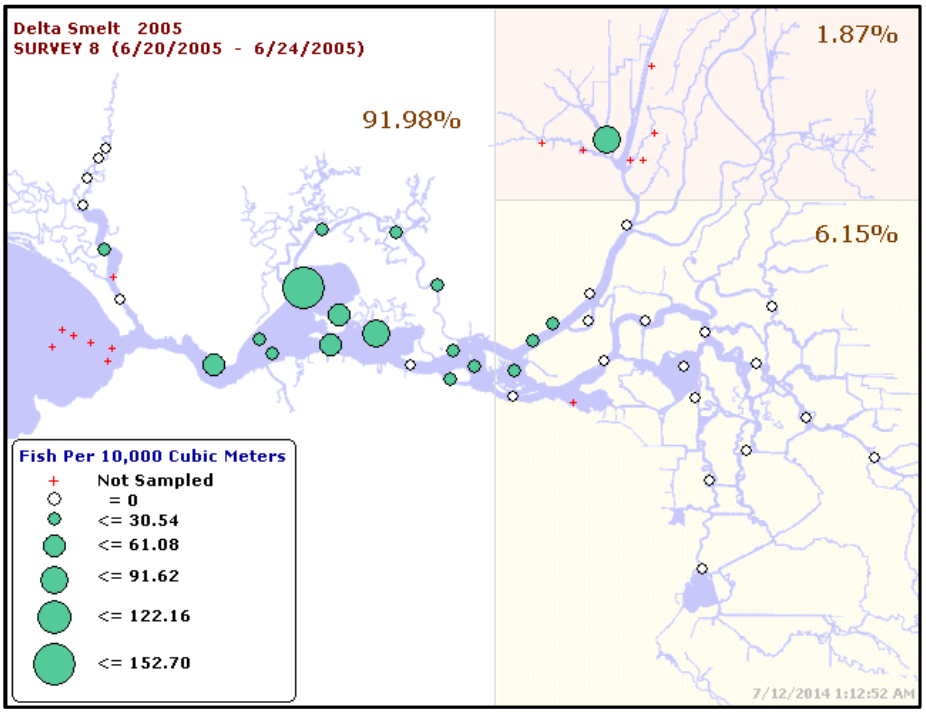
2008 Water Year: Sacramento = Critical; SJR = Critical



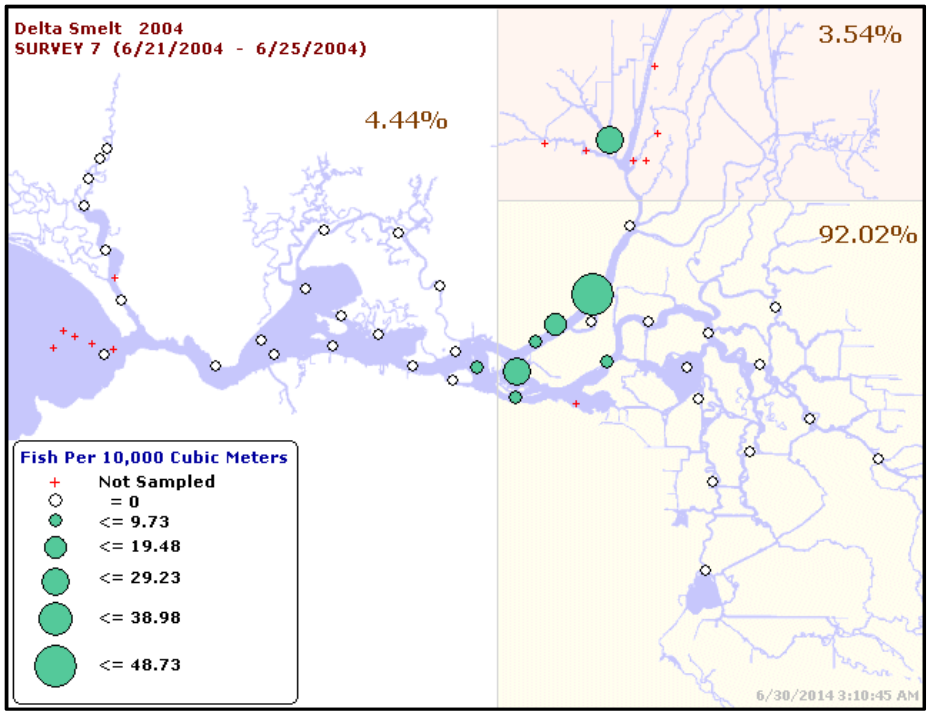
2007 Water Year: Sacramento = Dry; SJR = Critical



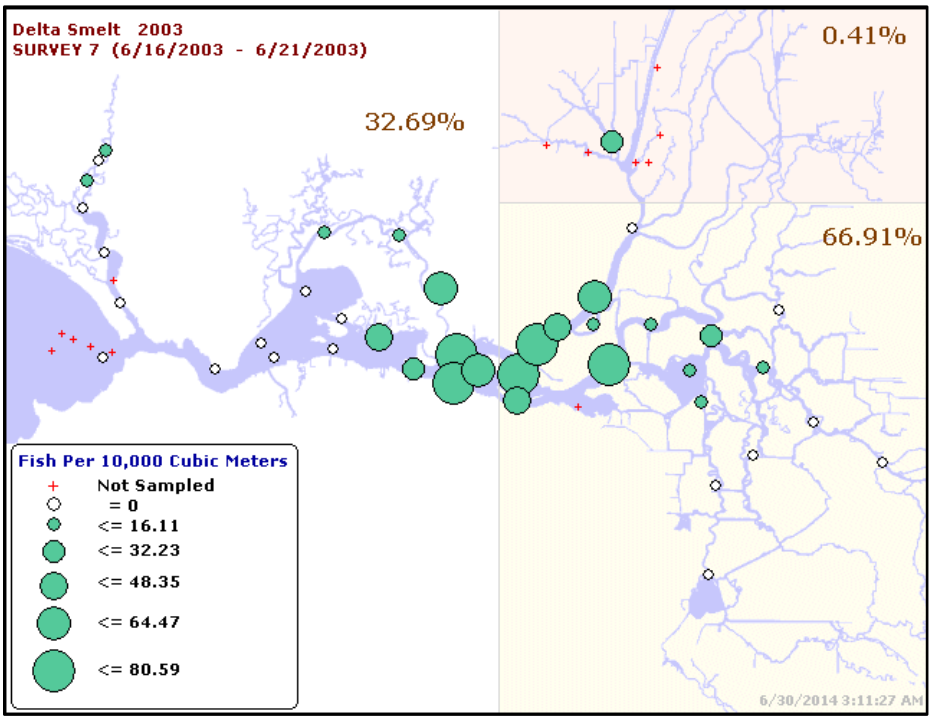
2006 Water Year: Sacramento = Wet; SJR = Wet



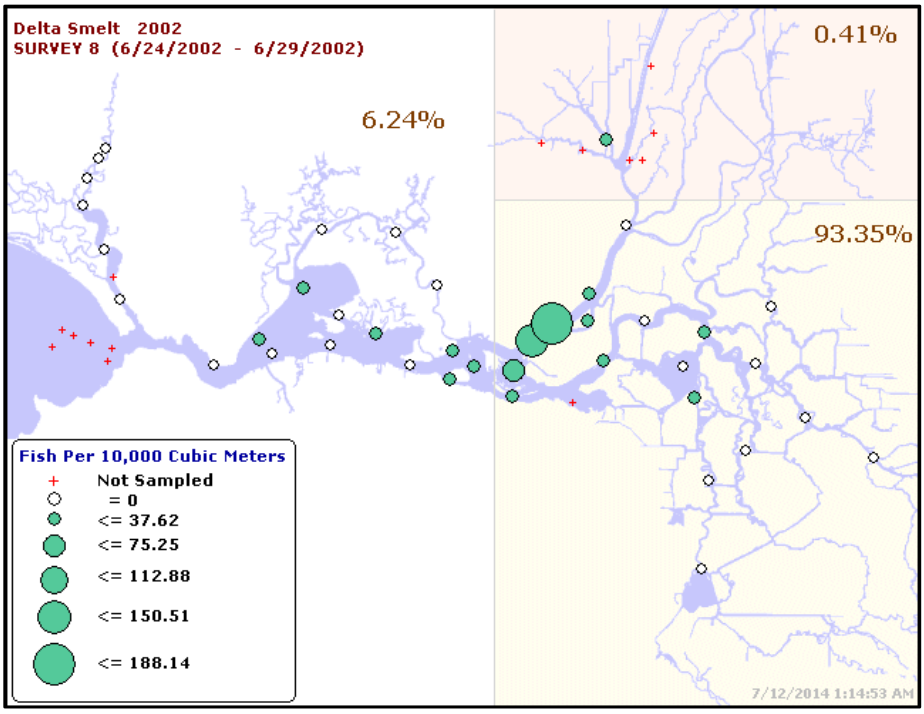
2005 Water Year: Sacramento = Above Normal; SJR = Wet



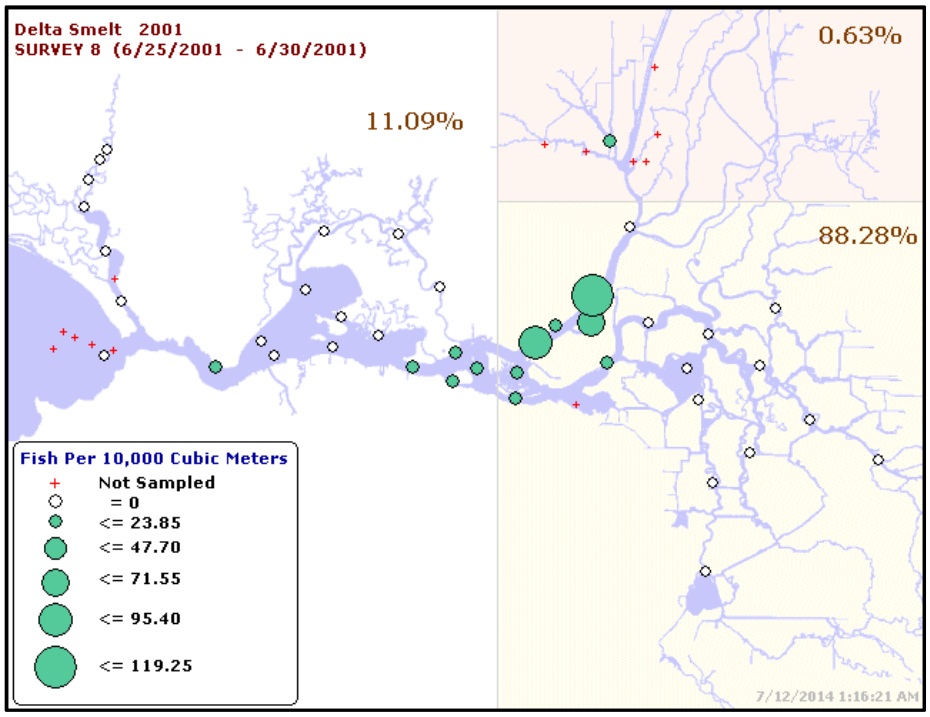
2004 Water Year: Sacramento = Below Normal; SJR = Dry



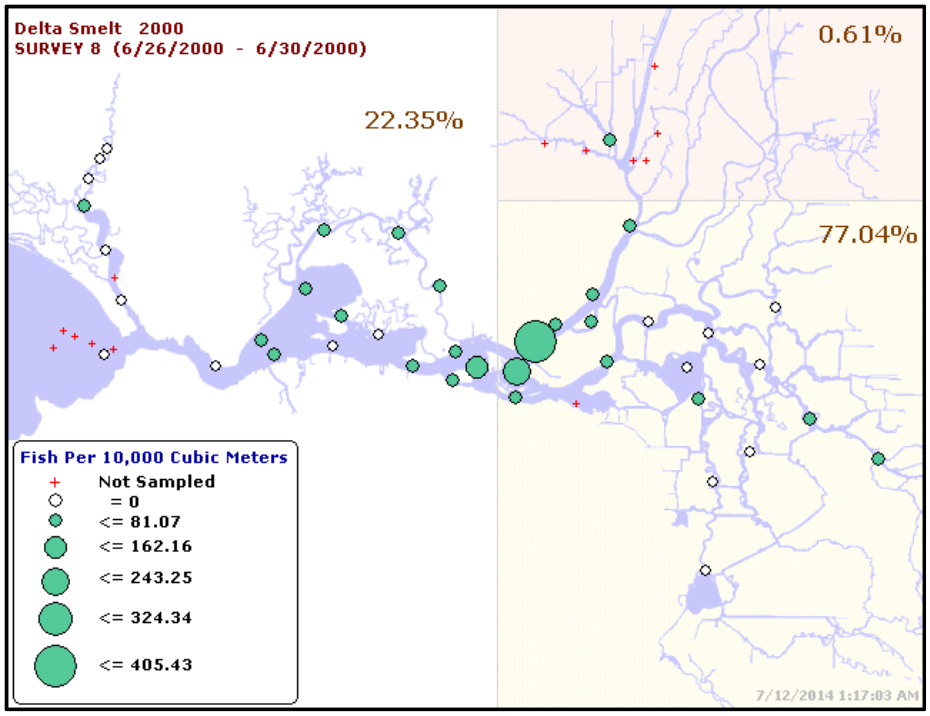
2003 Water Year: Sacramento = Above Normal; SJR = Below Normal



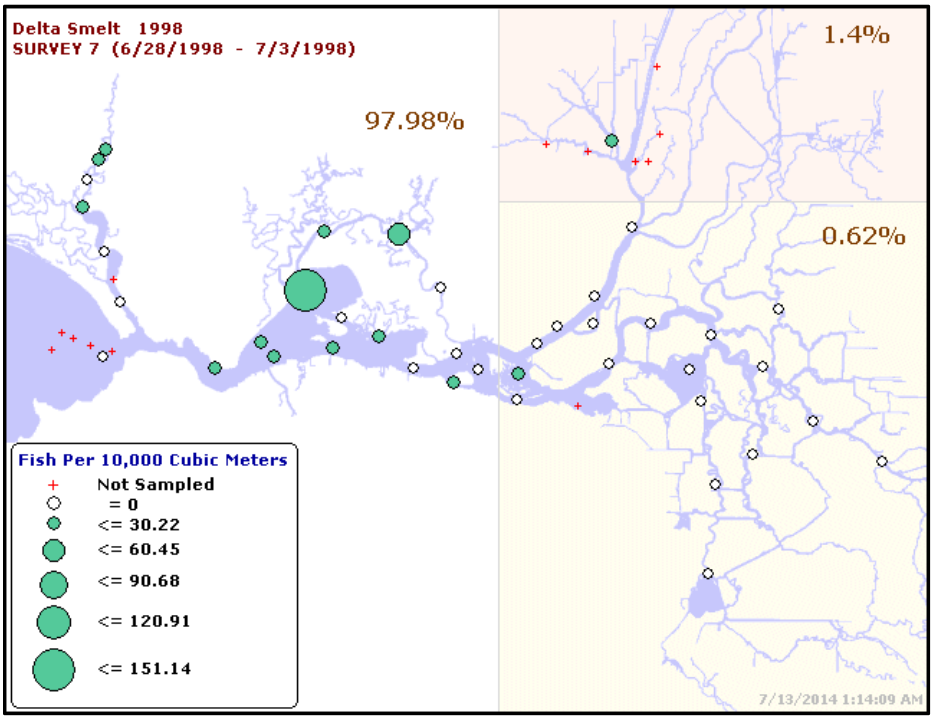
2002 Water Year: Sacramento = Dry; SJR = Dry



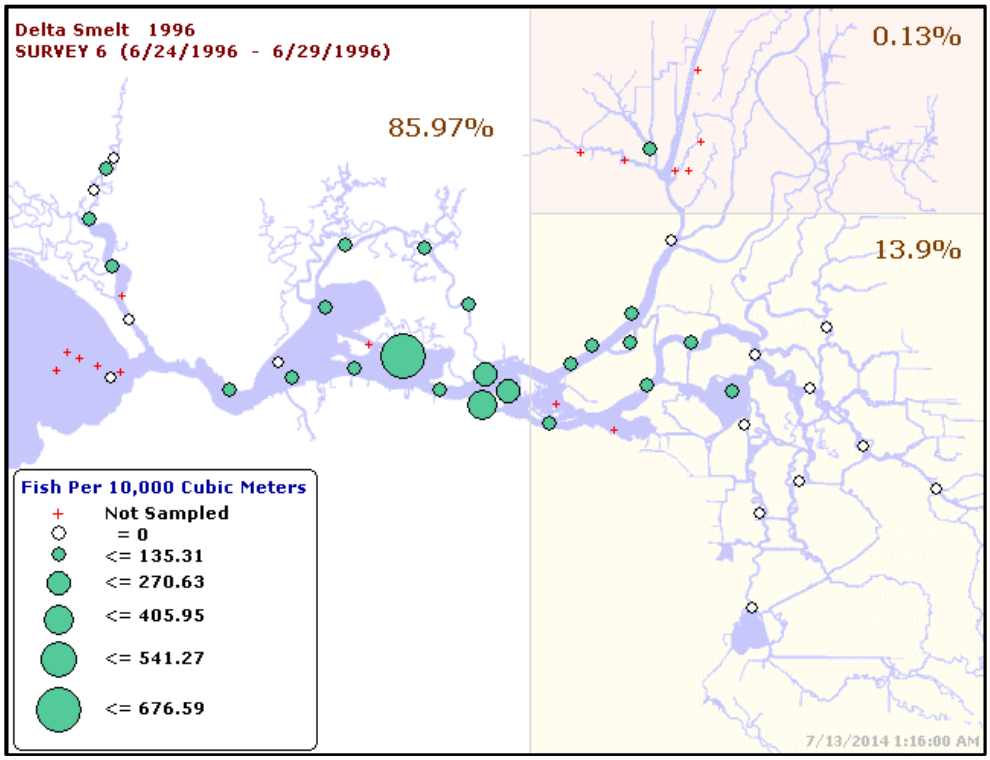
2001 Water Year: Sacramento = Dry; SJR = Dry



2000 Water Year: Sacramento = Above Normal; SJR = Above Normal



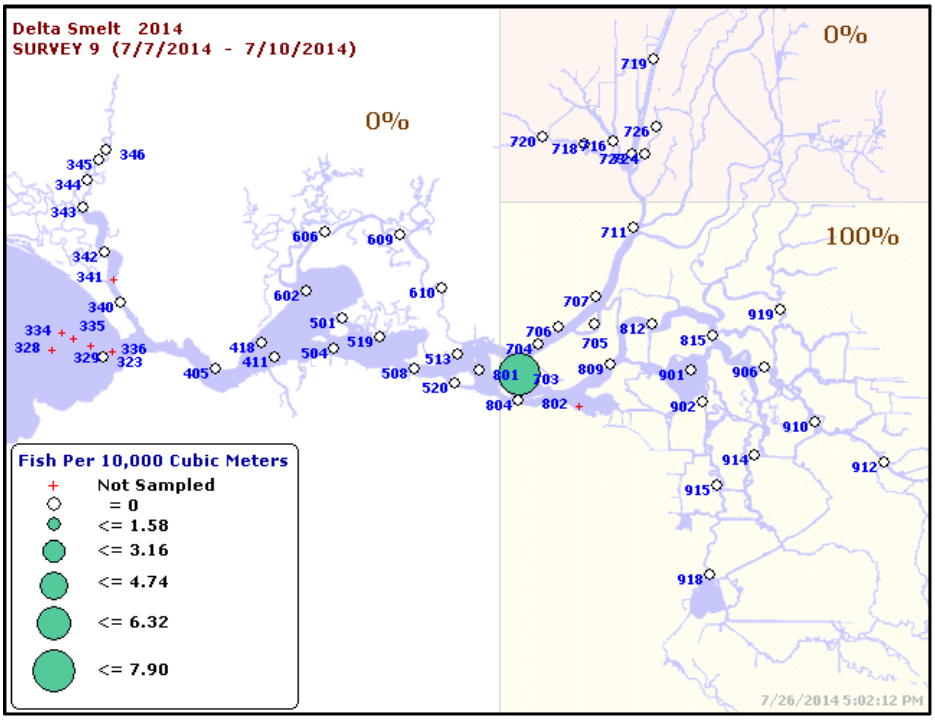
1998 Water Year: Sacramento = Wet; SJR = Wet



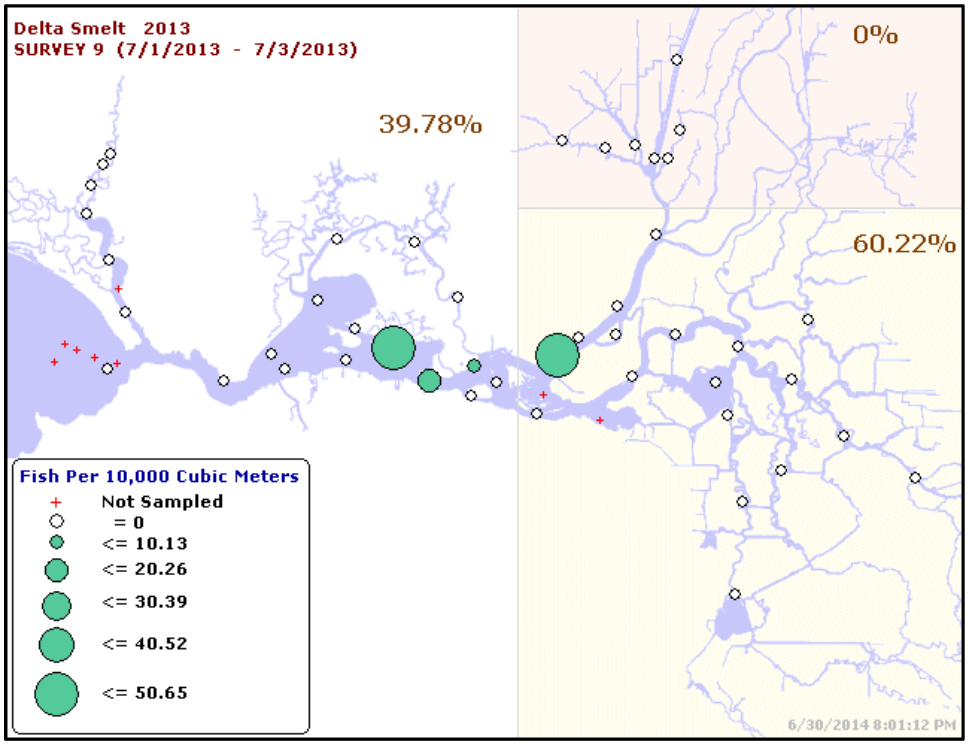
1996 Water Year: Sacramento = Wet; SJR = Wet

CDFW: 20mm Delta Smelt Surveys, Early July 1996-2013

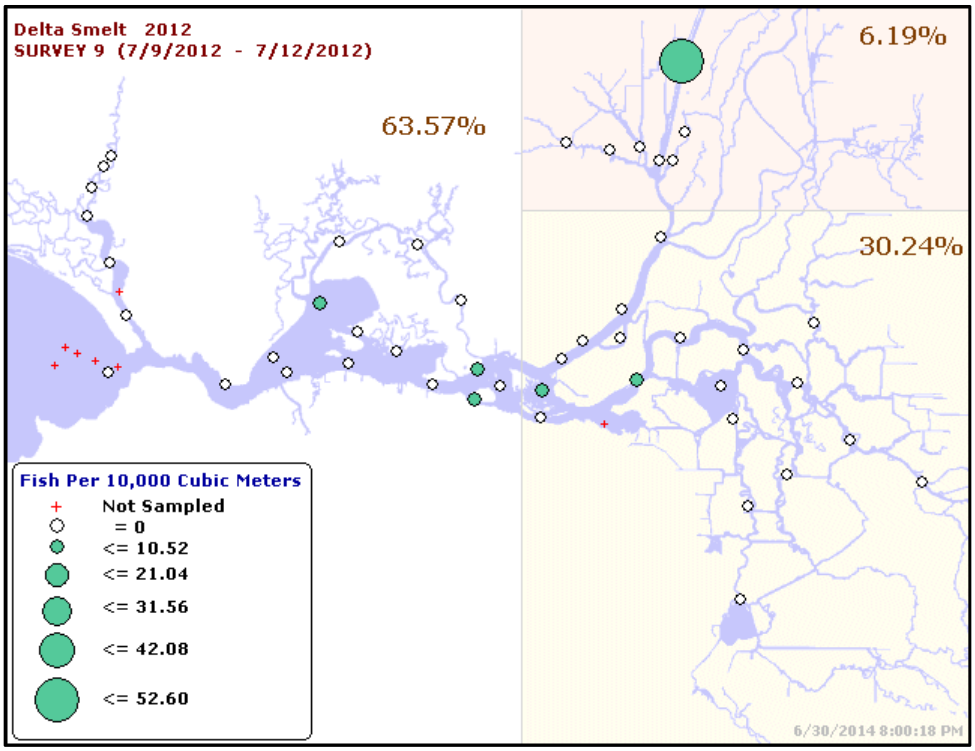
(with percentages)



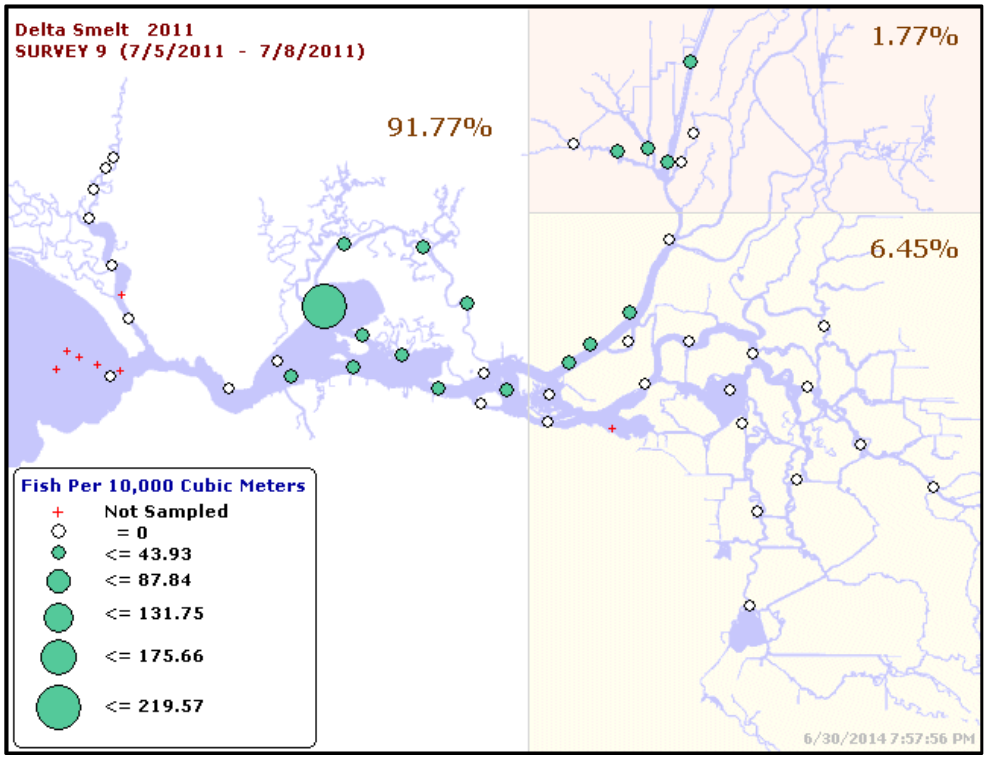
2014 Water Year: Sacramento = Critical; SJR = Critical



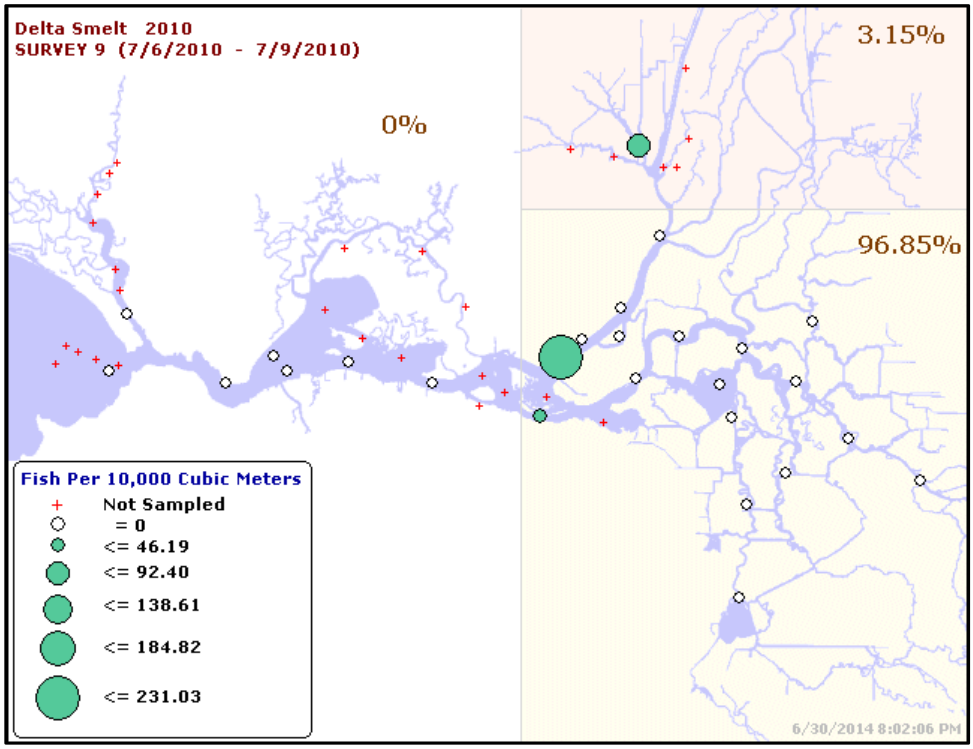
2013 Water Year: Sacramento = Dry; SJR = Critical



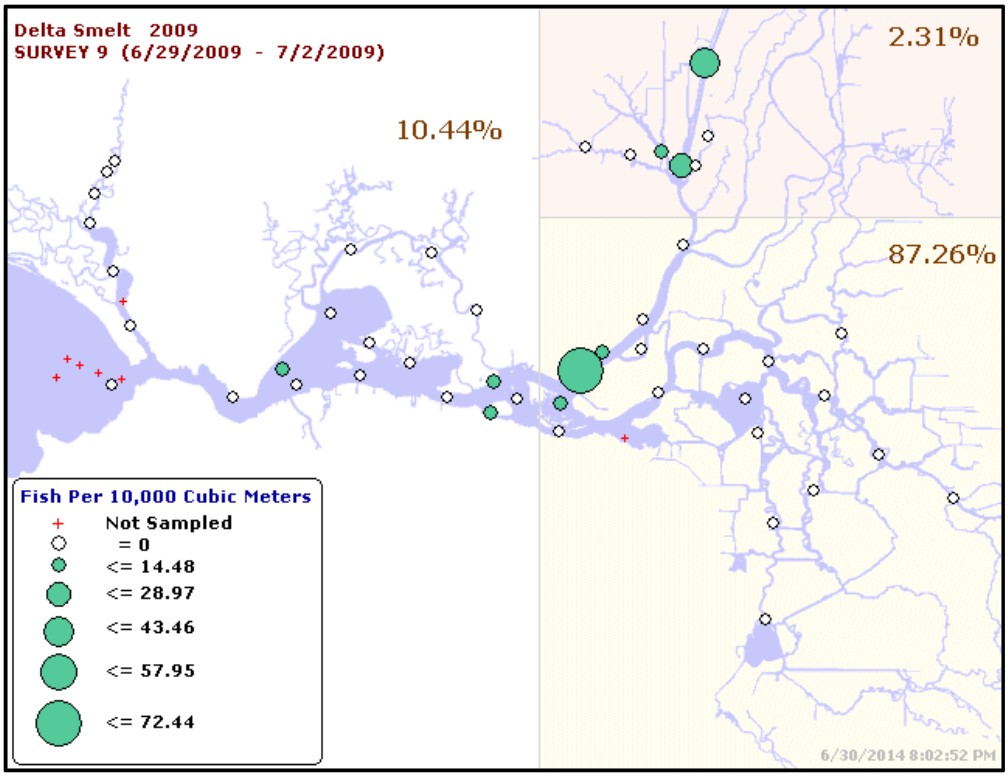
2012 Water Year: Sacramento = Below Normal; SJR = Dry



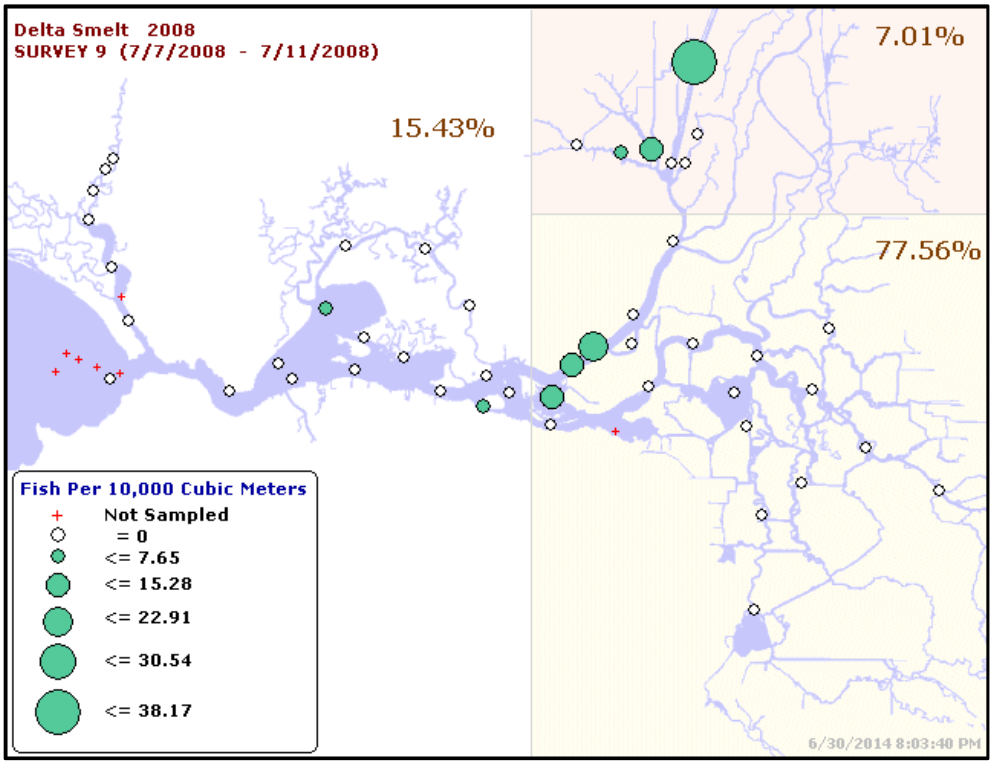
2011 Water Year: Sacramento = Wet; SJR = Wet



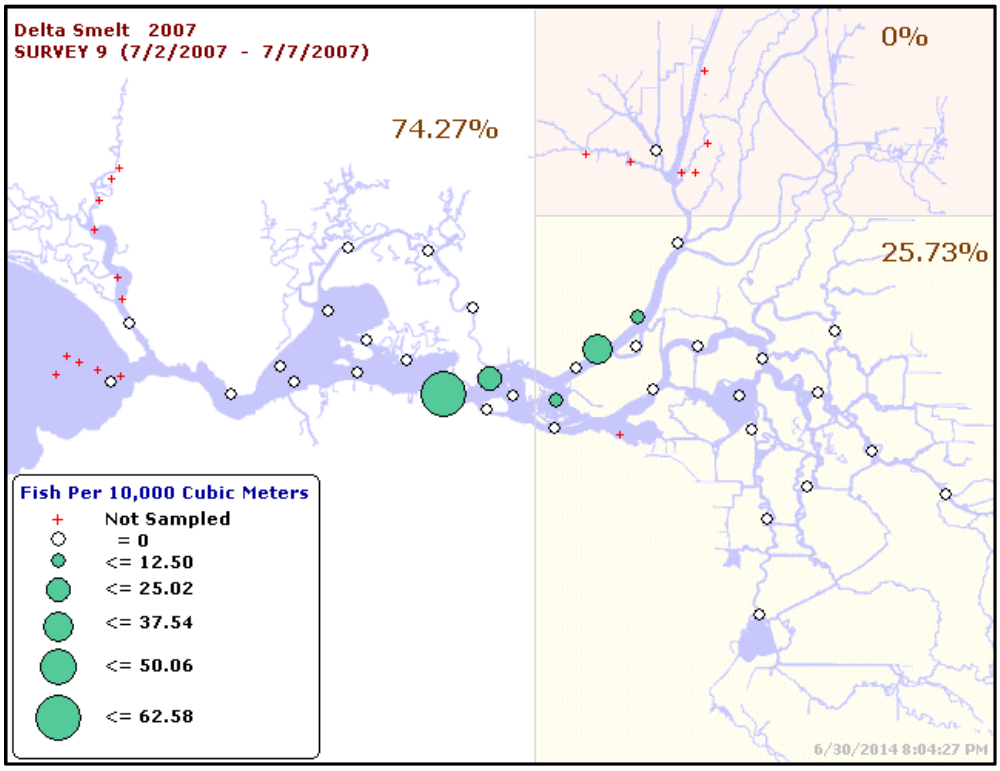
2010 Water Year: Sacramento = Below Normal; SJR = Above Normal



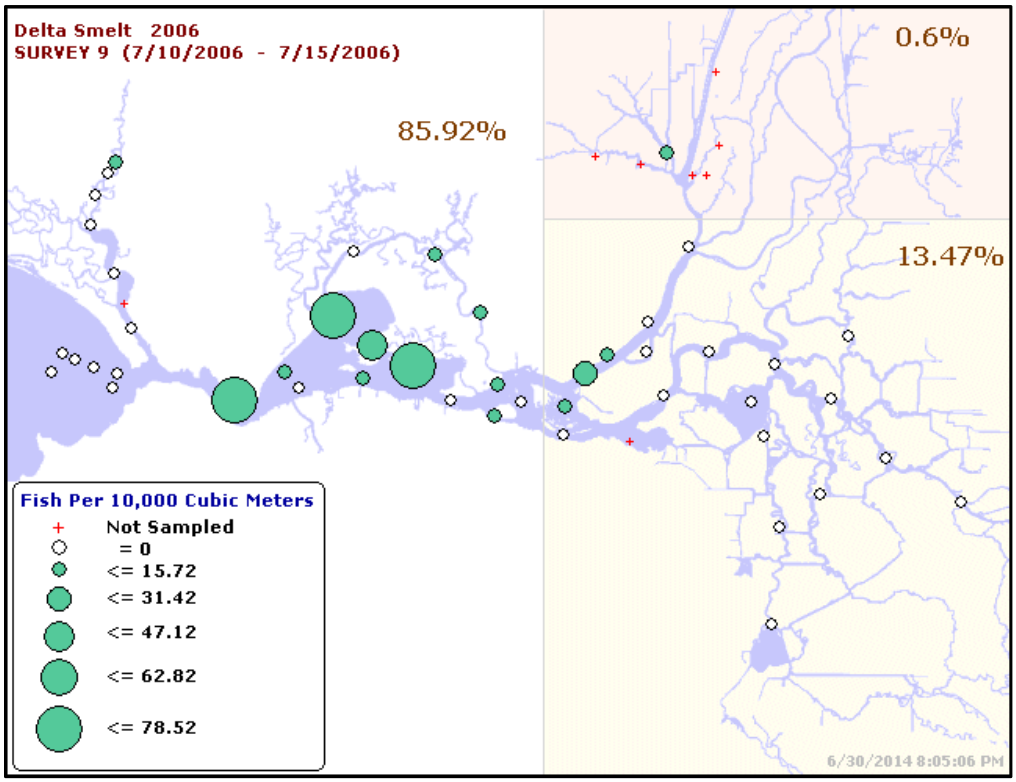
2009 Water Year: Sacramento = Dry; SJR = Dry



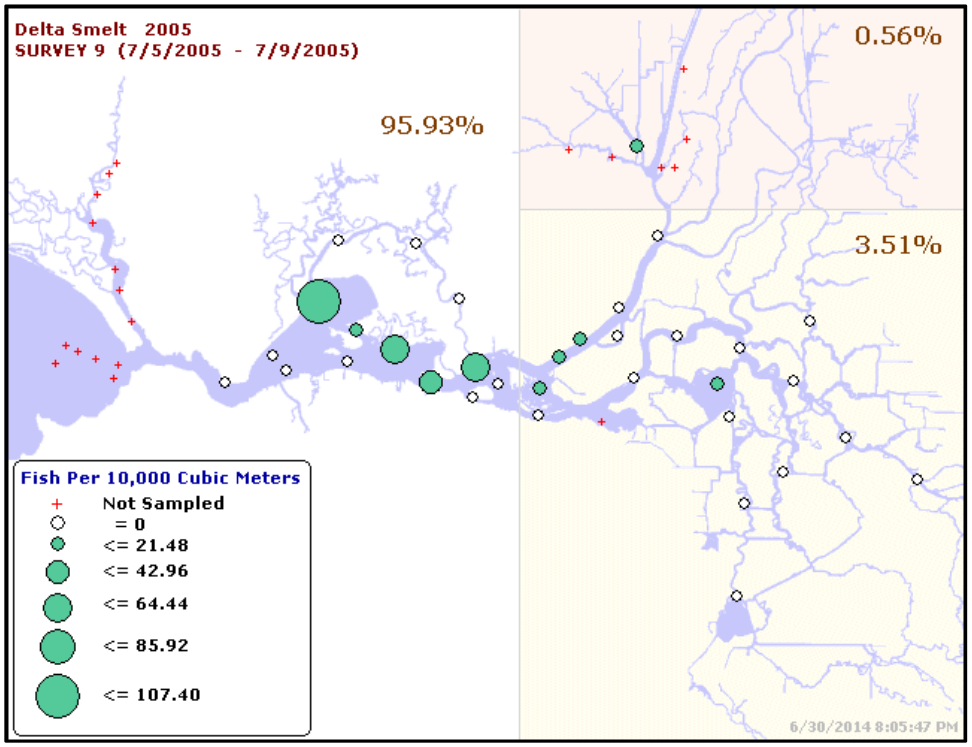
2008 Water Year: Sacramento = Critical; SJR = Critical



