Appendix B

COMMENT LETTERS RECEIVED ON THE 2009 DRAFT STAFF REPORT OF THE PERIODIC REVIEW OF THE 2006 WATER QUALITY CONTROL PLAN FOR THE SAN FRANCISCO BAY/SACRAMENTO-SAN JOAQUIN DELTA ESTUARY

STATE WATER RESOURCES CONTROL BOARD

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

STATE OF CALIFORNIA
Arnold Schwarzenegger, *Governor*

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
Linda S. Adams, *Secretary*

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Charles R. Hoppin, *Board Chair*
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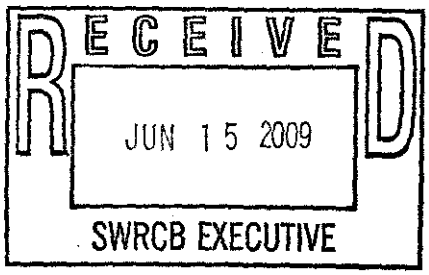
Tam M. Doduc, *Member*
Arthur G. Baggett, Jr., *Member*
Dorothy Rice, *Executive Director*

Comment Letters Received By:

Public Comment
2009 Periodic Review
Deadline: 6/15/09 by 12 noon

The Bay Institute
Natural Resources Defense Council

By email and hand delivery



June 14, 2009

Charles Hoppin, Chair
c/o commentletters@waterboards.ca.gov
State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812-2000

RE: DRAFT STAFF REPORT ON PERIODIC REVIEW OF 2006 BAY-DELTA PLAN

Dear Chairman Hoppin,

This letter is submitted as the comments of the Bay Institute and the Natural Resources Defense Council regarding the May 2009 draft staff report on periodic review of the 2006 Water Quality Control Plan (WQCP) for the San Francisco Bay/ Sacramento-San Joaquin Delta Estuary. We commend the staff for an exceptionally thorough and comprehensive analysis of the issues relating to periodic review of the 2006 WQCP, and we generally concur with the staff's recommendations as to which provisions of the Plan the Board should consider amending, and why.

We note, however, one critical omission in the draft report: the failure to address the Plan's existing narrative objective for salmon protection. More than enough information is available to augment this narrative objective with numeric criteria, both in the Plan itself (particularly, by amending the Vernalis flow objectives and the export criteria) and in the Program of Implementation (most importantly, by requiring the establishment of flow objectives and other water quality criteria in the Sacramento and San Joaquin Basin Plans, and taking associated water right and other actions, to support attainment of the narrative objective).

Thank you for your consideration of these comments. Please contact us if you have any questions regarding this letter.

Sincerely,

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Public Comment
2009 Periodic Review
Deadline: 6/15/09 by 12 noon

CALIFORNIA FARM BUREAU FEDERATION
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June 15, 2009

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State Water Resources Control Board
c/o Jeanine Townsend, Clerk to the Board
P.O. Box 100
Sacramento, CA 95812-2000

Re: 2009 Periodic Review Staff Report Comments; and 7/7/09 Hearing on Draft Resolution Adopting Staff Report. .

Dear Chairman Doduc and Members of the Board:

The California Farm Bureau Federation ("Farm Bureau") is a non-governmental, non-profit, voluntary membership California corporation whose purpose is to protect and promote agricultural interests throughout the state of California and to find solutions to the problems of the farm, the farm home and the rural community. Farm Bureau is California's largest farm organization, comprised of 53 county Farm Bureaus currently representing approximately 91,000 members in 56 counties. Farm Bureau strives to protect and improve the ability of farmers and ranchers engaged in production agriculture to provide a reliable supply of food and fiber through responsible stewardship of California's resources.

Farm Bureau appreciates the opportunity to comment on the *2009 Periodic Review Staff Report of the 2006 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary.*

Need for Urgent Relief for Overly Burdensome Regulation:

At this rock-bottom juncture in the California's legendary "water waters" saga (not to mention the state's staggering fiscal meltdown and partisan gridlock that provide the backdrop for this unprecedented crisis in water), sanity in general and a read through of the multiple recommendations in the 2009 Draft Periodic Review Staff Report urging another turn of this or that screw and, again, of this, and still another screw, demand the question, ***"Where does it end?"***

The present periodic review comes on the heels of the recent news of still greater water supply impacts under the June 2009 NMFS OCAP biological opinion—and, before that of the December 2008 USFWS Delta smelt OCAP biological opinion, the Eastern District's interim

smelt order prior to that, and in the third in a sequence of below average and dry years, compounded by an unprecedented and on-going man-made or regulatory drought. Even as the urban and agricultural export contractors in the San Joaquin Valley, the Tulare Lake Region, Kern and Southern California have seen their water supply decimated by layer upon layer of new regulatory restrictions, the Delta ecosystem remains in free fall.

In one sense, the single-minded will of our state and federal regulators to aggressively pursue species preservation and a high standard of environmental quality without compromise bears testimony to our cultural identity as Americans and our capacity as a society to cling to lofty ideals and abstract principles, no matter what. Unfortunately, in zealously pursuing one ideal (species protection and environmental quality), it seems we have completely lost track of other important public goods and important needs of society (water supply, food supply, human beings, and the state's economy). This, then, invites another inevitable response, and that is, ***"Something must give."***

The regulatory climate currently prevailing in our state is literally throttling our economy. It threatens our way of life and our collective prosperity as a society. An historic imbalance perhaps, in terms of past disregard for the environment, has been replaced by an almost complete lack of balance or regard for established economic uses of water and for the essential functions of critical infrastructure that have fundamentally shaped and transformed the face of California as we know over the last 150 years.

A "scorched earth" mentality seems to have replaced common sense and the public interest in our institutions and radical agendas carry the day. Meanwhile, competing interests remain locked in court battles, as conditions continue to deteriorate further.