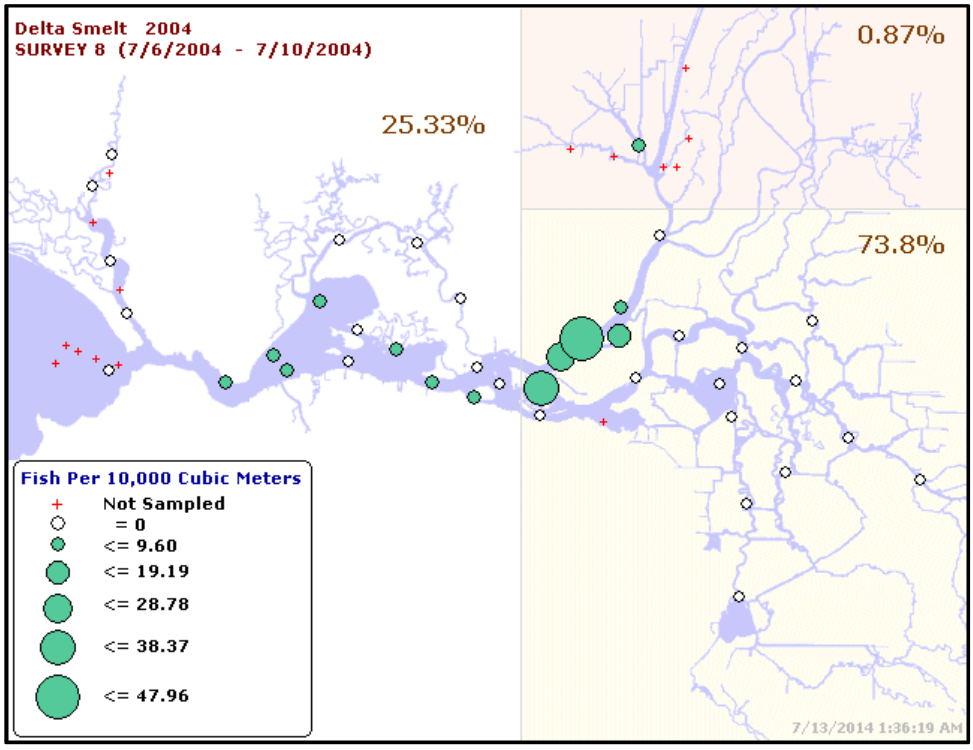
2007 Water Year: Sacramento = Dry; SJR = Critical



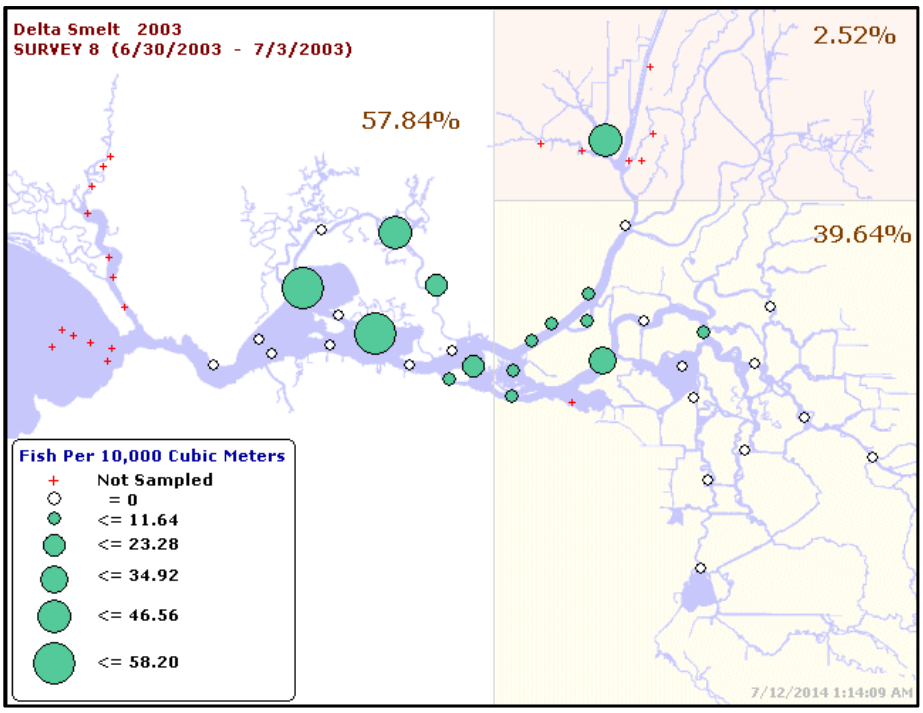
2006 Water Year: Sacramento = Wet; SJR = Wet



2005 Water Year: Sacramento = Above Normal; SJR = Wet

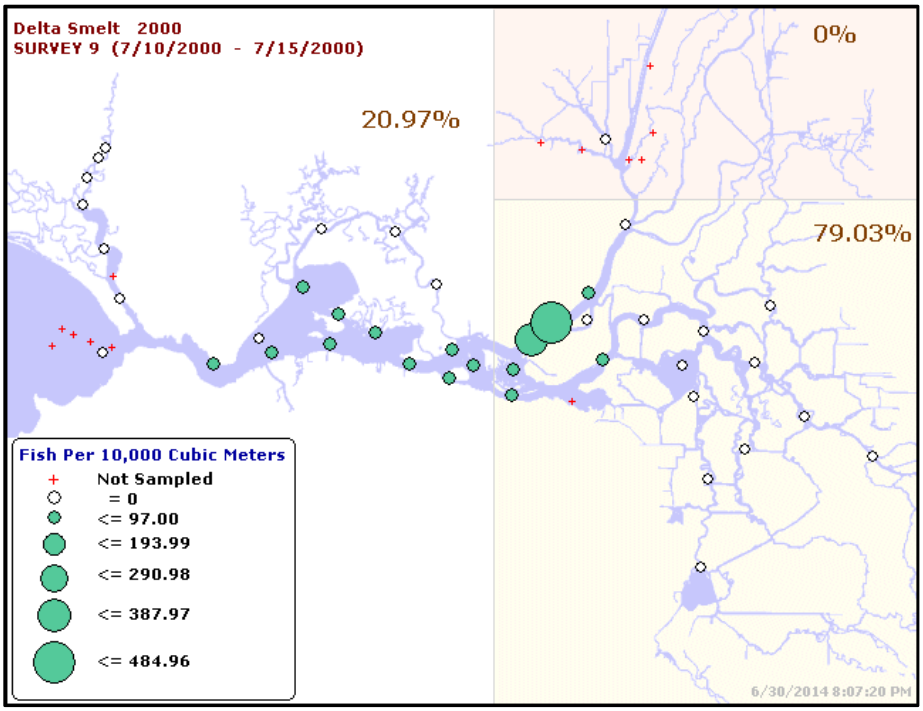


2004 Water Year: Sacramento = Below Normal; SJR = Dry

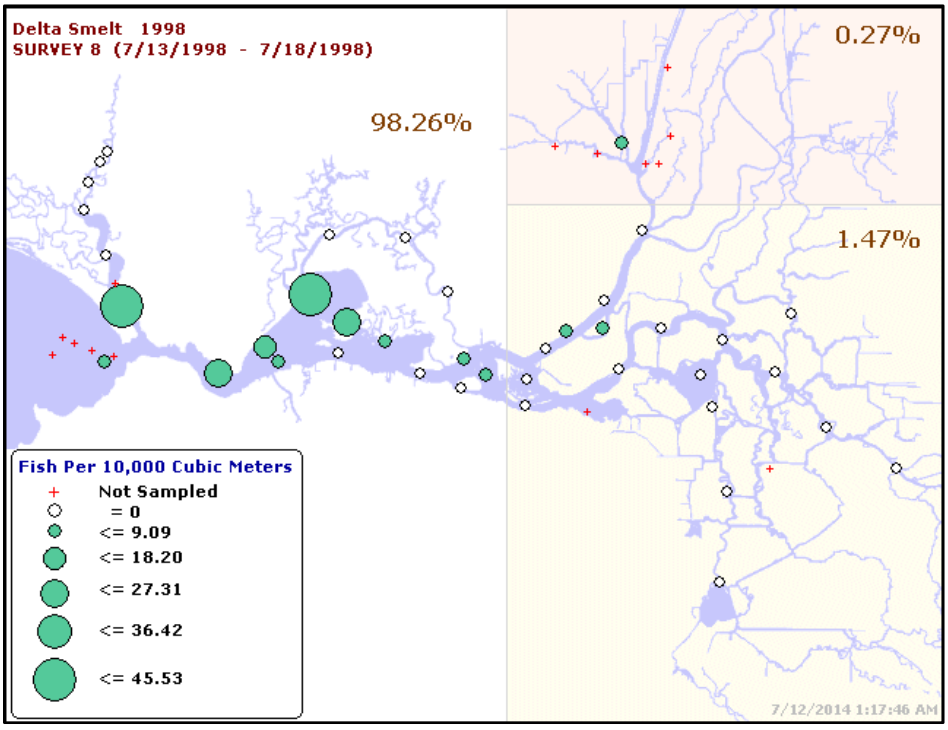


2003 Water Year: Sacramento = Above Normal; SJR = Below Normal

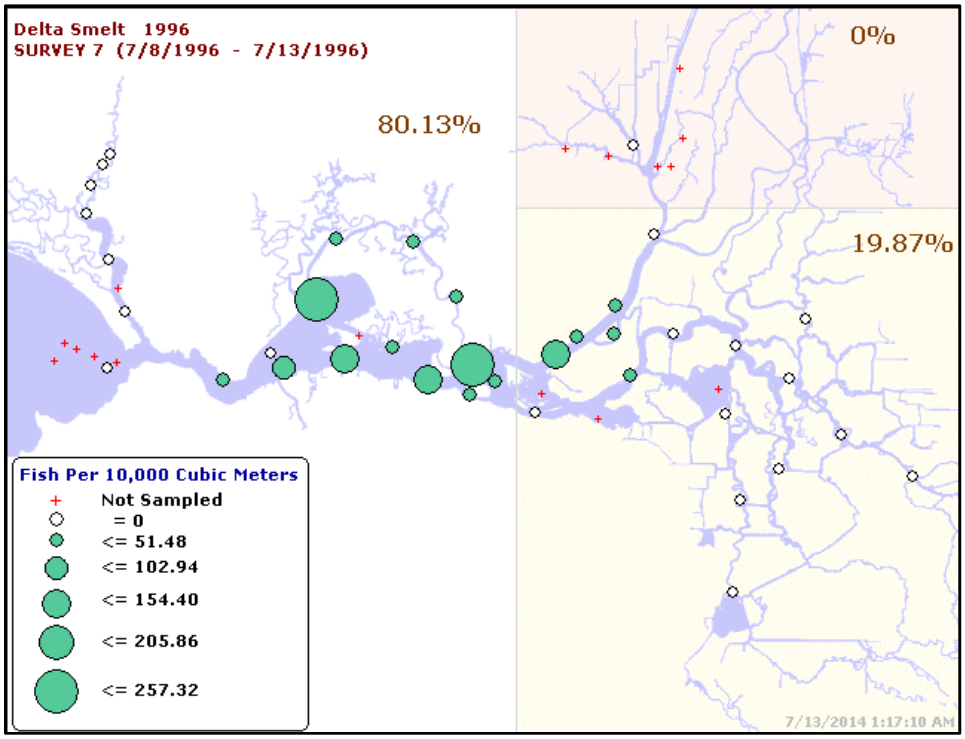
There Were No Early July Surveys in 2001 and 2002



2000 Water Year: Sacramento = Above Normal; SJR = Above Normal



1998 Water Year: Sacramento = Wet; SJR = Wet



1996 Water Year: Sacramento = Wet; SJR = Wet

Delta Smelt on the Scaffold

To summarize: during the summer of 2013, reductions in outflow, coupled with increased water exports, drew the LSZ and Delta smelt eastward into the Delta where smelt encountered lethal water temperatures. That situation was chronicled in a CSPA report titled *The Summer of 2013, the demise of Delta smelt under D-1641 Delta Water Quality Standards,* which predicted that the smelt population would plunge.[17] As predicted, the following Fall Midwater Trawl's Delta smelt abundance index was the second lowest level on record, statistically indistinguishable from the absolute lowest.

DFW conducts a series of 20-mm Delta smelt trawls monitoring post-larval-juvenile smelt. DFW does not publish their 20-mm Delta smelt indices, which are based on the initial surveys that begin in March of each year. CSPA took DFW 20-mm data and developed a series of indexes focused on the critical late June early July, when Delta smelt are drawn into the Delta be a combination of low outflow and export pumping. Those smelt are at risk of encountering lethal water temperatures. In 2014, juvenile Delta smelt were hammered by a combination of critically low outflow, water exports and lethal water temperature, as they were in 2013. The CSPA Delta

The previous low in 2009 was followed by a slightly better water year (below normal on the Sacramento and above normal on the San Joaquin) and smelt populations experienced a small rebound. This year, Delta smelt are being subjected to another year of critically dry conditions on both rivers. And this year, the State Water Board seriously weakened Delta flow and water quality standards. Delta outflow is below levels in recent memory and Delta smelt populations are at historic lows. Yet exports continue and water transfers are being approved with little environmental review.

The next Fall Midwater Trawl will almost surely find Delta smelt populations at new record lows. Population abundance levels over the last few years make the numbers of Delta smelt during the Pelagic Organism Decline (POD) in the early 2000s look robust. The POD years generated an enormous outcry. Myriad meeting were conducted, numerous studies funded and an array of programs launched. Today, the agencies that were so concerned about the POD are silent and have embraced measures they know will be disastrous for the species.

The point of no return, i.e., the level where the population cannot recover, is unknown. But, that point is likely approaching. A species that existed in this estuary for thousands of years and was the most abundant fish in the Delta is on the scaffold. Perhaps, the greatest tragedy is that our trustee agencies charged with the protection of Delta smelt; the USFWS, CDFW and the State Water Board have escorted it there.

[17] http://calsport.org/news/wp-content/uploads/CSPA-Cannon-Summer-2013-6.pdf

SUMMER 2013

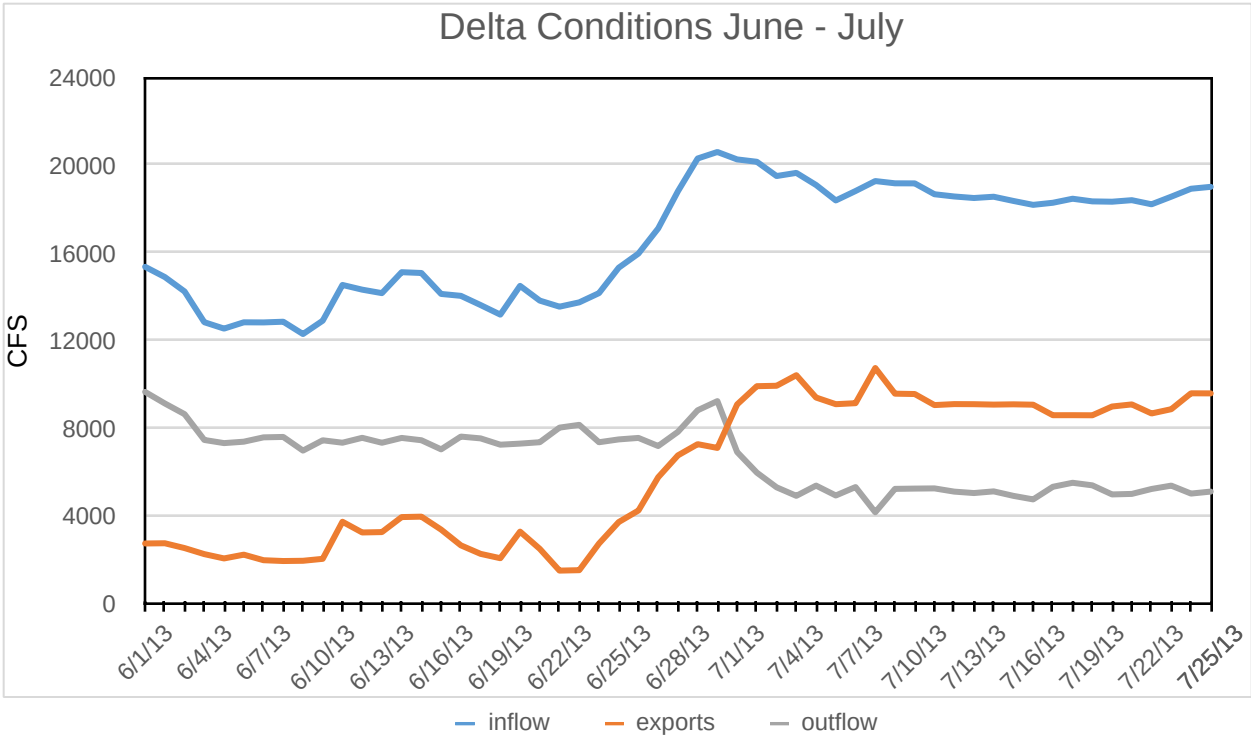
The demise of Delta smelt under D-1641 Delta Water Quality Standards

Thomas Cannon
Consultant

Representing
California Sportfishing Protection Alliance

August 2013

Summer 2013



Dry Year Standards Relaxed?

Despite near record low precipitation in the Central Valley in the spring of 2013, the water year remained classified as "dry," pursuant to D-1641. The "dry year" standards for EC at Emmaton were violated in April, May and June and the EC standard at Jersey Point was violated in June. These standards were established to protect agricultural beneficial uses in the Delta.

The Department of Water Resources and the Bureau of Reclamation, fearing that water exports from the State and Federal Water Projects (Projects) would lead to violations of Delta outflow and western Delta EC standards and depletion of cold water storage in Shasta Reservoir, asked the State Water Resources Control Board on 24 May to reclassify the water year to "critically dry" and requested permission to move the temperature compliance point on the Sacramento River upstream from Red Bluff to Anderson to save the cold-water pool supply in Shasta Reservoir. The Department of Fish and Wildlife, NOAA Fisheries and US Fish and Wildlife Service submitted letters supporting the request.

While the State Board had no authority to arbitrary change a water year classification, it informed the agencies that it "will not object or take any action if the Bureau and Department operate to meet critically dry year salinity objectives for Western and interior Delta."

On or about June 22, the Projects began substantially increasing exports and Delta inflows, and shortly thereafter significantly reducing Delta outflow per the Delta Standards.

The D-1641 standards for a dry year (Figure 1) already allowed salinity to encroach into the West Delta at Emmaton and Jersey Point. Earlier violations of those standards in the spring had already exacerbated conditions by summer (it should also be noted that South Delta EC standards were also violated in June and July through August 15).

This report reviews conditions in the summer of 2013, the inadequacy of D-1641 dry year standards and the adverse impacts to Delta smelt caused by violation of those already inadequate standards.

TABLE 3 (continued)
WATER QUALITY OBJECTIVES FOR FISH AND WILDLIFE BENEFICIAL USES

COMPLIANCE LOCATION	INTERAGENCY STATION NUMBER(RKI 1[])	PARAMETER	DESCRIPTION (UNIT) [2]	WATER YEAR TYPE [3]	TIME PERIOD	VALUE
DELTA OUTFLOW						
		Net Delta Outflow Index (NDOI) [7]	*Minimum monthly average [8] NDOI (cfs)*	*All*	*Jan*	*4,500 [9]*
				All	*Feb-Jun*	*[10]*
				W,AN	*Jul*	*8,000*
				BN		*6,500*
				D		*5,000*
				C		*4,000*
				W,AN,BN	*Aug*	*4,000*
				D		*3,500*
				C		*3,000*
				All	*Sep*	*3,000*
				W,AN,BN,D	*Oct*	*4,000*
				C		*3,000*
				W,AN,BN,D	*Nov-Dec*	*4,500*
				C		*3,500*
RIVER FLOWS						
Sacramento River at Rio Vista	*D-24 (RSAC101)*	*Flow rate*	*Minimum monthly average [11] flow rate (cfs)*	*All*	*Sep*	*3,000*
				W,AN,BN,D	*Oct*	*4,000*
				C		*3,000*
				W,AN,BN,D	*Nove-Dec*	*4,500*
				C		*3,500*
San Joaquin River at Airport Way Bridge, Vernalis	*C-10 (RSAN112)*	*Flow rate*	*Minimum monthly average [12] flow rate (cfs) [13]*	*W,AN*	*Feb-Apr 14*	*2,130 or 3,420*
				BN,D	*and*	*1,420 or 2,280*
				C	*May 16-Jun*	*710 or 1,140*
				W	*Apr 15-*	*7,330 or 8,620*
				AN	*May 15 [14]*	*5,730 or 7,020*
				BN		*4,620 or 5,480*
				D		*4,020 or 4,880*
				C		*3,110 or 3,540*
				All	*Oct*	*1,000 [15]*

Figure 1a. D-1641 EC Water Quality Objectives Table 2.

TABLE 2
WATER QUALITY OBJECTIVES FOR AGRICULTURAL BENEFICIAL USES

COMPLIANCE LOCATION	INTERAGENCY STATION NUMBER (RKI [1])	PARAMETER	DESCRIPTION (UNIT) [2]	WATER YEAR TYPE [3]	TIME PERIOD	VALUE
WESTERN DELTA						
Sacramento River at Emmaton	*D-22 (RSAC092)*	*Electrical Conductivity (EC)*	*Maximum 14-day running average of mean daily EC (mmhos/cm)*		*0.45 EC April 1 to date shown*	*EC from date shown to Aug 15 [4]*
				W	*Aug 15*	*----*
				AN	*Jul 1*	*0.63*
				BN	*Jun 20*	*1.14*
				D	*Jun 15*	*1.67*
				C	*----*	*2.78*
San Joaquin River at Jersey Point	*D-15\ (RSAN018)*	*Electrical Conductivity (EC)*	*Maximum 14-day running average of mean daily EC (mmhos/cm)*		*0.45 EC April 1 to date shown*	*EC from date shown to Aug 15 [4]*
				W	*Aug 15*	*----*
				AN	*Aug 15*	*----*
				BN	*Jun 20*	*0.74*
				D	*Jun 15*	*1.35*
				C	*----*	*2.20*
INTERIOR DELTA						
South Fork Mokelumne River at Terminous	*C-13 (RSMKL08)*	*Electrical Conductivity (EC)*	*Maximum 14-day running average of mean daily EC (mmhos/cm)*		*0.45 EC April 1 to date shown*	*EC from date shown to Aug 15 [4]*
				W	*Aug 15*	*----*
				AN	*Aug 15*	*----*
				BN	*Aug 15*	*----*
				D	*Aug 15*	*----*
				C	*----*	*0.54*
San Joaquin River at San Andreas Landing	*C-4 (RSAN032)*	*Electrical Conductivity (EC)*	*Maximum 14-day running average of mean daily EC (mmhos/cm)*		*0.45 EC April 1 to date shown*	*EC from date shown to Aug 15 [4]*
				W	*Aug 15*	*----*
				AN	*Aug 15*	*----*
				BN	*Aug 15*	*----*
				D	*Jun 25*	*0.58*
				C	*----*	*0.87*

Figure 1b. D-1641 Flow Water Quality Objectives Table 3.

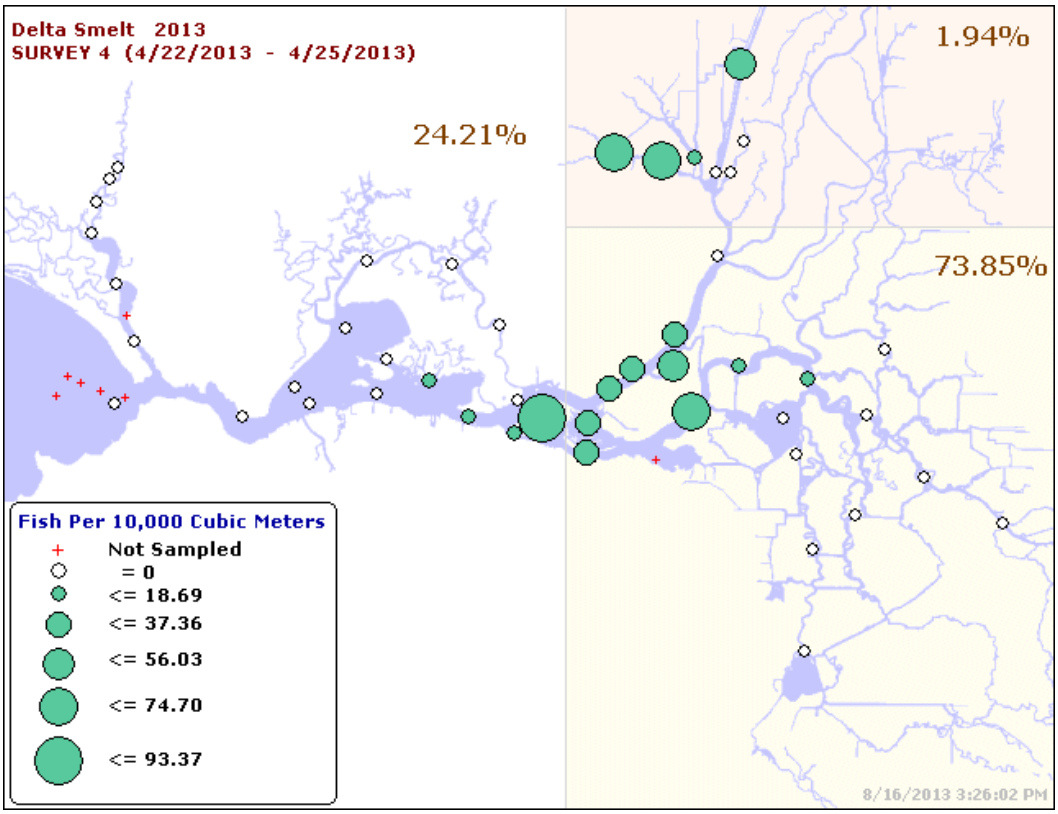


Figure 2. Late-April 2013, 20-mm Smelt Survey results. (Source: http://www.dfg.ca.gov/delta/data/20mm/)

Delta Smelt in April

Although not the subject of this report, spring conditions set the stage for summer. April 2013 was a tough time for smelt. Sacramento River inflow to the Delta dropped to only 6,000 cfs, San Joaquin inflows were 1500-3000 cfs, exports were up to 2,500-3,000 cfs, and outflow was as low as 6,000 cfs. Old and Middle River OMR flows were -1000 to -4000 cfs. The Delta Cross Channel was closed.

Over the past 20 years, the late April – early May period had been under the protection of VAMP (Vernalis Adaptive Management Program) experiment, but these protections ended in 2010. This year, without these protections, late April exports climbed to 2,500-3,000 cfs reaching 4,000 cfs in early May (from 1500 cfs cap under VAMP). This increase in exports without the VAMP export cap occurred under lower inflows, outflows, and negative OMR flows. Nearly three quarters of the Delta smelt population was in the Central and Western Delta (20-mm survey, Fig. 2) and thus subject to being exported (especially with negative OMRs with the DCC closed). Most of the smelt were not of salvageable size (they were only 10-25 mm), so they were entrained in the export water likely in large numbers (hundreds of thousands per day were moving into Old River toward pumps).

Despite these horrible conditions many still survived in the western Delta under the modest outflows and thus became subject to summer conditions.

Delta Smelt in Mid June

In mid June 2013 the small remnant population of delta smelt surviving in the San Francisco Bay-Delta after the below-normal water year of 2012 and poor spring conditions described above were spread through their usual dry-year habitats in the western Delta, eastern Suisun Bay, Montezuma Slough, and the Cache Slough/Bypass/Ship Channel complex in the north Delta (Figure 3).

Other than the north Delta group, most of the smelt were in their summer low-salinity zone (LSZ) home where salinities are low (0.5-5 ppt) and water temperature optimal (about 20C). With the protective dry-year EC standard of 0.45 through June 15, the LSZ was in eastern Suisun Bay west of the Delta.

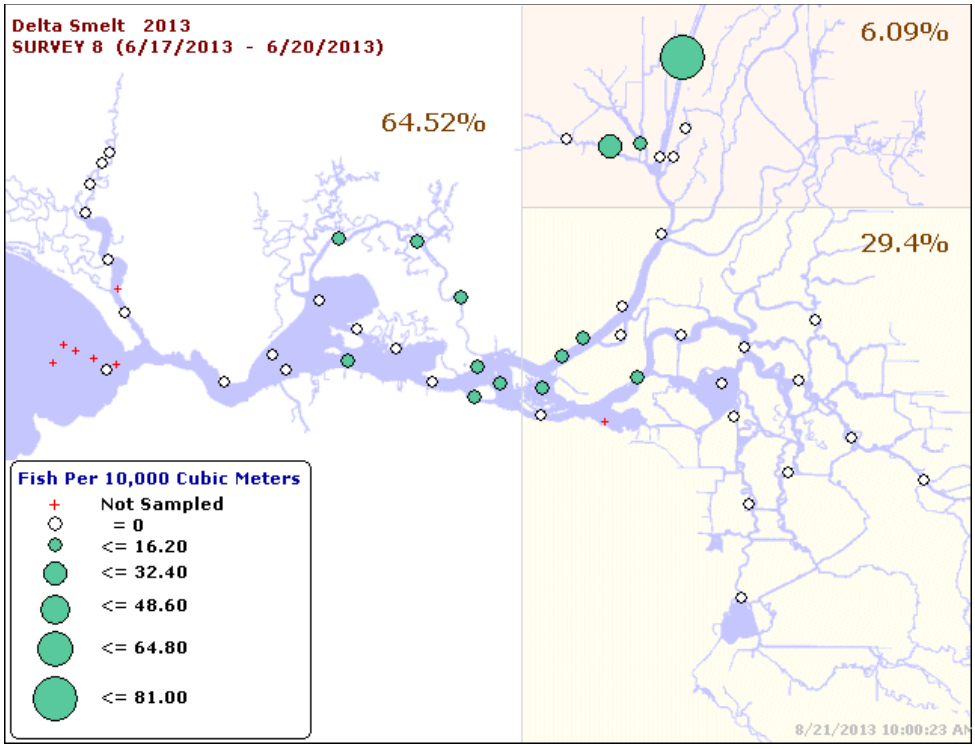


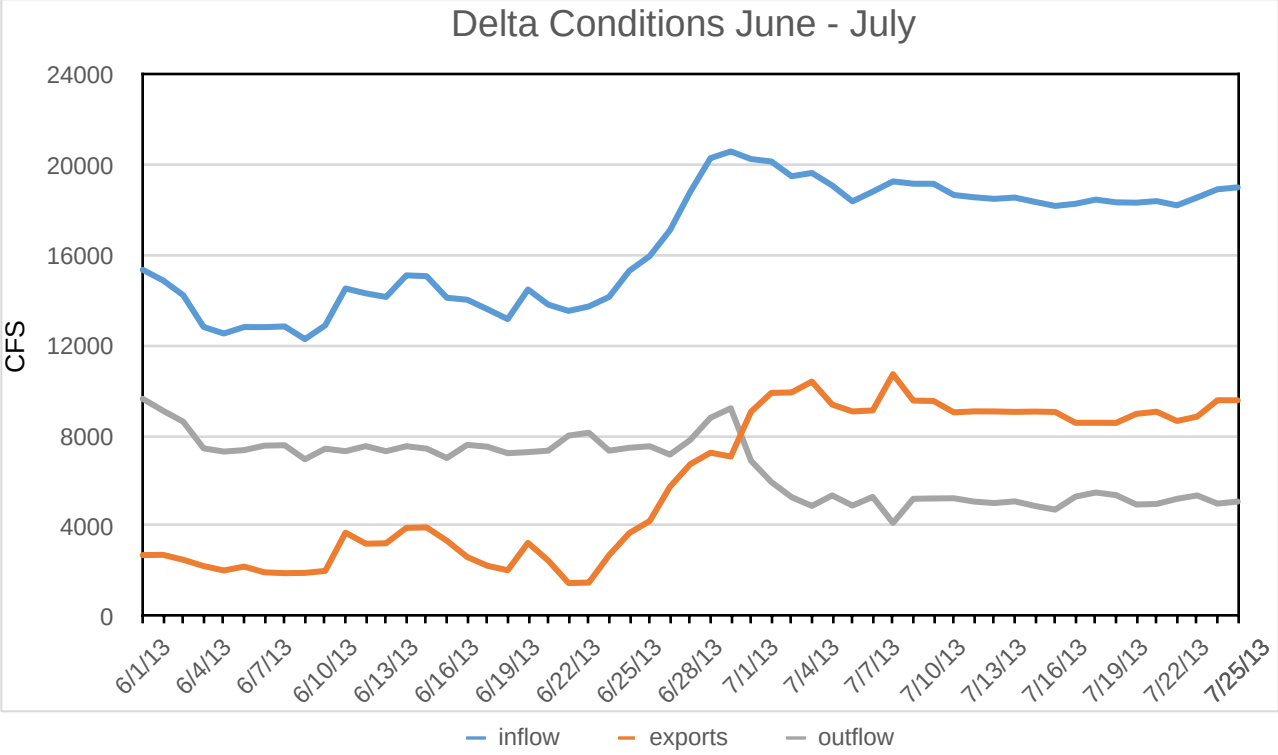
Figure 3. Mid-June 2013, 20-mm Smelt Survey results. (Source: http://www.dfg.ca.gov/delta/data/20mm/)

Summer Flow and Salinity Conditions

Beginning in the third week in June, inflow increase from the 12,000-14,000 cfs level to 20,000 cfs and exports increased from 2,000 to 10,000 cfs (Figure 4). A week later Delta outflow was reduced to 5,000 cfs.

West Delta

The effect is seen in the EC patterns at Emmaton and Jersey Point in the west Delta (Figures 5a and 5b). As outflow declines, salinities (EC) increase. The LSZ with its 500-6000 EC signature moved upstream into the West Delta with each incoming tide. In contrast, in wet year 2011, outflow was maintained at 8000 cfs and the LSZ did not move upstream into the Delta (Figure



5c).

Figure 4. June through July 2013 Delta inflow, outflow, and exports. Summer EC standards kick in after mid June.

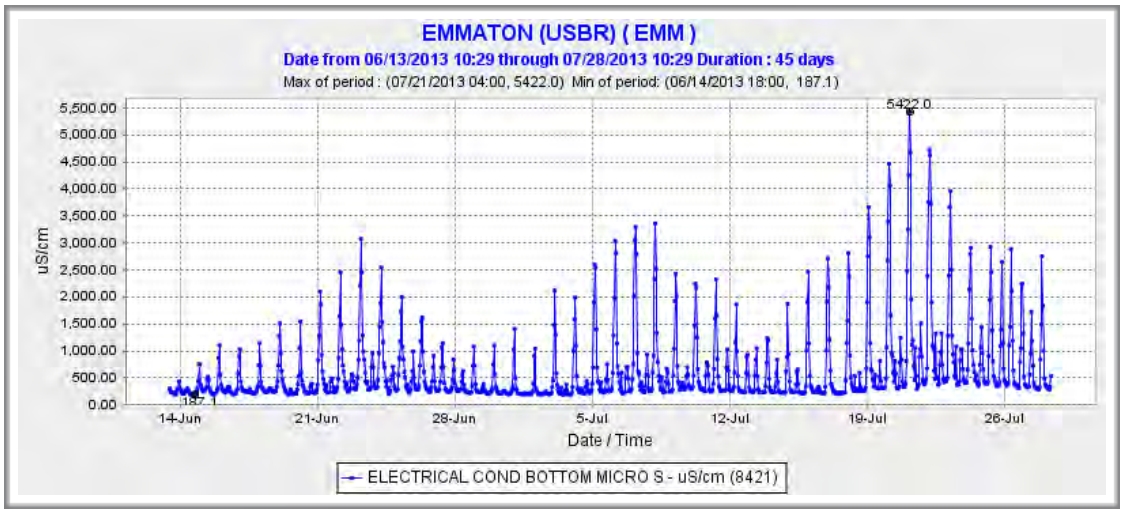


Figure 5a. Conductivity (EC) at Emmaton on lower Sacramento River in West Delta after mid June 2013. (Source: CDEC)

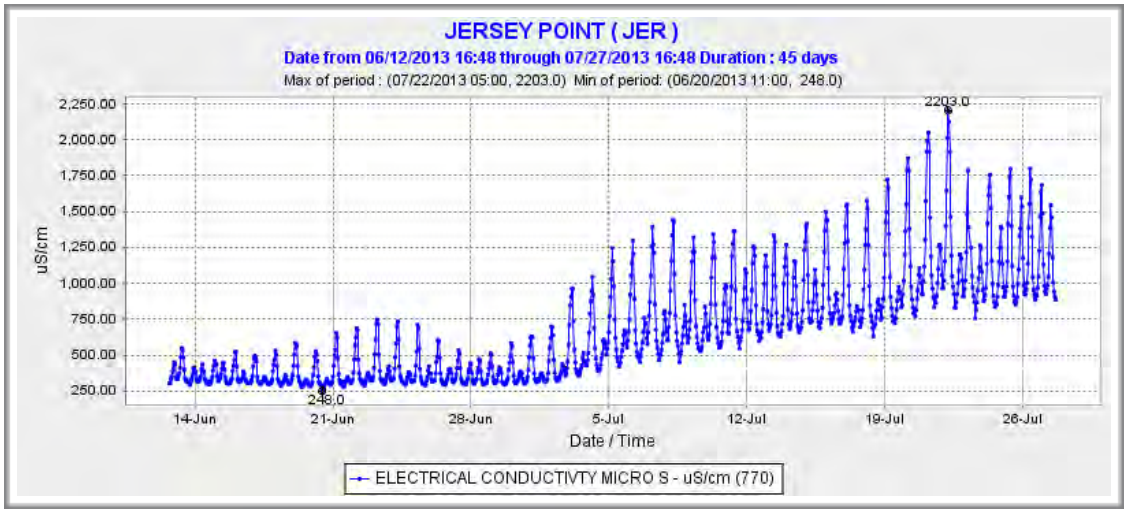


Figure 5b. Conductivity (EC) at Jersey Point on lower San Joaquin River in West Delta after mid June 2013. (Source: CDEC)

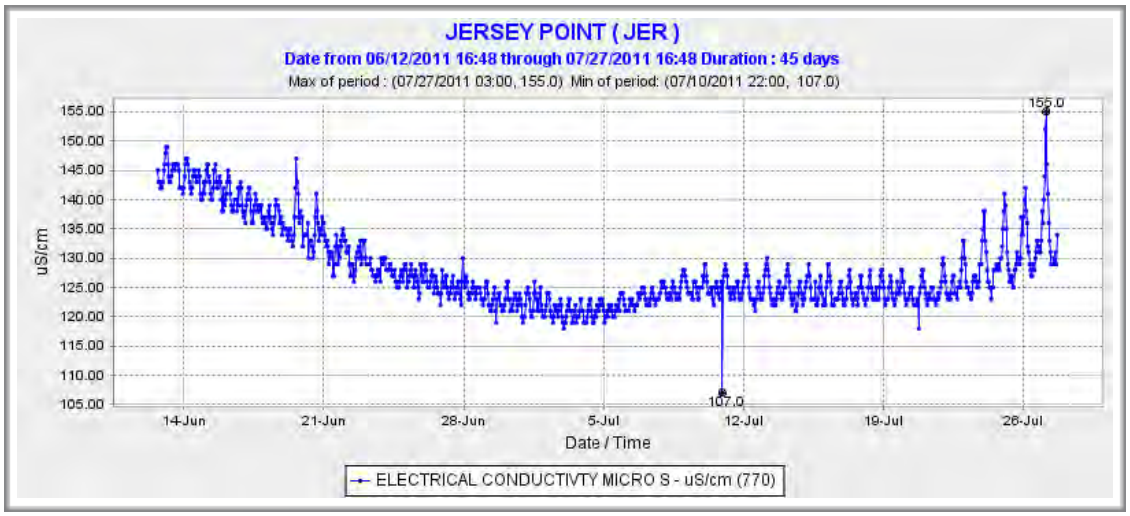


Figure 5c. Conductivity (EC) at Jersey Point on lower San Joaquin River in West Delta after mid June 2011. (Source: CDEC)

Eastern Suisun Bay

Salinity (EC) in Eastern Suisun Bay at Collinsville on the north and Pittsburg on the south also increased at the beginning of July with the decrease in outflow (Figures 6 and 7). At high tide the LSZ was well upstream of the two locations by early July. The lower end of the LSZ did extend downstream to these locations during low tides through July.

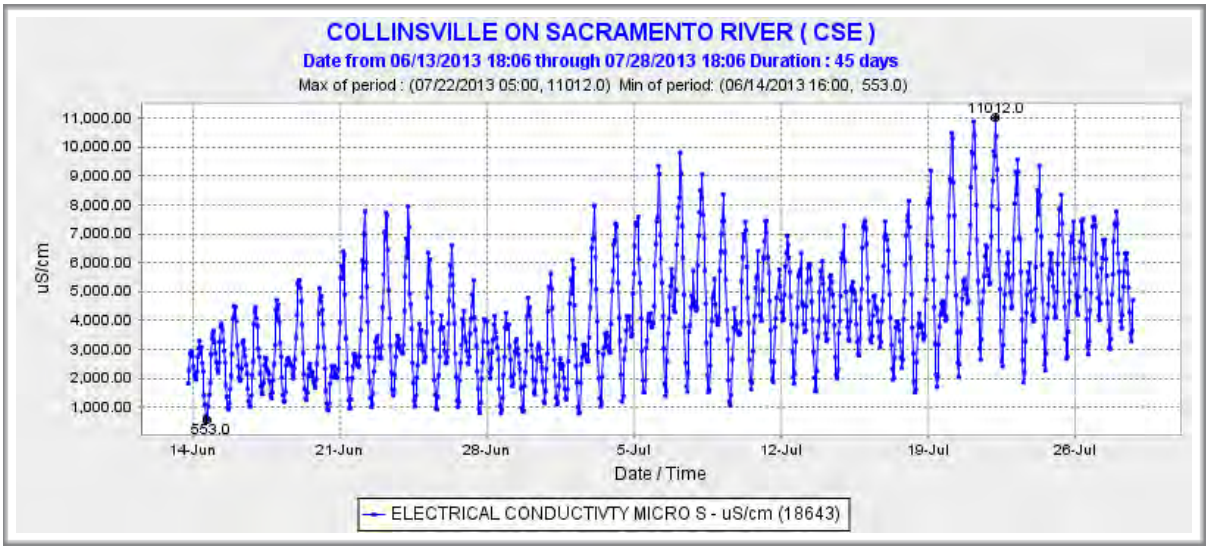


Figure 6. Conductivity (EC) at Collinsville in Eastern Suisun Bay after mid June 2013. (Source: CDEC)

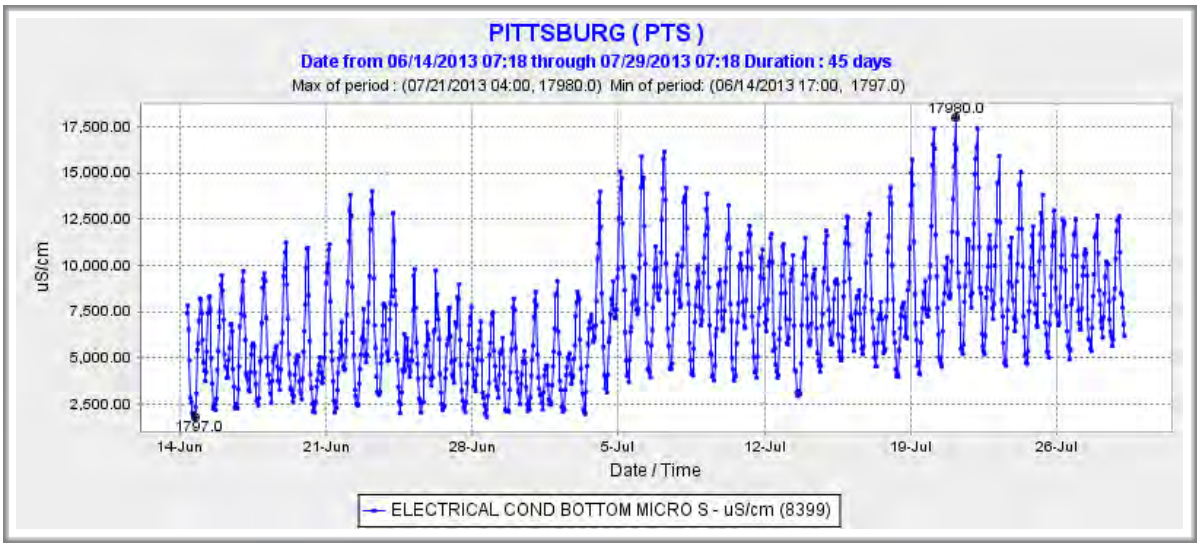


Figure 7. Conductivity (EC) at Pittsburg in Eastern Suisun Bay after mid June 2013. (Source: CDEC)

Central Delta

Central Delta EC as measured Threemile Slough on the San Joaquin River (Figure 8) and False River (Figure 9) also shows the movement of the LSZ upstream coincident with the reduction in Delta outflow at the beginning of July.

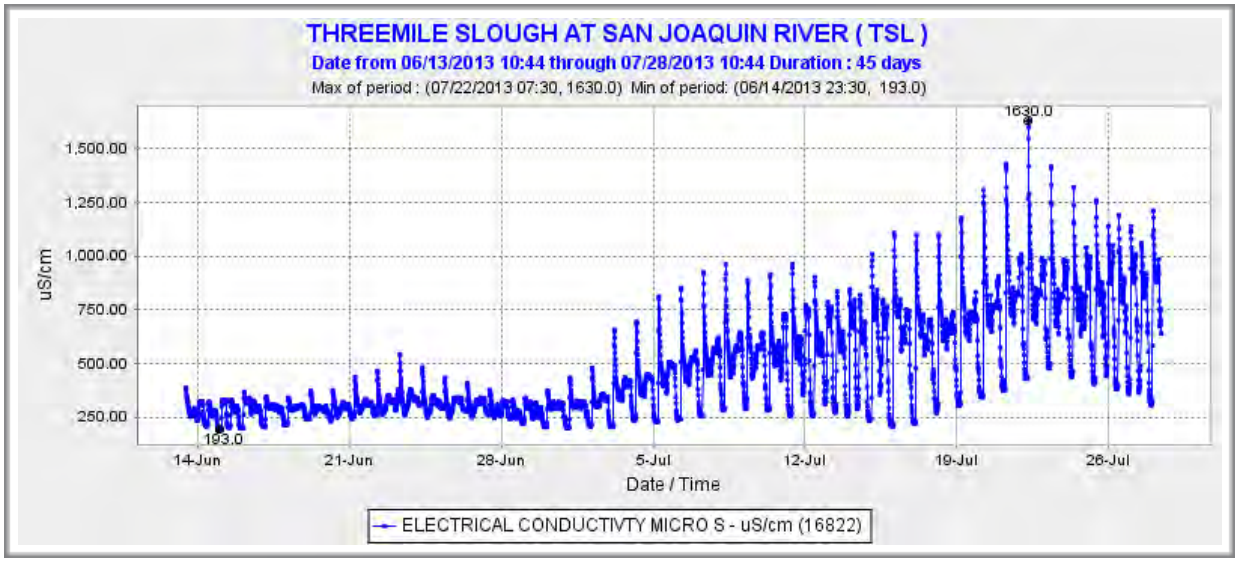


Figure 8. Conductivity (EC) at Threemile Slough in the Central Delta after mid June 2013. (Source: CDEC)

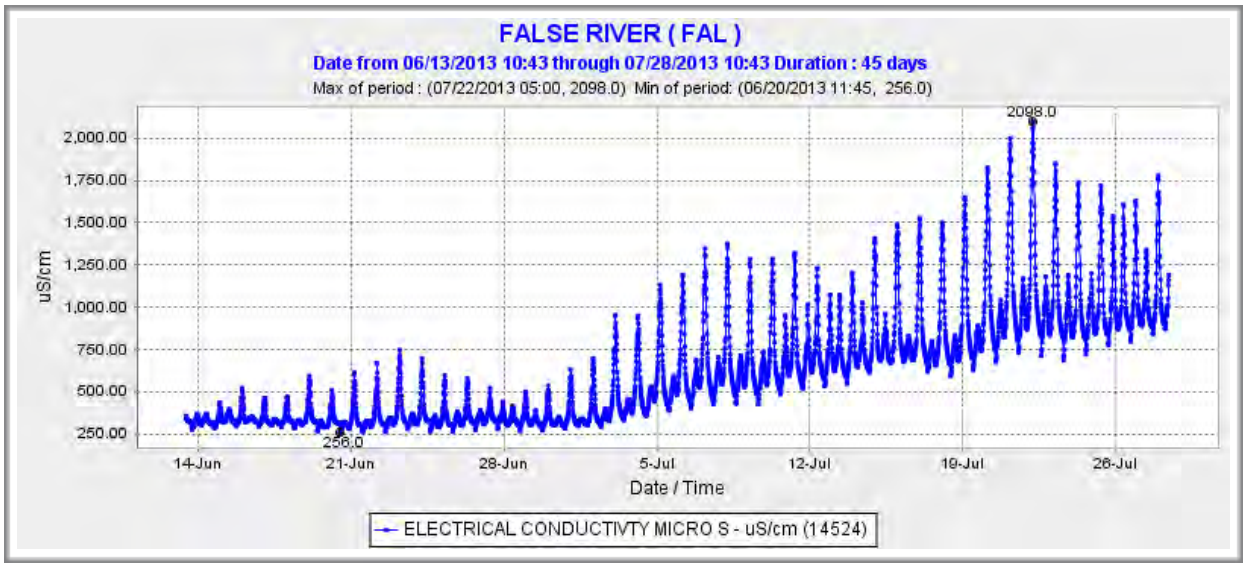


Figure 9. Conductivity (EC) at False River in the Central Delta at Franks Tract after mid June 2013. (Source: CDEC)

South Delta

South Delta EC also increased as the upper portion of the LSZ was mixed with cross Delta moving freshwater Sacramento River on the way to the export pumps. Salinity gradually increased in Old River as the head of the LSZ actually moved into the South Delta toward the export pumps (Figure 10).

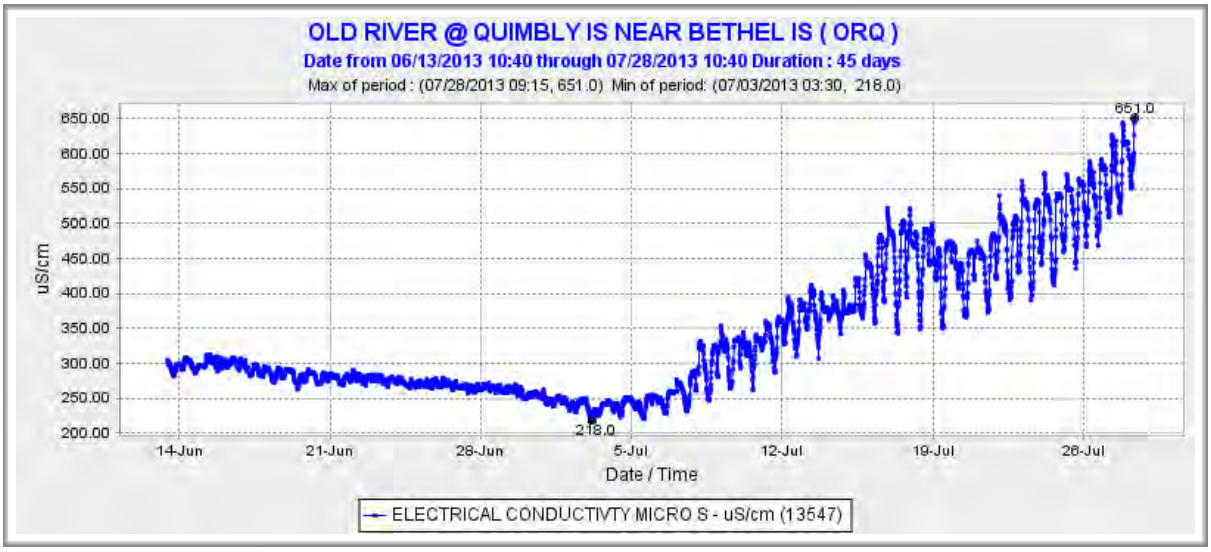


Figure 10. Conductivity (EC) in Old River in the Central Delta near Bethel Is after mid June 2013. (Source: CDEC)

Salinity in Clifton Court Forebay was slightly less as Forebay water is a mixture of Old River, Middle River, and East Delta waters of lower salinity (Figure11).

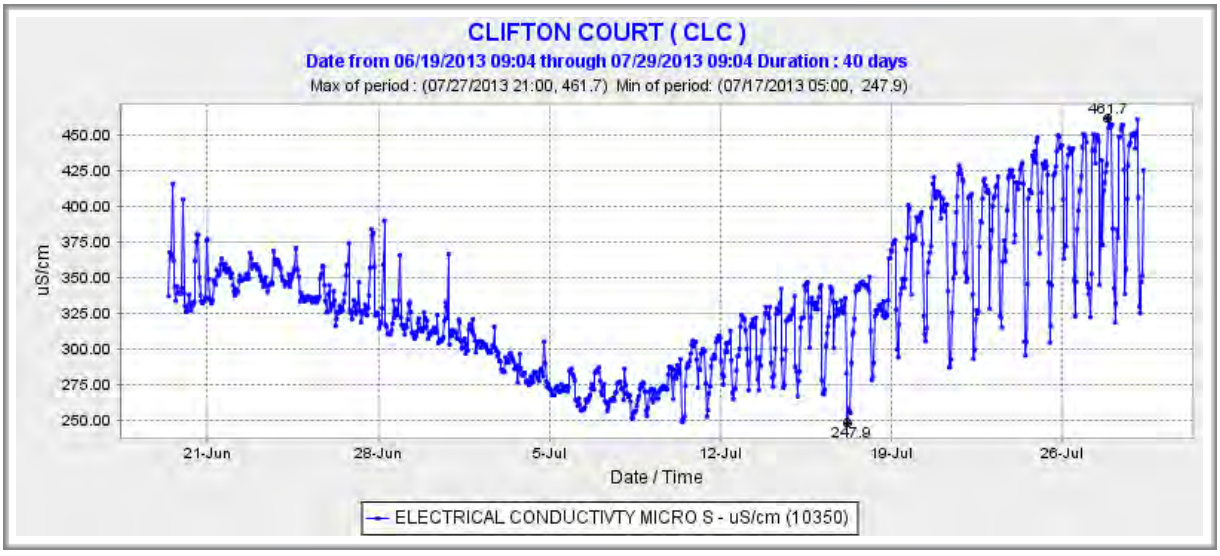


Figure 11. Conductivity (EC) in Clifton Court Forebay after mid June 2013. (Source: CDEC)

Summer Water Temperatures

Western Delta

Water temperatures reached near lethal levels for smelt (75-77F) in the western Delta by the beginning of July (Figures 12-14). Water temperatures rose sharply in late June due to the combination of warm air temperatures and sharply higher Delta inflows. Water temperatures declined thereafter through mid July with lower air temperatures, lower Delta inflows, and cooler waters moving upstream from Suisun Bay with lower outflows.

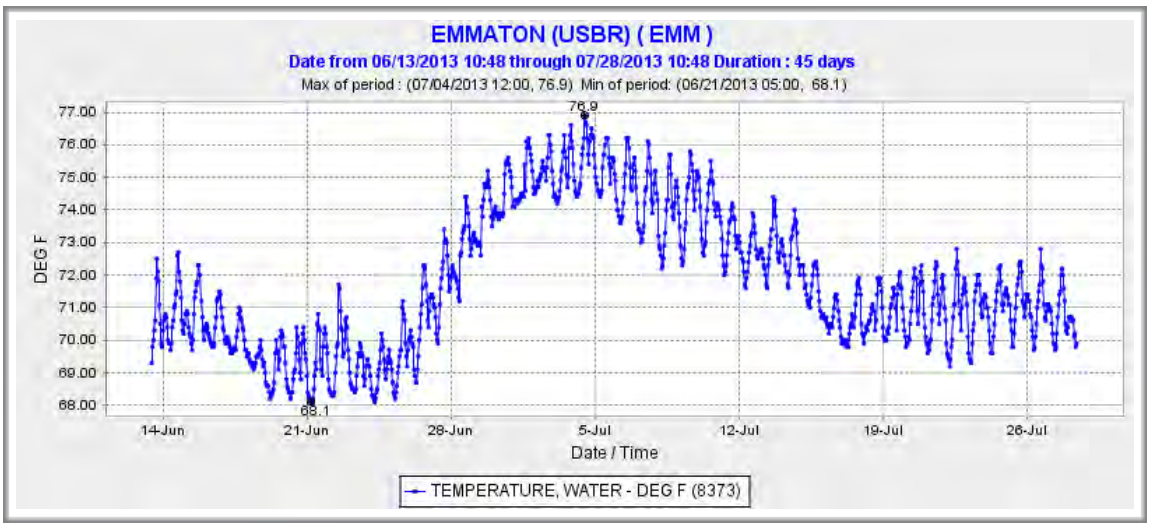


Figure 12. Water temperature at Emmaton mid June through July 2013. (Source: CDEC)

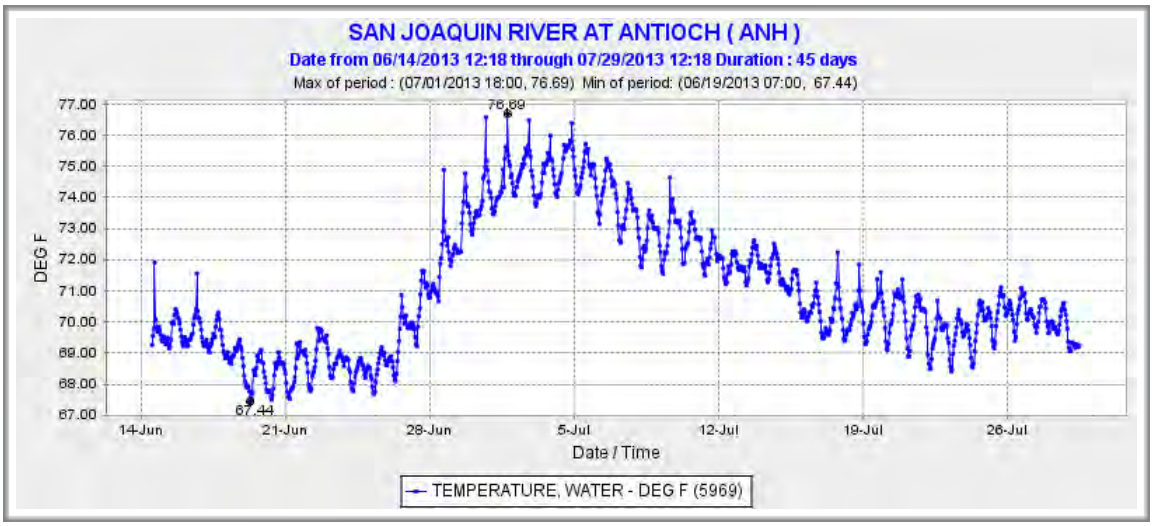


Figure 13. Water temperature at Antioch mid June through July 2013. (Source: CDEC)

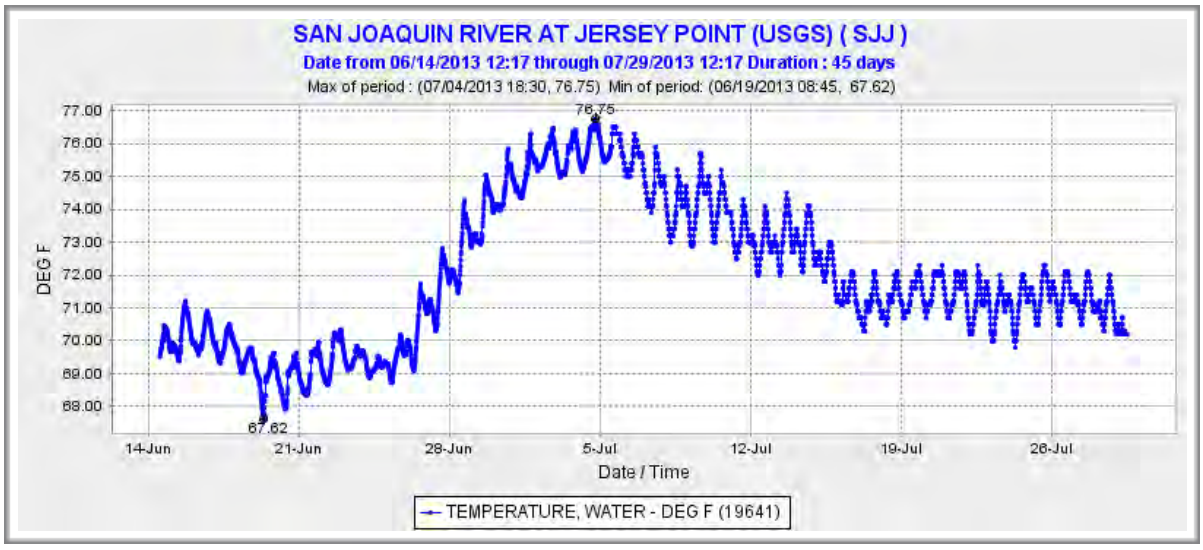


Figure 14. Water temperature at Jersey Point mid June through July 2013. (Source: CDEC)

Central Delta

Water temperatures reached near lethal levels for smelt (75-77F) in the Central Delta by the beginning of July (Figures 15 and 16). Water temperatures rose sharply in late June due to the combination of warm air temperatures and sharply higher Delta inflows. Water temperatures declined thereafter through mid July with lower air temperatures, lower Delta inflows, and cooler waters moving upstream from The West Delta with lower outflows.

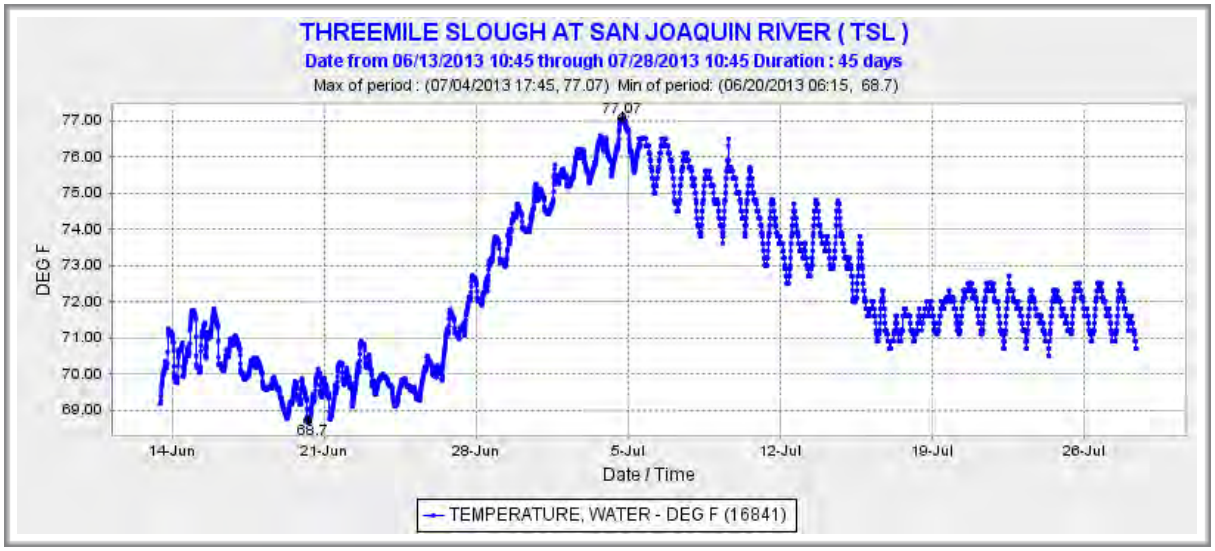


Figure 15. Water temperature at Threemile Slough mid June through July 2013. (Source: CDEC)

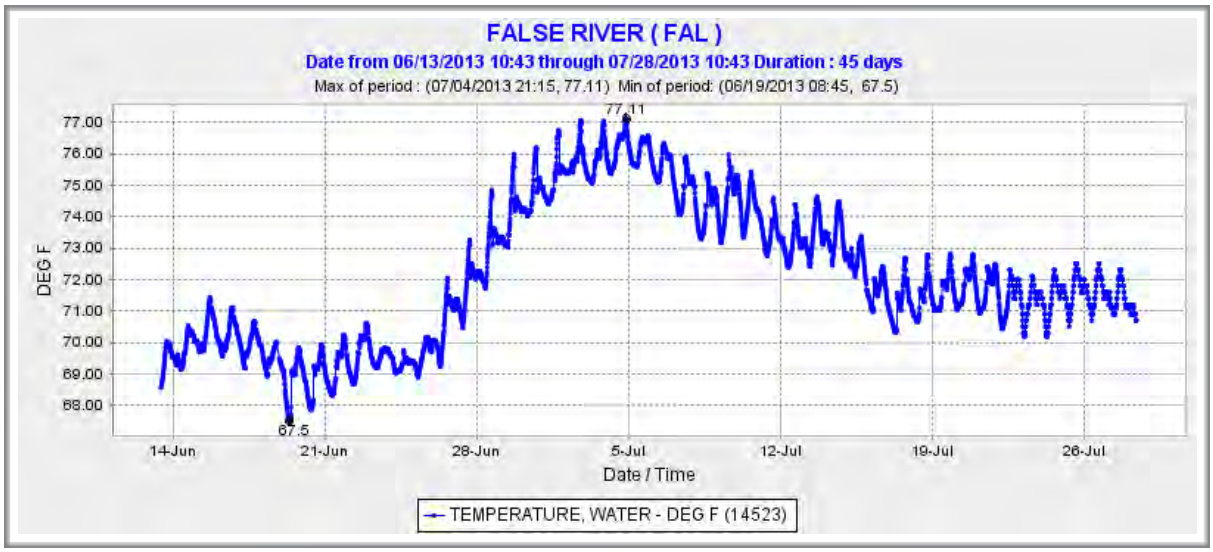


Figure 16. Water temperature at False River mid June through July 2013. (Source: CDEC)

South Delta

Water temperatures reached lethal levels for smelt (78-80F) in the South Delta by the beginning of July (Figures 17-18). Water temperatures rose sharply in late June due to the combination of warm air temperatures, sharply higher Delta inflows, and higher exports drawing warm water into the South Delta. Water temperatures declined thereafter through mid July with lower air temperatures, lower Delta inflows, and cooler waters moving into the South Delta from the western and central Delta with lower outflows.

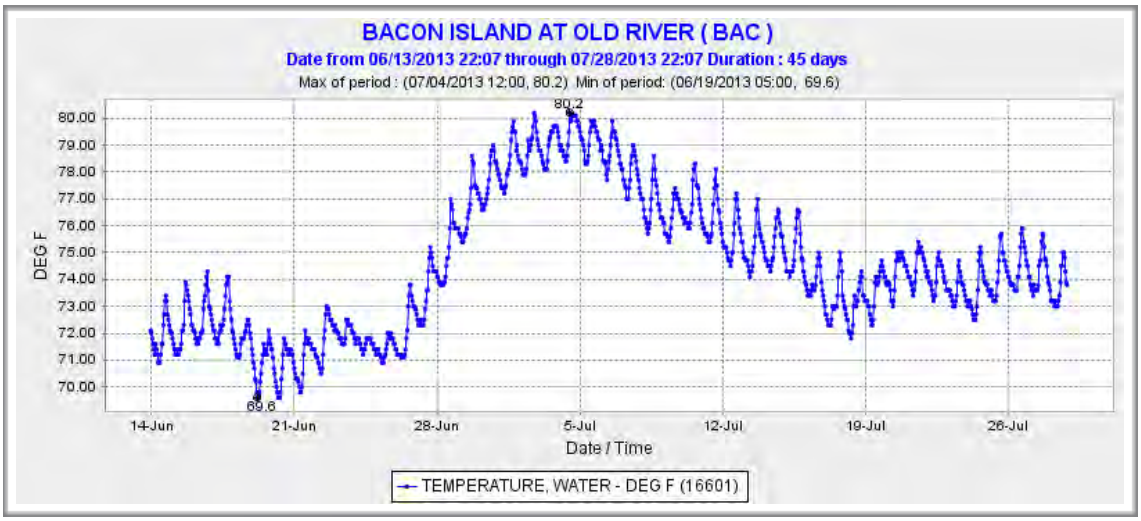


Figure 17. Water temperature in Old River near Bacon Is mid June through July 2013. (Source: CDEC)

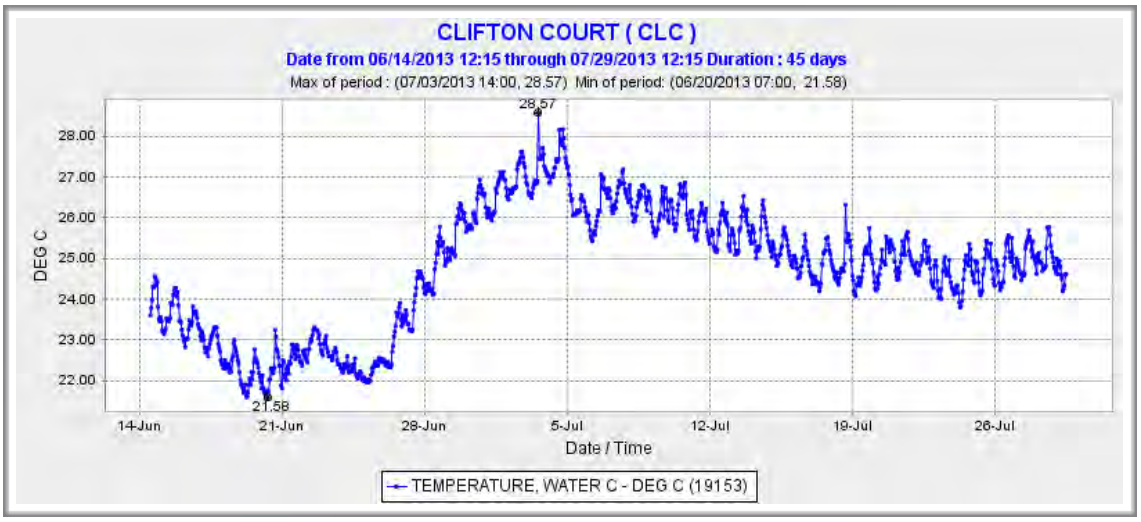
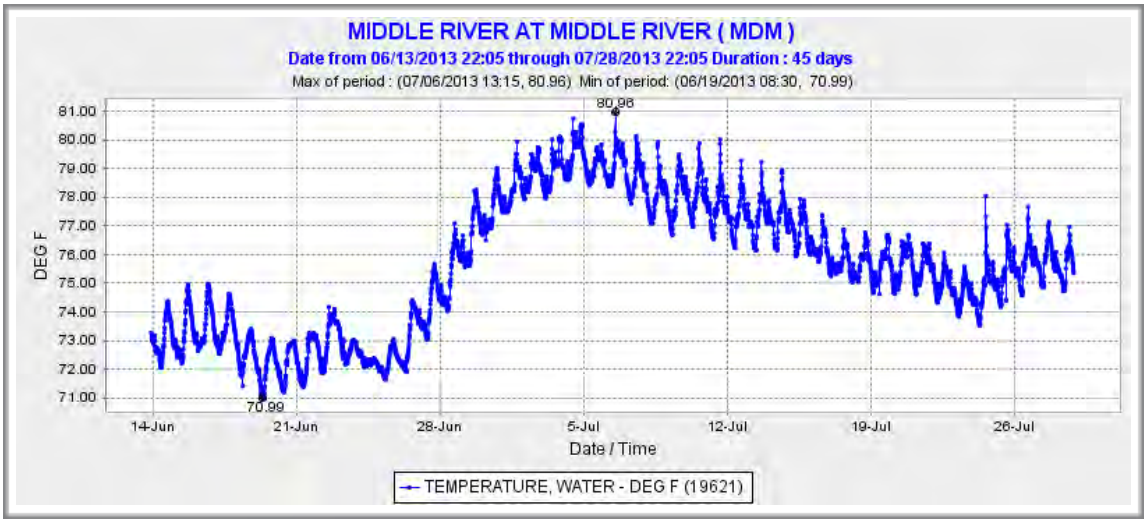


Figure 18. Water temperature in Clifton Court Forebay near Byron mid June through July 2013. (Source: CDEC)

Eastern Delta

Water temperatures in the eastern Delta also reached lethal levels of 80-81F (Figures 19 and 20).

Figure 19. Water temperature in Middle River mid June through July 2013. (Source: CDEC)



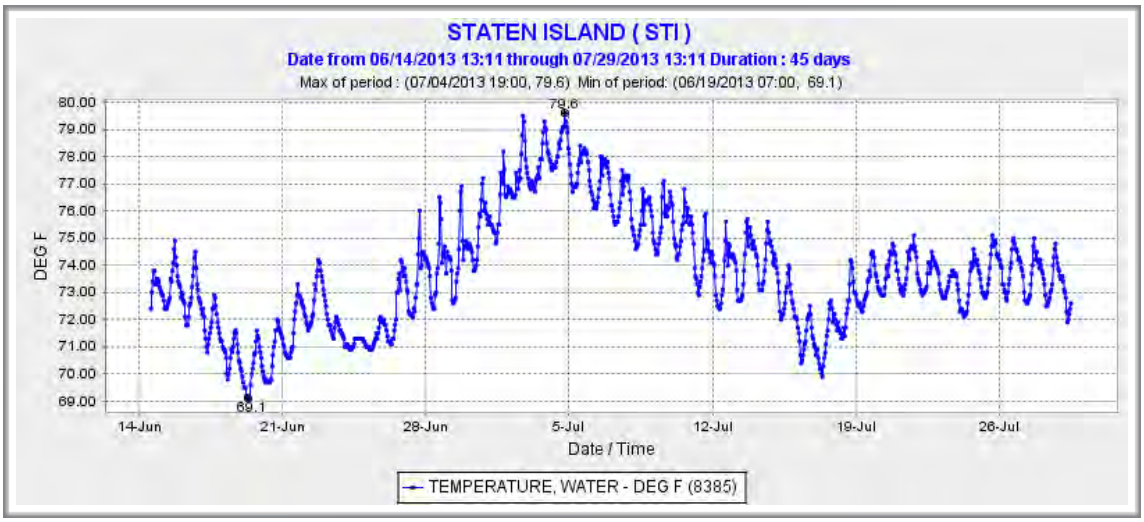


Figure 20. Water temperature near Staten Island mid June through July 2013. (Source: CDEC)

Delta Smelt Vulnerable

With the LSZ reaching into the Central and South Delta at high tides at a greater frequency through July than in wetter years it begs the question as to why were not more smelt salvaged. Clearly small salvage events occurred through mid June coincident with small pulses of exports (Figure 21). But, why not after mid June?

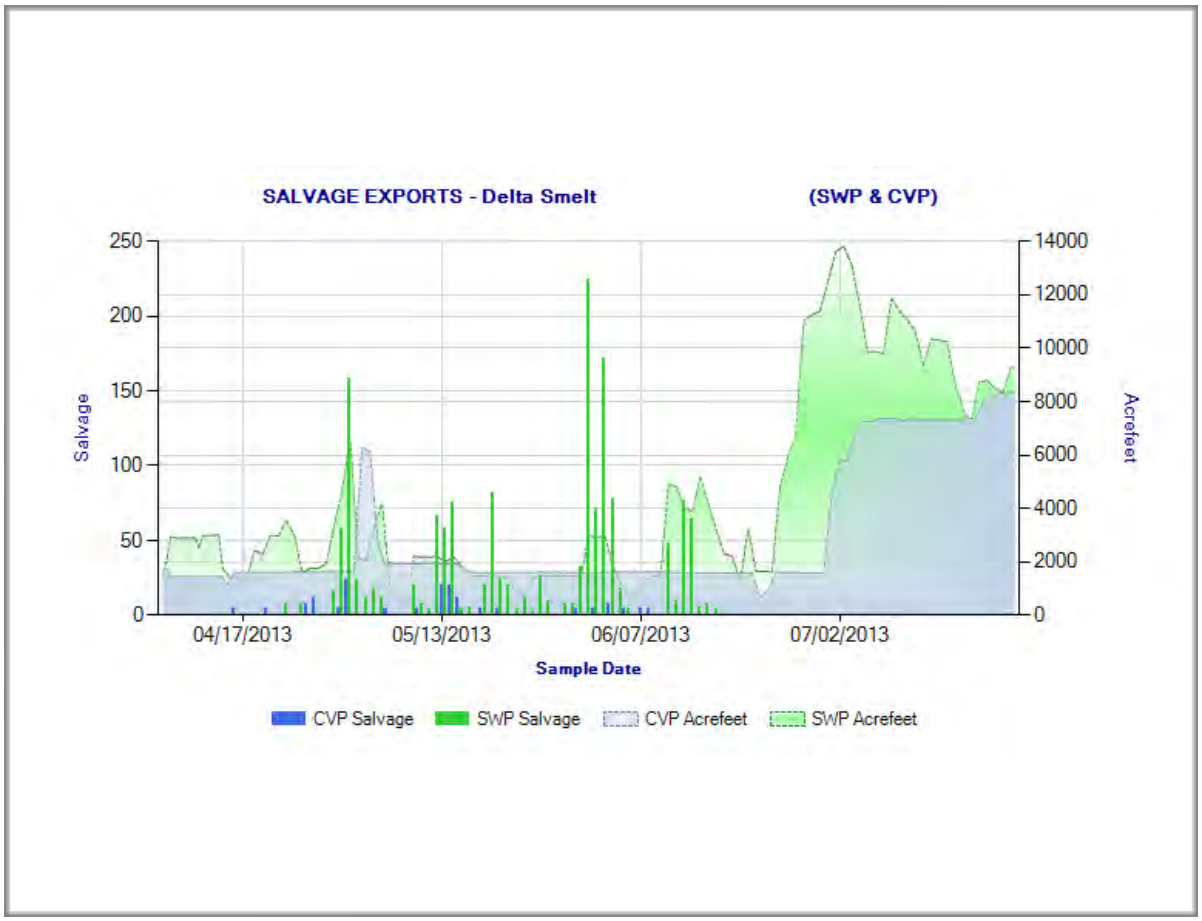


Figure 21. Delta exports and smelt salvage In spring and summer 2013. (Source: USBR MP)

First, the high inflows, low exports and high outflows kept the LSZ away from the influence of the pumps toward the end of June. Until about 8 July export demand was satiated by the pool of freshwater left over in the Delta from prior high inflows as observed in Clifton Court Forebay EC (Figure 11). But soon thereafter evidence of the LSZ being drawn to the pumps was apparent.

So why were no smelt salvaged after exports picked up and the LSZ entered the Central Delta? The answer is high water temperatures by early July. No smelt were able to survive passage to the

South Delta export salvage facilities because of lethal water temperatures in the Central and South Delta.

The high exports and high inflows at the end of June and beginning of July not only pulled the LSZ upstream into the Central Delta and under influence of the South Delta pumps at Clifton Court Forebay, but it also lead to a sharp increase in water temperature throughout much of the LSZ that was lethal to delta smelt (77-80F or 25-27C). Warm weather occurred at the beginning of July throughout the Delta (but reaching over 100F to the north and east), along with nearly a week of 20,000 cfs inflow (from the north and east) with high ambient water temperature, and near 10,000 cfs exports resulted in near lethal or lethal water temperatures in the North, Central, West, and South Delta. Smelt were able to survive only in the western portion of the LSZ of eastern Suisun Bay and extreme western Delta (Figure 22) where water temperatures remained sub-lethal at 22-24C.

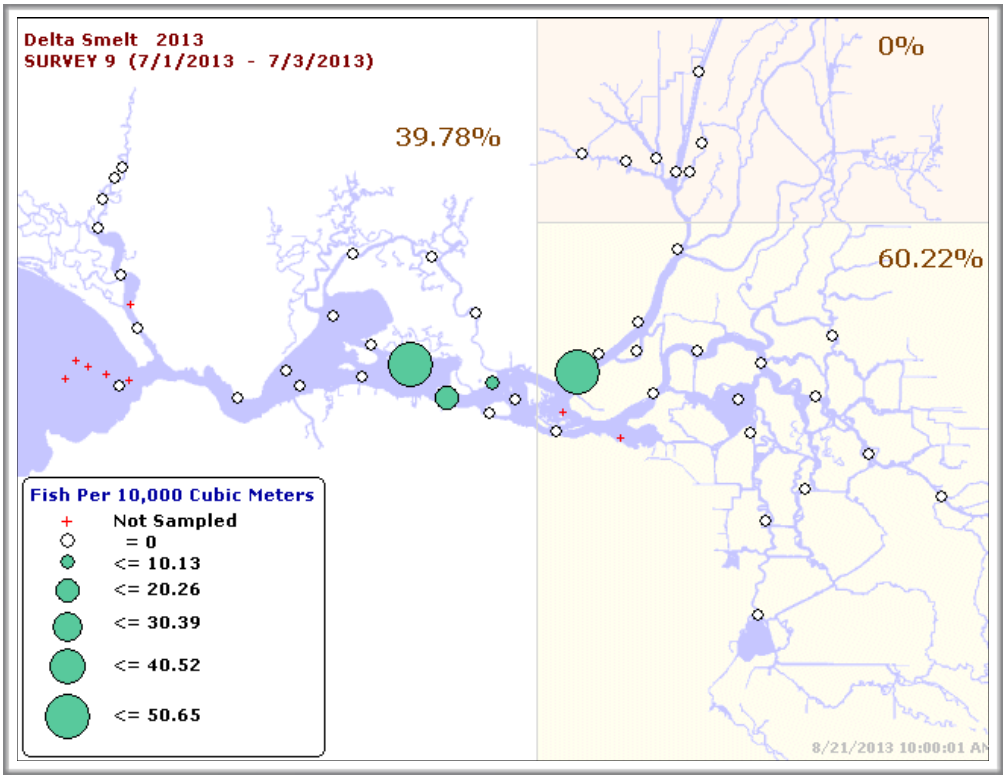


Figure 22. Early July 20-mm Smelt Survey results. (Source: http://www.dfg.ca.gov/delta/data/20mm/)

This ninth and last of the Department of Fish and Wildlife's 2013 20-mm Survey shows that the majority of smelt were in the Delta at the beginning of July. The Summer Townet Survey that began in mid June (unpublished CDFW data) has provided a Delta smelt abundance index based upon its first two surveys (weeks of June 10 and 24). The preliminary 2013 index is 0.7, down from last year's 0.9. The results from the remaining Summer Townet Survey and the Fall Mid-

Water Trawl Survey will help reveal the full extent to which Delta smelt were harmed by Project operations this summer. Based upon my decades of experience, I suspect that summer 2013 parallels the conditions during the Pelagic Organism Decline (POD) and record low smelt indices early in the last decade.

Solution

The problem remains that neither the D-1641 Water Quality Objectives for the Delta or the OCAP Biological Opinions have protections for Delta smelt after June. The demise of VAMP's limit on exports in the late spring has exacerbated the problem. The D-1641 dry and critical year standards for outflow are simply too low to protect delta smelt and their important habitats. Even with higher outflows, excessive exports remain a problem. The inflows necessary to sustain high exports reduce reservoir storage and cold-water pools, and bring warmer, low-productive reservoir water into the Delta and LSZ. Cooler, more productive, more turbid water, critical to delta smelt growth and survival is first exported from the Delta and then replaced with warm, low turbidity, low productivity reservoir water. Higher summer outflow and reduced exports (and a minimum of inflow necessary to sustain reduced exports) in drier years are fundamentally necessary for delta smelt recovery. A minimum of inflow and exports will increase residence time and productivity, allow higher productivity waters and smelt to remain in the Delta, and allow Delta waters to remain cooler to sustain smelt.