Balancing Competing Legitimate Economic and Reasonable Water Quality and Environmental Quality Objectives

The State Board's basin planning function is fundamentally intended to be a balancing process that weighs environmental and water quality considerations against competing consumptive water needs and economics and whose hallmark is "reasonable protection." In terms of its expansive water rights and water quality authorities, it was someone's accurate observation in Delta Vision that the Water Board holds most, if not all, of "the keys to the city." The question today is whether the Board will use those authorities to return balance to the state's water landscape. Will the Board use its powers to enable balanced solutions that harmonize and reconcile competing economic and environment objectives? Or will it mimic the misguided policies of regulatory agencies in the area of species protection and, instead, push the state further along the divisive path of conflict and narrow unrelenting pursuit of one set of objectives to the all but complete exclusion of all others.

Properly viewed, the Water Board must respond on not one, but two fronts: Californians have made it clear, they are committed to species protection and a high standard of environmental

quality. At the same time, however, the fact remains, our economy, our jobs, our businesses and communities, and our way of life depend on the reliable movement of water for human use. The accelerating trend of ever increasing regulation and ever diminishing water supply without allowance, accommodation, time for or means of possible adaptation, leaves farms, businesses, and people stranded. It affects or ends livelihoods and can upset years, if not generations of planning and investment in a day. In short, while it demonstrates an unflinching single-mindedness of purpose with respect to species and environment quality, it fails, completely, to take proper account of other critical needs of the state—and, ultimately, for this reason, it does not serve the broader, collective needs and interests of all Californians.

General Areas of Concern:

In addition to the obvious conclusion that various aspects of the current system are broken and in need of urgent repair, and regardless of the differing and sometimes conflicting perspectives and objectives of the various farm constituencies within the state, the California Farm Bureau has numerous general concerns related to the potential water supply, water rights and, as the case were, water quality implications of several Staff Report's recommendations on "Additional Issues" and, also, those issues the Board "Has Already Committed to Review."

Specifically, this comment would extend to the Water Board's on-going review of the ***South Delta Salinity and San Joaquin River Flow objectives***, and also to the Water Board Staff recommendations concerning consideration and possible adjustment of the current Water Quality Control Plan's existing objectives for ***Delta outflow***, ***Delta Cross Channel operations***, ***the I/E ratio***, as well as the recommendation concerning consideration of a set of potential new ***Old and River Middle flow objectives.***

Consistent with our general comments above, in approaching these issues, we would strongly urge the Board to remain mindful of its statutory obligation to balance economic and current and probable future consumptive use needs against competing water quality and environmental quality objectives.

In terms of general guidance on an approach to this periodic review and how to strike this difficult balance, a number of desirable characteristics of an updated plan would include the following:

- ***Maximum flexibility***, without compromise of core basin planning function
- ***Reasonable protection***, including potential trade-offs where necessary and appropriate to achieve overall balance and mutual protection of all beneficial uses
- Appropriate ***balancing of economic considerations*** against competing species and environmental quality concerns
- ***Forebearance from new and duplicative water standards*** where such protections are separately provided under another regulatory program (e.g., real-time monitoring and triggers in current or future biological opinions for coordinated project operations)

South Delta Salinity Standards:

Concerning South Delta salinity, any salinity standard, whether the existing standard or some adjusted standard, must in any case ensure reasonable protection of both South Delta agriculture and other beneficial uses in the system (including beneficial use upstream and outside of the Delta itself), and it is incumbent upon both the State Board Regional Boards and any affected stakeholders to cooperatively explore all feasible means of achieving such protection.

Of particular concern at this juncture, in the wake of the recently released June 2009 NMFS OCAP biological opinion prohibiting construction of such barriers, is the prior assumption that the existing standards would be achieved with permanent barriers in the South Delta. To the extent the recent biological opinion currently represents a absolute prohibition on the construction of such barriers, this situation clearly demands the immediate attention of the Board—both short-term, in terms of any impending violations under the outstanding cease and desist order against the Bureau of Reclamation and Department of Water Resources, and long-term, in the terms of a workable and lasting solution that can ensure reasonable protection of established beneficial uses in the South Delta, without disproportionate water supply impacts on other beneficial uses or water users elsewhere in the state.

In addition, current and interim solutions and Water Board planning should anticipate and proactively address potential future changes to the system that might significantly alter or affect Delta hydrodynamics, protection of beneficial uses, or long-term compliance with South Delta water quality standards.

Finally, as in all aspects of the periodic review, thorough empirical scientific and technical data and analysis, and strict observance of established due process and procedural protections of all parties, should support and guide any and all decisions relating to the South Delta salinity standards.

San Joaquin River Flows:

Farm Bureau is very concerned about the potential water supply implications of the periodic review as it relates to this topic and again urges a proper balancing of all competing interests.

Delta Outflow:

Any thought of imposing additional or more onerous outflow requirements on upstream users and project operations should be greatly tempered by the significant and now well-known post-Corbula weakening or erasure of any previous, statistically significant relationship between Delta outflow (X2) and abundance of any of a variety of species, including the delta smelt. Indeed, current population trends relative to outflow, and the increasing incidence of associated upstream coldwater and water supply conflicts, strongly suggest a need, not for harsher outflow standards, but rather for greater flexibility in terms of an adjustment of existing outflow objectives,

including possible forecasting and cumulative monthly averaging, and potential elimination or other appropriate adjustment of the costly and ineffective Roe Island trigger.

Upstream coldwater pool concerns and reservoir levels must likewise figure prominently in any review of the existing outflow standards.

Lastly, in addition to such enhanced flexibility without sacrifice of biological efficacy or ecological function, the Water Board should watch the BDCP's current exploration of potential innovative inflow-outflow hybrid approaches that seek greater balance between competing reservoir and coldwater and upstream objectives, and existing or possible modified outflow standards in the future, as a potential emerging issue.