An Overview of Habitat Restoration Successes and Failures in the Sacramento-San Joaquin Delta

Thomas Cannon

Bill Jennings

California Sportfishing Protection Alliance

July 2014

Table of Contents

Executive Summary

The Bay Delta Conservation Plan (BDCP) proposes to create or restore approximately 150,000 acres of aquatic, riparian and terrestrial habitat in the Delta. Given the astonishing lack of specific details in BDCP's programmatic restoration plan, this report briefly reviews historical habitat restoration projects in the 222,902 acres of existing conservation lands within the Delta in an effort to evaluate the likely success of BDCP's conceptual restoration plan.

Despite numerous restoration projects, there have been few documented successes in the Delta. Many proposed projects failed to move beyond a conceptual stage because of a lack of funding. A number of projects succeeded in acquiring property but failed to secure the funding necessary for implementation. Other restoration projects were constructed but failed because they were poorly conceived or lacked sufficient funding to maintain or adaptively manage the habitat. Even relatively successful projects have too often experienced mixed results and unintended consequences. Cumulatively, the myriad restoration projects have failed to slow or reverse the precipitous decline in the estuary's native pelagic and anadromous fisheries.

The consistent flaw of previous restoration efforts in the Delta has been a failure to adequately meet the habit requirements of native fish. The estuary's native species evolved over many thousands of years in response to existing habitat conditions. And that habitat included adequate physical (flow, residence time, variability, etc.) and chemical parameters (salinity, temperature, turbidity, chemical constituents, etc.), as well as the nutrients necessary for primary production to support renewable fisheries. Upstream diversions and Delta exports have radically altered the Delta's hydrodynamics, which has resulted in a loss of critical flows, less variability, degraded water quality and reduced primary productivity. The yearly export of phytoplankton, the foundation of the aquatic food web, is equivalent to more than 30% of net primary production.

The Delta's altered hydrology has allowed numerous invasive non-native species to become entrenched to the detriment of native communities. A number of fishery scientists have observed that a variable freshwater Delta has been transformed into something resembling an Arkansas lake. Creating more Arkansas lake habitat will simply create more Arkansas lake fish.

Successful restoration of native species requires restoring the conditions under which they evolved and prospered. This entails increasing outflows, mimicking the natural hydrograph, improving water quality, protecting the critical low salinity zone (LSZ) and reducing export of primary productivity. However, these are the essential elements BDCP cannot provide.

Construction and operations of BDCP's north Delta diversion facilities will exacerbate existing poor conditions by decreasing outflow, moving critical LSZ pelagic habitat eastward, degrading water quality and exposing sensitive life stages of listed species to massive new water diversions. As mitigation, BDCP proposes a conceptual and highly speculative plan to restore habitat with uncertain public funding.

Our review of the habitat needs of native species and the history of habitat restoration projects in the Delta reveals that BDCP's optimistic projections of success are unrealistic and not likely to restore native Delta fisheries.

Introduction

The Bay Delta Conservation Plan (BDCP) proposes to increase water supply reliability by diverting the Sacramento River through twin 40-foot tunnels under the Delta for export to the San Joaquin Valley and Southern California. It also proposes creation of approximately 150,000 acres of new habitat in the Delta to restore the estuary and offset adverse impacts from diverting vast quantities of water around the Delta. The costs of tunnel infrastructure will be paid by the state and federal water contractors while the vast majority of habitat restoration costs will be borne by the general public.

The BDCP EIR/EIS analyzes the tunnels to a project specific level, while habitat restoration has only been analyzed at a programmatic level. There are few details on specific habitat restoration projects. Fishery agencies and scientists have bluntly questioned the likelihood that habitat creation will be as successful as claimed by BDCP proponents or whether habitat restoration can realistically offset the projected adverse consequences from increased exports and reduced outflow to San Francisco Bay.

For example, the Delta Independent Science Board, in its review of the Draft BDCP EIR/EIS and Draft BDCP Plan, observed, "Many of the impact assessments hinge on overly optimistic expectations about the feasibility, effectiveness, or timing of the proposed conservation actions, especially habitat restoration"[1] and "Positive and timely benefits of habitat restoration are highly uncertain. Failure to realize these benefits will invalidate the final conclusion of no net negative effect."[2] Likewise, the Panel Review of the Draft Bay Delta Conservation Plan, prepared for the Nature Conservancy and American Rivers said, "BDCP is too optimistic about benefits of tidal marsh and floodplain restoration for smelt, particularly the extent of food production."[3]

The National Marine Fisheries Service, in comments on the Draft EIR/EIS said, "There is too much benefit to steelhead smolts assumed from habitat restoration in the Delta."[4] The U.S. Fish and Wildlife Services wrote, "Scientific literature cited in the plan, new analyses provided by DWR, and conclusions of the independent scientific review panel have reinforced our concern

---

[1] Delta Independent Science Board, Review of the Draft BDCP EIR/EIS and Draft BDCP, May 2014. Page 3.

[2] *Id.* Page A-25.

[3] Mount J., et al., Panel Review of the Draft Bay Delta Conservation Plan, prepared for the Nature Conservancy and American Rivers, September 2013, page 109.

[4] National Marine Fisheries Service, Federal Agency Comments on Consultant Administrative Draft EIR-EIS, July 2013, Page 8.

that the BDCP restoration plan has not been carefully thought out and has uncertain prospects for benefiting native aquatic estuarine species, particularly delta smelt and longfin smelt." [5]

Can habitat restoration offset the loss of flow due to diversion of massive quantities of fresh water around the estuary and restore severely degraded fisheries? The U.S. Environmental Protection Agency wrote in commenting on the Administrative Draft EIR/EIS, "There is broad scientific agreement that existing Delta outflow conditions are insufficient for protecting the aquatic ecosystem and multiple fish species, and that both increased freshwater flows and aquatic habitat restoration are needed to restore ecosystem processes in the Bay Delta and protect T & E fish populations. This includes statements from lead federal agencies."

Indeed, as the U.S. Fish & Wildlife Service testified during the State Water Resources Control Board's 2010 flow hearing, "flow in the Delta is one of the most important components of ecosystem function." Habitat is more than the spatial extent of acreage, and increases in habitat area doesn't ensure increases in habitat quality or functionality. Habitat requires adequate physical (flow, residence time, variability, etc.) and chemical parameters (salinity, temperature, turbidity, chemical constituents, etc.), as well as the nutrients necessary for primary production to support renewable fisheries. Yet, BDCP's principle strategy for fixing the Delta is based on the hypothesis is that increased habitat restoration acreage can substitute for flow.

The BDCP Conservancy Strategy identifies some 222,902 acres of existing conservation lands in the plan area. These include properties managed by conservancies and land trusts, agency restoration sites, designated biological mitigation sites, wetlands owned or managed by agencies or private parties, conservation easements, parks, and lands associated with implementation of HCPs and NCCPs.[6]

Since both the BDCP Plan and EIR/EIS contain few specific details of proposed habitat restoration, this report examines the history of habitat restoration in the Delta in order to provide some guidance on the likely success of future habitat restoration efforts. It summarizes our review of the habitat restoration that has taken place in the Delta over the past several decades with emphasis on habitat values for young Delta and longfin smelt as well as Chinook salmon.

Delta Habitat

Delta native fish species depend heavily on the Delta habitats, especially in drier years when flows are insufficient to move their young downstream to the Bay. Young smelt and salmon rear in brackish water in what is called the Low Salinity Zone or LSZ. This zone is typically defined as 0.5 to 6.0 ppt salinity (or roughly 500-10,000 EC conductivity). Another term referred to as X2 is defined as the center of the LSZ at 2 ppt salinity. After spawning upstream in freshwater, smelt tend to concentrate at X2 by summer. In drier years the LSZ and X2 are found mainly in the Delta in the main rearing period of young of both smelt species from late winter into early

---

[5] U.S. Fish and Wildlife Service Staff BDCP Progress Assessment, 2013, Page 7.

[6] Public Draft, Bay Delta Conservation Plan: Chapter 3, Conservation Strategy, Table 3.2-2, page 3.2-20.

summer. The LSZ is important because it provides slightly brackish water, frequently suitable water temperatures, and abundant prey for the young fish. The smelt are pelagic species found predominantly in shoal and open water, and beaches near the open water. It is critically important that habitat be restored and developed within or near the LSZ if the expected benefits to smelt and other pelagic fishes are to be achieved.

Young salmon begin entering the Delta as fry soon after emerging from river spawning gravels from late winter to early spring. Fry and fingerlings (25-75 mm) concentrate in shoreline areas and adjacent margin habitats including tidal marshes, sloughs, and channels. Smolt salmon (80 mm +) are often collected in open channels migrating westward toward the ocean generally in winter and early spring, but are also found feeding in margin habitats. It is important that habitats be restored and developed along their Delta migration pathways to ensure successful passage from the river to the Bay. BDCP proposes to restore only about twenty miles of channel margin habitat over a span of thirty years.

Delta aquatic habitat has been greatly altered by 150 years of reclamation. The majority of the tidal marsh, slough, and open water habitats were reclaimed or altered by a vast system of levees and connecting sloughs by the second decade of the last century. More recently, two major ship channels were carved through the Delta. It should be noted, however, that the recent precipitous decline in pelagic and anadromous species and the listing of numerous species pursuant to state and federal endangered species acts only occurred after construction of the Central Valley Project (CVP) and State Water Project (SWP) and the diversion of massive quantities of water to the San Joaquin Valley and Southern California.

Between 1930 and 1943, an average of 82% of estimated unimpaired flow reached San Francisco Bay. That has declined to less than 50% in recent years,[7] well below the 75% level identified by the State Water Resources Control Board as necessary to protect public trust resources and estuarine health.[8] The State Board's conclusions on needed flows followed a comprehensive proceeding, mandated by the State Legislature, involving agency and independent scientists, academia, water agencies and pubic interest groups. The California Department of Fish and Wildlife, under a similar legislative mandate, reached similar conclusions.[9]

---

[7] Swanson, C., WATER-Freshwater Inflow Indicators and Index, Technical Appendix, State of San Francisco Bay 2011, Appendix B, page 73.

[8] State Water Resources Control Board, Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem, 2010, page 5.

[9] CDFG, Quantifiable Biological Objectives and Flow Criteria for Aquatic and Terrestrial Species of Concern Dependent on the Delta, 2010.

A number of fishery scientists now refer to the Delta as being in a state of perpetual drought. The number of years of critically low inflow to the Bay has more than tripled to 62% of the time since the 1930s.[10]

The BDCP proposes upwards of 150,000 acres of habitat restoration, focusing primarily on tidal marsh restoration. Tidal marsh is proposed to provide direct and indirect benefits to Delta fish through the food web and as habitat for various fish species or specific life stages. One measure of the potential benefits of this large-scale restoration is to review the past history of restoration in the Delta. Have the various efforts to restore Delta aquatic habitats proved successful? This overview summarizes these restoration efforts and explains how that experience relates to habitat restoration efforts prescribed in the BDCP. But before examining historical habitat restoration efforts, we should consider a few of the inherent uncertainties of restoration efforts.

Uncertainties of Habitat Restoration

Much of the historical and BDCP habitat restoration has been focused on restoring tidal marsh. Recent scientific debate has focused on the relative merits of tidal marsh restoration on the shallow water and pelagic food web of the Delta. The key questions are whether smelt and salmon young use the tidal marsh habitats, whether tidal marshes contribute to food production in the preferred smelt and salmon open water (pelagic) and channel margins (shoreline) habitats of the Delta, whether restoration projects themselves create deleterious effects, and the uncertainties of funding and actual implementation.

One key BDCP hypothesis is that tidal marshes export nutrients and food web production to adjoining pelagic habitats. However, recent scientific reports question that hypothesis; "Tidal marshes can be sources or sinks for phytoplankton and zooplankton. Most appear to be sinks, particularly for zooplankton" and " Even under the most highly favorable assumptions, restored marshes would have at best a minor contribution of plankton production in smelt rearing areas." [11] Also, "Movement of plankton from a tidal marsh (beyond the immediate area of tidal exchange) is likely to be limited and to decrease strongly with distance. Even under ideal circumstances, plankton in water discharged from tidal marsh cannot greatly affect the standing crop of plankton in large, deep channels. Feeding by clams and other introduced species can further reduce contributions of marsh plankton to open-water food webs." [12] As the Delta Independent Science Board recently wrote, "Whether or not any increases in primary production

---

[10] Swanson, C., The Power of Measurement, Part II: Projected Freshwater Inflow to the San Francisco Bay Estuary with the Bay Delta Conservation Plan, Swanson's Blog, NRDC Switchboard, 17 December 2013, page 2.

[11] Mount J., et al., Panel Review of the Draft Bay Delta Conservation Plan, prepared for the Nature Conservancy and American Rivers, September 2013, page 109.

[12] Herbold, B. et al., The Role of Tidal Marsh Restoration in Fish Management in the San Francisco Estuary, 2014, page A-11. http://www.escholarship.org/uc/item/1147j4nz

will be transferred to zooplankton and on to covered species that may reside in the restored area or outside of it is largely unknown." [13]

There is also the looming question of whether the proposed habitat can be created without exacerbating methylmercury problems. As the National Marine Fisheries Service (NMFS) put it, "There is no indication that the kinds of habitat restoration that can meaningfully contribute to estuarine fish viability can be created or restored without also methylating the ubiquitous mercury in the system because the management tools available conflict with these fishes' habitat needs. Minimization of water depth and reduction of turbidity to control mercury methylation conflict with the direct habitat needs of delta and longfin smelt and will in some locations favor invasive species such as sunfishes and water hyacinth. However, minimization of water depth and turbidity will maximize the potential for algal production and algal production will generate dissolved organic carbon (DOC). If, as the ADEIS implies, restoration sites will also be designed to minimize the export of DOC from restoration sites to minimize anoxic conditions (reducing methylation opportunities) these designs will also reduce their potential food web benefits." [14] BDCP found that the preferred alternative would increase mercury concentrations and exceed tissue toxicity thresholds in largemouth bass in the Delta.[15] Increases in mercury loading resulting from habitat restoration projects would exacerbate the problem.

This issue is not limited to mercury. Marshes are often sinks for organic contaminates like PCBs, PAHs, organochlorine compounds and organophosphate and pyrethroid insecticides. Selenium is a serious problem. NMFS commented on the BDCP EIR/EIS, "An expected increase in contribution of San Joaquin River water to the Delta will increase selenium loading in the Delta, especially in the southern Delta and Suisun Bay where bioaccumulation by bivalves is assured (Stewart et al. 2004). This in turn represents an increased risk of deleterious reproductive effects caused by selenium accumulation in fish and wildlife." [16] BDCP found that the preferred alternative would increase annual average selenium concentration in sturgeon over the existing conditions and no action alternatives.[17]

There is also a serious concern that diverting flow around the Delta and reducing outflow will expand the range of overbite clams, "Finally, only adverse effects are indicated resulting from conservation measures in the context of invasive mollusks. CM1 may increase *Corbula* habitat by moving X2 upriver, assuming greater freshwater diversion. Given that *Corbula* is the more effective trophic competitor with covered planktivorous fish, this suggests degradation of habitat characteristics due to CM1. Restoration involved in CM4 (tidal wetland), CM5 (seasonally

---

[13] Delta Independent Science Board, Review of the Draft BDCP EIR/EIS and Draft BDCP, May 2014. Page B-39.

[14] National Marine Fisheries Service, Federal Agency Comments on Consultant Administrative Draft EIR-EIS, July 2013, Page 10.

[15] Bay Delta Conservation Plan, Appendix 8I, Mercury, Tables I-7a, I-15Aa, I-11Ba, I-11Ca, I-11Da.

[16] *Id.*

[17] Bay Delta Conservation Plan EIR/EIS, Appendix 8M, Selenium in Sturgeon, Tables 8M-2, 8M-3, Page 8M-9.

inundated floodplain), and CM6 (channel margin habitat) may increase potential benthic habitat for *Corbula* and *Corbicula,* overall exacerbating the impacts of these competitors. Tidal and shallow water habitat restoration, if invaded by *Corbula* or *Corbicula* may result in phytoplankton sinks actually worsening circumstances for fish.[18]

Another example of uncertainties in habitat restoration is the effect on tidal energy. As the Independent Science Board observed, "Tidal energy coming from outside the Golden Gate is another limited resource in the development of habitat in the Delta and its larger estuary. A major effect of many of the proposed habitat restoration activities (as well as potential island failures in the future) is likely to be the changes in tidal amplitude and mixing. This will affect the suitability of certain characteristics for restoration." [19] A number of agencies have expressed concerns that changes in tidal amplitude caused by creation of more open tidal habitat will increase salt intrusion in the Delta.

Given the programmatic level analysis of proposed habitat restoration, there is significant uncertainty that large-scale restoration projects will actually be implemented or implemented in a timely manner. The Independent Science Board acknowledged these concerns in saying, "Construction and flow operations may have impacts immediately, whereas the restoration impacts and benefits may lag a decade or more after construction" and "If proposed habitat restoration actions are not implemented in a timely fashion or are not as effective as assumed in the DEIR/DEIS, then the positive impacts of those actions would no longer be present, and the final assessment of a net positive or no net negative effect would not be valid." [20] They also noted, "The literature strongly suggests, however, that there are significant time lags between construction of a new habitat and its full functionality. This means that the benefits of habitat restoration may not occur for a long time and that the benefits may be too late for some species if negative impacts come first" and "Even if all acres are acquired and restoration actions are taken in a timely manner, whether those actions will deliver the anticipated benefits or not is also uncertain." [21]

The lack of funding commitments for BDCP's proposed restoration projects creates major uncertainties. Habitat restoration is extremely expensive. As we discuss below, many proposed restoration projects were unable to move beyond a conceptual stage because of a lack of funding. A number of projects were able to acquire property but couldn't secure the funding necessary for implementation. Other projects were constructed but failed because they lacked sufficient funding to maintain or adaptively manage the habitat.

---

[18] Delta Science Program, Review Panel Summary Report, Bay Delta Conservation Plan (BDCP) Effects Analysis, May 2012, page 60.

[19] Delta Independent Science Board, Review of the Draft BDCP EIR/EIS and Draft BDCP, May 2014. Page B-17.

[20] *Id,* page B-38.

[21] *Id,* page B-39.

What is clear is that populations of native species like salmon, steelhead, Delta and longfin smelt, splittail, threadfin shad, native phytoplankton and zooplankton, and several species introduced in the 1800s like striped bass and American shad are collapsing. In contrast to the rapid decline of native species: populations of recent invasive predatory species like inland silversides, bluegill, largemouth bass and overbite clams; troublesome invasive plants like water hyacinth, arundo, Brazilian waterweed, parrots feather and potamogeton; and less nourishing non-native copepods and mysids are flourishing.

Many scientists have observed that the state and federal project's massive water diversions and altered hydrograph have transformed the Delta into something resembling an Arkansas lake. In fact, the Delta is now home to a number of trophy bass fishing tournaments and Bass Master magazine recently ranked the Delta as the ninth best largemouth and smallmouth bass fishing spot in the entire nation. Creating additional Arkansas lake habitat will not restore the iconic native species of the Bay-Delta estuary.

The preceding examples are only a few of numerous critical comments by independent scientists and agencies regarding the highly speculative and questionable assertions by BDCP that habitat restoration is a magical bullet that will not only mitigate adverse impacts of diverting additional water around the estuary but will also restore seriously degraded fisheries. But these are not the subject and purpose of this review.

Instead, this report focuses on whether historical habitat restoration has met the physical goals and objectives of restoration. The following observations are focused primarily on the direct benefits to salmon and smelt based on four decades of sampling fish in Delta habitats. Are the altered habitats after levee breaching, channel digging, and vegetation planting functioning? Has water quality been sufficient to support fish? Have non-native invasive plants and fish taken over these new restored habitats? Are the habitats right for smelt and salmon?

History of Aquatic Habitat Restoration in the Delta

There are dozens of "restoration" sites around the Delta dating back several decades or more. There are even more in San Francisco Bay, which are not discussed in this report. As noted above, BDCP has identified almost 223,000 acres of existing conservation lands in the Delta. The majority of these lands were acquired in the last few decades.

Delta restoration has occurred as mitigation for many large and small development projects throughout the Delta. Levee repair, dredging, dock construction, sand mining, new water intakes, bridges, flow barriers, and the large federal and state water projects have undertaken some form of habitat mitigation.

In the recent decade, restoration has been larger and more formal under directed water project mitigation, multi-agency programs such as the Central Valley Project Improvement Act, Corps Central Valley Flood Control Levee Program, Sacramento and Stockton Port Programs, Delta Wetlands Program (private), the state Delta Levees Program, and the CALFED program. Under the State Water Project, Delta Wetlands Project, Montezuma Wetlands Project, PG&E Delta Power Plant Mitigation Program (HCP), and CALFED programs monies were available for

government and non-profits to purchase large-acreage projects such as Sherman Island, West Sherman Island, Twitchell Island, Yolo Bypass Wildlife Area, Big Break, Staten Island, Cosumnes River Preserve, Liberty Island, Stone Lakes NWR, Little Holland Tract, and many other significant areas.

In recent years, water districts have acquired large tracts of property in anticipation of future mitigation needs. The most notable is a 5000-acre portion (including 1,100 acres of wetlands) of the lower Yolo Bypass north of Liberty Island called the Lower Yolo Restoration Project.

However, habitat restoration projects have failed to achieve their stated purpose. They have neither slowed nor reversed the collapse of Delta fisheries. We see little on which to base any optimism that more of the same will lead to different results.

The California Department of Fish and Wildlife has conducted surveys of the Delta's pelagic species since 1959. The Fall Midwater Trawl (FMWT) survey was initiated in 1967, the year the State Water Project began exporting water from the Delta. It samples 122 stations each month from September to December, and the data is used to calculate an annual abundance index of pelagic species. These stations range from San Pablo Bay upstream to Stockton on the San Joaquin River, Hood on the Sacramento and the Sacramento Deep Water Ship Channel.[22]

Department of Fish and Wildlife
Percent Decline in Delta Fish Population Abundance Indices

Fall Midwater Trawl Survey

Species	1967 v. 2013	Five Year Average 67-71 v. 09-13
Striped Bass	99.6%	98.8%
Delta Smelt	95.6%	89.8%
Longfin Smelt	99.8%	99.4%
American Shad	90.9%	99.4%
Splittail	98.5%	87.7%
Threadfin Shad	97.8%	98.1%

Summer Townet Survey

Species	1967 v. 2013	Five Year Average 67-71 v. 09-13
Striped Bass	98.2%	95.4%
Delta Smelt	94.2%	94.3%

Data compiled by CSPA from CDF&W FMWT and STN annual abundance indices.

The Summer Townet Survey was begun in 1959 and samples striped bass and Delta smelt at 32 stations, ranging from eastern San Pablo Bay to Rio Vista on the Sacramento River and to Stockton on the San Joaquin River. Surveys begin in early June and continue on alternate weeks through August, and the data is used to calculate an abundance index.[23]

The annual abundance indices document the continued one to two orders of magnitude decline of the entire spectrum of native pelagic species in the estuary. The same magnitude declines hold true for the native lower trophic orders that comprise the base of the food web.

Central Valley anadromous fisheries have also not fared well and are far below the doubling levels mandated some 22 years ago by the Central Valley Project Improvement Act, California

[22] http://www.dfg.ca.gov/delta/projects.asp?ProjectID=FMWT

[23] http://www.dfg.ca.gov/delta/projects.asp?ProjectID=TOWNET

Water Code and California Fish and Game Code.[24] For example, winter-run, spring-run, Sacramento fall-run and San Joaquin fall-run Chinook salmon are at 5.7, 20, 31 and 25.5 percent, respectively, of legally mandated levels.

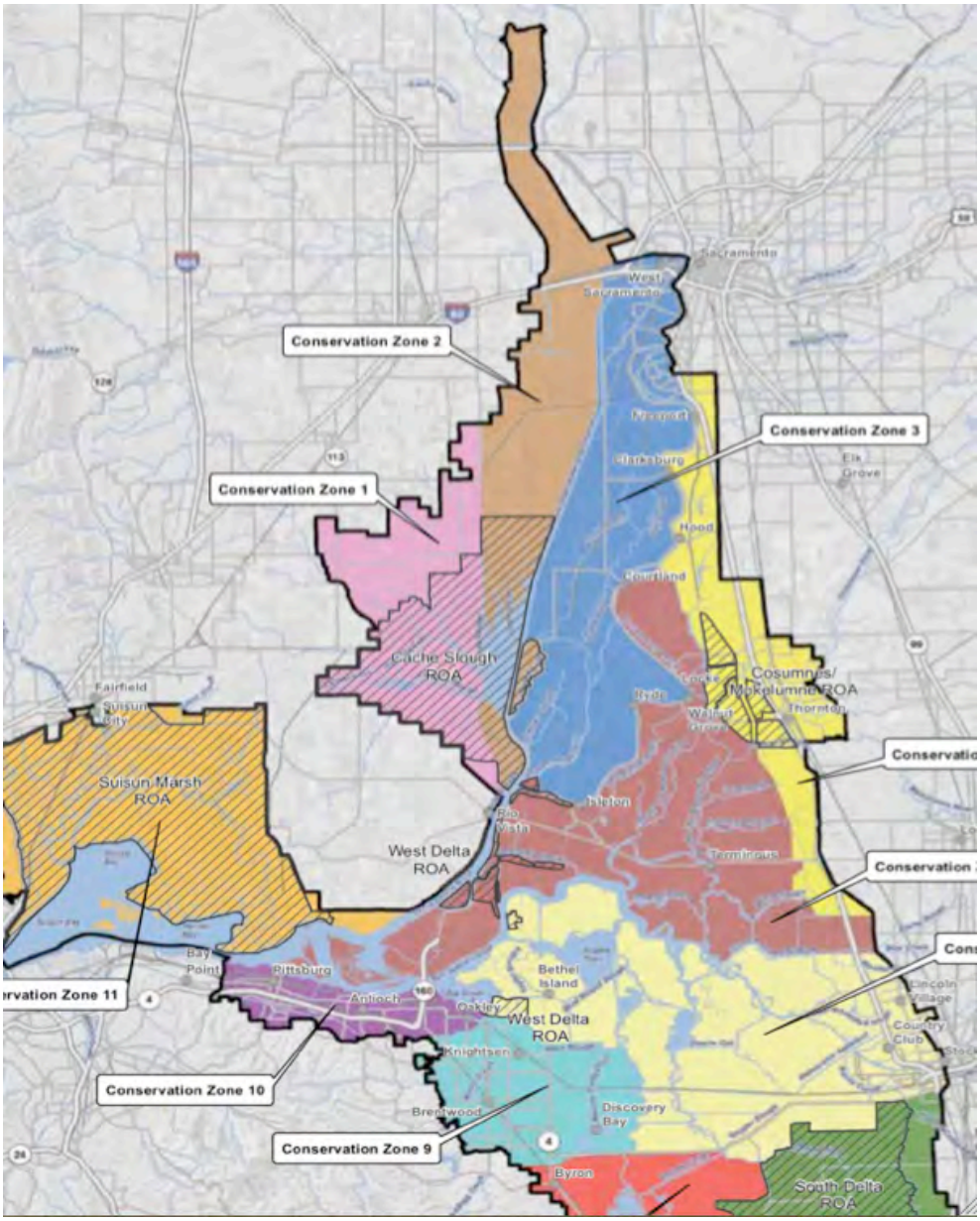


Figure 1. Delta habitat regions as defined in the Bay Delta Conservation Plan. Restoration sites included in the BDCP are shown by cross-hatching.

Geographic Coverage

The focus of this review is on restoration sites in the West, Central, East, and North Delta where habitats are potentially used by smelt and salmon. The South Delta is not addressed primarily

[24] http://www.fws.gov/stockton/afrp/Documents/Doubling_goal_graphs_020113.pdf

because there are few restoration sites and what there is may be of minimal benefit to smelt and salmon. There is discussion of lower San Joaquin River habitat in the discussion of the East Delta, as it is important habitat for salmon and splittail originating from the San Joaquin River system. For consistency, the BDCP Restoration Opportunity Areas (ROAs) are used for the various portions of the Delta. The areas are generally consistent with the BDCP designations (Figure 1), which include more area than the BDCP's Cache Slough ROA. The West Delta region includes the area from Collinsville to Rio Vista, Pittsburg to Antioch, including eastern Chipps Island.

Benefits, Successes, and Failures

This review discusses individual sites including benefits, successes, and failures. Failures include simply doing nothing with the specific properties and letting them deteriorate over time. Failures are common even for active restoration sites where what was built or constructed did not work or actually provided poor habitat. Given the large amount of overall effort and expense, there has been a disturbing lack of progress and overall success. There have been a few successes in protecting or restoring specific sites and considerable research on several of these sites has produced a wealth of restoration and ecological science.

However, what some characterize as new "paradigms" for Delta habitat restoration are, in reality, disasters in the making that jeopardizes both restoration success and the expenditure of billions of dollars. Fish cannot be coerced into thriving under conditions radically different than those in which they evolved over millennia. Restoration projects that fail to provide habitat that reflects conditions under which native species evolved cannot succeed in restoring native species.

West Delta

The West Delta has a rich history of failed habitat "restoration" and missed opportunities. Many of the habitats are managed as part of Suisun Bay/Marsh habitats and are described in the Suisun Marsh Habitat Management, Restoration and Preservation Plan.[25]

Figure 2. Chipps Island at the western boundary of the Delta on Suisun Bay is a failed mitigation site.

[25] http://www.fws.gov/sacramentøoutreach/2010/10-29/Documents/Tidal_CM_Chapter_1_Phys_Proc.pdf

Chipps Island

Chipps Island is a classic example of failed mitigation habitat. The roughly 700 acre "Delta island," at the west boundary of the Delta, has three main parcels: north, west, and east (Figure 2). Each has its own history and habitat characteristics. Today they are duck clubs. The north parcel was once purchased with mitigation funds by a non-profit but was eventually sold to a duck club for lack of restoration funds. The north and east parcels are muted tidal marshes that are flooded periodically during high tides. But, these are basically managed as freshwater marsh preferred by duck clubs in the Suisun Marsh area. The west parcel would be best described as brackish marsh, as the levees have long been breached and its channel network is fully tidal. The southern boundary of the island on the main ship channel is slowly eroding from ship wakes. Levees have been repaired in recent decades on the north parcel and have gates to allow water to enter the property when needed. Large numbers of native fishes including young salmon have been observed trapped within this parcel's ponds and channels. The island is in need of management and restoration, and the duck club owners have unsuccessfully attempted to sell the property. The island could potentially serve as important winter-spring rearing habitat for salmon and as Delta and Longfin smelt habitat in all but the driest years. However, Chipps Island is a restoration failure in that it should have been restored a decade after it was purchased with oil-spill mitigation funds.

Figure 3. The Collinsville site along the north shore of the lower Sacramento River channel. Collinsville is left center with Montezuma Island to its right.

Collinsville/Montezuma

Collinsville is at the west boundary of the Delta (Figure 3) and has a rich history. The two islands and most of the lowland shoreline (about 500 acres), at the base of the hills immediately east of Collinsville, were once PG&E property destined for a new Delta power plant.

After efforts to build a new plant failed, PG&E offered the property for restoration as part of the HCP permit mitigation to operate their two remaining power plants in the Delta. PG&E subsequently sold the two plants to Mirant/Southern. The plants are now included within the BDCP package of development actions to be permitted by the new BDCP-HCP process. The

Collinsville mitigation site remains in limbo having been once included in the original HCP permit.

However, it was never restored. Title to the property remains with the utility companies and was never transferred to the State, as intended under the original HCP permit. Once a navy base in World War II, the site's tidal channels have filled in with sediment and aquatic plants including invasive submergent aquatic vegetation (SAV) and water hyacinth.

The shoreline on the ship channel is eroding, along with its riparian vegetation. Invasive *Arundo* dominates the two islands. This area was once a designated mitigation site but was never restored as required under the utilities' permits. There is potential for restoration by creating tidal channels and shallow tidal marsh but only if intensive maintenance can control invasive weeds and insure adequate circulation. New permits are being sought under the BDCP without this site being included in the BDCP mitigation package. The BDCP, as an HCP/NCCP, would provide the power plants new ESA take permits, overriding the previous HCP that included the Collinsville site restoration. The new permits would not require the site to be restored. The hills adjacent to the site are now being developed by the utilities as wind farms.

West Sherman Area

The West Sherman area (Figure 4) includes Browns Island (far left), Winters Island (east of Browns), West Sherman (center) and West Island (southeast at right bottom corner).

Figure 4. West Sherman area with Browns and Winters Islands to west, West Sherman and Kimball in center, and Donlon and West Islands at lower right. All restoration opportunities of great potential value that were not included in BDCP. Cities of Pittsburg and Antioch are at lower left and right, respectively.

Browns Island

Browns Island is a 595-acre site generally referred to as "natural" and is part of the East Bay Regional Parks system. It was a reference site for the CALFED Breach study program. It has a dysfunctional tidal channel network with several large dead end channels and limited connection

between its marshes and the nearby Bay waters. Its interior waterways are heavily impacted by water hyacinth and parrots feather. The occurrence and density of introduced fishes far exceeds native species. A 2007 report funded by CALFED found that Browns Island was a source of methylmercury production.[26]

Winter Island

Winter Island is a 453-acre private duck club managed as a freshwater marsh duck club with a functional levee system except for its northern tip, which is fully tidal brackish marsh. Its 4.7 miles of riprapped shoreline has unscreened manually operated tidal gates maintain water levels on the island's managed wetlands. Dredge materials from the Stockton Deep Water Ship Channel and various San Francisco Bay dredging projects have been placed on the island to strengthen the levees. As presently configured, the island provides little habitat to the estuary's pelagic or anadromous species and is somewhat of a missed opportunity to restore tidal marsh. Winter Island is 400 acres of "missed opportunity" to restore tidal marsh.

West Sherman Island

West Sherman Island comprises several thousand acres immediately to the west of Sherman Island proper (center of Figure 4). It has large partially disconnected ponds and a slough (dark areas) and is dominated by invasive SAV and invasive floating aquatic vegetation (green areas). It is considered "restored" and is now a state wildlife area. Ship channels are on the north, west, and south sides and its shorelines and remnant levees are slowly eroding from wakes.

The Lower Sherman Island Wildlife Area Land Management Plan states, *"In summer, extensive growth of blue-green algae and aquatic plants can contribute a considerable quantity of organic matter to shallow, dead-end sloughs; this may reduce the level of dissolved oxygen in these locations. Most channels at the wildlife area are clogged with such plant growth." And "Submerged aquatic vegetation within the open water area of Sherman Lake is dominated by the nonnative species egeria. Egeria also dominates submerged vegetation along the shallower margins of the Sacramento and San Joaquin rivers. Large expanses of open water at Sherman Lake are dominated by the invasive nonnative species water hyacinth. This plant readily forms dense, interconnected mats that drift along the water's surface."*[27] *"Mercury contamination is widespread in sediments and waters of the Delta, including at LSIWA.*[28]

The Goals for the wildlife area include, "*Pursue funding and develop plans for identified restoration projects. Cooperate with the development and implementation of local and regional restoration plans for upland and riparian ecosystems by the Ecosystem Restoration Program of*

---

[26] http://mercury.mlml.calstate.edu/wp-content/uploads/2008/10/15_task5_3_browns.pdf

[27] DFW, Lower Sherman Island Wildlife Area Land Management Plan, page ES-5. http://www.dfg.ca.gov/lands/mgmtplans/lsiwa/docs/LSIWA_FinalLMP.pdf

[28] *Id*, page ES-4.

the California Bay-Delta Program and other programs that are consistent with the goals of this LMP."[29]

Lower Sherman Island was originally acquired to establish a public hunting and fishing area. The LSIWMP and CEQA document was finalized in 2007. The project was included as part of the CALFED Ecosystem Restoration Program Plan and Multi-Species Conservation Strategy. Given a lack of resources, restoration and maintenance have languished and the site is an example of failed restoration efforts. West Sherman Island is not included in the BDCP.

Kimball Island

Kimball Island is a 250-acre site on the south side of West Sherman. It is a "restored" tidal marsh, having been breached and channeled over a decade ago as a wetland mitigation bank. The original network of tidal channels has filled in with sediment and invasive aquatic plants and the SAV accelerate suspended sediment deposition and the reductions in turbidity. The lower turbidity water with abundant SAV is preferentially beneficial to non-native fishes including golden shiner, largemouth bass, sunfishes and silversides and detrimental to some native fishes. Constructed marshes like Kimball with limited tidal circulation are a recipe for backwater habitats dominated by invasive non-native aquatic vegetation and associated non-native fish community. While Kimball remains a somewhat functional tidal tule marsh, these subtidal backwater marshes also tend to have poor water quality in the form of low dissolved oxygen levels that also favor non-native fishes.

West Island to the southeast is a sandspit of dredge spoils with some channels and functional riparian shoreline. Its southern neighbor spoils island has nearly eroded away.

Donlon Island

Donlon Island a 200-acre site at the southeast corner of West Sherman is another "partially failed" restoration site. Its abandoned levee channels have long been clogged with invasive aquatic vegetation and associated non-native fish species. It was developed as a combination dredge spoils and mitigation site by the Corps of Engineers and the Port of Stockton in the 1980s.[30] Donlon Island is another example of a restored marsh with limited tidal circulation, which leads to backwater habitats dominated by non-native aquatic vegetation and fishes. It was in the CALFED Breach study and is not included in the BDCP.

West Island

West Island, to the southeast, is a sandspit of dredge spoils a few channels and some functional riparian shoreline. Its southern neighbor spoils island is nearly gone.

---

[29] *Id,* page ES-17.

[30] http://www.fs.fed.us/psw/publications/documents/psw_gtr110/psw_gtr110_i_england.pdf

Central Delta

The Central Delta area includes portions of the lower San Joaquin River, Big Break, False River, Dutch Slough, and Old River (including Franks Tract) (Figure 5). These areas are included in the West Delta ROA (see Figure 1).

Figure 5. The Central Delta including Big Break at bottom left, Franks Tract at upper right, lower San Joaquin River at upper left, False River at upper center, and Dutch Slough at lower center. Old River runs along the eastern side of Franks Tract.

Big Break

East Bay Regional Park District's Big Break Regional Shoreline Park is located along the south shoreline of Big Break. Once a leveed agricultural property, Big Break's levees failed in 1928 and the 1500-acre shallow bay has remained open since. The bay was once reclaimed marsh along the south shore of Dutch Slough, which connected the central and south Delta with the lower San Joaquin River channel. Today the bay is clogged with non-native invasive aquatic plants with an ecological footprint more like an "Arkansas bass lake". The oil company mitigation site at the west end of the Bay is also entirely dysfunctional, being clogged with invasive non-native submerged, emergent, and floating beds of aquatic vegetation (Figure 6). One of its two breaches is completely clogged with sediment and plants.

Big Break Regional Shoreline is on the northwest shoreline of the City of Oakley in Contra Costa County. In 1999 the U.S. Bureau of Reclamation purchased the 668-acre Lauritzen property that is situated along the west side of Big Break adjacent to the chemical company mitigation site as mitigation for the Rock Slough diversion project for the Contra Costa Canal in the Central Delta. This acquisition almost doubled the acreage of the Big Break Regional Shoreline. The site is described as *"a unique and valuable habitat area for several endangered fish and bird species"* in the East Bay Parks brochure.

The entire Big Break area is a prime example of establishing habitat that favors invasive non-native species over native species. It contains massive concentrations of non-native aquatic

plants that dominate the shallow water habitat. Neither of the two mitigation sites at the west side of Big Break has been restored as promised. They remain typical of the "restored" habitats of the Delta that have failed in most respects. Not only are they failed habitats, but they enhance populations of non-native predatory fishes that compete with and prey upon Delta native fishes. The Big Break area is not included in the BDCP.

Figure 6. The west end of Big Break is a failed chemical company mitigation site. Some of the chemical waste facilities can be seen at the lower left. The site is virtually abandoned. Big Break Marina is located at the right.

Dutch Slough

The Dutch Slough Tidal Marsh Restoration Area (Figure 7) lies just to the east of Big Break. The 1,178-acre site is comprised of three parcels, partially separated by Emerson Slough and Little Dutch Slough. In the fall of 2003, the Department of Water Resources completed the purchase with funds from CALFED's now defunct Ecosystem Restoration Program. The project proposes to breech the levees to create large expanses on intertidal tule and/or cattail marshes plus areas of open tidal water, managed marsh and uplands. Construction was scheduled to begin in 2013.

However, when the levees are breeched, the site will likely end up similar to Big Break with poor aquatic habitats dominated by non-native invasive aquatic plants. Another fundamental problem with the site is its location on Dutch Slough. During most of the spring and summer, especially in drier years, Dutch Slough has a net flow to the east toward Old River and the state and federal export facilities in the south Delta. Fish in this area would tend to be drawn to the export pumps. Dutch Slough has been proposed for over a decade as mitigation for development projects in the Oakley area and now for the BDCP. It is not a good site and would provide poor habitat contiguous with Big Break and its non-native predatory fishes.

Figure 7. The Dutch Slough Project consists of breaching levees on the upper center tracts. Dutch Slough is located at top and upper right. Big Break is at upper left. The Contra Costa Canal at bottom center is the southern boundary of the project.

Franks Tract

Franks Tract is owned by the State and maintained as a State Recreation Area. It comprises nearly 4000 acres of tidal aquatic habitat with many of the features of an "Arkansas bass lake". It is infested with non-native invasive aquatic plants. The CALFED Record of Decision (August 2000) identified Franks Tract as a location for one of the programmatic Ecosystem Restoration Program (ERP) actions that was intended to provide improvements in ecosystem restoration, recreation, and Delta water quality.[31] *"The Franks Tract Project is one of several interim actions to address fish and water quality concerns in the near future."* [32]

One possible action was to block False River, its connection to the west with the Lower San Joaquin River. False River receives a strong tidal flood flow from the lower San Joaquin. The inflow of turbid San Joaquin water can be seen in Figure 8. Other options included isolating Franks Tract from the Delta channels, thus eliminating it as a refuge for non-native plants and fishes, and reducing the influx of native fish species from the lower San Joaquin River into Franks Tract and Old River (the eastern boundary of Franks Tract).

Native fishes do poorly in Franks Tract because of the low turbidity and high concentrations of non-native predatory fish that thrive in the clear aquatic plant infested habitat. Unfortunately, nothing has been done to date and Franks Tract restoration is not included in the BDCP mitigation.

---

[31] Action 1: Restore Frank's Tract to a mosaic of habitat types using clean dredge materials and natural sediment accretion. Control or eradicate introduced, nuisance aquatic plants." Ecosystem Restoration Program Plan – Strategic Plan for Ecosystem Restoration – Final Programmatic EIS/EIR Technical Appendix July 2000.

[32] http://www.water.ca.gov/deltainit/action.cfm

View of Mildred Island looking south along Middle River with McDonald Island to left and Lower Jones Tract in the distance.

Mildred Island

Mildred Island is a small agricultural island of approximately 1,000 acres that was breached in 1983 and not reclaimed. Like Franks Tract, it is open water habitat dominated by SAV. Nobriga et al. (2005)[33] pointed out that non-native fishes dominate such habitat. Local fishermen have long recognized it as a bass hot spot. No attempt has been made to restore this habitat and the site is not included in the BDCP.

Twitchell Island

Twitchell Island is a 3,516-acre island bounded on the north by Seven Mile Slough, on the east and south by the San Joaquin River and on the west by Three Mile Slough. Eighty-five percent of the island is owned by the State of California. Currently, the island is primarily agricultural land with the major crop being corn. It is the site of a 15-acre experiment by the U.S. Geological Survey to study wherther growing tules and catttails can reverse the soil loss caused by farming. It was also the site of a CALFED funded mercury study where two experimental wetland ponds were created. It was found that both ponds were sources of methylmercury production.[34]

However, Twitchell Island does contain a success story. In 2005, the Twitchell Island Reclamation District (RD 1601) constructed and planted approximately 2,100 linear feet of setback levee to increase levee stability and provide 3,000 linear feet of shaded riverine aquatic habitat and 1.4 acres of emergent freshwater marsh habitat along both sides of a back channel off the San Joaquin River.[35] The site (Figure 9) has remained stable and functional after more than a decade. Though small, it is one of the few successes for restoring natural shoreline habitats along Delta levees. The small setback levee provides a small tidal slough with connections to the San Joaquin River, as well as prolific riparian plant community. No specific projects of this type were proposed in the BDCP.

---

[33] http://www.dwr.water.ca.gov/aes/docs/Nobriga_etal_2005.pdf

[34] http://mercury.mlml.calstate.edu/wp-content/uploads/2008/10/12_task5_3a_twitchell_final.pdf

[35] http://www.water.ca.gov/floodsafe/fessrøenvironmentałdee/twitchellsetback.cfm

Figure 8. The Twitchell Island setback levee project is located along the lower San Joaquin River on the south side of Twitchell Island at the center of the photo. It consists of a small tidal channel and island connected at several locations with the river.

North Central Delta

The north-central Delta is also part of the BDCP's designated West Delta ROA. The north-central Delta is sometimes described as the north Delta, as it includes the north of the "interior" Delta in the lower Sacramento River on the north side of Sherman Island.

Decker Island

Decker Island is a 648-acre island that was created between 1917 and 1937 when the Sacramento Ship Channel was dredged out and more than 30 million tons of dredge spoils were placed on top of existing wetlands. The island retains much of the original dredged sediment and has a spoils easement for U.S. Army Corps of Engineering dredging material. D.I Aggregate management LLC owns approximately 473 acres and, as seen in Figure 10, operates a large sand-sediment mining operation on the island. The Port of Sacramento owns approximately 140 acres.

The California Department of Fish and Wildlife purchased 34 acres in 1999 and, in conjunction with the Department of Water Resources, created a 26-acre wetland.[36] The restoration site was constructed similarly to the Kimball Island site by digging out interior channels and connecting them to the Sacramento River via a single breach. This design fails as it creates a dead-end slough system that clogs with aquatic plants (Figure 11) and provides habitat for non-native fish species. By 2003, over 90% of the tidal channels were clogged with water hyacinth (Rockriver, 2003, p. 91).

[36] http://www.water.ca.gov/floodsafe/fessrøenvironmentałdee/decker.cfm

Figure 9. Decker Island in the lower Sacramento River. The entrance to Three Mile Slough is at upper right.

Figure 10. Mosaic of Decker Island State Wildlife Area development at north end of island. Channels dug have eventually filled with sediment and non-native aquatic plants (light green areas are predominantly water hyacinth). (DWR figure)

Figure 11. The southeast portion of Decker Island. Dark areas are invasive Egeria, while the light green are non-native aquatic plants including water hyacinth. Light brown is interior muted tidal marsh. The light tan between marsh and shoreline is remnant sand levee. The channel at right is the original Sacramento River channel.

Dead end tidal channels like the Decker and Kimball (see Figure 4, above) projects fill with submerged aquatic plants that strain the fine sediments for the water resulting in clear water favored by non-native fishes and avoided by many native fishes including Delta smelt. The dark channels in Figure 11 indicate clearer water than the turbid river. The site also has riparian plantings along its river shoreline, which are generally functional sandy beaches.

The southeastern portion of the island consists about 200 acres of "natural" shoreline used for pasture grazing (Figure 12). This site was once slated for CALFED restoration as it has a low elevation and much potential for tidal marsh-slough habitat. The black areas seen in Figure 12 are nonnative submerged aquatic plants, probably egeria, with the lighter green being other invasive aquatic plants including water hyacinth inshore. Decker Island restoration is included in the BDCP (see Figure 1), although no specific design is provided.

Sherman Island Levee Setback Project

The Sherman Island Levee Setback Project was constructed a decade ago by the Sherman Island Reclamation District (RD 341). The project consists of approximately 6,000 linear feet of setback levee to increase levee stability and provide 6.87 acres of intertidal channel margin habitat and 1.68 acres of riparian scrub shrub along Mayberry Slough (adjacent to Donlon Island site). The project is another example of mitigation provided by the State for the Delta Levees Program. Like the Twitchell Island setback project, this project was successful in restoring a narrow band of riparian and intertidal shoreline habitat along a Delta channel that has been sustained for over a decade on what was otherwise 100% unvegetated rock riprap.

Figure 12. The Sherman Island Levee Setback Project is shown on the southwest shoreline of Sherman Island on Mayberry Slough across from Donlon Island as a narrow strip of green on a new near-white rock levee.

North Delta

The North Delta is the northern component of the North Delta Arc of fish habitat connecting Suisun Bay/Marsh ROA with the Cache Slough ROA via the lower Sacramento River (see Figure 1).[37] The Cache Slough ROA is the BDCP component of the North Delta. It includes Liberty Island, Little Holland Tract, Cache Slough, Lindsey Slough, Barker Slough, Prospect Island, and the Sacramento Deep Water Shipping Channel (Figure 14). This area is considered the new "paradigm" for Delta restoration and thus is a key focus of the BDCP mitigation package.

The area has several features that potentially make it "good habitat." Bypass floods wash it clean several times a decade; it is a back water with long residence time except in floods, and it is a perfect elevation for shallow turbid water and intertidal habitats preferred by many Delta native fishes.[38] The area also has several negative features: low freshwater inflow, high nutrient loadings, and warm summers. Much of the area generally reaches lethal water temperatures for Delta smelt (25C/77F) in summer, particularly in heat waves.

Liberty Island, Little Holland Tract, Little Hastings Tract, and Prospect Island were once leveed reclaimed agricultural lands in the lower Yolo Bypass/Cache Slough region of the Delta. Over the decades all the island levees failed and breached and were subsequently purchased by the government and left for Mother Nature's tides and Bypass floods. Liberty Island is the largest of the reclamations at about 5000 acres. The tides flood all but about 1000 acres of the northern portion of the island. The middle and lower portions of the island are subtidal. The lower

[37] http://californiawaterblog.com/2013/10/26/north-delta-arc-lifts-hope-for-recovery-of-native-fish/

[38] http://www.water.ca.gov/aes/docs/Sommer_Mejia_SFEWS_Smelt_Habitat_2013.pdf

several thousand acres remain open water connected to Cache Slough. Tules invaded the intertidal habitats of the flooded islands early, but tule expansion has since been limited.

Figure 13. Cache Slough – Lower Yolo Bypass region of North Delta. Lindsey/Barker sloughs are at lower left. Upper Cache Slough is at upper left. Sacramento Deep Water Ship Channel is at right edge. The flooded islands including Liberty (center) and Little Holland Tract (upper center right) of the lower Yolo Bypass are at center right. Prospect Island is east of Ship Channel at lower right.

The shallow waters with long residence time with abundant nutrients and sunshine make the open waters around Liberty Island very productive. The areas relatively high turbidity, mainly from wind-wave erosion along with periodic flood scouring, limit invasive rooted aquatic plants. The aquatic habitat of the area including the Ship Channel appears ideal for Delta smelt and other native Delta fishes.[39]

[39] http://www.water.ca.gov/aes/docs/Sommer_Mejia_SFEWS_Smelt_Habitat_2013.pdf

The 200 acres of northern Liberty Island have been "restored" as a Delta smelt conservation bank with credits being sold for Delta smelt mitigation (Figure 15). Channels have been dug in uplands area to create slough and marsh habitats. The channels are connected to Liberty Slough and the main open waters of Liberty Island.

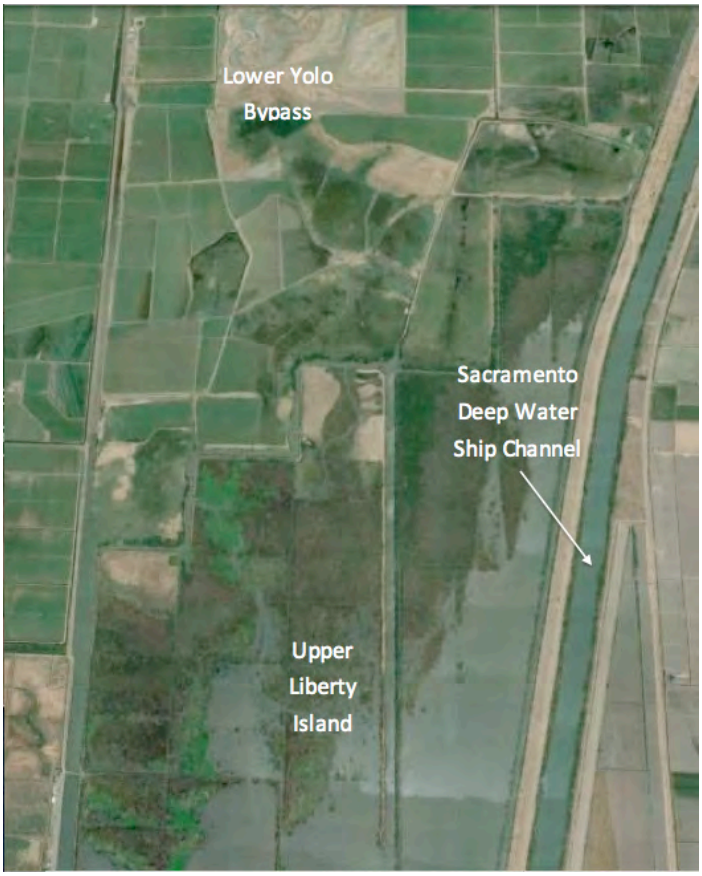


Figure 14. Upper Liberty Island (left center) and Little Holland Tract (right center). Ship Channel is at right. Stair-step levee remnants and Liberty Slough are north boundary of Liberty Island. Dark aquatic vegetation is tules. Light green is invasive non-native yellow primrose (able to take hold in the lee of high remnant levees). North staircase sections have brown upland habitats. Liberty Island Conservation Bank is upper right staircase with manmade channels and lowlands excavated from uplands. To the north of Liberty north or Liberty Slough is Yolo Ranch, which is also slated for BDCP mitigation.

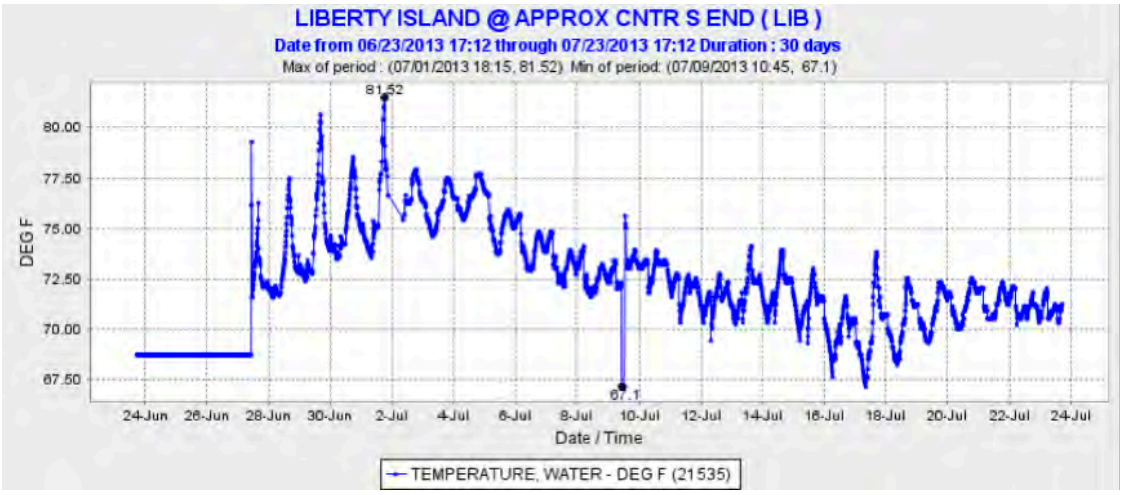


Figure 15. Water temperature during early summer 2013 at Liberty Island. (Source: DWR CDEC)

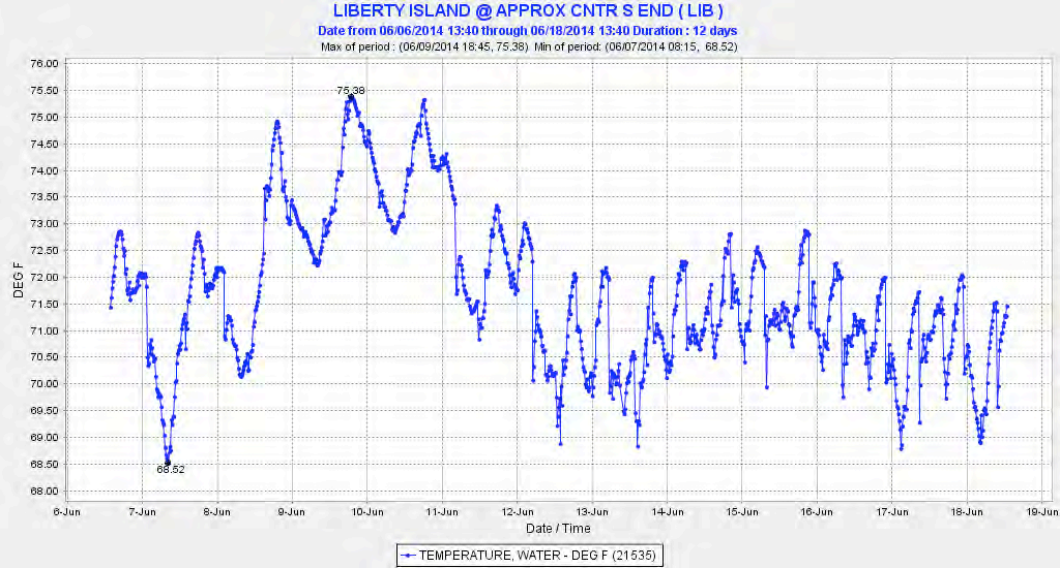


Figure 16. Water temperature during late spring 2014 at Liberty Island. (Source: DWR CDEC)

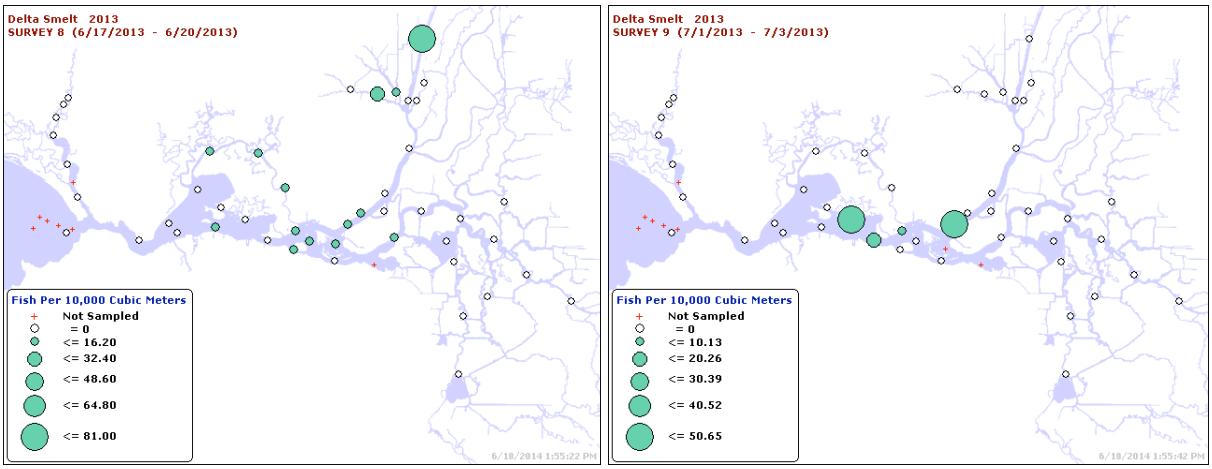


Figure 17. Comparison of Delta smelt distributions in early summer 2013 20-mm surveys before and after heat wave at beginning of July. Note the concentration of smelt in Cache Slough area before the heat wave and the lack of smelt in that area after the heat wave.

The main problem with the Cache Slough area is its periodic warm water temperatures as seen in Figures 16 and 17. With water temperatures generally considered lethal for Delta smelt above 75F, the area is basically inhospitable in summer for smelt. If not for the regular occurrence of the "Delta Breeze", the entire area would only be suited for non-native catfish and carp. Though there may be periodic refuge for smelt in deeper channels of Cache Slough and the Sacramento Deepwater Ship Channel (SDWC), there has been little study of the ability of smelt to use these deep-water refuges and successfully survive the summer of warm dry years like 2013 (Figure

18). While Summer Townet Survey collected some Delta smelt in the Ship Channel in July surveys, none were collected in August surveys.[40]

Recent surveys of the Ship Channel by CDFW question the ability of Delta smelt to survive the summer: "*While the extent of SDWC usage by delta smelt is still unclear, these surveys have shown that delta smelt are limited in their ability to utilize the SDWC year round.*" [41]

The Cache Slough complex experiences frequent toxicity from agricultural and urban discharges of chlorpyrifos and pyrethroid insecticides to copepods on which Delta smelt feed and to invertebrates in general. High temperatures tend to increase the toxicity of pyrethroids.[42]

Figure 18. Prospect Island is located between the Ship Channel and Miners Slough. The lower 300 acres are a Port mitigation area. The northern 1600 acres are owned by DWR and intended as a BDCP mitigation site.

Lower Yolo Restoration Project

The Lower Yolo Restoration Project is a proposed tidal restoration project by the State and Federal Water Contractors Water Agency to partially fulfill the habitat restoration requirements of the biological opinions for the Operations Criteria and Plan (OCAP) of the state and federal water projects. It would also help meet restoration objectives of BDCP. The project is located on a 3,795-acre site to the west of the Sacramento Ship Channel and to the north of Liberty Island and would result in the creation of approximately 1,226-acres of perennial emergent marsh (tidal) wetlands and 34-acres of non-tidal marsh.

The proposed enhancement of tidal wetlands at Yolo Ranch to the north of Liberty Island as well as breaching of leveed lands along Cache Slough (see Figure 15) would increase the area of shallow open waters that would warm in the summer sun to levels lethal to Delta smelt. This is a concern as the Sacramento Ship Channel and the general Cache Slough provides habitat for the northern spawning population of Delta smelt. The creation of

[40] http://www.dfg.ca.gov/delta/data/townet/

[41] https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=30643

[42] Weston, DP. et al., Urban and agricultural pesticide inputs to a critical habitat for the threatened delta smelt (Hypomesus transpacificus), Environ Toxicol Chem, 2014.

additional open water will likely increase the amount of seawater that enters the Delta, leading to increased violations of salinity standards and expansion of the overbite clam and a resulting reduction in estuarine food availability. The site will also likely become a net sink for phytoplankton and zooplankton.

The project will likely become a net producer of methylmercury, and even if MeHg is not exported it will tend to bioaccumulate in resident and migratory species. Further, the area will be highly vulnerable to colonization by invasive weeds that will require extraordinary and expensive long-term management to control, something that has not been evidenced by the vast majority of habitat restoration efforts in the past.

Project implementation will likely go forward but, like numerous previous restoration projects, is likely to create unintended and detrimental impacts.

Prospect Island

Prospect Island is located between the Ship Channel and Miners Slough east of Liberty Island (Figure 19). Prospect Island was once a leveed farmland likes its neighboring tracts. Its lower end became a mitigation site for the Port of Sacramento. The upper portion failed in the recent decade and flooded, stranding thousands of fish. The island has since been purchased and levees repaired by the state with intention of the site being part of the BDCP mitigation package. DWR acquired the northern 1,300 acres from the U.S. Bureau of Reclamation in 2010, which had purchased the property in 1994 for restoration purposes that never occurred. The Port of West Sacramento owns the southern 300 acres and has used it for dredge spoil placement.

The Prospect Island Tidal Habitat Restoration Project is a component of the Fish Restoration Program Agreement (FRPA) comprised of a joint effort by the California Department of Water Resources (DWR) and the California Department of Fish & Wildlife (CDFW) to restore the property to freshwater tidal wetland and open water (subtidal) habitats to benefit native fish and improve aquatic ecosystem functions. "*Restoration will entail interior grading, vegetation management, possible clean fill import for subsidence reversal, possible weir installation, breaching of exterior levees, and addressing various property considerations. Monitoring will take place as part of a science- based adaptive management plan. The design of future restoration projects will incorporate knowledge gained through the implementation and monitoring of this project.*" [43] Planning and design is expected to be completed by late 2015, with construction commencing by early 2016.

Restoration of the site is complicated by local seepage problems for agricultural lands to the east of Prospect. Full tidal access to the northern portion of the island would result in extensive open water, not unlike Liberty and Little Holland Tract (Figure 20). However, without the scour provided by periodic Bypass floods, upper Prospect like lower Prospect would likely become infested with non-native invasive aquatic plants. Additionally, hydrodynamic modeling shows that open water restoration projects have the potential to increase seawater intrusion into the Delta. Flooding the island also has the potential to increase soil saturation and impact

[43] http://www.water.ca.gov/environmentalservices/frpa_prospect_restoration.cfm

neighboring islands because of the horizontal sand lens that runs under the islands. Restoration might result in the island becoming a net exporter of methylmercury.

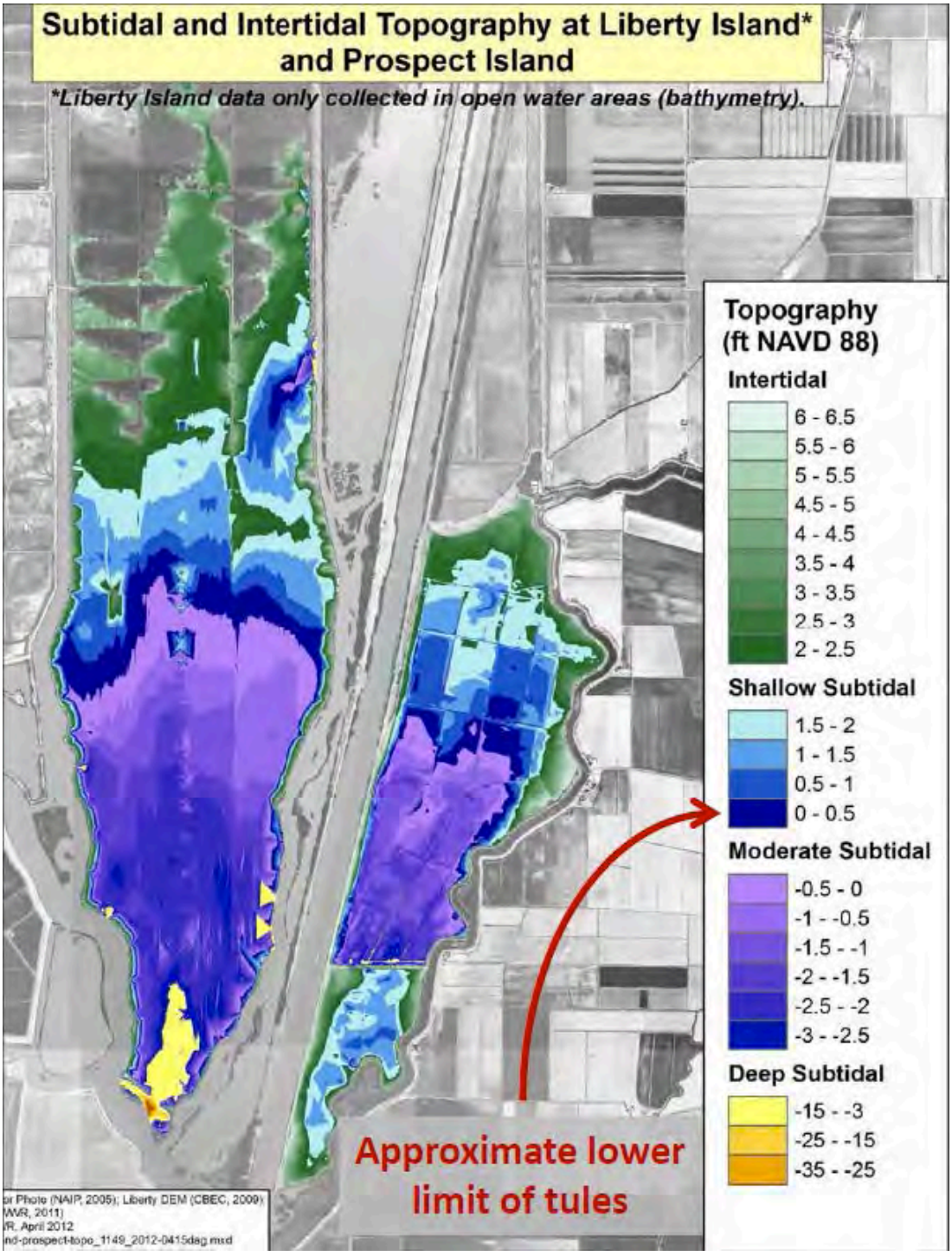


Figure 19. Liberty-Prospect area project water elevations.[44]

[44] http://www.delta.ca.gov/res/docs/meetings/2013/2013%20DC%20Board%20Mtg_Prospect_FINAL.pdf

The lower island mitigation site is entirely dysfunctional as native Delta fish habitat because of the lack of circulation and dominance of invasive non-native aquatic plants. As seen in Figure 19, the open waters lack turbidity (dark color) and provide habitat more suited for non-native warm water fish species. Miners Slough reached 77F during the early July 2013 heat wave and early June 2014 heat wave. More shallow open water habitats would increase warming of the area.

Upper Yolo Bypass

An example of a restoration project that has been largely beneficial with significant unresolved and potential adverse impacts is the Yolo Basin Wetlands Project. And it should be kept in mind that this project, coupled with all of the other restoration projects implemented over the last 30 or 30 years in the estuary, has not reversed the precipitous decline of the Delta's pelagic and anadromous fisheries.

The Yolo Bypass is seasonal floodplain to the west of Sacramento that typically floods in about 60% of years, when winter and spring floodwaters enter from the Sacramento River and several small streams. The floodplain appears to be particularly good spawning and rearing habitat for splittail and young Chinook salmon. The Bypass supports 15 native and 27 non-native fish species. The Yolo Basin Wetlands Project comprises 2,223-acres of seasonal wetlands and 185-acres of perennial wetlands and was dedicated in 1997.[45] Potential enhancements that have been discussed include additional wetlands, fixing fish passage and stranding problems and increasing the frequency of floodplain inundation in drier years.

Measures to address fish stranding in the Bypass were proposed by the Anadromous Fisheries Restoration Program in 1995, by the CALFED Record of Decision in 2000 and the National Marine Fisheries Service OCAP Biological Opinion in 2009, but never occurred. In 2011, biologists documented the stranding of hundreds of listed green sturgeon, spring-run Chinook salmon and steelhead trout in the Bypass. In July 2013, National Marine Fisheries Service biologists estimated that the numbers of stranded endangered winter-run Chinook salmon could be as high as half of the year's returning population.[46] BDCP proposes to facilitate additional periods of inundation and address the stranding issue.

The area is a net producer and exporter of methylmercury. For example, The State Water Board has found that when the Yolo Bypass is flooded, it becomes the dominant source of methylmercury to the Delta.[47] Restoration actions that lead to an increase in wetting and drying

---

[45] http://www.water.ca.gov/aes/docs/Yolo_Fisheries_Paper_2001.pdf

[46] http://calsport.org/news/?s=winter+run+stranding

[47] State Water Resources Control Board, 2009 Periodic Review of the 2006 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin River Delta Estuary, adopted resolution 2009-0065, page 29. http://www.swrcb.ca.gov/waterrights/water_issues/programs/bay_delta/periodic_review/docs/periodicreview2009.pdf

periods could exacerbate existing mercury problems.[48] A 2010 report of a study funded by the Central Valley Regional Water Quality Control Board to evaluate methylmercury cycling and export from agricultural and natural wetlands in the Yolo Bypass found that periodic flooding of rice fields promotes the production of methylmercury beyond rates seen in naturally vegetated wetlands, whether seasonally or permanently flooded.[49]

A potential and unresolved issue of concern is the loading of urban and agricultural wastes into the Bypass, especially toxic concentrations of insecticides. Another potential issue is expansion of invasive aquatic plants in the perennial wetlands, without continual and costly oversight.

North East Delta

Planning for the Cosumnes/Mokelumne ROA habitat restoration has been going on for decades. Yet other than the lower Cosumnes Preserve, little has been done to restore tidal aquatic habitat in the East Delta. With federal and state grants, the Nature Conservancy has purchased much of the corridor from Walnut Grove east to the Cosumnes Preserve including most of the properties in Figure 1. Staten Island and McCormick Williamson Tract were purchased by the nature Conservancy more than a decade ago in the 1990s with CALFED funding. Invertebrates in the Cosumnes area have been found to have the highest concentrations of methylmercury in the Delta.

Aquatic habitat restoration in the area would be problematic considering the close association of the tidal channels with the Delta Cross Channel at Walnut Grove. Waters in the area are also warmer than other parts of the Delta and subject to warm summer inflows of the lower Sacramento River at the Delta Cross Channel. Restoration planning on projects such as the McCormick Williamson Tract is proceeding.[50]

Delta Meadows State Park was designed to preserve some of the original Delta habitats. The Park is now closed. The following is an excerpt from page 1 of the McCormack-Williamson Tract Restoration Planning, Design and Monitoring Program: *"The ultimate significance of these findings for the restoration is that regardless of careful design of a tidal gradient as has been done in other Delta projects, a restored upper Delta will be subjected to an unpredictable flood regime that will result in a spatially complex assemblage of geomorphic units that will defy conventional criteria for "success" in restoration. That is not inherently bad in that it is the natural condition of the system. However, the assumption of a well-ordered tidal geomorphic process as exists in other modern tidal freshwater wetlands is not appropriate for MWT (McCormick Williamson Tract). In addition, the presence of extremely high mercury*

---

[48] Foe, C., et al., Task 2: Methyl mercury concentrations and loads in the Central Valley and Freshwater Delta, CALFED, 2008. http://mercury.mlml.calstate.edu/wp---content/uploads/2008/10/04_task2mmhg_Winal.pdf

[49]http://www.waterboards.ca.gov/centralvalley/water_issues/tmdł central_valley_projects/delta_hg/other_technical_reports/ybwa_hg_final_rpt.pdf

[50] https://watershed.ucdavis.edu/project/mccormack-williamson-tractnorth-delta-project-restoration-planning-design-and-monitoring

concentrations in both the Delta Meadows and MWT create significant uncertainty in the biogeochemical fate of wetland restoration of MWT, though the opportunity exists for experts to study the biogeochemistry of Delta Meadows and establish how such a wetland functions in the face of existing pollution."[51]

East Delta

The lower San Joaquin channel in the Delta from Mossdale downstream to Prisoners Point (Figure 20) is also part of the East Delta that has been largely ignored by Delta restoration programs. The corridor is important for many fishes including salmon and steelhead from San Joaquin tributaries, as well as Delta species such as splittail. It suffers in summer from low flows, high water temperatures, low dissolved oxygen, algal blooms and heavy pollution loads, but it is an important corridor for many species in winter and spring.

The Stockton or San Joaquin Deep Water Ship Channel dominates the area. The channel converted the once sinuous channel to a straight channel for shipping by cutting through many points creating a series of dredge-spoil islands. The Port of Stockton owns most of these created "islands." The lower San Joaquin channel from Mossdale downstream to Prisoners Point (Figure 21) has been largely ignored by Delta restoration programs.

Figure 20. South East Delta – San Joaquin River between Stockton and Prisoners Point. The ship channel can be seen cutting through a series of Delta islands at the center of the photo. Mildred Island is at the lower center and eastern edge of Franks Tract and Old River are at the upper left.

[51] https://watershed.ucdavis.edu/pdf/crg/MCWTFinal.pdf

Conclusion

Research over the past several decades indicates that Delta native fishes, especially Delta smelt, have very refined habitat preferences that should be the focus of any habitat restoration projects. The main habitat features of importance include salinity, turbidity, tidal flows, productivity, and water temperature. Creating habitat that meets most or all of these criteria is extremely difficult but necessary. Very few of the restoration projects undertaken to date meet these criteria.

Many implemented and proposed projects have fatal flaws (e.g., Liberty Island - lethal water temperatures) and did not consider these basic needs when designed and built (e.g., Decker Island, Kimball Island). Many project areas have actually deteriorated after purchase and little actual restoration was implemented (e.g., PG&E's Collinsville property). Other projects failed because necessary funds to restore, maintain and adaptively manage the areas were never provided (e.g., Chipps Island, Franks Tract). Consequently, many of these restoration sites evolved into havens for an astonishing assemblage of invasive plants and fishes and adversely impacted native species (e.g., Big Break, West Sherman Island, Donlon Island). A number of projects that could be considered a success have had mixed results with unintended consequences (Yolo Bypass).

The blunt fact is that the cumulative effects of all of the myriad restoration project that have been constructed in the Delta have not reversed the continued decline of native fisheries. This is because few restoration projects have been designed with the needs of fish in mind. And there is nothing in BDCP's proposed habitat restoration scheme that indicates it can or will produce habitat that meets the needs of fish. Indeed, BDCP proposes to exacerbate existing habitat problems.

As we've observed, native species evolved over many thousands of years in response to habitat. And that habitat included adequate physical (flow, residence time, variability, etc.) and chemical parameters (salinity, temperature, turbidity, chemical constituents, etc.), as well as the nutrients necessary for primary production to support renewable fisheries. The export projects have radically altered the Delta's hydrodynamics, which has resulted is a loss of critical flows, less variability, degraded water quality and reduced primary productivity. The yearly export of phytoplankton biomass is equivalent to more than 30% of net primary production. And BDCP proposes to expand the export of primary production to the north Delta. It proposes to move the critical LSZ habitat further east where smelt will more frequently encounter lethal water temperatures and entrainment in project pumps. It proposes make Sacramento salmonids run a gauntlet past massive new diversion facilities.

The Delta's altered hydrology has allowed numerous invasive non-native species to become entrenched to the detriment of native communities. We have transformed a variable freshwater estuary into something resembling an Arkansas lake. Creating more Arkansas lake habitat will simply create more Arkansas lake fish.

The best options for meeting the necessary fish habitat criteria is to increase flow and variability, mimic the natural hydrograph, protect the LSZ, improve water quality and reduce the export of

primary productivity. But, those are the things BDCP cannot offer. Instead, the EIR/EIS predicts less flow and variability, a less protective LSZ, reduced water quality and increased export of primary production. That is not a recipe for improved habitat.

BDCP even ignores or marginalizes the obvious habitat improvements that could be undertaken. Migrating young salmon fry and fingerlings tend to concentrate in shoreline areas and adjacent and adjacent margin habitats along channels. Salmon smolts are frequently collected in the open channels migrating westward but are also found feeding in margin habitats. The shoreline restoration efforts on Twitchell, Decker and other west Delta sites have been successful. Yet, BDCP proposes to restore only about twenty miles of channel margin habitat over a span of thirty years.

Franks Tract is a death trap for smelt. Once drawn into Franks Tract, Delta and longfin smelt are unlikely to survive lethal temperatures, predation or entrainment at the south Delta pumps. There have been numerous proposals to place a barrier across False River or to wall off Franks Tract from surrounding channels. BDCP is silent on the issue.

In closing, we offer a bottom line. Habitat restoration cannot be successful if it doesn't meet the flow and water quality needs of native species that evolved over millennia. The history of habitat restoration in the Delta is that it hasn't met those needs, and BDCP will not meet those needs.

Attachment A: Comparison of this Review with the Habitat Assessment in BDCP HCP Appendix 5E

Appendix 5E of the BDCP HCP discusses some of the above areas and specific sites in the context of the proposed Conservation Measures. Unfortunately, the BDCP assessments, which are predicated on a conceptual programmatic level with few specific details, are seriously over optimistic of both the results of past efforts and the potential benefits of future restoration projects.

For example: page 5E-iv; *"In this appendix we evaluate the potential of restored habitat to enhance productivity of the Delta based on a simple depth relationship (Lopez et al. 2006) while cautioning that the realities highlighted by Lucas and Thompson (2012) may limit the value of restoration in regard to phytoplankton production."*

The BDCP fails to consider the both the benefits and detriments of shallow water habitat, while focusing on water depth and phytoplankton. Shallow water provides key spawning and rearing habitat for most Delta native fish with its cover, turbidity, and food via aquatic and terrestrial insect and benthic invertebrate communities. However, shallow water can also contain lethal water temperature, harbor invasive plants and be detrimental to native fish.

CM5 Seasonally Inundated Floodplain Restoration

"*The proposed restoration of 10,000 acres of seasonally inundated floodplain habitat and the increase in flooding in the Yolo Bypass are expected to increase the amount and value of accessible rearing habitat for juvenile salmon and splittail. For salmon, the intent is to route salmon away from the interior Delta and through habitat that is favorable for growth.*" (p. 5.E-v)

The Bypass may be favorable to juvenile fish growth in winter compared to rivers, but its flows attract and strand many adult anadromous fish. Springtime warming of the water also increases water temperatures to lethal levels for smelt and salmon. Pollution from adjacent agricultural and industrial dischargers is a serious problem, as is methylation of mercury. Numerous unscreened diversions (some simple tide gates) pose a threat to fish. These problems are ignored in the assessment.

"*Floodplain restoration also is expected to increase the export of production downstream, providing increased food supplies (phytoplankton, zooplankton, insects, and small fish) for pelagic fish species such as delta smelt and longfin smelt (Kneib et al. 2008).*" (p. 5.E-v)

While Bypass floods are one of the benefits of wet years, BDCP provides no added Bypass flooding in drier years, when such benefits are in short supply and critically needed.

CM4 Tidal Natural Communities Restoration

"*Under the hypothetical restoration footprint, BDCP restoration is expected to add about 55,800 acres of subtidal and intertidal habitat for covered fish in the Delta by the end of the permit term, representing a 54% increase in these communities relative to current levels. The greatest*

increase in tidal acreage would be in the South Delta, followed by Cache Slough, Suisun Marsh, West Delta, and East Delta subregions; there is no restoration under CM4 in the North Delta or Suisun Bay subregions." (P. 5.E-xi)

As we pointed out above, there is little value in developing subtidal and tidal habitats in the South Delta. There are huge problems associated with increasing such habitat in the Cache Slough area (e.g., warm isolated habitats, mercury methylation), especially in the areas proposed (e.g., Prospect Island and leveed lands south of Cache Slough). Suisun Marsh simply is not in play in drier years. Emphasis should be on West and Central Delta.

"Splittail are expected to benefit from the restoration of tidal marsh and floodplain habitats. Splittail exhibit a wide tolerance for conditions in the Delta. Their abundance is believed to relate more to the amount and duration of flooding of Yolo Bypass and other floodplain areas used for spawning. Splittail are expected to benefit from the expansion of food production in tidal wetlands due to the expanded flooding of Yolo Bypass (CM2) and, to a much lesser extent, other floodplain areas (CM5)." (P. 5.E-xii)

Splittail do relatively well in wet years with existing floodplains; it is in drier years when they would benefit from such actions, which are not provided in the BDCP floodplain prescriptions. Splittail may benefit from South Delta floodplain restoration, but in drier years most splittail production is lost to South Delta exports.

"The expectation is that restored shallow areas would promote production of tules and other native macrophytes that will increase the availability of aquatic insects, other invertebrates, and detritus to augment food for covered fish species. The change in the prod-acres index over the implementation period relative to the current level suggests that, by the end of the permit term (LLT), restoration benefits to food production would be greatest in Cache Slough followed by the South Delta… Transfer of this production to food for listed fish species could be complicated by potential consumption by clams, nutrient levels in the Delta and hydrodynamic factors. However, benefits can be maximized by restoration design and adaptive learning of restoration methods in the Delta." (P. 5.E-xii)

This is another example of the gross over-estimation of benefits from the proposed BDCP restorations. First, the Cache Slough area is already highly productive and shows no sign of food limitations. Second, there is little evidence that any of the productivity from the area is transferred to the Delta in drier years when benefits would be greatest. There is little chance that benefits can be "maximized" by design or adaptive learning. The three major areas proposed, leveed lands south of Cache Slough, Prospect Island, and Yolo Ranch, if converted to tidal habitats as discussed earlier, would have devastating negative effects on Cache Slough area habitats as well as habitats downstream in the Central and West Delta.