Inflow/Export Ratio & Potential Old & Middle River Standard:

As the staff report notes, the current WQCP's existing I/E limits on exports (expressed as a function of total and SJR Delta inflow versus total combined exports of the CVP and SWP) is, in many respects, designed to achieve the same objectives as the more recent Old and Middle River ("OMR") reverse flow restrictions under the Eastern District's interim order, and now under the newly issued NMFS and USFWS biological opinions.

Some relevant questions, then, include whether there is any substantial benefit to a potential new OMR standard that is not already provided either by the existing by the I/E ratio, existing OMR restrictions under the new NMFS and USFWS biological opinions or any applicable court order, or some combination of two. If a new OMR standard in the WQCP would be merely duplicative of existing OMR restrictions in the biological opinions or under any applicable orders of the courts, then such a new standard is perhaps not necessary, so long as these surrogate standards under the ESA are met.

Some additional areas of possible relevant inquiry might include asking whether the existing I/E limits have any independent utility separate from any OMR requirement now controlling in the system and, also, undertaking an examination of any overlap, duplication, or inconsistency of purpose among the two. This inquiry should focus not only on potential biological conflicts or benefits, but also on the potential adverse water supply impacts of any change to or expansion of the existing standards.

Delta Cross Channel Operations:

The diurnal operations concept and salmon outmigration studies by Burau, et al. are clearly a promising area of inquiry, in terms of potential modifications to current gates operations that could possibly enhance fish protections and, at the same time, maintain or improve the intended dual water supply and water quality functions of the gates. The existing water quality functions of the gates are, of course, a critical consideration that must be carefully weighed and balanced against any proposed change in gate operations for the protection of fish.

Suisun Marsh Gates:

As the Staff Report notes, operations of the Suisun Marsh salinity gates can sometimes cause eastward movement of the low salinity zone ("X2"). The magnitude of this effect and, if warranted, any ways it might potentially be avoided without unduly impacting established beneficial uses, are areas of possibly useful inquiry.

Yolo Bypass Floodplain:

Modification of the Freemont Weir and more frequent inundation of the Yolo Bypass is being considered as a potential long-term conservation measure in the BDCP. In addition, steps toward near-term realization of this goal have been included as a requirements of the recently issued June 2009 NMFS OCAP biological opinion. While it appears that such an action could provide various potential benefits to native fish species, there are also, associated with this proposal, a variety of as yet unresolved agronomic, private property, and flood control issues.

In addition, it is not clear whether more frequent diversion of water from the Sacramento River into the Yolo Bypass via a modified Freemont Weir would not create a new point of diversion or place and purpose of use with an associated need for a change in water rights.

Finally, there are the water quality concerns mentioned in the text related to residual pesticides and increased mobilization and bioavailability of mercury.

Should this action proceed, all of these are issues that will need to be addressed with local stakeholders, in an eventual EIR/EIS, and in any related regulatory processes (e.g., Delta Mercury TMDL, a potential change petition, the Regional Board's irrigated lands program, through the Army Corps of Engineers or any necessary flood control-related permits and approvals, etc.).

Closing:

The California Farm Bureau thanks the Board for the opportunity to comment on the upcoming periodic review of the Bay-Delta Water Quality Control Plan.

Sincerely,

Justin E. Fredrickson
Environmental Policy Analyst

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california water impact network

California Sportfishing Protection Alliance

"An Advocate for Fisheries, Habitat and Water Quality"

June 10, 2009

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JUN 10 2009
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Jeanine Townsend. Clerk to the Board
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Subject: 2009 Periodic Review Staff Report Comments

The California Water Impact Network (C-WIN) and the California Sportfishing Protection Alliance (CSPA) have reviewed the State Water Resources Control Board's (State Water Board) Draft Staff Report for the Periodic Review of the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary and we respectfully submit the following comments.

California has both state and federal clean water laws, state and federal Endangered Species Acts and a water code that specifies in great detail how water is to be allocated, reallocated, and put to maximum and reasonable beneficial use. The present reality of a disintegrating Delta ecosystem, seriously polluted waterways and collapsing fisheries, coupled with over 500 million acre-feet of water rights in a state that has an average runoff of 77 million acre-feet[1] is a searing indictment of the failures of the State and Central Valley Boards to enforce the law.

The State Water Board adopted the Bay-Delta Water Quality Control Plan in 1995 and waited until 2003 to initiate a review that took almost three years until adoption in 2006. We note that a triennial review should be conducted every three years, but is now treated by the State Water Board as a "periodic review." In the interval, the Delta became increasingly polluted, salmon and pelagic fish populations crashed while exports significantly increased. Despite an obviously collapsing estuary, the State Water Board limited itself to largely cosmetic modifications to the 1995 Plan and postponed addressing critical threats to the Delta until the future. It now appears that these urgent issues that include the enforcement of Delta water quality standards, consideration of the reasonableness of current Delta diversions, examination of whether application of water to impaired lands is a beneficial use and interim actions to protect fisheries, water quality and the public trust must wait until the State Water Board considers, in what will assuredly be the granddaddy of all evidentiary proceedings, the proposals resulting from the BDCP and Delta Vision processes.

In other words, the effect of State Water Board inaction appears to mean that it does not anticipate considering the C-WIN/CSPA public trust, unreasonable use and method of diversion petition until the Bay-Delta Conservation Plan process more fully develops the peripheral

[1] Face value of water rights and average runoff data are found online at: http://www.waterboards.ca.gov/water_issues/hot_topics/strategic_plan/docs/final_draft_strategic_plan_update_090208.pdf, page 10, second paragraph, fifth sentence. Accessed June 5, 2009.

canal/isolated conveyance projects. By then it will be too little too late for the Pelagic Organism Decline and the collapsing Central Valley salmon runs, as well as for ocean species like the southern resident killer whale. Delay and inaction by the State Water Board is an unreasonable and unacceptable abdication of the State Water Board and its public trust responsibilities to these natural resources.