"BDCP restoration will modify flood conveyance levees and infrastructure to restore 10,000 acres of seasonally inundated floodplain along river channels in the South Delta." (P. 5.E-xii)

Again, the need for and potential benefit of South Delta floodplain restoration are greatly overestimated. Much of the benefit is estimated to accrue from the South Delta to salmon and

splittail in wet years. Production of both species is already relatively good in wet years in the San Joaquin, but minimal in drier years when the proposed habitat benefits would not accrue.

CM6 Channel Margin Enhancement

"*There is some indication that channel margin could be extremely important rearing habitat in years with low precipitation when floodplains are not functioning. A study by McLain and Castillo (2009) found that densities of Chinook salmon fry in the Sacramento River and Steamboat Slough were higher compared with Miner Slough and Liberty Island Marsh during a low outflow year. Fry apparently bypassed marshy habitats at the downstream end of the Yolo Bypass because outflow during the winter was relatively low and flows into the Yolo Bypass were negligible (McLain and Castillo 2009*)." (P. 5.E-vi)

The majority of BDCP channel margin habitat restoration is located above Rio Vista on the Sacramento. The crucial channel margin habitats of the Delta migration corridors of the lower Sacramento and San Joaquin rivers are ignored. In drier years, these habitats are critically important to many Delta fishes including young salmon, steelhead, splittail, and Delta smelt. The BDCP proposal for channel margin restoration is totally inadequate given the importance of such habitat. As mentioned above, channel margin restoration has been some of the most successful restoration efforts to date in the Delta.

"By targeting areas that have been shown to have poor habitat value and biological performance coupled with extensive occurrence of covered fish species, it is possible that channel margin enhancement, together with associated restoration activities such as CM7 Riparian Natural Community Restoration, can provide more than a proportional 4% increase in overall habitat value. Such locations include the greatly altered reach of the Sacramento River between Freeport and Georgiana Slough, for example." (P. 5.E-xiv)

The 20-mile prescription for channel margin restoration in the BDCP is inadequate. The spot treatments prescribed are totally inadequate for a restoration category that has been proven successful and needed. The greatly altered large leveed channel upstream of Rio Vista would be difficult to restore and is not the area of greatest need. The many miles of channel margins between Rio Vista and Collinsville, Antioch and Pittsburg, and around Sherman Lake are more important and largely un-leveed. These areas are also adjacent to important shoal and pelagic habitats, unlike the prescribed Freeport to Georgiana Slough reach upstream of Rio Vista that will be subject to the direct effects of the BDCP tunnel intakes.

Expected Benefits to Fish from BDCP Restoration

Appendix 5E is wildly optimistic as to the potential benefits to key fish species from BDCP-prescribed restoration.

Cache Slough ROA

Delta Smelt: *"The decrease in HSI for the egg-larvae stage is the result of increased water temperatures in the subregion by the LLT primarily due to climate change impacts. There was*

almost no change in the HSI value for temperature over the period due to covered activities alone reflecting the lack of impact of the BDCP on temperature in Cache Slough." (P. 5.E-95)

Our earlier discussion of the Cache Slough locations especially Liberty Island and Prospect Island clearly point out that these areas are too warm for Delta smelt from spring through summer, especially in dry years. The BDCP analysis of the effect on water temperature of adding 10,000 acres of open water on water temperatures is seriously flawed. The added tidal exchange alone will draw the LSZ further into Delta and expose fish to potentially lethal water temperatures. Water diversions from the area including the NBA will also have an impact. There may be little change in HSI values because the area is already too warm in spring and summer, especially in dry years.

Salmon: "*Salmonids, those that enter the Yolo Bypass, make extensive use of the Cache Slough area. Fish can move down through the bypass and into Cache Slough where their survival is affected by local conditions. Tidal marsh restoration in Cache Slough is likely to benefit primarily juvenile foraging salmon by providing access to high-value areas for rearing. Increases in size at ocean entry have been shown to correlate with increased ocean survival (Claiborne et al. 2011). The aggregate effects of these improvements in habitat availability and environmental condition are likely to result in better outmigration success for juvenile Chinook salmon.*" (P. 5.E-100)

The prescribed actions for the Yolo Bypass only affect habitat in winters of wet years and do little for salmon in dry years when such benefits are critically needed. Adding slightly to the frequency of inundation in wet years will not provide the needed benefits for salmon.

Longfin Smelt: "*The overall impact was toward appreciably greater habitat for longfin smelt in Cache Slough although it is not clear from this analysis whether the increase in habitat quantity compensates for the decrease in habitat value (HSI) related primarily to increasing temperatures*" (from climate change).

West Delta ROA

Delta Smelt: "*The West Delta subregion currently provides HUs largely for larval and juvenile delta smelt with relatively small amount of habitat for delta smelt spawning (Table 5.E.4-24). This is because most of the subregion is subtidal with a small amount of tidal freshwater (Figure 5.E.4-67).*" (P. 5.E-105)

This statement is simply not true. The entire West Delta ROA from Collinsville to Rio Vista is generally freshwater in winter and spring of most years and has ideal shoreline habitat for spawning smelt. Such statements reflect the lack of understanding in the BDCP of the actual habitat requirements of many of the species of interest.

"*Suitability was lowest in all time periods for juvenile delta smelt because of low turbidity in summer and fall months*." (P. 5.E-106)

One reason for the lower turbidity is that the South Delta water export facilities pump water from the LSZ, which is replaced by high inflows from Sacramento River reservoir releases. Despite such effects, Longfin and Delta smelt still concentrate in the LSZ in the West Delta in all but the wetter years. The increases in habitat values predicted are small because so little habitat restoration is proposed in the West Delta. What habitat is proposed, at Dutch Slough, North Sherman, and Decker Island, as outlined in my report above have overly optimistic benefits predicted for these sites given their location, restoration design, and potential function. It should be noted that the proposed North Delta water exports would further reduce turbidity by 7 to 8 percent.

Comments on Appendix 5EB – Review of Restoration in the Delta

"*This report summarizes the lessons learned from previous restoration activities in the Delta, to provide a starting point for planning and study of restoration concepts: what should we try to replicate or avoid?"* (P. 5.E.B-1)

These conclusions, as to benefits of past restoration efforts, are overly generous and lack scrutiny on many levels.

Liberty Island

Liberty Island is a case in point: *"In some cases, accidental changes have resulted in improved conditions for native fish species (e.g., Liberty Island)"* (P. 5E.B-1).

The many problems with Liberty Island (e.g., warm water, high inorganic turbidity, high methylation of mercury, etc.) make it a poor model for future restoration.

"*For example, the apparent success of the Liberty Island transformation appears to be due in part to the juxtaposition of flow from the Sacramento River (Yolo Bypass) and Cache Slough, tidal flux and wind that result in high turbidity, movement of sediment, and local prey production. Sediment comes primarily from Yolo Bypass and the inward movement of sediment from Suisun Bay during the summer, which, along with strong summer winds, keeps the area turbid during the portions of the year that Yolo Bypass is not flooded. The result appears to be that the island provides on-site habitat and food for delta smelt and other species (Whitley and Bollens 2013) while also exporting some of its production. "* (p5E.B-5) *"This site is perhaps the best example of the potential for restoration to provide habitat and food for native fish species. Liberty Island is part of a large complex of planned restoration areas and naturally restoring areas, including Cache Slough, Little Holland, and Prospect Island, and it is also hydrologically connected to the Sacramento River and is downstream of Yolo Bypass*." (P. 5E.B-13)

The wide, open, shallow embayments of Liberty Island and Little Holland Tract are very turbid from wind fetch across the islands. However, the shallow, muddy waters are not natural and certainly not tidal marsh as they were historically before reclamation. Waves and floods are continually eroding the inorganic soils of the two areas, which were previously under intensive agriculture and are now part of the Bypass. The shallow waters warm excessively in the intense sun and warm air of late spring through early fall. Water entering the area from the Bypass Tule

Canal can be best described as agricultural "return" water with high levels of organics, nutrients, agricultural chemicals, and other pollutants. Smelt are able to survive the summer only by seeking refuge in deeper nearby channels and holes scoured by historic floods. Their ability to survive the summer is highly questionable. The habitat may in fact have been better before the island breaching when narrow deep sloughs surrounded the original marshes or more recently the reclaimed agricultural islands (this would apply to both Liberty Island, Prospect Island and Little Holland Tract). Adding thousands of acres more of such habitat by breaching levees south of Cache Slough, north of Liberty Island, and on Prospect Island following the Liberty paradigm could be disastrous.

"*An important feature of the Liberty Island site it that it is hydrologically complex; these hydrodynamics shape environmental conditions and the resulting biological response. The site is at the downstream end of the Yolo Bypass and is heavily influenced by freshwater flow from the Sacramento River. It is also subject to significant tidal fluctuations that push water upstream and then pull water back downstream. The result is high turbidity and flow conditions that appear to have limited the growth of SAV*."…"*Tidal flow rather than river discharge was 43 responsible for 90% or more of the material flux into and out of Liberty Island* (P. 5E.B-14).

The site is not heavily influenced by freshwater flow from the Sacramento River except during floods. Normally its minor inflows are from the Bypass Tule Canal. Tidal flows do enter the lower end of Cache Slough near Rio Vista, but only have a minor influence on lower Bypass water quality and habitat conditions.

"*The landward transport of sediment, surrounding backwater sloughs with high residence time, and complex morphology—along with large open areas where sediment is resuspended by wind and tidal currents—are all physical drivers that allow Liberty Island to have habitat suitability that favors native species like delta smelt*." (P. 5E.B-15).

The Liberty Island habitat does not favor Delta smelt. By midsummer most smelt in the area are found in the Sacramento Deepwater Ship Channel to the east of the Bypass. Liberty Island is generally too warm for smelt by early summer.

Decker Island

"*Restoration at Decker Island, which involved restoration of a U.S. Army Corps of Engineers dredge spoils site, has been plagued by development of dense Egeria beds, especially in shallow channels that were created at the site (Rockriver 2008). Nonnative fish species were more abundant than native species in restored channels with dense vegetation. Rockriver (2008) recommended substrate changes to discourage centrarchid fish species (e.g., bass), and chemical applications to control SAV*." (P. 5E.B-6).

The site is also plagued with water hyacinth (FAV), which requires chemical treatment by the Department of Boating and Waterways. Shallow channels primarily a problem when they "dead end." Flow-through channels tend to stay open, although Egeria and other invasive SAV plants invade most Delta shallow water habitat.

Franks Tract

"*In contrast to the more complex hydrodynamics of Liberty Island, the lake is primarily influenced by tidal flow*." (p5E.B-15).

Franks Tract has very complex hydrodynamics beginning with tidal inflows from False River and Old River, along with negative flows down Old River from the Tract to the South Delta export pumps.

Mildred Island

"*Currently, the deep water at Mildred Island appears to prevent Egeria and clams while allowing phytoplankton production (Lucas et al. 2002)… Breaching of Mildred Island, on the other hand, resulted in relatively little Egeria and net production of phytoplankton to the Delta, though it also harbors large populations of nonnative predatory fish (Nobriga et al. 2005*)." (P. 5E.B-16)

Any plankton production would likely be exported at the South Delta export pumps, as net flows are almost always in that direction, which is why there are few native fish. Neither Franks nor Mildred should be left in their present state, as they offer refuge and breeding areas for nonnative fishes, as well as sinks for native fishes.

Big Break

"Big Break is presently a flooded island similar to Franks Tract. Pilot-scale restoration projects within it will: (1) restore tidal marsh, floodplain, and Antioch dune habitat on the Delta of Marsh Creek to restore target fish and dune species, (2) restore bio-filtration floodplains along urbanizing reaches of Marsh Creek to protect and improve water quality entering the Delta, (3) monitor aquatic species in Big Break and water quality along Marsh Creek, (4) develop a volunteer-driven native plant nursery to generate plants for restoration, and (5) continue a public outreach, education, and citizen planning program in the watershed to monitor the project over time." (P. 5E.B-17)

As discussed previously, the Big Break pilot projects offer little value for Delta native fishes, leaving another extremely poor habitat complex within the West Delta low salinity zone area that should be restored.

Donlan Island (P.5E.Bp-17)

The EIR/EIS fails to mention the dysfunctional nature of this restoration site. (See previous discussion of this site.)

Sherman Lake (P. 5E.Bp-18)

The EIR/EIS fails to mention the dysfunctional nature of much of this site (e.g., large areas of invasive FAV). (See previous discussion of this site.)

Prospect Island

"*Prospect Island has flooded seven times since 1981, and likely has little value for agriculture (Sanderstom et al. 2010). Therefore, the intentional breaching and re-flooding of Prospect Island could create beneficial habitat for Delta and migratory fish species (Sanderstom et al. 2010).*" (P. 5E.Bp-18)

Or it could just as easily create very poor habitat conditions as discussed previously.

Dutch Slough

"*The 1,200-acre pasture site has the potential for restoring over 6 miles of shoreline and a mosaic of tidal, riparian, and upland habitats, to provide enhanced fish and wildlife habitat in the western Delta. The unique, relatively unsubsided site topography would allow restoration of intertidal dendritic channels.*" (P. 5E.B-19)

As stated earlier, the Dutch Slough project would create poor habitat similar to Big Break and Franks Tract and its waters and aquatic production would drawn eastward toward the South Delta export pumps.

McCormack-Williamson Tract

"*The McCormack-Williamson Tract is a 1,654-acre island located immediately downstream of the confluence of the Cosumnes and Mokelumne Rivers, owned by The Nature Conservancy. The island offers opportunities for restoration of critical tidal freshwater marsh and floodplain habitat (Grosholz and Gallo 2006; Moyle et al. 2007) and may also moderate flood flows in the northern Delta, and is particularly suitable for expanding shallow water and tidal marsh habitat in the Delta."* (P. 5E.B-20)

As discussed earlier, the island is "downstream" of the Delta Cross Channel, thus its flows are destined for the South Delta exports. The area is too warm in summer for Delta smelt. It does not lie in the spawning and rearing zone of Delta smelt.

Decker Island

"*Collectively, these efforts should lead to the long-term sustainability of a complex wetland ecosystem with considerable wildlife, water quality, and aesthetic benefits (California Department of Water Resources 2013)."* (P. 5E.B-21)

As discussed previously, the Decker Island DWR mitigation site is largely dysfunctional. There are no plans to adaptively rebuild the site to make it functional nor are there any specific plans to restore the remainder of the island that has a Corps dredge spoil easement.

What are the Major Flaws in BDCP's Proposed Native Delta Fish Habitat Restoration Program?

Given the described weaknesses in the BDCP habitat restoration prescriptions described above, what are the fundamental flaws in BDCP's approach to habitat restoration?

1. Above all, BDCP assumes that the quantity of habitat is more important than the quality of habitat. It ignores the fact that habitat restoration must replicate the quality of habitat under which species evolve over eons.
2. There is too much focus on tidal marshes that the fish will not use, which provide little indirect benefit to fishes through foodweb enhancement, and are located in areas of the Delta that are not beneficial.
3. There is a lack of focus on pelagic habitats particularly in the key Low Salinity Zone which typically occurs from lower Suisun Bay into the West Delta (most important is the Collinsville to Rio Vista reach of the lower Sacramento River and the Pittsburg to Prisoners Point reach of the lower San Joaquin River, as well as the confluence waters of the two rivers of Eastern Suisun Bay).
4. There is little emphasis on channel margin habitat particularly in the regions mentioned above in #2.
5. There is disregard for the many neglected areas that need restoration funding to fix poor habitat conditions despite decades of pleas from their government and NGO owners and managers (e.g., Sherman Lake, Big Break, Franks Tract, McCormick-Williamson Tract).
6. There is too much emphasis on areas that are too salty (Suisun Marsh), too warm (Cache Slough/Bypass and South Delta), and where waters are destined for South Delta exports (South and East Delta).
7. There is a lack of emphasis on salinity control and water temperature, and tidal flows and mixing, freshwater inputs, and Delta exports that control these key habitat features.
8. More emphasis is needed on the physical controls that are available or could be installed to enhance salinity and water temperatures of the important habitats (e.g., Montezuma Salinity Control Weir, Delta Cross Channel Gates, temporary installed weirs, Head of Old River Gates, and South Delta export facilities).
9. There is no mention of managing the open water (pelagic) habitats along the hundreds of miles of deepwater dredged shipping channels that have greatly affected the Delta, or mitigating for the ongoing effects of dredging on these habitats.
10. There is a disturbing disregard for water quality in the Delta, not just water temperature and salinity. Methylmercury is a serious problem in tidal marshes and seasonally flooded habitats emphasized by BDCP. Many of the solutions recommended (e.g., source control, etc.) for these problems are infeasible or unlikely to be successfully implemented.
11. Many important areas have simply been left out of the plan (e.g., Grizzly Bay, Montezuma Slough, Chipps Island, Collinsville, West Sherman, Big Break, Franks Tract, northern shoreline between Collinsville and Rio Vista, lower San Joaquin from Jersey Point to Prisoners Point, lower Old and Middle Rivers, lower San Joaquin downstream of Stockton to Prisoners Point, eastern Suisun Bay from Pittsburg to Antioch including New York slough and the southern shoreline).
12. There is a lack of emphasis on fixing hydrological connections such as Montezuma Slough, False River, Dutch Slough, Three Mile Slough, Delta Cross Channel, Sacramento

Deepwater Ship Channel, Georgianna Slough, Miners Slough, Sutter Slough, and Steamboat Slough to enhance the Low Salinity Zone of the Bay/Delta.

13. There is nothing in the Plan that will effectively address non-native invasive aquatic species that have undermined the native habitats and fish communities.
14. There is little in the Plan that addresses basic nutrients and the base of the food chain – phytoplankton production.

About the Authors

Tom Cannon has studied and surveyed many of these habitats over the past four decades in various roles as a fishery biologist involved in the Delta. His professional career has focused on estuarine fisheries ecology with experience on East Coast and West Coast estuaries and degrees in fisheries ecology, biology and biostatistics.

From 1977-1980, Tom was project director of Bay-Delta ecological studies for PG&E's Bay-Delta power plants effects studies that included habitat assessments of each of their Delta sites. From 1980-1982, he was a consultant to the State Water Contractors, the National Marine Fisheries Service and the State Water Resources Control Board (State Board) determining the effectiveness of the 1978 Bay-Delta water quality standards in protecting the Bay-Delta ecosystem and striped bass population. In 1986-1987, he consulted to the State Water Contractors and Bureau of Reclamation during State Board hearings on water quality standards.

From 1994-1995, he consulted to the State Water Contractors and the California Urban Water Agencies working on the 1995 Bay-Delta water quality standards and how the new standards would affect the Bay-Delta ecosystem and its fish populations. Between 1995-2003, he was a consultant to the CALFED Bay-Delta Program where he worked on various teams assessing the effects of alternative Delta operations, habitat improvements and water supply infrastructure. From 2002-2010, he was involved in activities related to the Striped Bass Stamp Program, Salmon Hatchery Program and Delta fish surveys funded by the U.S. Fish and Wildlife Service to assess the effects on Delta fish and habitats.

In the past decade, Tom worked closely with the Fishery Foundation of California, California Striped Bass Association and the California Sportfishing Protection Alliance on Delta science related to fisheries, water quality standards and the Bay Delta Conservation Plan. For Wildlands Inc. he supported efforts to develop wetland and fisheries habitat throughout the Delta region and co-authored a 2007 report on fish use of shallow water habitats of the Western Delta for Wildlands Inc. and Fishery Foundation. There he compared fish populations and habitat from surveys conducted between 2002-2007 in the Western Delta with earlier surveys conducted in 1978-1979.[52] He has personally surveyed many of the restoration sites in this report.

Bill Jennings is a life-long fisherman who has been with the California Sportfishing Protection Alliance for more than thirty years, serving as both its Chairman and Executive Director. Between 1995 and 2005, he also served as Deltakeeper, where he oversaw an extensive water quality monitoring program that was approved by the State of California and which worked closely with the Aquatic Toxicology Laboratory at U.C. Davis and state and federal agencies in collecting water samples throughout the Delta. Bill has spent thousands of days on Delta waters patrolling, monitoring and fishing and thousands of additional days participating in administrative and legal proceedings before state and federal agencies protecting water quality and fisheries. He is personally familiar with many of the restoration sites discussed in this report.

---

[52] Cannon, T. and Kennedy T., Fish Use of Shallow Water Habitats of the Western Delta 1978-79 and 2002-07, May 2007.

AQUALLIANCE
DEFENDING NORTHERN CALIFORNIA WATERS

July 30, 2015

Glenn-Colusa Irrigation District
Thaddeus Bettner, General Manager
344 East Laurel Street
Willows, CA 95988

Re: Comments on the Draft Environmental Impact Report for the Glenn Colusa Irrigation District 10-Wells Project (Groundwater Supplemental Supply Project SCH# 2014092076)

Dear Mr. Bettner:

AquAlliance submits the following comments and questions on the Draft Environmental Impact Report ("DEIR") for the Glenn Colusa Irrigation District ("GCID") 10-Wells Project (Groundwater Supplemental Supply Project) ("Project"). These comments represent the comments of AquAlliance and its members. The Project proposes to install five new production wells and continue operating five additional production wells during dry and critically dry years for 8.5 months from approximately February 15-Marh 15 and April 1-November 15. The annual, maximum, cumulative total pumping is 28,500 acre-feet ("af") and is more water than the annual use of the Chico district of California Water Service Company that serves over 100,000 people.[1]

Unfortunately, the Project description fails to disclose details that are necessary for the public to review and comment. Moreover, there are no alternatives presented to the public beyond the No Project Alternative. The repeated use of conclusory statements leads to an absence of impacts in the EIR that are not supported by evidence. The DEIR as written fails to make a technically persuasive case for the 10 wells, and therefore the proposed Project should be rejected until the lead agency/Project proponent, GCID, can more effectively present scientific principles and analysis instead of mere assertions of negligible impact to third-parties and the environment. The recirculation of a new Draft EIR will be required because of the extreme deficiencies in the DEIR currently out for public review. The deficiencies in the DEIR cannot and will not be evaded by responses to comments in a Final EIR.

We include by reference all other letters submitted in response to this DEIR and submit comments and attachments created for AquAlliance by Kit Custis, AquAlliance's comments and attachments to the 10-Year Water Transfer Program, and an electronic copy of the report *Hydrostratigraphy and Pump-test Analysis of the Lower Tuscan/Tehama Aquifer, Northern Sacramento Valley, CA* that was hand delivered to the GCID office on July 28, 2015.

[1] California Water Service Company *2010 Urban Water Management Plan Chico-Hamilton City District*, p. 32.

I. Legal Requirements Under CEQA

Under CEQA, the project must include "the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment…"[2] To comply with CEQA's standards for completeness, the project description must address "not only the immediate environmental consequences of going forward with the project, but also all 'reasonably foreseeable consequence[s] of the initial project'."[3] As courts have recognized for decades, "an accurate, stable and finite project description" is "the sine qua non of an informative and legally sufficient EIR."[4] Reliance on a "curtailed, enigmatic or unstable definition of the project" stands as the paradigm of legal error under CEQA, because it "draws a red herring across the path of public input."[5] An "EIR may not define a purpose for a project and then remove from consideration those matters necessary to the assessment whether the purpose can be achieved."[6] CEQA requires "interactive process of assessment of environmental impacts and responsive project modification which must be genuine."[7]

A lawful project description under CEQA helps the lead agency "develop a reasonable range of alternatives to evaluate in the EIR [that] will aid the decision-makers…"[8] However, "a lead agency may not give a project's purpose an artificially narrow definition…." [9] A "curtailed or distorted project description may stultify the objectives of the reporting process."[10] In Inyo III, the court rejected the Los Angeles Department of Water and Power's attempt in its EIR to "narrow the city's obligation—and the scope of this lawsuit—down to the relatively small flow of underground water destined for in-valley use."[11] That narrow definition evaded the county's warning that EIR simply assumed the "filling of the second aqueduct," and the State Board's warning that the narrow definition diverted attention "from the impacts of the major project which is the importation of additional water to Los Angeles."[12] The "selection of a narrow project as the launching pad for a vastly wider proposal frustrated CEQA's public information aims The department's calculated selection of its truncated project concept was not an abstract violation of CEQA," but rather, a failure to proceed "in a manner required by law."[13] The "impermissibly truncated" and inconsistent project definition in the EIR also unlawfully skewed the lead agency's assessment of the "no project" alternative and project alternatives.[14]

---

[2] 14 Cal. Code Regs., § 15368; see also Nelson v. County of Kern (2010) 190 Cal.App.4th 252, 271.
[3] Communities for a Better Environment v. City of Richmond (2010) 184 Cal.App.4th 70, 82 (quoting Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova (2007) 40 Cal.4th 412, 428; Laurel Heights Improvement Assn. v. Regents of University of California (1988) 47 Cal.3d 376, 391, fn. 2 (Laurel Heights I).
[4] County of Inyo v. City of Los Angeles (Inyo III) (1977) 71 Cal.App.3d 185, 199.
[5] Id. at 199.
[6] County of Inyo v. City of Los Angeles (Inyo V) (1981) 124 Cal.App.3d 1, 9.
[7] County of Inyo v. City of Los Angeles (Inyo VI) (1984) 160 Cal.App.3d 1178, 1183; see Id. at 1186 (project cannot be defined to set up "a CEQA turkey shoot").
[8] 14 Cal. Code Regs, §15124(b); see also In Re Bay-Delta Programmatic Environmental Impact Report Coordinated Proceedings (In Re Bay-Delta) (2008) 43 Cal.4th 1143, 1166 (lead agency "may structure its EIR alternatives analysis around a reasonable definition of underlying purpose and need").
[9] Id.
[10] Inyo III, 71 Cal.App.3d 185, 192; see also Inyo VI, 160 Cal.App.3d at 1186 .
[11] Inyo III, 71 Cal.App.3d at 196.
[12] Id. at 198.
[13] Id. at 200 (quoting Pub. Res. Code, § 21168.5.
[14] Id. at 200-206.

In Communities for a Better Environment, the court held that the City of Richmond's EIR for a refinery project "fails as an informational document," in part because the EIR's project description "is inconsistent and obscure as to whether the Project enables the Refinery to process heavier crude."[15] The court noted that conflicting information in the EIR, and in 10-K statements filed with the Securities and Exchange Commission, contradicted the benign account provided in the EIR. The substantial evidence test was "not relevant" to assessment of violations of CEQA's information disclosure provisions. If the EIR does not "adequately apprise all interested parties of the true scope of the project for intelligent weighing of the environmental consequences, informed decision-making cannot occur under CEQA and the final EIR is inadequate as a matter of law.[16]

Project Definition in DEIR

Fundamental Purpose

The DEIR simply states that the Project "is proposing to install and operate five new groundwater production wells and operate five existing groundwater wells to augment District surface water supplies during dry and critically dry water years." (p. 2-1) The wells are proposed to operate "as needed during dry and critically dry years" until they reach a "maximum cumulative total annual pumping volume of 28,500 ac-ft." (Id.)

A complete and accurate description of the existing and affected environmental setting is critical for an adequate evaluation of impacts to it. *See e.g. San Joaquin Raptor/Wildlife Rescue Ctr. v. County of Stanislaus* (1994) 27 Cal.App.4th 713; *Galante Vineyards v. Monterey Peninsula Water Mgmt. Dist.* (1997) 60 Cal.App.4th 1109, 1122; *County of Amador v. El Dorado County Water Agency* (1999) 76 Cal.App.4th 931, 955; *Cadiz Land Co. v. Rail Cycle* (2000) 83 Cal.App.4th 74, 94.

As discussed, below, and in the expert reports created by Kit Custis on behalf of AquAlliance, the DEIR fails to comport with these standards.

Relationship to Past Projects and Plans

The Project is part of larger GCID projects, plans, grants, and agreements to transfer water (aka conjunctive use) and is also integrally related to other inter-connected actions by GCID, the California Department of Water Resources ("DWR"), the U.S. Bureau of Reclamation ("Bureau"), and others in the Sacramento Valley, and has the potential to have significant and far-reaching environmental impacts. However, the DEIR fails to make these connections that illustrate GCID's pursuit of conjunctive use projects.

For example, the broader history of the existing wells and GCID's delay in analyzing their planned long-term use for transfers and non-overlying water projects is not revealed. First, GCID was sued in 2007 over the claim that installing the wells (7 at the time) was exempt from CEQA because they were planned just for "research," despite the fact that GCID and local partners engaged in the Stony Creek Fan Project ("SCFP"). The SCFP's aquifer performance testing was hardly research, but preparation to enter the emerging water market as described in the 2005 Lower Tuscan grant proposal: "…this [conjunctive water use] program would provide

[15] 184 Cal.App.4th at 89.
[16] Id. at 83 (citations omitted).

opportunities to benefit from water transfers through the state and federal water projects. Overall program recovery would occur through groundwater substitution from wells tapping the lower Tuscan Formation aquifer system. These wells could be operated in the Butte Basin in conjunction with the SWP [State Water Project – Oroville] or in eastern Glenn and Colusa County in conjunction with the CVP [Central Valley Project– Shasta]."[17] The district's attempt to now evaluate impacts from these wells in this DEIR cannot be limited to this project's artificially limited project description, but rather, must evaluate the whole of the impacts of operating these wells. Similarly, and as discussed further below, the DEIR should not simply assume that the construction of new wells will not foreseeably result in environmental impacts greater than those contemplated by this project's artificially narrow project description.

Also omitted from the DEIR is the assurance in the Bureau's 2009 Environmental Assessment for the *Glenn-Colusa Irrigation District Stony Creek Fan Aquifer Performance Testing Plan* that use of the wells in any way beyond "research" required additional analysis. The Findings of No Significant Impact document for that project states, that: "The data and information compiled during implementation of this aquifer testing plan would be used as input prior to longer term use of the wells and would require future environmental review." (U.S. Bureau of Reclamation, p. 10) In addition, the Glenn-Colusa Irrigation District Stony Creek Fan Aquifer Performance Testing Plan ("APT") response to comments claimed: "The APT is a two-year program and the test production wells would not be used after conclusion of the program unless there is a subsequent decision to do so that is supported by the appropriate level of environmental review. This commitment is confirmed in the SCF APT itself, the notice of exemption issued by GCID in the related CEQA review process (See Appendix A), the EA (page 15), as well as briefs filed in the Superior Court litigation and the Court's ruling in that case." (p.7)

Despite the promises and legal commitments, GCID waited until 2015 to produce this DEIR while using the wells for multiple purposes: "GCID first pumped these wells in 2007, at 547 ac-ft for that year. In 2008 and 2012, the wells were pumped at less than 500 ac-ft; and in 2009, a dry year, GCID pumped 1,405 ac-ft. In 2010, no groundwater was pumped. GCID entered into two water transfer agreements, in 2011 and 2013, and pumped 6,300 and 5,000 ac-ft, respectively, in those years to supply the water transfer programs (GCID, 2013)." (DEIR p. 3-15). What is not disclosed in the DEIR is that GCID planned to sell 85,000 af to San Luis Delta Mendota Water Authority ("SLDMWA") in 2008 by fallowing no more than 20 percent of the district's irrigated acreage, crop shifting, and "[2],500 acre-feet that could be transferred would be made available by groundwater substitution attributable to pumping from two GCID-owned electric wells."[18] The contribution the existing five and newly-proposed five wells would provide to these and similar projects cannot be circumscribed by an artificial label on the project description, but instead, must be considered in conjunction.

It is clearly a significant omission that the DEIR doesn't disclose what transpired in 2014 or what is planned for 2015. What is known by AquAlliance to date is:

---

[17] Glenn Colusa Irrigation District and the Natural Heritage Institute, June, 2005. Proposition 50 planning grant proposal to create the Lower Tuscan IRWMP entitled: *Regional Integration of the Lower Tuscan Groundwater Formation into the Sacramento Valley Surface Water System Through Conjunctive Water Management.*

[18] GCID 2008. *Initial Study and Proposed Negative Declaration for Option Agreement Between Glenn-Colusa Irrigation District, San Luis & Delta-Mendota Water Authority and the United States Bureau of Reclamation for 2008 Operations, and Related Forbearance Program*, pp. 2-3.

- After GCID"s General Manager, Thad Better, assured the public at a 2014 Chico water forum that the GCID wells weren't being used, it turned out that GCID had the 5 wells running to help landowners flood their fields and pumped 459 af. [19]
- The 5 wells were also used to transfer 4,512 af to the Tehama Colusa Canal Authority in 2014.[20]
- In 2015 GCID is selling water again to Tehama Colusa Canal Authority by allowing their members to use personal wells - 15,269 acre-feet (af) of which 11,494 af will be made available by pumping groundwater.
- GCID also committed to sell 55,283 af of Sacramento River water to San Luis Delta Mendota Water Agency south of the Delta in 2015.
- On June 16, 2015 GCID turned on its existing five production wells while issuing a Notice of Exemption (NOE) based on an "emergency." To provide some history about these wells, they were installed eight years ago under a previous exemption that asserted that they were necessary for "research." The 2015 NOE claims that because of the 25% cut-back to their river water that was made clear in April, and new requirements to withhold additional water to attempt to save the 2015 winter-run salmon, they are facing emergency conditions. However, the most recent conditions could be foreseen by GCID, a water district that is in constant contact with the regulatory agencies and was fully aware of the serious hydrologic conditions and obliteration of the winter, fall, and spring salmon runs in 2014. There is no limit in time or volume in the NOE for the 5 wells.

GCID's failure to disclose its commitment to implement the SVWMA and its participation in repeated transfers, even when it claims in-district emergencies, proves that a shell game is operating. More of this will be discussed below.

Project Goals and Objectives

The fundamental purpose of the 10-Wells Project gives rise to more specific project objectives on page 1-5:

- Increase system reliability and flexibility
- Offset reductions in GCID Settlement Contract allotments during the irrigation season in drought years
- Periodically reduce Sacramento River diversions to benefit migrating fish
- Protect and maintain agricultural production in times of water shortage to minimize economic disruption

Below are specific comments and questions about the objectives presented.

1) "Increase system reliability and flexibility"
What "system" will receive "reliability and flexibility" from the 10-Wells Project? The vagueness of the objective leaves the reader unsure of the need for the Project. The Project is depicted as a "Supplemental Supply Project," however GCID is simultaneously selling river water to buyers north and south of the Delta in 2015.[21] The 10-Wells Project claims shortages yet in practice

[19] Bettner, Thad e-mail to Barbara Vlamis June 2, 2014.
[20] Bettner, Thad letter to Jim Brobeck June 30, 2014.
[21] Bureau of Reclamation, 2015. *2015 Transfer Proposals as of May 19, 2015* obtained by AquAlliance through the Freedom of Information Act.

GCID has enough to sell water. It is in this way that groundwater is actually connected to water transfers, even if the Project's stated use is for district needs.

2) "Offset reductions in GCID Settlement Contract allotments during the irrigation season in drought years" The DEIR fails to address how GCID has specifically managed reductions in the past and that recent dam operations, or dam mismanagement is more likely, are part of the shell game to push CVP districts toward groundwater.[22] This objective directs the reader to the Alternatives that were considered and rejected, two of which make for shared sacrifice during extremely rare CVP reductions. The DEIR can't have it both ways – either reductions are rare or they are regularly expected and, therefore, the additional stress of the 10-Wells Project to the hydrologic system is against the best interests of even GCID and certainly its neighbors. If CVP reductions are planned to be much more regular, this must be disclosed and analyzed in the DEIR.

3) "Periodically reduce Sacramento River diversions to benefit migrating fish"
How will fish benefit from the extraction of 28,500 af of groundwater that has not been historically needed when it is well documented that groundwater loss comes at the expense of stream flow? "Groundwater pumping can alter how water moves between an aquifer and a stream, lake, or wetland by either intercepting groundwater flow that discharges into the surface-water body under natural conditions, or by increasing the rate of water movement from the surface-water body into an aquifer."[23]

4) "Protect and maintain agricultural production in times of water shortage to minimize economic disruption"
This is another laudatory goal that fails the sniff test. GCID's 2008 Negative Declaration for a project to transfer 85,000 af to San Luis Delta Mendota Water Authority by fallowing no more than 20 percent of the district's irrigated acreage determined that it would have "no impact" on "human beings, either directly or indirectly." The ability to absorb an 85,000 af loss of water during a Critical water year was GCID's legal position in the 2008 CEQA document, so why would the district possibly need 28,500 af from the existing and proposed wells to minimize economic disruption now and into the future? [24] In addition, the district regularly supports crop

---

[22] Restore the Delta Protest Petition to the State Water Resources Control Board, July 22, 2015. "While we concede that DWR and the Bureau have in the near term diligently petitioned for temporary urgency changes reasonably promptly given natural conditions of drought in California and the Central Valley watershed of the Delta, the Board's authority to evaluate the temporary urgency change petition, and the petitioners' exercise of due diligence with respect to the substance of the petition, does not end with natural conditions. Instead, the California Constitution, Article X, Section 2, and the Public Trust Doctrine, as well as California Water Code sections 850546, 850217, and 850238 require the Board to consider whether the petitioners have also exercised due diligence in reasonably using and diverting water, as well as protecting public trust resources." (p. 5.)

[23] U.S. Geological Survey web site regarding groundwater depletion: http://ga.water.usgs.gov/edu/gwdepletion.html

[24] GCID 2008. *Initial Study and Proposed Negative Declaration for Option Agreement Between Glenn-Colusa Irrigation District, San Luis & Delta-Mendota Water Authority and the United States Bureau of Reclamation for 2008 Operations, and Related Forbearance Program*. "No Impact. The negative declaration assesses the potential impacts of the proposed Project. There would be no construction activities associated with the proposed Project. Typical farming practices with the idling of land in GCID would comply with applicable health and safety ·requirements. The potential increase in farmed acreage within the SLDMW A service area is within annual variability and could provide a minor beneficial effect on human economic activity. Therefore, the proposed Project would not cause substantial adverse effects on human beings, either directly or indirectly."

idling water transfers during dry and critical years, which the DEIR admits thwarts agricultural production. The district's on-again off-again support of this goal is arbitrary. Moreover, the project itself supports crop idling transfers by providing alternative water sources for the district in dry and critical years.

In 2010, a Below Normal water year, the *Glenn-Colusa Irrigation District 2010 Water Transfer to San Luis & Delta-Mendota Water Authority Draft Initial Study and Negative Declaration* had GCID planning to sell 20,000 af using groundwater substitution and didn't even *mention* impacts to the economy or humans. This pattern was repeated again in 2013, a Dry water year, when the water transfer CEQA document failed to mention, let alone consider, impacts to the economy or humans.[25] Clearly, GCID has through time demonstrated a lack of concern for impacts to the economy and humans, yet minimizing "economic disruption" has been elevated to an objective in the DEIR. The use of this goal obscures the district's historic behavior in feathering its own cap at the expense of the region's water and economy, which misleads the public.

In short, science and law should now converge to prevent GCID from framing the 10-Wells Project in a manner that forecloses meaningful alternatives and consigns the Sacramento Valley's future to fairy tales. As presented in the DEIR, the approach to project definition includes significant errors and omissions.

Key Problems with the GCID Project

GCID May Not Avoid Consideration of the Significant Environmental Impacts By Improperly Segmenting the Proposed Activities

The Project is part of GCID's multi-decade involvement in planning and implementing a much larger project, the Sacramento Valley Water Management Agreement ("SVWMA"), which still requires programmatic CEQA review. The SVWMA is not disclosed in the DEIR and has been gradually implemented by GCID and other parties absent the programmatic CEQA document (see Cumulative Impacts). The DEIR further fails to describe the numerous other programs of which this Project is a small component part. The review in the DEIR violates CEQA's prohibition against segmenting a project to evade proper environmental review (*Laurel Heights Improvement Association v. Regents of the University of California*, 1988, 47 Cal.3d 376).

The Project is a direct link to implementing the SVWMA and other subsequent plans and programs. Please consider the following:

- The SVWMA was signed in 2002 and the need for a programmatic EIS/EIR was clear and initiated, but never completed.[26] GCID is a signatory.

[25] *Notice Of Preparation Initial Study And Proposed Negative Declaration Glenn-Colusa Irrigation District 2013 Water Transfer To San Luis & Delta-Mendota Water Authority.*

[26] Perhaps even more telling, the Bureau actually began its own Programmatic EIS to facilitate water transfers from the Sacramento Valley, and the interconnected actions that are integrally related to it, but never completed that EIS and now has impermissibly broken out this current segment of the overall Program for piecemeal review in the present draft EA. See 68 Federal Register 46218 (Aug 5, 2003) (promising a Programmatic EIS on these related activities, "includ[ing] groundwater substitution in lieu of surface water supplies, conjunctive use of groundwater and surface water, refurbish existing groundwater extraction wells, install groundwater monitoring stations, install new groundwater extraction wells…" Id. At 46219. See also

- Sacramento Valley Integrated Regional Water Management Plan (2006). GCID serves on the Joint Powers Authority and has been implementing the SVWMA through state grants and federal appropriations and agreements. (see more in Cumulative Impact section below).
- The Sacramento Valley Water Management Plan prepared by the Sacramento River Settlement Contractors in cooperation with the Bureau. (2006). GCID is a Settlement Contractor. "[t]o examine the potential for groundwater production and recharge within a gravely strata located in Glenn County, the Stony Creek Fan. GCID's Conjunctive Use Program is being developed in conjunction with the Stony Creek Fan Program and build upon data contain [sic] though this investigation and the Sacramento Valley Water Management Program." (p. 2-56).
- The Stony Creek Fan Partnership Orland Project Regulating Reservoir Feasibility Investigation. GCID is one of the partners. (Id.)
- GCID's Stony Creek Fan Aquifer Performance Testing Plan to install seven production wells in 2009 that will extract 26,530 AF of groundwater as an experiment.
- GCID's Lower Tuscan Conjunctive Water Management Program (Bureau provided funding). "GCID shall define three hypothetical water delivery systems from the State Water Project (Oroville), the Central Valley Project (Shasta) and the Orland Project reservoirs sufficient to provide full and reliable surface water delivery to parties now pumping from the Lower Tuscan Formation. The purpose of this activity is to describe and compare the performance of three alternative ways of furnishing a substitute surface water supply to the current Lower Tuscan Formation groundwater users to eliminate the risks to them of more aggressive pumping from the Formation and to optimize conjunctive management of the Sacramento Valley water resources."[27]
- GCID's water transfers in 2008 and in 2010.
- GCID's participation in the California Drought Water Bank for 2009. "In 2009, GCID transferred 6,585acre-feet to the California Department of Water Resources (DWR), as part of the 2009 Drought Water Bank. GCID made the transfer water available through crop idling."[28]
- The Bureaus of Reclamation's 2010/2011 Water Transfer Program of 395,910 af of CVP and non-CVP water with 154,237 AF of groundwater substitution (EA/FONSI p. 2-4 and 3-107). GCID was prepared to participate by selling 40,000 af of which 20,000 would have been available from groundwater substitution. (Final EA at p. 2-4)
- "One-year GCID transfer of surplus Base Water Supply and US Bureau of reclamation Project Water during calendar year 2011 to 8,200 acres of Colusa Drain Mutual Water Company, comprised of previously cultivated, agricultural land outside, but contiguous to

---

http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=788 (current Bureau website on "Short-term Sacramento Valley Water Management Program EIS/EIR").

[27] U.S. Bureau of Reclamation Assistance Agreement, 2006.

[28] Glenn-Colusa Irrigation District 2010 Water Transfer to San Luis & Delta-Mendota Water Authority Initial Study and Negative Declaration p. 1-2.

existing GCID boundaries, or otherwise, conveniently served with water from the Colusa Basin Drain when water is available within the Basin." [29] 6,300 af was transferred using groundwater substitution from GCID's wells for the first time. [30]

- In 2012 GCID's Critical Year Groundwater Well Program would pump 12,000 af. The Bureau planned water transfers of 76,000 af of CVP water all through ground water substitution.[31]
- In 2014 GCID planned to sell water north and south of the Delta.
    - Buyer Tehama Colusa Canal Authority sought 7,852 af with 4,154 af from groundwater substitution.
    - SLDMWA sought15,951 af.
- The 10-Year Water Transfers Program allows GCID to sell up to 91,000 af per year, including through groundwater substitution, from 2015-2024, to the San Luis Delta Mendota Water Agency.

The proposed project would facilitate additional water transfers that must be analyzed as part of the whole of the project. (See, *Citizens Association for Sensible Development of Bishop Area v. Com& of Invo* (1985) 171 Cal.App.3d 151, 165-166; *McQueen v. Board of Directors of the Midpeninsula Regional Open Space District* (1988) 202 Cal.App.3d 1136, 1144; *Laurel Heights Improvement Ass'n v. Regents of the University of California*, supra, 47 Cal.3d at pp.395-396.) The DEIR explains that GCID is a participant in the Long Term Water Transfer program ("LTWT") coordinated by and between the Bureau of Reclamation and the SLDMWA. (DEIR 3-76.) The DEIR notes that while the LTWT EIR originally evaluated GCID groundwater substitution transfers as part of the LTWT program, GCID now voluntarily seeks to convert all of its transfers under that program to cropland idling, while eliminating groundwater substitution, "originally shown at 25,000 ac-ft." (DEIR 3-76.) The DEIR explains that, "GCID elected to reduce the quantities from what was originally presented in the LTWT EIS/EIR in order to reduce potential conflicts between the proposed project and the LTWT." (DEIR 3-76.) In other words, to support and further the LTWT, GCID now proposes to pump a roughly equivalent amount of groundwater on its own, while still utilizing crop idling transfers as proposed under the LTWT. Moreover, nothing will prevent GCID from utilizing the existing or new wells to support groundwater substitutions under the LTWT. For each of these reasons, the direct, indirect, and cumulative impacts of GCID's participation in the LTWT should be considered here. See, AquAlliance, comments on the Long Term Water Transfer EIS/EIR, December 1, 2014.

Thus, while the DEIR provides no express explanation of why the proposed maximum groundwater pumping capacity of the project would be 28,500 ac-ft per year, the DEIR clearly explains that this project will be used to provide groundwater to the district in amounts almost identical to that which the district has voluntarily foregone in groundwater substitution under the LTWT. Nothing, however, under the LTWT nor under the proposed project affirmatively binds

[29] http://www.ceqanet.ca.gov/DocDescription.asp?DocPK=651108

[30] Glenn Colusa Irrigation District Draft EIR Groundwater Supplemental Supply Project2015, p. 3-15.
[31] U.S. Bureau of Reclamation Memorandum to U.S. Fish and Wildlife Service January 24, 2012. *Section 7 Endangered Species Act Consultation with U.S. Fish and Wildlife Service (USFWS) for 2012 "North-to-South" Water Transfers.*

the district to these proposed amounts. Accordingly, and in order to avoid this shell game of simply taking the same groundwater under the pretense of a separate project under another name, these two projects must be evaluated together.

Indeed, GCID's participation in the LTWT itself belies the fundamental purposes of this proposed project, to provide additional water to the district in times of supposed shortages. In fact, the district proposes to sell off water rights under the LTWT during dry and critically dry years, and now proposes to pump an equivalent amount to offset the "shortage" it creates voluntarily by selling its water to south of delta users. As the DEIR states, these two projects are inextricably linked, and subject to the broad discretion of the GCID board to allocate water between the two on an annual basis.

The DEIR must evaluate higher rates of groundwater extraction than proposed by the DEIR.

The DEIR incompletely describes the project in the following, limited, terms:

> GCID is proposing to install and operate five new groundwater production wells and operate five existing groundwater wells to augment District surface water supplies during dry and critically dry water years (see Figure 2-1). The proposed project wells would be operated as needed during dry and critically dry water years to achieve a maximum cumulative total annual pumping volume of 28,500 ac-ft. Total capacity per well would be approximately 2,500 gallons per minute.

(DEIR 2-1.) The DEIR, however, provides no justification for limiting its analysis of the whole of the project to additional pumping of 28,500 ac-ft per year during dry and critically dry years. Nothing in the DEIR explains how or why groundwater extraction from these wells will be so limited.

What is the basis for the 28,500 ac-ft target? How, specifically, does this target amount of water satisfy each of the project objectives? What legal constraints, if any, are in place to ensure that no greater amounts could be withdrawn from these pumps? As the DEIR discloses in Table 3-4, the pumping capacities of the existing wells are far greater than the projected 2,500 gpm rate planned in the Project. (p. 3-15.)

Once constructed, additional operations of these pumps is entirely foreseeable. According to the DEIR at least, no further regulatory approvals would be needed to utilize the new and existing pumps in non-dry and critically dry years, and in amounts greater than 28,500 ac-ft per year (only construction approvals are referenced in the DEIR). The DEIR states that the pumps will be operated 24 hours a day and 7 days a week, but for only 8.5 months a year. Should the pumps be operated for the entire year, production increases to 40,300 ac-ft per year. Should the pumps be operated during any normal or wet year, the groundwater recovery anticipated by the DEIR would not be realized.

The DEIR states that "[a]ny future uses of groundwater facilities other than for supplementing GCID's water supply sources (for example, a water transfer) would require a separate evaluation and approval, at the time any such specific action is proposed, in compliance with NEPA and/or CEQA, as appropriate." (DEIR 2-3.) But this is simply not the case. As discussed above, five of

the wells included in the present project were constructed, and have been operated on numerous occasions for numerous reasons, without CEQA review. Similarly, the DEIR itself notes that "GCID can augment its surface water supply with a maximum of 5,000 ac-ft of groundwater available annually from existing District-owned wells." (DEIR 1-2.) Though the basis for the 28,500 af cap is not provided, it is evident that GCID intends to use its own wells to pump groundwater as needed and at any capacity.

The Supreme Court in *Laurel Heights I* held that an EIR must analyze future effects of a project where such effects are (1) reasonably foreseeable, and (2) significantly greater in scope or degree. 47 Cal.3d 376, 393-399. For example, in *Communities for a Better Environment v. City of Richmond*, 184 Cal.App.4th 70 (2010), the Court set aside an EIR for its failure to analyze Chevron's ability to process lower grade crude oil as a result of equipment upgrades, even where the proposed air district permit for the project could have prevented the throughput of lower grade and more polluting crude oil. As here, the project purpose stated in the *CBE* EIR was "to allow more flexibility in refining future crude supplies." But, as here, the "flexibility" Chevron achieved through its equipment upgrades allowed for more and different impacts than those put forth in the artificially limited project description. With no actual restrictions on the new infrastructure, the Court held the EIR to be inadequate, stating, "[f]ar from being an informative document, the EIR's conclusions call for blind faith in vague subjective characterizations." Such is the case with the project description at hand, which claims a maximum groundwater extraction of 28,500 ac-ft per year in dry and critically dry years only, while providing no binding requirements or even practical limitations that would so limit future groundwater extraction from these new wells, once constructed, to the proposed project amounts.

Nor may GCID simply rely on the DEIR's proposed mitigation measures to truncate review of the project's impacts. The Court in *Stanislaus Natural Heritage Project v. County of Stanislaus*, 48 Cal.App.4th 182 (1996), overturned an EIR where the lead agency failed to fully analyze future water supply impacts based on a mitigation measure designed to avoid such future impacts. The court rejected this as insufficient under CEQA, holding that the whole of the project must be evaluated, and only then may the efficacy of mitigation measures be considered. (205-206.)

In contrast, in *Kings County Farm Bureau v. City of Hanford*, 221 Cal. App. 3d 692, the Court of Appeal upheld an EIR that considered only a 20 year lifespan for a project, where the facility at issue obtained only a 20 year contract and permit to operate. Any future decision to extend the plant operation would require a new permit approval, and therefore, subsequent CEQA review. (739.) Here, in contrast, no future, binding, limitations, such as an expiring contract or regulatory permit, might limit GCID's future uses of the newly constructed pumps to the stated project timing and amount.

In sum, the DEIR is premised on an improperly "curtailed" and "distorted" project description. (*County of Inyo* v. *City of Los Angeles* (1977) 71 Cal. App.3d 185, 192.) Since "[a]n accurate, stable and finite project description is the *sine qua non* of an informative and legally sufficient EIR" (*id.* at p. 193), even were the FEIR deemed to be adequate in all other respects, the selection and use of a "truncated project concept" violated CEQA and mandates the conclusion that the County did not proceed "in a manner required by law.'" (*Id.* at p. 200)

Any need for additional groundwater pumping can only be the result of either increased demand, decreased supplies, or a combination of the two. However, the DEIR fails to provide any quantitative information on these project drivers. Based on historic climatic variation, the DEIR simply projects forward that "it is anticipated that GCID could operate the proposed project approximately 16 times in a 40-year period." (DEIR 2-3.) But the DEIR fails to provide any substantial evidence to support this future baseline projection. Over the prior 40 year period used to project the scope of the project going forward, haven't demands increased while supplies have simultaneously diminished? Indeed, the DEIR itself cites to decreasing supplies as a project driver, effectively rendering the past 40 years of pumping rates totally inapplicable to the 40 future years of project operations that the DEIR analyzes. The DEIR fails to make any adjustments to its projections, which rely on historic data, to account for present and future changes in demand and supply. As just one example, demands within Glenn County alone have increased significantly from 2000-2013 as agriculture is expanded or converted to tree crops.[32] Meanwhile, supplies are decreasing statewide, regionally, and locally, as a result of increasing average temperatures, and decreasing precipitation. See, AquAlliance, Comments on Long Term Water Transfer EIS/EIR, December 1, 2014, pp. 41-44. The EIR must make some good faith attempt to evaluate these and similar factors when projecting the scope of operation of the proposed project.

II. The DEIR Does Not Establish that GCID has Any Legal Right to Pump this Additional Groundwater.

The DEIR fails to meaningfully address whether GCID has a legal right to increase groundwater pumping, whether in its existing wells, or within the newly proposed wells, for distribution of this pumped groundwater throughout the district. In contrast to GCID's appropriative surface water rights, which it may allocate to a non-overlying use, any overlying right to pump groundwater is limited to the beneficial use of said groundwater upon the property of the overlying landowner within the same basin or watershed. (*California Water Service Co. v. Edward Sidebotham & Son* (1964) 224 Cal. App.2d 715, 725; see also, *City of Barstow v. Mojave Water Agency* (2000) 23 Cal.4th 1224.) The DEIR does not demonstrate that GCID would, in fact, solely limit its use of extracted groundwater to lands it owns throughout the same basin or watershed. GCID was put on notice that construction of its five existing wells did not provide this right, and is reminded of that again here.

III. Hydrology

Groundwater Conditions

A complete and accurate description of the existing and affected environmental setting is critical for an adequate evaluation of impacts to it. *See e.g. San Joaquin Raptor/Wildlife Rescue Ctr. v. County of Stanislaus* (1994) 27 Cal.App.4th 713; *Galante Vineyards v. Monterey Peninsula Water Mgmt. Dist.* (1997) 60 Cal.App.4th 1109, 1122; *County of Amador v. El Dorado County Water Agency* (1999) 76 Cal.App.4th 931, 955; *Cadiz Land Co. v. Rail Cycle* (2000) 83 Cal.App.4th 74, 94.

[32] AquAlliance 2015. Summary of Agriculture Reports 2000-2013. Based on actual reports found at: http://www.countyofglenn.net/govt/departments/ag/crop_reports.aspx

The 3.1.1 Environmental Setting section is deficient with its general description of the region's climate based on the work of Bertoldi in 1991. Even if the region experiences "typical years" in the future, it certainly has experienced shifting patterns since 2000. More current annual data and trends must be presented that reflects these changing conditions and specifically for Glenn County, where the wells are proposed for use and its surrounding counties.

The DEIR similarly provides limited groundwater elevation data of the Sacramento Valley groundwater basin in the subsection Groundwater Conditions. (pp. 3-7 to 3-10.) Table 3-2 provides groundwater level changes from the summer of 2004-2014. (DEIR p. 3-8.) DWR provides a number of additional groundwater level and depth to groundwater maps that the DEIR should use to help complete its description of the affected environment.[33]

AquAlliance's tables below illustrate maximum and average groundwater elevation decreases for Butte, Colusa, Glenn, and Tehama counties, all the counties believed to overly the Tuscan Aquifer, at three aquifer levels in the Sacramento Valley between the fall of 2004 and 2014.[34]

County Fall '04 - '14	**Deep Wells (Max decrease gwe)**	**Deep Wells (Avg. decrease gwe)**
Butte	-12.7 (-11.4)	-10.5 (-8.8)
Colusa	-59.5 (-31.2)	-59.5 (-20.4)
Glenn	-79.7 (-60.7)	-44.3 (-37.7)
Tehama	-34.6 (-19.5)	-10.9 (-6.6)

County Fall '04 - '14	**Intermediate Wells (Max decrease gwe)**	**Intermediate Wells (Avg. decrease gwe)**
Butte	-21.8	-6.5
Colusa	-39.1	-16.0
Glenn	-40.2	-14.5
Tehama	-20.1	-7.9

County Fall '04 - '14	**Shallow Wells (Max decrease gwe)**	**Shallow Wells (Avg. decrease gwe)**
Butte	-13.3	-3.2
Colusa	-20.9	-3.8
Glenn	-44.4	-8.1
Tehama	-15.7	-6.6

[33] http://www.water.ca.gov/groundwater/data_and_monitoring/northern_region/GroundwaterLevel/gw_level_monitoring.cfm#Well%20Depth%20Summary%20Maps

[34] Id.

Below are the results from DWR's spring monitoring for Sacramento Valley groundwater basin from 2004 to 2014.

County Spring '04 - '14	Deep Wells (Max decrease gwe)	Deep Wells (Avg. decrease gwe)
Butte	-20.8	-14.6
Colusa	-26.9	-12.6
Glenn	-49.4	-29.2
Tehama	-6.1	-5.3

County Spring '04 - '14	Intermediate Wells (Max decrease gwe)	Intermediate Wells (Avg. decrease gwe)
Butte	-25.6	-12.8
Colusa	-49.9	-15.4
Glenn	-54.5	-21.7
Tehama	-16.2	-7.9

County Spring '04 - '14	Shallow Wells (Max decrease gwe)	Shallow Wells (Avg. decrease gwe)
Butte	-23.8	-7.6
Colusa	-25.3	-12.9
Glenn	-46.5	-12.6
Tehama	-38.6	-10.8

The additional DWR data in multiple counties that depend on the Tuscan Aquifer clearly present a more comprehensive picture of the conditions of the Sacramento Valley groundwater basin over time than what is provided in the DEIR. It also highlights significant data that is intentionally omitted from the DEIR. For Glenn County alone (all that is provided in the DEIR), the fall measurements indicate much more dramatic declines from summer measurements in the deep wells and all the spring levels punctuate the serious lack of groundwater recovery. Obfuscating basic and foundational material regarding existing conditions leaves the public and policy makers with a lack of confidence in the 10-Wells Project, the DEIR, and the lead agency, GCID. Therefore, the DEIR will need to be revised, once these data are obtained, and recirculated as a Draft EIR in order to ensure the public and relevant decision makers receive full disclosure of the existing conditions and trends that are used for analysis and the development of conclusions for the 10-Wells Project.

Groundwater Properties

The DEIR fails to discuss the pressurized condition of the down-gradient portion of the Tuscan formation, which underlies the Project area. Dudley finds significant importance in the pressurized state of the lower Tuscan aquifer located in the Butte Basin. "It is interesting to note that groundwater elevations up gradient of the Butte Basin, in the lower Tuscan aquifer system, are higher than the ground surface elevations in the south-central portion of Butte Basin. This creates an artesian flow condition when wells in the central Butte Basin are drilled into the lower Tuscan

aquifer."[35] The artesian pressure indicates recharge is occurring in the up-gradient portions of the aquifer located along the eastern margin of the Sacramento Valley several miles east of the project.

The DEIR fails to provide recharge data for the aquifers although GCID was provided this information seven years ago. Professor Karin Hoover, Assistant Professor of hydrology, hydrogeology, and surficial processes from CSU Chico, found in 2008 that, "Although regional measured groundwater levels are purported to 'recover' during the winter months (Technical Memorandum 3), data from Spangler (2002) indicate that recovery levels are somewhat less than levels of drawdown, suggesting that, in general, water levels are declining."[36] According to Dudley, "Test results indicate that the 'age' of the groundwater samples ranges from less than 100 years to tens of thousands of years. In general, the more shallow wells in the Lower Tuscan Formation along the eastern margin of the valley have the 'youngest' water and the deeper wells in the western and southern portions of the valley have the 'oldest' water," adding that "the youngest groundwater in the Lower Tuscan Formation is probably nearest to recharge areas."[37] "This implies that there is currently no active recharge to the Lower Tuscan aquifer system (M.D. Sullivan, personal communication, 2004)," explains Dr. Hoover. "If this is the case, then water in the Lower Tuscan system may constitute fossil water with no known modern recharge mechanism, and, once it is extracted, it is gone as a resource."[38] The DEIR must account for this feature in its description of existing conditions, and its projections of recharge rates.

Groundwater Depletion

The DEIR illegally defers formulation and evaluation of mitigation measure WR-1. (*See, e.g.*, *POET, LLC v. State Air Resources Board* (2013) 218 Cal.App.4th 681; *Preserve Wild Santee v. City of Santee* (2012) 210 Cal.App.4th 260; *Sacramento Old City Association v. City Council* (1991) 229 Cal.App.3d 1011; CEQA Guidelines § 15126.4(a)(1)(B); *Defend the Bay v. City of Irvine* (2004) 119 Cal.App.4th 1261, 1275.) In relying on WR-1, the DEIR goes so far as to defer the environmental impact analysis that should be provided now, as part of the DEIR itself. Moreover, WR-1 fails to include clear performance standards, criteria, thresholds of significance, evaluation of feasibility, analysis of likelihood of success, and even facially permits significant impacts to occur. And importantly, WR-1 does not, in fact, reduce potentially significant impacts to less-than-significant levels, but rather, attempts to monitor for when significant effects occur.

WR-1 requires GCID "implement a groundwater monitoring program," but a monitoring program itself cannot prevent significant impacts from occurring. "The monitoring program will rely on DWR's CASGEM program and the District's monitoring network. The monitoring program will include semiannual measurements of groundwater levels at a network of wells throughout the Sacramento Valley. Many of the established observation wells (including multi-completion well clusters) are instrumented with data-logging pressure transducers to provide continuous

[35] Dudley, Toccoy 2005. *Seeking an Understanding of the Groundwater Aquifer Systems in the Northern Sacramento Valley: An Update*.
[36] Hoover, Karin A. 2008. *Concerns Regarding the Plan for Aquifer Performance Testing of Geologic Formations Underlying Glenn-Colusa Irrigation District, Orland Artois Water District, and Orland Unit Water Users Association Service Areas, Glenn County, California*. White Paper. California State University, Chico.
[37] Dudley, Toccoy 2005. Id.
[38] Hoover, Karin A. 2008. Id.

groundwater level data." (EIR 3-40.) Although monitoring does not disclose or analyze impacts for CEQA purposes, the DEIR still fails to provide any of the most foundational information about its proposed "groundwater monitoring program," such as how many wells will be monitored, what is a sufficient number of wells, how many will be monitored semiannually, how many will be monitored continuously, where are the monitoring wells located, what strata are the wells monitoring, who will manage and report on the data, and how will the public have access to the data and reports?

To elaborate on the timing of monitoring, it is absolutely crucial. Common sense suggests that significant groundwater pumping could occur in less than six months – one of the periods planned for monitoring. And monitoring after transfer-related pumping can only show whether significant impacts have occurred; it cannot prevent them. Yet this is exactly what the EIR proposes: "A subset of the well network will be selected for groundwater level monitoring prior to (monthly), during (weekly), and after (weekly for 1 month and monthly thereafter) groundwater pumping for the proposed project. The monitoring network will incorporate a sufficient number of monitoring wells and adequate spatial distribution to evaluate groundwater levels prior to, during, and after project operations." (EIR 3-40.) Hence, WR-1 only requires elements of the mitigation plan to kick in after monitoring shows significant impacts are occurring, which are extremely likely to occur given the fact that monitoring alone amounts to no mitigation or avoidance measures. Additionally, the DEIR fails to provide any guidance on what constitutes "a sufficient number of monitoring wells." (Id.)

Compounding WR-1's inadequacy as a mitigation measure, the DEIR asserts that, "As part of the monitoring program, GCID will use data from DWR's existing monitoring programs to establish longer-term antecedent trends in groundwater levels within the basin." (p. 3-40). But this is exactly the kind of information that must be provided to the public in the DEIR. When would GCID finally establish these trends, how would they be disclosed to the public, and what would they possibly alter with the Project?

Even still, the proposed mitigation measure WR-1 doesn't mitigate significant impacts. The mitigation proposal includes the following requirements: 1) "Reduce or relocate pumping until natural recharge corrects the issue." This, of course, could take years[39] and really amounts to no mitigation of the significant impact at all. (See also, AquAlliance, comments on the Long Term Water Transfer EIS/EIR, pp. 19-22, 36, 47, 59-61, 66.) 2) How GCID would feasibly and legally "relocate" pumping is not explained. 3) "Reimburse third parties for significant increases in pumping costs due to an increase in lift." In what amount, at what time, as decided by whom? Monetary compensation is not always sufficient to cover damages to business operations. (*See* CEQA Guidelines § 15370; *Gray v. County of Madera* (2008) 167 Cal.App.4th 1099, 1122.) 4) "Lower the pump in third-party wells affected by the proposed project," may help an injured third-

[39] Custis, Kit 2015. "Although the DEIR doesn't provide an estimate of the stream depletion rate as a percentage of the stream flow, it appears from the maximum values listed in Table 3-6 that the depletion rates for the listed streams and rivers are less than 48% of the average stream flow. This would suggest that the time it takes until the aquifers pumped by the GCID well are 95% recharged by stream depletion may take decades. In fact, a report on the impacts from the 2009 groundwater substitution transfers simulating from 1976 to 2003 using the SACFEM groundwater model showed aquifer recovery following a single 1976 pumping event was only 60% after 30 years (Figure 4d in CH2MHill, 2010). This suggests that the impacts from a single year of GCID's groundwater extraction project and the impacts from reoccurring pumping events will continue for many years."

party, but like monetary damages may not sufficiently cover damages or be done in a timely manner with well companies months behind due to the existing dry conditions. Finally, "[o]ther actions as appropriate" is so vague as to be meaningless. (EIR 3-40.)

Mitigation measure WR-2 is similarly flawed with its reliance on monitoring and deferred analysis of impacts of the present project. WR-2 also assumes that subsidence impacts will take place quickly allowing GCID to determine exclusive culpability or deflect it to "regional conditions." (DEIR p. 3-41/42.) This simplistic view is not founded in science – more likely wishful thinking. The DEIR instead should disclose how long-term physical responses result from repeated lowering of groundwater. The following evidence demonstrates that the Project's subsidence impacts may be significant and it was first provided to GCID in 2008.[40]

Dr. Kyran Mish, former Presidential Professor, School of Civil Engineering and Environmental Science at the University of Oklahoma related: "It is important to understand that *all* pumping operations have the potential to produce such settlement, and when it occurs with a settlement magnitude sufficient enough for us to notice at the surface, we call it *subsidence*, and we recognize that it is a serious problem (since such settlements can wreak havoc on roads, rivers, canals, pipelines, and other critical infrastructure)."[41] Dr. Mish further explains that "[b]ecause the clay soils that tend to contribute the most to ground settlement are highly impermeable, their subsidence behavior can continue well into the future, as the rate at which they settle is governed by their low permeability." (Id.) "Thus simple real-time monitoring of ground settlement can be viewed as an *unconservative* measure of the potential for subsidence, as it will generally tend to underestimate the long-term settlement of the ground surface." (Id.) (emphasis added).

However, the DEIR asserts that, "If groundwater levels do not recover above historical lows within 6 months following cessation of project operation and project operations will not resume the next year, GCID will assume groundwater level drawdown is due to regional conditions and land subsidence monitoring may be stopped." (pp. 3-41 and 3-42.) This conclusory assertion falsely assumes that 1) Any water level above the *historic lows* avoids or offsets damage from non-reversible subsidence. 2) If groundwater recovers above historic lows, subsidence isn't occurring and therefore can't be attributed to the 10-Wells Project and 3) If groundwater levels don't recover above historical lows, when there is a planned one-year lapse in GCID's pumping, there are no impacts from GCID's pumping. However, the DEIR contains conclusions reached by the U.S. Geological Survey ("USGS") that affirm the long-term and gradual nature of subsidence that accrues from continuous groundwater depletion,: "These small changes accumulate over time and can lead to impacts such as changes in stream, canal, or levee elevations and slopes; damage to infrastructure such as roads, bridges, and utilities; damage to building foundations; and collapse of well casings (USGS, 2015b)." (p. 3-13.)

USGS also confirms that, "In many aquifers, ground water is pumped from pore spaces between grains of sand and gravel. If an aquifer has beds of clay or silt within or next to it (figure 2), the lowered water pressure in the sand and gravel causes slow drainage of water from the clay and silt beds. The reduced water pressure is a loss of support for the clay and silt beds. Because these beds

[40] Mish, Kyran 2008. *Commentary on Ken Loy GCID Memorandum*. White Paper. University of Oklahoma.
[41] Id.

are compressible, they compact (become thinner), and the effects are seen as a lowering of the land surface. The lowering of land surface elevation from this process is permanent. For example, *if lowered ground-water levels caused land subsidence, recharging the aquifer until ground water returned to the original levels would not result in an appreciable recovery of the land-surface elevation*."[42] (emphasis added) It is quite clear that WR-2 is a completely inadequate mitigation measure for subsidence impacts.

The DEIR's evaluation of subsidence suffers from the same flaws as that of the Long Term Water Transfer Final EIS/EIR, and AquAlliance's April 8, 2015 comments on these deficiencies (pp. 2-5) are incorporated here.

Groundwater Quality

The DEIR fails to disclose the existence or extent of all the hazardous waste plumes in the Tuscan groundwater basin where GCID's wells are and will be located or in the Tehama formation that intermingles with the Tuscan in Glenn County. (*See e.g. San Joaquin Raptor/Wildlife Rescue Ctr. v. County of Stanislaus* (1994) 27 Cal.App.4th 713.) For example, the Orland dry cleaners plume is certainly within the incremental drawdown forecast in Figure 3-6. There is also no discussion of whether the increased groundwater extraction proposed by the Project may mobilize some of the PCE and TCE plumes under Chico since the pressurized condition of the down-gradient portion of the Tuscan formation, which underlies the 10-Wells Project area, benefits from recharge waters in the foothills and mountains to the east and north of Chico.[43] Toccoy Dudley et al support this finding of a pressurized lower Tuscan aquifer across the Sacramento River from GCID. "It is interesting to note that groundwater elevations up gradient of the Butte Basin, in the lower Tuscan aquifer system, are higher than the ground surface elevations in the south-central portion of Butte Basin. This creates an artesian flow condition when wells in the central Butte Basin are drilled into the lower Tuscan aquifer." [44] The artesian pressure indicates recharge is occurring in the up-gradient portions of the aquifer located along the eastern margin of the Sacramento Valley many miles into Butte County. This indicates that flow moves through the Chico plume areas toward the down-gradient portion of the Tuscan Aquifer where the existing GCID wells are located and new wells are proposed.

In addition, the DEIR fails to describe a significant saline portion of the aquifer stratigraphy of the project area. According to Toccoy Dudley, former Groundwater Geologist with the Department of Water Resources and former director of the Butte County Water and Resources Department, saline groundwater aquifer systems of marine origin underlie the various freshwater strata. The approximate contact between fresh and saline groundwater occurs at a depth ranging from 1,500 to 3,000 feet.[45]

---

[42] U.S. Geological Survey (USGS). 2015a. "Land Subsidence from Ground-Water Pumping." Available at http://geochange.er.usgs.gov/sw/changes/anthropogenic/subside/. Retrieved July 24, 2015.

[43] DWR, 2009. Glenn-Colusa Irrigation District Test-Production Well Installation and Aquifer Testing, pp. 25-26.
[44] Dudley, Toccoy 2005. *Seeking an Understanding of the Groundwater Aquifer Systems in the Northern Sacramento Valley: An Update*.
[45] Id.

More recent research has documented threats of contamination. "The BFW [base of fresh water] boundary occurs primarily in late Tertiary to Quaternary unconsolidated sediments at depths near land surface to more than 3,500 feet below ground surface. The BFW is an uneven boundary that in some places reflects the major geologic structures underlying the Sacramento Valley, and in other areas, transgresses underlying geologic structures. In some areas, the BFW boundary is well above the base of post-Eocene marine strata. This is most likely caused by high artesian pressures and upward vertical gradients in deep aquifers in the Sacramento Valley, which have been documented in DWR monitoring wells. This suggests that migration of poor quality water into continental sediments that previously contained freshwater has occurred over geologic time. This finding has implications for brackish and saline water upconing beneath areas of prolonged groundwater pumping in the Sacramento Valley."[46]

Certainly the public has no idea of or ability to comment on the important water quality conditions not presented in the DEIR, which fails the full-disclosure mandate in CEQA. The 10-Wells Project must either be withdrawn or full disclosure must be presented in a recirculated DEIR. (See, e.g., *Laurel Heights Improvement Ass'n v Regents of Univ. of Cal.* (1993) 6 Cal.4th 1112; 14 Cal Code Regs., § 15088.5(a); 40 C.F.R. § 1502.9(c); *California v. Block* (9th Cir. 1982) 690 F.2d 753, 770.)

IV. Species Impacts

Aquatic Species

It is useful that the DEIR acknowledges the demise of four anadromous fish runs in Stony Creek (spring, fall, late-fall, and winter salmon). (pp. 3-43 - 3-44). The acknowledgement serves to illustrate the existing strains on the hydrologic system, both surface and ground, once supported these runs of salmon. We select one tributary mentioned as an example to elucidate many points. Stony Creek is simulated with the 10-Wells Project to have an average depletion of 1.8 cfs and a maximum of 11.6 cfs. The text that follows these figures in the 3.1 Water Resources section, states, "As shown in Table 3-6, the majority of the maximum streamflow depletions occur during or shortly following the drought of water years 1987–1992. During critically dry year types, it is expected that many of the surface streams within the drawdown area would naturally have minimal or no flow (for example, Stony Creek, Little Chico Creek, and Walker Creek). Furthermore, these streams do not substantially contribute supply to the CVP, SWP, or non-project water users." (p. 3-39).

The text is troubling for many reasons.

1) The conclusion that "many of the surface streams within the drawdown area would naturally have minimal or no flow," during critically dry years and therefore the impacts would be "less than significant" avoids serious consideration of the importance of underflow. "The DEIR's evaluation of impacts from stream depletion is also inadequate because it assumes that once a streambed becomes dry continued pumping of groundwater has no effect on surface flow. This

[46] Springhorn, Steven T., el al, May 2013. *Base of Fresh Groundwater in the Sacramento Valley, California*, Geological Society of America Abstracts with Programs. Vol. 45, No. 6, p.51. https://gsa.confex.com/gsa/2013CD/webprogram/Paper219191.html

assumption ignores the role that stream underflow plays on maintaining pools and riparian habitats. The assumption also ignores the fact that the depth to saturated ground water beneath a streambed will impact the volume and duration of flow needed to re-wet the channel at the beginning of the next rainy season. The deeper the depth of ground water, the more aquifer voids there are that need to be re-filled in order for the stream to sustain constant flow. In other words, a greater volume of water for a longer period of time is needed at the beginning of the rainy season to sustain surface flows."[47] (p. 11.)

2) "Furthermore, these streams do not substantially contribute supply to the CVP, SWP, or non-project water users." On what basis is this conclusion made? The DEIR does not say. How much water in the streams is backfilling over used groundwater? How does contributing, substantially or otherwise, "to the CVP, SWP, or non-project water users" constitute the only value from a stream?

3) If the simulations are correct and the "majority of the maximum streamflow depletions occur during or shortly following the drought of water years 1987–1992," how is that not a significant impact when streams may already have minimal or no flows even according to the DEIR? Dewatering streams, be they ephemeral or annual, no matter how low the flow can be essential for fish species. For example, according to research conducted by Dr. Paul Maslin, Mud Creek provides advantageous rearing habitat for out-migrating Chinook salmon (1996). Salmon fry feeding in Mud Creek grew at over twice the rate by length as did fry feeding in the main stem of the Sacramento River. *Id. The Recovery Plan For The Evolutionarily Significant Units Of Sacramento River Winter-Run Chinook Salmon And Central Valley Spring-Run Chinook Salmon And The Distinct Population Segment Of California Central Valley Steelhead* confirms this importance of small areas of refugia for out-migrating salmon in tributaries to the Sacramento River: "Non-natal rearing tributaries to the Sacramento River include freshwater rearing habitat. Some non-natal rearing areas potentially have a high value because they provide critical and improved growing conditions, particularly during high winter flow events on the Sacramento River."[48]

4) The 10-Wells Project will further deplete the hydrology in Glenn County and may also affect the hydrology in surrounding counties, streams, and the Sacramento River. Dewatering of salmon bearing streams that interface with the targeted Lower Tuscan Formation Aquifer would result in physical changes to these streams that may result in significant adverse impacts to biological resources. This effect has been observed in the Cosumnes River, where "[d]eclining fall flows are limiting the ability of the Cosumnes River to support large fall runs of Chinook salmon." This is a river that historically supported a large fall run of Chinook Salmon.[49] Indeed, "[a]n early study by the California Department of Fish and Game . . . estimated that the river could support up to 17,000 returning salmon under suitable flow conditions." (Id.), citing CDFG 1957 & USFWS 1995. But "[o]ver the past 40 years fall runs ranged from 0 to 5,000 fish according to fish counts by the CDFG (USFWS 1995)," and "[i]n recent years, estimated fall runs have consistently been below 600 fish, according to Keith Whitener." (Fleckenstein, et al. 2004). Indeed, "[f]all flows in

[47] Custis, Kit, 2015. *Comments and Recommendations on Draft Environmental Impact Report for Glenn Colusa Irrigation District's Groundwater Supplemental Supply Project, June 2015* for AquAlliance.
[48] National Marine Fishery Service, 2014.
[49] Fleckenstein, Jan; Anderson, Michael; Fogg, Graham; and Mount, Jeffrey 2004. *Managing Surface Water-Groundwater to Restore Fall Flows in the Cosumnes River*, Journal of Water Resources Planning and management.

the Cosumnes have been so low in recent years that the entire lower river has frequently been completely dry throughout most of the salmon migration period (October to December)." (Id.)

Research indicates that "groundwater overdraft in the basin has converted the [Cosumnes River] to a predominantly losing stream, practically eliminating base flows…." (Id.) And "investigations of stream-aquifer interactions along the lower Cosumnes River suggest that loss of base flow support as a result of groundwater overdraft is at least partly responsible for the decline in fall flows." (Id.) Increased groundwater withdrawals in the Sacramento basin since the 1950s have substantially lowered groundwater levels throughout the county." (Id.) The DEIR fails to consider such broader ecological and hydrological impacts stemming from increased groundwater extraction during already dry and critical years.

5) Lower Stony Creek is designated as critical habitat for spring-run salmon and Central Valley steelhead (p. 3-44), yet the DEIR concludes that because Stony Creek is already impaired, "[p]otential drawdown effects on surface waters of lower Stony Creek are anticipated to have less-than-significant impacts on anadromous salmonids." (p. 3-53) The DEIR's empty conclusion, without any supporting data or analysis, is taken by GCID as a release from even offering a mitigation measure for struggling Stony Creek that is suffering death by a thousand cuts. However, the federal register for critical habitat provides a different view of the needs and potential of Stony Creek.

> "The CHART [Critical Habitat Analytical Review Teams] has evaluated the available information, particularly with regard to Stony Creek (HSA 550410), and concluded that this stream is occupied by both spring run Chinook and steelhead. Juvenile spring run Chinook have been consistently documented using Stony Creek as rearing habitat since 2001 (Corwin and Grant, 2004), as well as in previous years (Maslin and McKinney, 1994). Similarly, juvenile steelhead have been periodically documented rearing in Stony Creek (Corwin and Grant, 2004; Maslin and McKinney, 1994). The CHART also concluded that Stony Creek has PCEs that support both species. Water temperature monitoring from 2001 through 2004 has shown that temperatures in Stony Creek under current operations are generally suitable for adult and juvenile salmonids (below 65 °F) from mid-October through late May. Water temperatures have been found to be suitable for salmonid spawning and incubation (below 56 °F) from mid-November through early May (Corwin and Grant, 2004). Though successful steelhead spawning has not been documented recently in Stony Creek, habitat conditions under current operations are considered marginally suitable to support steelhead reproduction. Because of ongoing restoration actions and ESA section 7 consultations, progress is being made toward improving these habitat conditions, and we expect conditions to continue to improve into the future."[50]

We must be clear: <u>any</u> additional impairment by the 10-Wells Project is adverse modification of critical habitat, yet that is not addressed in the DEIR. Added to this significant lapse is the failure

[50] National Marine Fisheries Service, 2005. *Federal Register /Vol. 70, No. 170 / Friday, September 2, 2005 /Rules and Regulations, Endangered and Threatened Species; Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California*.

of the DEIR to disclose many relevant recovery recommendations[51] for Stony Creek that the 10-Wells Project clearly undermines. Examples include, but are not limited to:

- Improve water temperature conditions in Stony Creek by identifying and implementing projects that would increase stream flows and increase shaded riverine habitat.
- Implement projects to increase floodplain habitat availability in Stony Creek to improve juvenile rearing habitat.
- Monitor and evaluate sportfishing impacts in Stony Creek to ensure that the fishery allows for the recovery of steelhead; modify regulations as necessary. (Id.)

The DEIR assumes an average depletion of 0.5 cfs in Little Chico Creek and a maximum of 3 cfs. (p. 3-53) The DEIR assumes an average depletion of 0.3 cfs in Big Chico Creek and a maximum of 11.6 cfs. (Id.)

Big Chico and Little Chico Creeks are also listed as critical habitat for Central Valley steelhead (Oncorhynchus mykiss) and Central Valley Spring Run Chinook Salmon (Oncorhynchus tshawytscha), although the DEIR fails to point out the salmon critical habitat designation for Little Chico Creek. (pp. 3-48 to 3-49). Again, <u>any</u> additional impairment by the 10-Wells Project is adverse modification of critical habitat, yet that is not addressed in the DEIR. Recovery actions for Big Chico Creek that are undermined by additional strains on streamflow include, but are not limited to:

- Implement projects to increase Big Chico Creek floodplain habitat availability to improve habitat conditions for juvenile rearing
- Increase monitoring and enforcement in Big Chico Creek to ensure that the water quality criteria established in the Central Valley Water Quality Control Plan (Basin Plan) are met for all potential pollutants (SWRCB 2007).

<u>Giant Garter Snake</u>

Section 2-4 presents permits and approvals that are required for the 10-Wells Project. Noticeably absent are requirements for a permit from the California Department of Fish and Wildlife and from the U.S. Fish and Wildlife Service for impacts to the giant garter snake ("GGS"). However, the DEIR acknowledges the potential for construction impacts: "Additionally, the proposed well sites are located within 200 feet of rice fields and canals, both of which provide suitable habitat for giant garter snake (GGS). Though the construction sites do not directly provide suitable habitat for GGS, nor do the sites contain suitable winter hibernacula for the species, it is possible that, due to their close proximity to suitable habitat at all well locations, GGS could be present within the project construction areas during construction. Though the likelihood of impacts on GGS are low, any impact on GGS would be significant. Implementation of avoidance measures listed in MM BIO-4 would eliminate impacts to GGS." (DEIR p. 3-52)

[51] National Marine Fisheries Service, 2014. *Recovery Plan For The Evolutionarily Significant Units Of Sacramento River Winter-Run Chinook Salmon And Central Valley Spring-Run Chinook Salmon And The Distinct Population Segment Of California Central Valley Steelhead.*

It may be a good first step to prepare for "avoidance measures," but that does not eliminate the requirements under the California and federal Endangered Species Acts. The presence of wetlands in the Project area will require a permit from the U.S. Army Corps of Engineers (DEIR p. 3-50) that will lead to consultation with the U.S. Fish and Wildlife Service. GCID must also apply to the California Department of Fish and Wildlife for an incidental take permit.