While we support many of the analyses and priorities in the draft staff Periodic Review report, we find little solace that the outcome will result in positive changes for beneficial uses, particularly the Public Trust fishery resources of the Bay-Delta. The State Water Board's consistent lack of water rights and water quality enforcement as well as its weak NPDES permitting requirements continues to ensure that the Board will utterly fail to remedy the problems of the Bay-Delta Estuary, with its preventable ecological death we fear is both inevitable and imminent.

The Governor's February 2009 Drought Proclamation makes a mockery of both the meaning of the word "drought" and efforts to protect beneficial uses and meet federal and state water quality requirements. Not only has CEQA been suspended for various legislatively unauthorized and environmentally illegal projects (namely, the Board's recent approval of the 2009 Drought Water Bank and the Central Valley Project/State Water Project Place of Use Consolidation), but also the very state law upon which this water quality planning effort is based has been suspended—Water Code Section 13247.

Furthermore, the Periodic Review outlined in the draft Staff Report recommends no action on two key issues with a strong federal nexus—fish screens on the Central Valley Project/State Water Project pumps and development of an implementation plan for the salmon doubling narrative. The screens are required in the CalFed Record of Decision, and authority for the Central Valley Project pumping plant screens is contained in the Central Valley Project Improvement Act (P.L. 102-575, Section 3406(B)(4)). The salmon doubling narrative in the 2006 Water Quality Control Plan Water Quality Control Plan is a federal mandate of Central Valley Project Improvement Act (Section 3406(b) (1), as well as State Law (Fish and Game Code Section 6902).

These issues are also brought up in the recent National Marine Fisheries Service's Final Biological Opinion on the Central Valley Project/State Water Project Operations Criteria and Plan (Salmon Biological Opinion), along with many other related issues discussed below.

Recommendations

Therefore, given the total failure of the 2006 Water Quality Control Plan to protect fisheries, and as discussed in the attached detailed comments, C-WIN and CSPA recommend that, there should be a complete revision of the 2006 Water Quality Control Plan, so that the State Water Board will:

1. At a minimum, incorporate the Reasonable and Prudent Measures contained in the Salmon and Delta Smelt Biological Opinions. These represent the MINUMUM requirements for survival of the species. They do not provide for recovery of listed or non-listed species.
2. Eliminate the Vernalis Adaptive Management Program and at a minimum, a return to the 1995/D-1641 San Joaquin River pulse flows. Examination of the recent Salmon Biological Opinion suggests that much higher flows are warranted for survival of listed species.

3. Evaluate how much water is necessary for Bay-Delta ecosystem health
4. Develop and implement fish screen criteria that results in installation of state-of-the art fish screens at the federal and state pumps—coupled with comprehensive monitoring to ensure the screens work to achieve the planned outcomes for fish protection.
5. Develop and adopt an implementation plan for the fish doubling narrative.
6. Conduct a hearing to rescind the waiver of the agricultural water quality standards, order the Central Valley Board to rescind the July 2006 waiver for agricultural discharges, and instead impose WDR's for all agricultural dischargers. As part of this proceeding, the State Water Board would reinstate the permanent standards, with responsibility borne by the federal and state projects by releasing water from reservoirs on the San Joaquin side of the Delta and by limiting pumping at the state and federal export projects.
7. Consideration and adoption of a land retirement program for drainage impaired agricultural lands in the two projects' areas of water use. C-WIN and CSPA continue to contend that irrigation of these saline seleniferous lands is a wasteful and unreasonable use of water in violation of Article X, Section 2 of the California Constitution.
8. Include water right investigation, enforcement and other activities in the Water Quality Control Plan monitoring program to ensure adequate river flows and water quality for fisheries.
9. Determine that there will be fish passage at Central Valley watershed rim dams.
10. Provide dedicated cold water storage in rim reservoirs to sustain suitable temperatures for salmon and delta fisheries per the recent National Marine Fisheries Service (NMFS)[2] and U.S. Fish and Wildlife Service Biological Opinions[3] on the Central Valley Project/State Water Project Operations Criteria and Plan.
11. Conduct an interim evidentiary hearing to investigate salt loading caused by delivery of Delta water to the San Joaquin Valley and impose terms and conditions in permits to control salt loading to the San Joaquin River and Delta.
12. Prevent redirected impacts to the Trinity River and other tributaries from Delta operations.
13. Conduct an interim evidentiary hearing to investigate increased exports and reverse flows in Old and Middle Rivers and consider terms and conditions in permits to protect the Delta ecosystem from the effects of the increased export of, so called, "surplus" water.
14. Direct, as an immediate enforcement matter, the Department of Water Resources to halt all Delta diversions until such time as approval from the California Department of Fish and Game under the California Endangered Species Act is obtained.
15. Conduct an evidentiary hearing to receive evidence and recommendations from fishery and water agencies on how to minimize the impact of warm water discharges from rim dams on salmon and other affected species, including interim emergency measures.
16. Develop Selenium standards for acute and chronic fish and animal tissues addressing concerns about bioaccumulation raised in US Fish and Wildlife Service research[4] and REQUIRED by the Biological Opinion for the California Toxics Rule by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service.[5]

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[2] See http://swr.nmfs.noaa.gov/ocap.htm

[3] See http://www.fws.gov/sacramento/es/documents/State Water Project-CVP_OPs_BO_12-15_final_OCR.pdf

[4] Also see http://www.calsport.org/toxicityofSeleniumtoSalmonids-for.pdf

[5] U.S. Fish and Wildlife Service and National Marine Fisheries Service. Biological Opinion on Final Rule for the Promulgation of Water Quality Standards: Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California. March 24, 2000.