Substantively regarding GGS, there is developing research that GGS may spend a great deal of time underground during the active season. "As for the probability of being in a terrestrial environment, much individual variation existed in the probability of being underground (logit-normal SD for individual-specific random intercept = 1.85 [1.63–2.12]). Predicting whether a given individual will be on the surface or underground is therefore fraught with uncertainty, despite high posterior precision of estimates of the behavior of an average Giant Gartersnake (Figs. 4 and 5)."[52]

This significant research must be considered if the 10-Wells Project moves forward. The DEIR also fails to acknowledge that there may be operational impacts to GGS. This must be developed and, if the Project goes forward, recirculated in a revised DEIR.

Additional Comments

The reader is referred to Figures 3.3 and 3.6 to view the potential drawdown effects on Stony Creek (DEIR p. 3-53) with Tehama-Colusa Canal mentioned as a reference point, however, it is not on either Figure.

As mentioned previously, the two-year and six-year scenarios leave out serious periods of drought or dry conditions, such as 2007-2010 and 2012-2015, a four-year drought that has been declared an emergency by Governor Brown multiple times. This is a serious omission undermining the description of baseline environmental conditions, analysis of supplies and demands associated with foreseeable project production, and exacerbated impacts of the project itself, that must be corrected in a recirculated DEIR.

Tables 3.1 and 3.6 are incapable of presenting data with which to simulate streamflow depletion because, as stated in the DEIR, there are "limitations of the available gaging data." (pp. 3-6 and 3-39). In an effort to locate existing data, AquAlliance checked the Big Chico Creek Near Chico (BIC) gage on July 24, 2015 and there is insufficient flow to even register a reading at this time.[53] In addition, the USGS no longer maintains a gage on Big Chico Creek.[54] Regarding Little Chico Creek estimated flows, Table 3-1 indicates that the period of record for DWR gage A04270 Taffee Road near Chico, CA was 1991-2002 and that gage A04280 Near Chico, CA was from 1975-1996 and that, "Data for this gage were downloaded in 2011; the data are no longer available from

[52] Halstead, Brian J., Shannon M. Skalos, Glenn D. Wylie, and Michael L. Casazza. 2015. Terrestrial ecology of semi-aquatic giant gartersnakes (Thamnophis gigas). Herpetological Conservation and Biology. In Press, PP. 10-11.

[53] California Department of Water Resources , California Data Exchange Center. http://cdec.water.ca.gov/cgi-progs/queryF?BIC&d=24-Jul-2015+13:37. "BRT" signifies discharge at stage below available rating table.

[54] https://water.usgs.gov/nsip/

original data source: DWR, 2015a," (footnote "e" p. 3-6). Stony Creek's flows are also based on distant years and 1955 -1990 and 1941-1973 (p. 3-6). It is impossible for the public to have any confidence in modeling results that are using such antiquated input data. The DEIR relies on only modeling to consider impacts from the Project when it must compile and present results from actual monitoring and reporting prior to recirculating a revised DEIR.

Shallow Groundwater Monitoring Framework

A comprehensive monitoring program was proposed in the mid-2000s and is still absolutely necessary. The Sacramento Valley Integrated Water Management Plan lead to a draft Framework for Sacramento Valley regional water resource monitoring that would also benefit shallow domestic-well owners. Starting on page five, it reads: "Habitat Monitoring; The long-term health of riparian vegetation, wetland species, and a number of other native habitat are commonly associated with maintaining a minimum range of groundwater levels and an appropriate level of interaction between surface water and groundwater resources. The lowering of groundwater levels due to the interception of groundwater underflow to surface water systems due to the increased groundwater extraction associated with conjunctive water management programs, have the potential to impact the native habitat areas," and that, "In order to identify potential habitat impacts associated with implementation of conjunctive water management alternatives, a program-specific network of shallow monitor monitoring wells should be developed to detect changes in water levels over the shallowest portion of the aquifer. The groundwater monitoring network should contain shallow monitoring wells that will record changes to the water table elevation in the vicinity of these sensitive habitat areas."[55] The Framework has many other valuable suggestions that were protective of the region's residents and environment. Unfortunately, the Framework was shelved, and the shallow monitoring network never got off the ground.

This Framework could have been operation for over seven years and it should definitely be in place prior to the 10-Wells Project and continue in perpetuity. It should also be presented in a recirculated Draft EIR as a viable mitigation measure, or project alternative

V. Climate Change

Once SB 97 was approved in California in 2007, analysis of greenhouse gas emissions became a part of the CEQA process[56] and that is reflected in the DEIR from an air quality and air pollution perspective. Unfortunately, the DEIR fails to discuss Climate Change, the result of greenhouse gas emissions and its impacts on the hydrology of the region or the Sacramento River watershed upon which GCID's river and stream water claims depend. This obvious omission is at the heart of the 10-Wells Project that claims the need for more water in a district with an exorbitant claim to water - 825,000 af per year.

The gross omission of any climate change analysis in the DEIR fails to accurately describe the existing climatological conditions into which the project may be approved, fails to accurately describe the diminution of water and natural resources over recent and future years as a result of

[55] McManus, Dan et al, 2007. *Sacramento Valley Water Resource Monitoring, Data Collection and Evaluation Framework*

[56] http://opr.ca.gov/docs/SB_97_bill_20070824_chaptered.pdf

climate change, fails to integrate these changing circumstances into any future baseline or cumulative conditions, and fails to completely analyze or support the DEIR conclusions regarding the project's potentially significant impacts. See, AquAlliance, comments on LTWT EIS/EIR, pp. 30, 40-45.

Both climate change and the 10-Wells Project have the potential to degrade the hydrology of the counties within GCID's district, surrounding counties, and flows in the Sacramento River. This must be remedied in a recirculated DEIR

VI. The EIR fails to analyze a reasonable range of alternatives.

As discussed in Sections I and II above, the DEIR fails to explain what is driving the suggested demand for more water, which leads to a failure to produce viable alternatives. The 10-Wells Project is being sold as an essential need for GCID without providing the context of the Sacramento Valley Water Management Agreement, climate change, demand from outside the Sacramento Valley, and GCID's regular participation in the water market. Additionally, there is no discussion of the Water Fix's premise (formerly the Bay Delta Conservation Plan) that Delta exports through the Twin Tunnels will not only increase in the wetter years, but they will also rise in drier years from water transfers.

The "no project alternative" itself does not constitutes a reasonable range of alternatives.

CEQA requires public agencies to identify in an EIR feasible alternatives that could avoid or substantially lessen a project's significant environmental effects. (Pub. Res. Code §§ 21002, 21002.1(a), 21100(b)(4), 21150.) CEQA's procedures require that an EIR must present a "reasonable range" of alternatives to the project that "foster meaningful public participation and informed decisionmaking." (Guidelines, § 15126.6(f), Guidelines, § 15126.6(a) citing *Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal.3d 553 (*Goleta Valley II*), and *Laurel Heights I, supra,* 47 Cal.3d 376.)

However, this does not mean that the "rule of reason" allows the lead agency to concoct an arbitrary assemblage of "alternatives" selected to make the agency's preferred project a foregone conclusion. The "rule of reason" requires that the action alternatives selected for substantive discussion in an EIR must satisfy specific, objective criteria that would allow the decision makers a reasoned choice. For example, each alternative must be capable of "feasibly attain[ing] most of the basic objectives of the Project." (Guidelines, § 15126.6(a), (f).) The Guidelines provide that,

> The range of potential alternatives to the proposed project shall include those that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects. The EIR should briefly describe the rationale for selecting the alternatives to be discussed. The EIR should also identify any alternatives that were considered by the lead agency but were rejected as infeasible during the scoping process and briefly explain the reasons underlying the lead agency's determination.

(Guidelines, § 15126.6(c) [emphasis added.) Hence, alternatives rejected as infeasible are not considered to be among the reasonable range of alternatives required to be considered. Nor can it

be said that the no project alternative can be among the reasonable range of alternatives considered, as it is required to be evaluated regardless of whether it feasibly meets most of the project objectives, which it normally won't. Accordingly, an EIR that limits its substantive discussion to alternatives that the agency has already has determined are not feasible or will not attain the basic objectives of the project, fails to present a "reasonable range" of alternatives that fosters meaningful public participation or informed decisionmaking. (*Id*.)

Here, the DEIR has failed to satisfy CEQA's legal requirement to analyze a reasonable range of alternatives that would reduce or avoid the Project's significant impacts. Rather than evaluate the environmental benefits of any alternatives at all, the DEIR instead rejects out of hand a proper evaluation of any alternative mentioned in the EIR, discussing the environmental impacts of only the no project alternative and the proposed project alternative.

In addition, the DEIR eliminates from discussion alternatives that would not yield 28,500 ac-ft of water per year, but nothing in the project objectives indicates whether or why 28,500 ac-ft per year is a necessary project component. (DEIR 5-3.) Alternatives should only be eliminated if infeasible or do not meet most project objectives.

The DEIR fails to meaningfully evaluate the no project alternative.

The DEIR's discussion of the no project alternative is internally contradictory. On one hand, the DEIR states that, under the no project alternative, "[t]he five existing wells would be used as needed under GCID's discretion," such that "[a]s water shortages occur, GCID anticipates that groundwater pumping would increase both within the District's service area and in adjacent areas to meet future water demands." (DEIR 5-1.) On the other, the DEIR states that "[u]nder the No Project Alternative, GCID would not use its existing wells as part of a coordinated pumping program . . . to supplement water supplies to offset critical water year reductions." (DEIR 5-2.) In conjunction, this description renders the no project evaluation impossible to discern.

More troubling, the DEIR states that, under the no project alternative, the same project would still be built: "Under the No Project Alternative it is assumed that GCID would construct new wells on an as-needed basis for specific District use and that the existing wells included as part of the proposed project would be fully used as needed during years of shortages, once appropriate environmental analysis has been conducted." (DEIR 5-1.) Again, the DEIR's assessment that, under the no project alternative, the district's existing and proposed wells both would, and would not, be used, fails to support CEQA's fundamental purpose of informed environmental decision-making. The DEIR must evaluate the environmental consequences "as what would be reasonably expected to occur in the foreseeable future if the project were not approved." (Guidelines, § 15126.6(e)(2).) While the Guidelines do provide that, "If disapproval of the project under consideration would result in predictable actions by others, such as the proposal of some other project, this "no project" consequence should be discussed," here, the DEIR does not suggest that substantially the same project would be proposed "by others," as the Guidelines allow for, but rather, the DEIR simply suggests that GCID itself would go forward with the same project. This does not comply with CEQA.

In fact, through the no project alternative, the district could defend existing water rights in a way that would satisfy all of the project objectives. Recently past and current water management and

allocation decisions by state and federal water project operators and managers have reverberated through the past four year's dire supply conditions.[57] These decisions are not just artifacts of current natural conditions. Not only could the CVP and SWP been managed better in the recent past, but the sellers, like GCID, who are also the holders of very senior water claims, could have fought for themselves, their regions, and the environment in which they live, do business, and recreate. How could they do this, one might ask, and how would it apply to the 10-Wells Project?

This could meet three of the Project's objectives. If the objective is to increase reliability and flexibility for GCID and not, as we wonder in Section I above, the system that facilitates the expansion of the water market, protecting the senior claims to water would meet this objective. It would also provide more flexibility to, "Periodically reduce Sacramento River diversions to benefit migrating fish," and "Protect and maintain agricultural production in times of water shortage to minimize economic disruption." By virtue of its senior water claims, in 2015 alone GCID has proposed to sell 55,283 af to SLDMWA south of the Delta and 15,269 af to TCCA north of the Delta.

While it wouldn't "Offset reductions in GCID Settlement Contract allotments during the irrigation season in drought years," the DEIR acknowledges that this has been extremely rare.

In addition, the DEIR's discussion of biological impacts under the no project alternative contains no explanation of how impacts would be reduced at all, simply stating, in its entirety: "Under the No Project Alternative, GCID would continue to implement its current water management program. Resulting effects on biological resources would be similar to what is presently occurring within GCID's service area." (DEIR 5-2.) This fails to provide any "compar[ison of] the environmental effects of the property remaining in its existing state against environmental effects which would occur if the project is approved," as CEQA requires. (Guidelines, § 15126.6(e)(3)(B).)

<u>The EIR should evaluate an alternative that reduces or eliminates water transfers.</u>

As discussed above, GCID admits it desires to forego groundwater substitution water transfers as part of the LTWT Program, instead selling water through crop idling under the LTWT, and pumping a roughly equivalent amount of groundwater through this project as it originally proposed to use for groundwater substitution under the LTWT. Further, this DEIR proposes that groundwater pumping for this project will only occur during dry and critical years to help offset diminished supplies during those times. And, the LTWT similarly asserts that transfers will only occur during dry and critical years, to help offset diminished supplies during those times; where GCID plans to act as a willing seller of water claims, via crop idling, under the LTWT.

Considering these inextricably interconnected programs in tandem, then, a reasonable alternative to the proposed project would be to not participate in cropland idling and water transfers during

[57] California Sportfishing Protection Alliance, February 2014. Presentation to the State Water Resources Control Board. "In water year 2011, the Department of Interior used only 348.8 TAF of the 800 TAF of CVPI § 3406(b)(2) water. 'Interior decided to not bank the unused (b)(2) water from water year 2011.' In water year 2013, DWR exported more than 826,000 acre-feet of water beyond what it had informed its contractors it could deliver."

dry and critical years. Indeed, the DEIR itself provides strong reasoning for why this should be considered to be a potentially feasible alternative that would reduce or avoid significant environmental impacts. The DEIR, for example, rejects a potential alternative to *increase* crop idling as infeasible, stating that,

> Idling would counter the goals and objectives of the proposed project. Cropland idling would neither increase system reliability nor protect agriculture, and it has the potential to result in significant adverse impacts on land use, water quality, air quality, and wildlife.

(DEIR 5-4.) Because cropland idling is assuredly contrary to the proposed project's goals and objectives, and results in greater environmental impacts, an alternative to not voluntarily participate in the LTWT cropland idling program is, logically, wholly consistent with the proposed project's goals and objectives, and would lessen significant environmental impacts.

Accepting Shortages

When GCID experienced water cutbacks in the past, the entire State of California was also impacted by the multiple year dry conditions. This couldn't be more true in the current drought of 2012-2015. In the past, GCID and other districts in the Sacramento Valley lived within the means of less than 100% supply when times were hard. After all, fallowed fields can be replanted and shared sacrifice by hydrologic region benefits the whole.

VII. Growth Inducing Impacts

This Project has the potential to cause numerous growth-inducing impacts. Section 21100(b)(5) of CEQA requires that an EIR discuss the growth-inducing impacts of a proposed project. A project could have a growth inducing impact if it could:

- Foster economic or population growth, or construction of additional housing;
- Remove obstacles to population growth, for example, developing service areas in previously unserved areas, extending transportation routes into previously undeveloped areas, and establishing major new employment opportunities;
- Encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively.

The CEQA Guidelines, for example, provide an illustration of how a major expansion of a wastewater treatment plant that might remove wastewater treatment capacity as a constraint on growth in its service area. (CEQA Guidelines, § 15126.2(d).) The DEIR argues, contrary to the CEQA Guidelines, that "Except where supply limitations have been specifically identified as an impediment to development approvals, water supply reliability alone is not the determinative factor inducing growth in any region of California." (DEIR 4-1.) Nothing, however, in the Guidelines or statute suggest that a growth inducing impact is limited to "the determinative factor inducing growth," as if such a factor could ever even be objectively isolated. On the contrary, the removal of any growth limiting factor should be seen as inducing growth.

The DEIR concludes its analysis of growth inducing impacts by stating, "it is not expected that new agricultural opportunities would be of a significant magnitude to drive economic growth resulting in the demand for new housing above that anticipated by Glenn County's or Colusa County's general plans. Therefore, growth inducement is not expected as a result implementing the proposed project." (DEIR 4-1.) Not only does the DEIR not explain what "new agricultural opportunities" would occur, or what would actually constitute a "significant magnitude," but the DEIR also again relies on a false standard of significance by claiming that any such growth would not be meaningful if it was less than that contemplated by the Counties' general plans. (See, *Federation of Hillside & Canyon Ass'ns v. City of Los Angeles* (2000) 83 Cal.App.4th 1252, 1265 (growth inducement must be discussed even where consistent with general plan.) CEQA nonetheless requires this EIR to incorporate the discussion from any general plan and/or general plan EIR that describes the growth this project would induce. (*Friends of the Eel River v. Sonoma County Water Agency* (2003) 108 Cal.App4th 859, 877; *Sierra Club v. West Side Irrig. Dist.* (2005) 128 Cal.App4th 690. It is unlikely these wells or their water supply capacity were evaluated by the respective general plan EIRs. Moreover, and perhaps most importantly, the DEIR only seems to contemplate here the arbitrary pumping levels proposed in the project description, not the actual capacity of these pumps on an annual basis. It is precisely this development of additional capacity, not analyzed by this DEIR, that serves to induce growth.

The Bureau, DWR, the SWRCB, and the Settlement Contractors have all participated in the creation and implementation of the SVWMA that extracts water from areas of origin north of the Delta for export. This opening up of supply on a finite water supply, has only fueled additional demand, which again fuels pursuit of more supply. This is the essence of the dog chasing its tail. As demonstrated above and below, installing wells has been a pivotal piece of the SVWMA and the SVIRWM. This is the essence of growth inducement: creating more capacity. The 10-Wells Project is producing the amount of water needed by a city of over 100,000 people.

Added to this is what we discussed previously: Table 3-4 illustrates that the pumping capacities of the existing wells are far greater than the projected 2,500 gpm rate planned in the Project. (DEIR p. 3-15.) Additionally, the DEIR uses loose language to define the capacities of the new wells: "Each well would have a target pumping capacity of 2,500 gallons per minute and would require a 100- to 250-horsepower pump motor." (p. 2-3.) Having existing infrastructure with greater capacity than proposed in the Project, installing new infrastructure with higher capacity than the proposed Project, and retaining the ability to use that infrastructure for longer periods of time, from the proposed 8.5 months to 12 months, provides GCID with pre-approved and pre-installed infrastructure for future demand.

VIII. Cumulative Impacts

CEQA requires evaluation of a project's incremental effects "viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects." (CEQA Guidelines § 15065(a)(3).) "[A] cumulative impact consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts." (CEQA Guidelines § 15065(a)(3).)

An EIR must also discuss significant cumulative impacts. CEQA Guidelines §15130(a). Cumulative impacts are defined as two or more individual effects which, when considered

together, are considerable or which compound or increase other environmental impacts. CEQA Guidelines § 15355(a). "[I]ndividual effects may be changes resulting from a single project or a number of separate projects. CEQA Guidelines § 15355(a). A legally adequate cumulative impacts analysis views a particular project over time and in conjunction with other related past, present, and reasonably foreseeable future projects whose impacts might compound or interrelate with those of the project at hand. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time. CEQA Guidelines § 15355(b). The cumulative impacts concept recognizes that "[t]he full environmental impact of a proposed . . . action cannot be gauged in a vacuum." *Whitman v. Board of Supervisors* (1979) 88 Cal. App. 3d 397, 408 (internal quotation omitted).

Following these standards, the DEIR must evaluate the cumulative impacts to water resources caused by the project in conjunction with the closely-related projects, below.

The Sacramento Valley Water Management Agreement

The DEIR omits discussion of the SVWMA. The close connection of the 10-Wells Project to the SVWMA is laid bare through documents associated with the [Sacramento Valley] Integrated Regional Water Management Program ("SVIRWMP"), which is discussed briefly. (DEIR p. 3-76.) The DEIR's Section 3.8.2.3 highlights the following districts that benefitted from funds garnered through the SVIRWMP: Browns Valley Irrigation District, Anderson-Cottonwood Irrigation District, Feather Water District, GCID, Natomas Central Mutual Water Company, Sutter Mutual Water Company, Meridian Farms Mutual Water Company, Pelger Mutual Water Company, Reclamation District 108, River Garden Farms Company, and Butte Water District. Moreover, the DEIR discloses that public money through Proposition 50 has been used for 11 implementation projects in the Sacramento Valley. However, the details of the projects are not disclosed. Instead, the DEIR asserts that, "Although several of the projects funded by this grant are generally similar in nature, each project has independent utility, and is implemented by each grantee as needed to supplement their current surface water supplies in various water-year types." Nevertheless, the SVWMA and the Sacramento Valley Regional Water Management Plan's documents unveil a very different picture.

In 2003, the Bureau published an NOI/NOP for a "Short-term Sacramento Valley Water Management Program EIS/EIR." (68 Federal Register 46218 (Aug 5, 2003).) As summarized on the Bureau's current website:

> The Short-term phase of the SVWM Program resolves water quality and water rights issues arising from the need to meet the flow-related water quality objectives of the 1995 Bay-Delta Water Quality Control Plan and the State Water Resources Control Board's Phase 8 Water Rights Hearing process, and would promote better water management in the Sacramento Valley and develop additional water supplies through a cooperative water management partnership. Program participants include Reclamation, DWR, Northern California Water Association, San Luis & Delta-Mendota Water Authority, some Sacramento Valley water users, and Central Valley Project and State Water Project contractors. SVWM Program actions would be locally-proposed projects and actions that include the development of groundwater to substitute for surface water supplies, conjunctive use of groundwater and surface water, refurbish existing groundwater

> extraction wells, install groundwater monitoring stations, install new groundwater extraction wells, reservoir re-operation, system improvements such as canal lining, tailwater recovery, and improved operations, or surface and groundwater planning studies. These short-term projects and actions would be implemented for a period of 10 years in areas of Shasta, Butte, Sutter, Glenn, Tehama, Colusa, Sacramento, Placer, and Yolo counties.[58]

The resounding parallels between the SVWMA NOI/NOP and the presently proposed project are not merely coincidence: they are a piece of the same program, and are closely-related activities that will result in similar effects upon the same environmental resources.

Page 2 of the SVIRWMP's *Proposal for Implementation Grant, Step 2 Attachment 5, Work Plan*[59] presents the centerpiece project, the Conjunctive Water Management Project. "A successful Conjunctive Water Management Project within the Sacramento Valley requires three critical activities that must proceed in unison. These include (1) groundwater production, (2) groundwater recharge, and (3) monitoring and assessment." What follows are the participating districts with the number of productions wells they sought:

- Anderson Cottonwood Irrigation District Groundwater Production Element 4 wells
- Browns Valley Irrigation District Water Groundwater Production Element 1 well
- Feather Water District Water Management Groundwater Production Element 1 well
- Glenn-Colusa Irrigation District Groundwater Production Element 8 wells
- Lewis Ranch Groundwater Production Element 1 well
- River Garden Farms Groundwater Production Element 2 wells
- Meridian Farms Groundwater Production Element 1 well
- Pelger Mutual Water Company Groundwater Production Element 1 well
- RD 108 Groundwater Production Element 5 wells

How are these districts' projects, including the Lead Agency GCID's, viewed as "generally similar in nature," but with "independent utility" when they are pursuing the specific goals of the SVWMA and the SVIRWMP? And let us be clear, those goals are ***not*** just for "supplemental supply" within their districts as suggested. The SVIRWMP elucidates that, "These elements were strategically formulated under the adopted Sacramento Valley Water Management Agreement (SVWMA, Phase 8, included in Attachment 4), which was executed in December 2002 by more than 40 Sacramento Valley water users, the Department of Water Resources, the Department of Fish and Game, the Bureau of Reclamation, the Fish and Wildlife Service, and various water users throughout the state. **Fifty percent of the Conjunctive Water Management Project capacity will be dedicated to meeting water quality standards in the Bay-Delta while the remaining 50 percent will be used to improve local and regional water supply reliability or to help meet other water needs in the state**." [emphasis added] [60]

The DEIR also fails to disclose how many of the SVWMA districts and/or the SVIRWMP Participating Entities have installed wells that have been used in water transfers and how many are

[58] http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=788
[59] Northern California Joint Exercises of Powers, June 2006.
[60] Id. p.2.

committed to participate in the 10-Year Water Transfer Program (aka Long-term Water Transfers)[61] or continuing transfers outside it.[62] In addition, where is the disclosure that the production wells above, added to others installed by SVWMA districts and SVIRWMP Participating Entities, have been used to facilitate the goals from the SVIRWMP quote immediately above?

The 10-Wells Project that is presented as a seemingly innocuous attempt to "augment District surface water supplies during dry and critically dry water years" (DEIR p. 2-1) is part of a much larger agreement and multiple planning efforts. GCID's past and current actions make it abundantly clear that the stated 10-Wells Project is just another attempt to obfuscate its involvement in implementing the SVWMA through massive public funds from SVIRWM grants and federal appropriations (see Section I).

The 10-Year Water Transfer Program (aka Long-Term Water Transfers)

The DEIR mentions the 10-Year Water Transfer Program ("10-Year Program") in section 3.8.2.1. It does *not* reveal that the 10-Year Program contains significant numeric figures that should be incorporated into the cumulative impact analysis, such as:

1. The EIS/EIR analyzed transferring up to 600,000 af per year from the selling districts. No matter what figure the Bureau transfers year-to-year, this program has the ability to transfer up to 600,000 af each year.
2. GCID may have provided internal direction to itself, subject to change, that counter numbers in the 10-Year Program's EIS/EIR (DEIR p. 3-76), but the 10-Year Program's Final EIS/EIR retained the original number and will allow the sale of up to 91,000 af per year from GCID in any given year. (p. ES-6 and p. 2-14.) A vote by the GCID Board of Directors is all it would take to reverse the internal commitment, a non-binding statement, and begin selling water at the 91,000 af per year threshold.

Annual Transfers

The DEIR fails to delineate the numerous transfers that have occurred in the recent past and those that are proposed outside the 10-Year Water Transfer Program. What should the public conclude from this glaring omission? GCID's failure to disclose their own repeated transfers and those from the region and Sacramento Valley is arbitrary and capricious.

The DEIR should disclose what level of monitoring has occurred during the past annual transfers. If monitoring transpired, was there comprehensive coordination of methods, data collection, and data analysis for both individual and all Sacramento Valley water transfers and are the products available to the public? This might shed light on the results of cumulative actions by numerous water sellers in the Sacramento Valley, including the lead agency, GCID. This material is not presented here nor is it in the public realm, to our knowledge.

[61] U.S. Bureau of Reclamation and San Luis Delta Mendota Water Authority, 2015. Final EIS/EIR 10-Year Water Transfer Program (aka Long Term Water Transfers) p. ES-12. http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=18361
[62] Id. p. 4-5.

As discussed above, the cumulative installation of well infrastructure, the repeated annual water transfers, participation in the 10-Year Water Transfer Program, and the increasing escalation of groundwater use by Sacramento Valley water districts involved in water sales do not exist in a vacuum. Instead, they are actually integrated, important parts of a broader program to develop regional surface and ground water resources into a conjunctive use system. GCID has planned for multiple decades to exploit groundwater, to "… integrate the Lower Tuscan Formation into the Central Valley water supply system…" and bank "…SWP and CVP contractual entitlements in the Lower Tuscan Formation…"[63]

The Project is also only one of several proposed and existing projects that affect the regional aquifers and surface waters. The existence of these numerous related projects makes an adequate analysis of cumulative impacts especially important.

IX. Additional Comments and Questions

Modeling

SacFEM has serious flaws yet is relied on exclusively for projections and impact analysis. Material produced for AquAlliance's comments on the 10-Year Water Transfer Program's EIS/EIR are equally relevant for the 10-Wells Project and is presented here. "One example of incorrect modeling assertions in the EIR/EIS is the characterization[1] of SacFEM2013 and its parent code MicroFEM as 'three-dimensional' and 'high-resolution'. In fact, the SacFEM2013 model provides only a linked set of two-dimensional analyses[2], and would more charitably be described as "two-and-a-half dimensional" instead of possessing a fully-3D modeling capability. This limitation is not an unimportant detail, as a general-purpose 3D groundwater model could be used to predict many important physical responses, e.g., the location of the phreatic surface within an unconfined aquifer. For the SacFEM2013 model, this prediction is part of the data instead of part of the computed solution, and hence SacFEM2013 apparently has no predictive capability for this all-important aquifer response."[64]

The relevant content from the *SACFEM2013: Sacramento Valley Finite Element Groundwater Flow Model User's Manual*[65] on this topic illustrates that the model is indeed being touted as having the capacity "[t]o generate a 3D surface defining the elevation of the base of fresh groundwater." (p. 3-5.) In addition, the DEIR states that, "SACFEM2013 was developed using the MicroFEM modeling code (MicroFEM, 2015), which is capable of simulating three-dimensional, transient, single-density groundwater flow in layered systems." (p. A-1.) Sadly, it is clear that the DEIR is relying on the very limited predictive capability of SacFEM for many of the most crucial conclusions for disclosing the significance of impacts from the 10-Wells Project.

This thin veneer is no substitute for actual, on the ground data from GCID's groundwater substitution transfers using the five existing wells. For example, "GCID pumped groundwater from July to September 2013 to make water available for transfer to the San Luis & Delta

[63] U.S. Bureau of Reclamation Assistance Agreement, 2006, p. 5.
[64] Mish, Kyran D., 2014. Comments for AquAlliance on Long-Term Water Transfers Draft EIR/EIS, p. 3.
[65] "A complete description of the construction and calibration of SACFEM2013 is provided in SACFEM2013: *Sacramento Valley Finite Element Groundwater Flow Model User's Manual* (CH2M HILL and MBK Engineers, Inc., 2015)." (DEIR p. A-1.)

Mendota Water Authority (SLDMWA). Groundwater was pumped in lieu of diverting surface water under its pre-1914 water right and its Settlement Contract No. 14-06-200-855A-R-1 with the United States Bureau of Reclamation (USBR)."[66] The results of the groundwater substitution transfer are poorly discussed in the report, regularly using vague numeric approximations such as "recovered to within a few feet" and "generally recovered." However the exhibits highlight the serious effects from pumping 5,000 af in 2013. When Figure D-7 is contrasted with Figure D-8, it is clear that impacts were occurring as far as 3-4 miles away across the Sacramento River in Butte County were still drawing water to the cone of depression six months later. The hydrograph figures illustrate some conditions that are not in the text and contradict some of the report, such as:

- Figure C- 2. Production well GCID 2 experienced a precipitous collapse of 240 feet at the end of the transfer period, but appears to have almost recovered in March 2014.
- Figure C-10 Monitoring well 21N02W04G002M dropped over 50 feet at the end of the transfer period and in March 2014 was still approximately 13 feet below the March 2013 starting measurement.
- Figure C-13. Monitoring well 22N02W01N001M dropped over 90 feet at the end of the transfer period and in March 2014 was still approximately 10 feet below the March 2013 starting measurement.
- Figure C-14. Monitoring well 22N02W15C002M dropped over 50 feet at the end of the transfer period and in March 2014 was still approximately15 feet below the March 2013 starting measurement.

Actual data with additional, unbiased professional analysis would have better informed the public than what is provided with the DIEIR's reliance on modeling. "MicroFEM is a poor choice for such large-scale modeling. It is an old code that apparently utilizes only the simplest (and least accurate) techniques for finite-element modeling of aquifer mechanics, and MicroFEM (and hence SacFEM2013) embed serious limitations into the model that compromise the accuracy of the computed results." [67]

<u>Maps must be provided to illustrate all wells in an expanded radius of the Project's wells</u>

There is a profound gap in understanding regarding the potential areas of impact from GCID's existing and proposed 10 wells. (See CEQA Guidelines § 15124(a).) There also are no maps in the DEIR that indicate the number of domestic and production wells even in the area of impact assumed by SacFEM. We argue that maps with this information must be provided in a recirculated Draft EIR and that the radius of potential impact must be expanded. Drawing from the scientific analysis completed by professors Todd Greene and Karin Hoover,[68] we find that, "The importance of this new information on the hydrostratigraphy around the GCID wells is that the generally symmetrical pattern of drawdown that resulted from the SACFEM2013 modeling effort may not reflect the predominance of coarser-grained, water-rich zones on the east side of the wells. The results of the SACFEM2013 model show that the total area of the pumping impacts and the outer distance to the no-impact boundary is greater to the west in Glenn County, than east in Butte

[66] West Yost Associates, 2014. *2013 Final Water Transfer Report* for Glenn Colusa Irrigation District, p. 1.
[67] Mish, Kyran D., 2014. Comments for AquAlliance on Long-Term Water Transfers Draft EIR/EIS, p. 4.
[68] Greene, Todd J. and Karin Hoover, 2015. *Hydrostratigraphy and Pump-test Analysis of the Lower Tuscan/Tehama Aquifer, Northern Sacramento Valley, CA*.

County. In fact, no wells in Butte or Tehama counties are proposed for monitoring in mitigation measures WR-1 and WR-2, and obviously are not included in the Glenn County BMO monitoring program. This lack of monitoring in Butte County, when that area may be a major source of the water pumped by GCID's wells, may allow for impacts that are inadequately recognized and thus improperly mitigated."[69]

Seismicity

The DEIR fails to discuss in any way the possible seismic risks from the 10-Wells Project. Not only does the construction of five new wells suggest a potential for seismic impacts, but there is also potential for seismic shaking because of subsidence from Project operations that in turn may cause additional stress to existing structures. Lack of disclosure in the DEIR necessarily leads to an absence of analysis of the potential effects from the Projects' construction and excessive groundwater pumping on the numerous known earthquake faults running through and about Northern California. As recently detailed in a paper published by a well-respected British scientific journal, "[u]plift and seismicity driven by groundwater depletion in central California," excessive pumping of groundwater from the Central Valley might be affecting the frequency of earthquakes along the San Andreas Fault, and raising the elevation of local mountain belts. The research posits that removal of groundwater lessens the weight and pressure on the Earth's upper crust, which allows the crust to move upward, releasing pressure on faults, and rendering them closure to failure. The 10-Wells Project and the cumulative water transfer projects impact the volume of groundwater extracted as farmers are able to pump and then forego surface water in exchange for money. The drought has exacerbated the demands from the water transfer market that is the major goal of the SVWMA, which is being implemented through the SVIRWMP and the 10-Year Water Transfer Program and has also depleted the natural regeneration of groundwater supply due to the scarcity of precipitation.

Detailed analyses of this seismicity and focal mechanisms indicate that active geologic structures include blind thrust and reverse faults and associated folds (e.g., Dunnigan Hills) within the Coast Ranges-Sierran Block ("CRSB") boundary zone on the western margin of the Sacramento Valley, the Willows and Corning faults in the valley interior, and reactivated portions of the Foothill fault system. Other possibly seismogenic faults include the Chico monocline fault in the Sierran foothills and the Paskenta, Elder Creek and Cold Fork faults on the northwestern margin of the Sacramento Valley.[70]

This deficiency must be corrected and included in a recirculated Draft EIR.

X. Conclusion

GCID's examination of the proposed Project fails to comply with the most essential review and disclosure requirements of CEQA, thereby depriving decision makers and the public of the ability to consider the relevant environmental issues in any meaningful way (details above). Rather,

---

[69] Custis, Kit, 2015. Comments and Recommendations on Draft Environmental Impact Report for Glenn Colusa Irrigation District's Groundwater Supplemental Supply Project, June 2015 for AquAlliance, p. 5.

[70] http://archives.datapages.com/data/pacific/data/088/088001/5_ps0880005.htm (Custis, Exhibit A 10-Year Water Transfer Program)

GCID has neglected to disclose significant information regarding the 10-Wells Project and cumulative impacts in violation of CEQA in what appears to be an ongoing effort to avoid disclosure of GCID's commitments to the SVWMA and implementation through the SVIRWM and the 10-Year Water Transfer Program. AquAlliance has demonstrated in 2010,[71] 2012,[72] 2013,[73] 2014,[74] and in 2015 that key questions have not been addressed, significant data gaps exist and the possible and very probable impacts are not disclosed, but summarily rejected without data and a scientific basis for the conclusions.

For the majority of the twentieth century, northern California supported family farming, healthy salmon runs, rich hydrologic watersheds, and a diverse environmental heritage. GCID members share in this heritage. We hope that GCID will not only recall the heritage of which it is a part, but actively participate in efforts to defend and restore the health of this region and its water legacy for future generations. That legacy continues to be in the crosshairs of water policies that have repeatedly failed in the San Fernando, Owens, and San Joaquin valleys of California. For all of the above-mentioned reasons, the 10-Wells Project should either be withdrawn or the DEIR should be withdrawn, revised, and recirculated after the release of the long-missing SVWMA programmatic EIR.

AquAlliance respectfully requests notification of any meetings that address this proposed GCID Project or any other GCID project that requires any consideration of CEQA. Please send AquAlliance any additional documents that pertain to this project, including a possible notice of determination through the U.S. Postal Service and e-mail.

Sincerely,

Barbara Vlamis, Executive Director
AquAlliance
P.O. Box 4024
Chico, CA 95927
(530) 895-9420
barbarav@aqualliance.net

[71] AquAlliance comments on the 2010/2011 Water Transfer Program's EA/FONSI
[72] AquAlliance's comments on water transfers by Western Canal WD and Butte Water District, 2012.
[73] AquAlliance's scoping comments on the Bureau and SLDMWA's North-to-South Water Transfer Program, 2013.
[74] AquAlliance comments on the 2014 Bureau and SLDMWA's North-to-South Water Transfer Program and the SLDMWA's 10-Year Water Transfer Program EIS/EIR.

United States Department of the Interior

BUREAU OF RECLAMATION
Mid-Pacific Regional Office
2800 Cottage Way
Sacramento, California 95825-1898

IN REPLY
REFER TO:
MP-410
ENV - 7.00

JAN 24 2012

FS	DFS	AFS-GRC	AFS-EA
AFS-ES-V	AFS-ES-C-S	ADM	
Sect. 7			
FILE			

MEMORANDUM

To: Deputy Assistant Field Supervisor, Endangered Species Division, Fish and Wildlife Office, Sacramento, California

From: Regional Resources Manager, Mid-Pacific Regional Office, U.S. Bureau of Reclamation, Sacramento, California

Subject: Section 7 Endangered Species Act Consultation with U.S. Fish and Wildlife Service (USFWS) for 2012 "North-to-South" Water Transfers

RECEIVED
FEB 07 2012
SACRAMENTO FISH & WILDLIFE OFFICE

The Bureau of Reclamation is beginning the environmental compliance process for Central Valley Project (CVP) related water transfers in 2012. Based on the limited nature of north-to-south water transfers that may be proposed in 2012, Reclamation requests concurrence from the USFWS that 2012 water transfers may affect, but are not likely to adversely affect Federally listed species in the Sacramento and San Joaquin River Valleys.

As described below, water transfers in 2012 would be different in nature, and much less than, those evaluated in the 2010-2011 Water Transfer Program Environmental Assessment (EA) and Biological Assessment (BA) and would therefore have fewer effects, and potentially no effects, on listed species. The most notable difference for 2012 transfers is that no crop idling transfers would occur. If capacity in the Delta becomes available to pump transfer water south, groundwater substitution transfers would be the only water transfers considered by the purchasing agencies south of the Delta.

In 2010, Reclamation completed the EA/Finding of No Significant Impact and Endangered Species Act consultation for the 2010-2011 Water Transfer Program. USFWS issued the Biological Opinion (BO) for 2010-2011 water transfers on March 2, 2010. The EA and BO considered effects of groundwater substitution and cropland idling transfers from CVP contractors in the Sacramento Valley to purchasing agencies south of the Delta. Because of wet hydrologic conditions and limited export capacity, CVP contractors did not request any crop idling or groundwater substitution transfers in 2010 or 2011, and no water transfers were made under the 2010-2011 Water Transfer Program.

Reclamation is currently working with the San Luis & Delta-Mendota Water Authority on the Long-Term Water Transfers Environmental Impact Statement/ Environmental Impact Report (EIS/EIR) that will provide environmental coverage for water transfers for 10 years, from 2013 through 2022. The EIS/EIR is on schedule to be completed, with a signed Record of Decision, by April 2013. Because of the proposed completion date in 2013, Reclamation must complete environmental documentation for the 2012 water transfer season.

Potential Water Transfers in 2012

For 2012 water transfers, Reclamation anticipates a maximum of approximately 76,000 acre-feet of water could be transferred. The 76,000 acre-feet of transfer water would be made available through groundwater substitution. The same mitigation measures that applied to groundwater substitution transfers would be implemented in 2012 as were provided in the 2010-2011 EA and BO.

Potential Effects to Species of 2012 Water Transfers

As stated above, Reclamation and water agencies did not make any water transfers in 2010 or 2011, and thus the water transfer program did not have any effect on the species in these two years. Additionally, giant garter snake populations would likely have benefitted from the amount of water available during the past two years. The proposed 2012 water transfers, if implemented to their full extent, would not result in any rice lands being idled, as none of the water would be generated through crop idling, and the environmental commitments for groundwater substitution in the 2010-2011 Water Transfer BO would be met. This would eliminate effects on giant garter snake habitat and the potential effects on individuals cited in the BO of stress, reduced growth, reduced reproductive success or mortality. Given that the program was not implemented in 2010 and 2011, there would be no cumulative effects on any listed species from the program carrying forward into 2012. Therefore, it is highly unlikely that the implementation of the proposed transfer program in 2012 would have any effect on giant garter snake populations.

The EA and BA also evaluated effects of water transfers to the listed San Joaquin kit fox. The BO concurred with Reclamation's conclusion in its BA that the 2010-2011 Water Transfer Program was likely to affect, but unlikely to adversely affect Federally-listed threatened San Joaquin kit fox, as the transfers would not result in the conversion of natural lands to annual crops or annual crops to permanent (woody) crops. Given the smaller amount of the proposed 2012 transfers, these conclusions would also be valid for the proposed program, and no adverse effects on San Joaquin kit fox would be anticipated.

For 2010-2011 water transfers, Reclamation included an environmental commitment to implement transfers within the operational parameters specified in the 2008 Biological Opinion for the Coordinated Operations of the Central Valley Project and State Water Project. Therefore, the effects of the 2010-2011 Water Transfer Program on federally-listed threatened Delta Smelt and its critical habitat were covered in the 2008 Biological Opinion. USFWS agreed to this conclusion in the 2010-2011 Water Transfer Program BO. Reclamation would meet this environmental commitment when implementing 2012 water transfers. Therefore, the conclusions in the EA and BO for 2010-2011 water transfers would also be valid for 2012 transfers and no adverse effects on Delta Smelt would be anticipated.