17. Develop a focus on water use efficiency, rather than water supply development, to both reduce demand and improve water quality.
18. Create a comprehensive monitoring program for the Bay-Delta

Conclusion

As noted, the draft staff Periodic Review report contains many good analyses and recommendations, some which address our recommendations above; yet some do not. C-WIN and CSPA believe that the State Water Board is complicit in a plan to increase exports from the Bay/Delta watershed, subverting its ecological health while appearing to investigate and modify the water rights of in-watershed users. In so doing, the State Water Board repeatedly contravenes basic rules of water law from upholding water right priorities to flow and quality regulation, to acceding to "emergency" suspension of its environmental planning authority. Watershed of Origin statutes and the corresponding first in time, first in right seniorities held by upstream water users are being reversed in favor of export water suppliers because of their tremendous political influence.

The State Water Board focus is narrow and technical- solely on process, rather than keeping its eye on water policy substance, at the expense of any water regulation and policy vision, and political relevance to the desires of the people of California for flowing rivers with healthful and productive ecosystems. Even the destructive CalFed process recognized at a minimum that the environmental damage caused by dams, diversions, and export uses played a significant role in the damage done to California's aquatic environment. The State Water Board seems to take only a drowsy interest in such things at present.

The State Water Board in this "periodic review" is again failing to rouse itself to use its ample legal authority to protect California's environment and economy and is again failing to enforce the California Constitution and statutes, including Article 10, Section 2. The State Water Board appears unwilling to investigate damage done by permit holders under applicable Water Code sections regarding water rights and water quality, and thus neglects its duties as the state water quality regulator under the federal Clean Water Act and the California Porter-Cologne Act. The State Water Board has an "affirmative duty"[6] to regulate the conditions of water rights and water quality to prevent the destruction of the public trust.

We have little confidence that this Periodic Review of the 2006 Water Quality Control Plan will lead to widespread compliance with California water law and protection of beneficial uses. Unfortunately, this plan does not contain the requisite analysis or strategy to improve the California environment, nor convince permitted water diverters that the future of California water enforcement will be anything more than "business as usual." C-WIN and CSPA urge the State Water Board to vigorously enforce California water law for the protection of the environment as suggested above and discussed in detail in the attached comments.

We also note that the requirement to provide 15 copies of comments on a DRAFT Staff Report can only be construed as a deliberate effort to prevent or deter public participation. Even for enormous water rights hearings, only five copies are required. In an electronic age it is absurd to require hard copies of comments on a DRAFT staff report for a Triennial Basin Plan Review.

[6] See National Audubon Society vs. Superior Court http://www.monobasinresearch.org/legal/83nassupct.html

C-WIN/CSPA Comments on Staff Report for Periodic Review of the 2006 WQCP for San Francisco Bay/Sacramento-San Joaquin Delta Estuary

Absent meaningful enforcement by the State Water Board, we are left with little recourse but to encourage the U.S. Environmental Protection Agency to rescind California's authority under the Clean Water Act for the Bay-Delta, and to promulgate and implement its own Bay-Delta Water Quality Control Plan and assure NPDES permitting authority for the State of California.

Respectfully submitted,

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Senator Dianne Feinstein
Hon. George Miller, 7th District, US Congress
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Hon. Fran Pavley, Senator 23rd District
Hon. Jared Huffman, 6th Assembly District, State of California
Lisa Jackson, USEPA Administrator
Laura Yoshi, Acting Regional Administrator, USEPA Region IX
Rodney McInnis, SW Regional Administrator National Marine Fisheries Service
Lester Snow, Director, California Department of Water Resources
Donald Glaser, Regional Director, Mid-Pacific Region, US Bureau of Reclamation
Ren Lohoefener, Regional Director, US Fish and Wildlife Service
Barbara Vlamis, General Manager, Butte Environmental Council
Barbara Barrigan-Parrilla, Executive Director, Restore the Delta
Dante J. Nomellini, Counsel, Central Delta Water Agency
John Herrick, Counsel, South Delta Water Agency

C-WIN/CSPA Comments on Staff Report for Periodic Review of the 2006 WQCP for San Francisco Bay/Sacramento-San Joaquin Delta Estuary

DETAILED COMMENTS ON PERIODIC REVIEW OF 2009 WATER QUALITY CONTROL PLAN

I. Background

It is the generally accepted view in the environmental and fishing communities, shared by C-WIN and CSPA, that the State Water Board has failed to properly carry out its constitutional and statutorily duties to both protect the public trust, and to prevent waste and unreasonable use of water in California. Over the course of many years, the State Water Board has chosen to act as a secondary player in the on-going saga of water supply and environmental problems in the State. As noted by the Governor's Delta Vision Task Force, the State Water Board "*enforces its own laws and regulations poorly or not at all.*"

As will be clear by our specific comments contained herein, our experience before the State Water Board is that the Board's continued failures to properly enforce the Water Code and environmental laws is directly responsible for the present pelagic organism crash and that it is mostly responsible for the looming failure of the California water supply system.

We agree with these words of the Delta Vision task force:

> *"With respect to the water system, California already possesses a strong constitutional and statutory foundation for carrying out the recommendations of the [Governor's Delta] Vision. Yet key agencies and institutions too often lack consistent political support for certain missions, or are simply under-funded. As a result, the existing water governance structure enforces its own laws and regulations incompletely, unevenly, and on the basis of insufficient information.*
> *Measurement, reporting, and enforcement capabilities are all inadequate. In a state where the "reasonable use" of water is mandated by the Constitution itself, this is an unacceptable state of affairs."*
>
> Delta Vision Strategic Plan draft p. 13, lines 20-27.

In an attempt to help remedy these long-standing failures, in March of 2008, C-WIN and CSPA filed a complaint with the State Water Board's complaint division to provide sufficient information to cause the State Water Board to investigate the State Water Project and the federal Central Valley Project for public trust and unreasonable use and unreasonable methods of diversion violations at their respective diversion facilities in the Delta. While we have dropped our litigation on that complaint, our concerns remain and we will use every opportunity available to point out the failures of the State Water Board regarding wasteful and unreasonable use and method of diversion by the Central Valley Project and State Water Project. We reiterate our request for such a hearing in this letter.

Again, as the Governor's Delta Vision Task Force makes clear:

> *"With respect to the ecosystem, enforcement of laws and regulations is driven more by court decisions than by any comprehensive long-range plans for ecosystem recovery. This introduces great uncertainty into water management and ecosystem management alike. It also tends to force environmental management agencies into a reactive posture focused on legal compliance rather than on proactive restoration of a*

badly degraded ecosystem"

Delta Vision Strategic Plan Draft, p.13, lines 29-34.

This strongly suggests that California's current water regulation regime resembles the condition the state faced by 1913, when its water bodies were plagued by wide-spread lawsuits in the absence of a coherent system of water regulation. Since 1914, we have had a Water Code, and since the late 1940s there has been some form of water pollution control regulation; yet here we are.

Our skepticism comes from problems that are already well established: the State Water Board organization's clear administrative problems, the fragmented nature of regulatory oversight affecting water resources in general in the State, the lack of qualified State Water Board staff, and the lack of resources from the Governor and other state officials in charge of budgets- and now additional staffing cuts due to the State budget deficit. What the proposed Periodic Review of the 2006 Water Quality Control Plan will not do is solve any of California's well-documented water problems; it simply proposes various slow responses while accepting a largely failed regulatory framework dating back to the Bay-Delta Accord of 1994. We now believe the failure of the Accord and CalFed is obvious in the record of the Pelagic Organisms Decline and the commercial salmonid fishery closures of 2008 and 2009. The Board's torpor on this obvious situation testifies to its apparent indifference to California's water and ecological problems.

II. C-WIN and CSPA's General Comments On The Staff Report for Periodic Review of the 2006 Water Quality Control Plan.

The proposed Periodic Review in the Staff Report describes a suite of activities the State Water Board will undertake over the next three years to amend the Water Quality Control Plan better to protect beneficial uses of water, as required by the federal Clean Water Act (Section 303(c) (33 U.S.C., § 1313(c)) and the California Water Code (Section 13240).

Unfortunately, the proposed Periodic Review and the board's continued dismal performance (such as continued lack of enforcement against the Bureau of Reclamation and the California Department of Water Resources for violation Cease and Desist Orders No. 262.31-16 and 262.31-17 of Delta salinity standards contained in the Water Quality Control Plan) evidences little appreciation or understanding of the gravity or nature of the accelerating disintegration of the Delta's ecosystem and is essentially a justification for the status quo. It implies or promises progress where little exists, ignoring reasonable interim actions that would ensure collection and development of information critical to the success of any long-term programs, let alone ensure protection from clear and present dangers to Delta ecosystems.

The State Water Board seems to have largely decided on a business-as-usual approach while waiting for the Bay-Delta Conservation Plan (BDCP) and Delta Vision processes to be finalized. It is likely to be a long wait. BDCP represents the most complicated and ambitious habitat conservation plan ever envisioned in the nation coupled with a massive scheme to hydrologically modify the core of California's water circulation system. BDCP's anticipated time schedule is absurdly optimistic and the unprecedented effort will almost certainly be substantially delayed, if it survives at all. California's fisheries may not survive in the interim. Moreover, the Bay Delta Conservation Plan is premised on a balancing of economic with ecological concerns, and is thus a demotion of ecological protection in light of the substantive authorities the State Water Board has available to it to enforce in its jurisdiction. The State

Water Board waiting for the Bay Delta Conservation Plan proceeding's outcomes is akin to the Board proceeding with a hand tied behind its back and one eye covered. The Bay Delta Conservation Plan in this light resembles more a calculated effort to design effective extirpation of vulnerable Delta ecosystems and listed species, likely outcomes of the co-equal position, as compared with analyses by the Public Policy Institute of California's team in their July 2008 report on *Comparing Futures for the Sacramento-San Joaquin Delta*. There, the coequal position of economic and ecological concerns in the Delta led clearly to a substantially reduced likelihood of long-term survival by vulnerable fish species. The State Water Board must not remain a conscientious objector to actions necessary to ensure the survival of species already languishing on the brink of extinction.

The proposed Periodic Review for the Water Quality Control Plan ignores crucially needed emergency measures to address the current crisis in Delta fisheries. It is silent on each of the following questions:

1. How much water does the Delta really need?

There is no effort outlined in the Periodic Review or contemplated in parallel proceedings (Delta Vision, BDCP, SDIP, etc.) to determine how much water the Delta requires to maintain a stable ecosystem or how various levels of reduced exports would affect south-of-Delta water users. Indeed, the Department of Water Resources (DWR) and the U.S. Bureau of Reclamation (Bureau) have strenuously resisted calls by resource agencies and the environmental and fishing community to determine how much water the Delta needs before embarking on projects to increase water exports.

The State Water Board should schedule an interim evidentiary hearing to collect evidence on how much water is required to maintain the Delta ecosystem and what impacts potential reductions on exports would have on water users. If such information is unavailable, the State Water Board should order Department of Water Resources and the Bureau to undertake such studies in a timely manner as a condition of their permits. C-WIN and CSPA believe that the evidence submitted for the hearings on D-1630 (draft order) and its predecessor, the **October 1988 Draft Water Quality Control Plan for the San Francisco Bay/ Sacramento-San Joaquin Delta Estuary**[7] would provide ample information on the water needs for a healthy Delta.

2. How Will the Board Create and Manage a Comprehensive Delta Monitoring Plan?

With the exception of salt and mercury, there is a paucity of reliable information on the concentration, fate and transport of contaminants in the Delta, despite the fact that many of these pollutants are highly toxic and bioaccumulate in fish and wildlife. These pollutants also pose a threat to human health. Water quality has been identified by the POD workgroup as one of the three likely causes of the decline of pelagic species. An understanding of the fate and transport of these pollutants is critical to both the restoration of fisheries and any future projects that contemplate a modification of the hydrologic regime. Historical environmental analyses have focused almost exclusively on salt and several drinking water contaminants. The present lack of information on the array of toxic contaminates present in the Delta precludes any legally defensible environmental analysis of future projects. CSPA has long urged both the State and Central Valley Boards to establish a comprehensive Delta-wide monitoring program similar to

[7] See http://www.fishcalendar.net/cac/SWRCBs_1988_draft_Bay-Delta_water_quality_plan.pdf

those conducted by the San Francisco Estuary Institute in San Francisco Bay and the Sacramento River Watershed Program in the Sacramento River, and should strive to integrate the Delta program with its up- and downstream cousins to help establish the tracking needed to assess fate and transport issues.

The State Water Board should schedule an interim evidentiary hearing to collect evidence and recommendations on the scope of an adequate contaminant monitoring program for the Delta. The Department of Water Resources, Bureau and other beneficiaries of Delta exports should be directed to timely establish the Delta monitoring program, as a condition of their permits.

3. When Will Necessary State-Of-The-Art Fish Screens Be Required On Delta Export Pumps?

Screening of agricultural diversions on Delta tributaries accomplishes little if the Banks and Jones pumping plants subsequently destroy fish bypassing agricultural screens. New fish screens at the export pumps would drastically reduce entrainment of virtually all of the pelagic and salmonid listed pursuant to state and federal endangered species acts. New state-of-the-art fish screens were required mitigation measures in the CalFed Record of Decision. Evaluation of the success of the *installed* new fish screens was to occur *before* further consideration of a peripheral canal. The new screens at the Contra Costa intake have only recorded the entrainment of a single Delta smelt since they were constructed (much different than the 26,000 Delta smelt killed by the project pumps between June 1 and June 24 of 2007). The screening project was mothballed after MWD and the State Water Contractors, the beneficiaries of the State Water Project and Central Valley Project, stated that they would not pay for them. The first units of the new screens would have been in place today had the water contractors not refused to pay for them. Had they been in front of Clifton Court Forebay, which would have eliminated most of the current predation occurring in the Forebay (Forebay predation is the largest cause of mortality for most species "taken" by the pumps), and significantly improved salvage and survivability of many other species presently in precipitous decline, including salmon, steelhead, splittail, threadfin, American shad, longfin, striped bass, etc.

The required state-of-the-art screen project also encompassed improved new salvage facilities, transportation methods and improved release methods and new release areas. The new screens would have significantly reduced the approach velocity of water and new screen openings would have been reduced from the present one-inch to a couple of millimeters (thereby preventing most smelt from going down the DMC to Los Angeles).

A component of the new screen project would have been an accelerated and intensified effort in improving survivability of smelt. Indeed, survival rates of salvaged Delta smelt are improving. Recent results from Pit-tag (passive integrated transponder tags) monitoring show that approximately 33.3 percent of Delta smelt salvaged survives collection, transport and release back into the Delta (14 percent at the Central Valley Project). Unfortunately, most smelt that reach the present screens pass through them and are never diverted to the salvage buckets.

As previously noted, under CalFed an evaluation of the success of the installed new fish screens was to occur before further consideration of a peripheral canal. Clearly, it cannot be claimed that money is an obstacle to construction of new screens, considering the estimated costs of proposed new reservoirs and a peripheral canal. The State Water Board should mandate the timely installation of state-of-the-art fish screens as mandated by the CalFed

Record of Decision as a condition of water exports out of the Bay-Delta estuary, and the Water Quality Control Plan should include this element under issues recommended for further review.

4. What New Conditions On Export Pumping Will Be Implemented In Light Of Increased Water Exports And Resulting Reverse Flows To Protect The Bay/Delta Ecosystem?

The average of State Water Project and Central Valley Project exports in the 1970s were 1.430 MAF and 2.141 MAF, respectively. Exports in the 1980s averaged 2.425 MAF (State Water Project) and 2.519 MAF (Central Valley Project). During the 1990s, average exports were 2.305 MAF (State Water Project) and 2.219 MAF (Central Valley Project). Exports dramatically increased between 2000 and 2007 to an annual average of 3.251 State Water Project and 2.590 MAF (Central Valley Project).

Additionally, average annual exports to Contra Costa Water District and the North Bay Aqueduct significantly increased from 90 TAF and 0 TAF, respectively, in the 1970s to 121 TAF and 49 TAF in the 2000s. In other words, total average annual exports from the South Delta increased from 3.662 MAF during the decade following approval of the subject water rights to an annual average of approximately 6.008 MAF between 2000 and 2007.

The dramatic increase in the level of exports, beginning in 2003 coincided with the crash in pelagic species populations. For example, exports in 2003, 2004, 2005, 2006 and 2007 were 6.323 MAF, 6.145 MAF, 6.470 MAF, 6.315 MAF and 5.806 MAF, respectively. More recently, in water year 2008 during a second year of low unimpaired flows and regulatory and judicial intervention into the Pelagic Organism Decline, Delta exports slowed to 3.741 MAF.

The availability of water for these increased exports apparently came from "surplus" water made "available" by the Monterey Agreement, signed by DWR and contractor parties in 1994; resulting amendments took effect over a number of years but were mostly executed by 1999. The Third District Appellate Court ruled the Monterey EIR invalid in 2000. When the State Water Board issued D-1641, it could not have been aware that exports would dramatically increase in the ensuing years and could not have anticipated the environmental consequences resulting from the significant increase in exports.

The State Water Board should conduct an interim evidentiary hearing to investigate increased exports and reverse flows in Old and Middle Rivers and consider terms and conditions in permits to protect the Delta ecosystem from the effects of the increased export of, so called, "surplus" water.

5. Addressing Current Salt Loading to the San Joaquin River and Delta

Delta salinity standards continue to be violated with impunity. Both the 1995 Water Quality Control Plan for the Delta and D-1641 directed the Central Valley Board to move the salt compliance point upstream of Vernalis. Fourteen years later, the Central Valley Board has still not released the proposed upstream salinity objectives.

The State Water Board assigned Department of Water Resources and the Bureau the responsibility for meeting salinity objectives in the 1979 Delta Plan, D-1485 and the 1995 Delta Plan and D-1641. Salinity standards continue to be routinely violated. The San Joaquin River Salinity and Boron TMDL assigns responsibility for controlling salt delivered to the San Joaquin Valley from the Delta to the Bureau. The Bureau's salt load reductions are to be addressed

through a joint Management Agency Agreement with the Central Valley Board. Unfortunately, despite signing the Management Agency Agreement, the Bureau is still claiming sovereign immunity (despite a specific waiver of sovereign immunity in Central Valley Project Improvement Act (P.L.102-575) Section 3406(b)) and, while promising some level of cooperation, refuses to accept specific enforceable load limits that will actually lead to reductions in salt loading to the San Joaquin River. The State Water Board had indicated in D-1641 that source control is the preferred method of addressing Southern Delta salinity, yet the Board's actions do not correspond with this. Instead, the State Water Board seems truly dedicated to avoiding source control.

To resolve this impasse, the State Water Board should conduct an interim evidentiary hearing to investigate salt loading caused by delivery of Delta water to the San Joaquin Valley and implement terms and conditions in permits to control salt loading to the San Joaquin River and Delta. This will resolve any question of whether the Regional Board has the authority to issue WDRs or require the Bureau to commit to specific reductions in salt loading. Meaningful reductions in salt loading of the San Joaquin River will also lead to a reduction in the use of New Melones water to meet the Vernalis objective, thereby freeing up clean Stanislaus River water for beneficial uses, not the dilution of pollution.

6. When Will Water Storage Levels Be Increased to Protect River Flows and Temperatures for Fish Protection in the Likely Event of Dry Water Years in the Future?

Water storage in Shasta and Oroville were recently at historic lows and would be much lower if not for late season storms. While storage levels in 2009 have recovered somewhat, the principle cause of this earlier shortfall is the cannibalization of north-of-Delta storage over the last several years to provide unrealistic water allocations during 2 years of drought and to supply south-of-Delta storage in Semi-Tropic and Kern water banks and Diamond Valley Reservoir. The State Water Board and the Department of Water Resources should require these facility owners to report their storage levels using real-time methods for uploading online, so that more realistic and honest appraisals of the state's water supply picture can occur as the Department and the U.S. Bureau of Reclamation develop their allocation forecasts each year. Unless the approaching water year proves to be extremely wet, next years' instream flows on the Feather, Sacramento and Yuba rivers are likely to approach record lows with accompanying high water temperatures. The Trinity River can also expect high water temperatures in the event of another dry year. These low flows and high temperatures will likely cause and contribute to increased pre-spawn mortality and reductions in spawning and rearing habitat, temperatures lethal to salmonid eggs and larvae and increases in pollutant concentration. Given the dramatic crash of pelagic species and the recent acceleration in the long-term decline in salmonid escapement, these expected low flows with poor water quality and low temperatures could trigger a catastrophic disaster to fisheries already hovering on the edge of extinction.

The State Water Board should immediately schedule an evidentiary hearing to receive evidence and recommendations from fishery and water agencies and the general public on possible interim emergency measures that may be implemented to reduce or mitigate this potential disaster to already depressed fisheries.

7. When will the Department of Water Resources obtain CESA Clearance for its Delta Pumps?

Department of Water Resources continues to operate the State Water Project pumps without appropriate clearance from the Department of Fish and Game under the California Endangered Species Act (Fish and Game Code Section 2081 et seq). As determined by Judge Frank Roesch in Alameda County Superior Court, the Department of Water Resources has no CESA approvals to "take" Delta smelt. The State Water Board should condition continued Delta exports upon receipt of a "2081" permit from CDFG. The Board missed an opportunity to do so when it issue Order WR 2009-0033 in late May 2009 amending Department and Bureau permits to consolidate the places of use of water in their projects.

III. Survey of Failed State and Regional Board Programs

The State Water Board's 2006 Water Quality Control Plan for the Bay-Delta is a case history of how and why the Delta's ecosystem is imploding. Beyond the big questions we pose in the previous section, there are numerous problems, gaps and leadership failures in State and Regional Water Board programs that bear on the Periodic Review of the 2006 Bay-Delta Water Quality Control Plan. For example:

1. **Water Quality and Contaminant Control**

The State Water Board pays lip service to the control of the largest sources of water quality impairment and controllable pollutant loading into the Delta and its tributaries. While recent information (including research reviewed in the draft Periodic Review staff report) has, perhaps, refined our understanding of these issues, the causes and sources of these problems and the actions necessary to reduce or eliminate them have been known for decades. The State and Regional Water Boards identified salt and selenium impairment of the San Joaquin River and Delta, organophosphorus (OP) pesticides in the Sacramento and San Joaquin Rivers and Delta, low dissolved oxygen in the Stockton Ship Channel, agricultural pollution and the problems of municipal wastewater and stormwater discharges many, many years ago. The sources and actions necessary to address and eliminate them have also been long known. The statutory authority and regulatory tools to address them have existed since the 1970s.

Unfortunately, what has been absent is the political will to meaningfully attack these problems. The State Water Board continually avoids opening its own regulatory toolbox, minimizing long-overdue regulatory enforcement and focusing instead on historically ineffective stakeholder and voluntary processes. This continues a long-standing State and Regional Waterboard policy of denial and delay. The Periodic Review now before the Board essentially foreshadows business-as-usual. The refusal to control pollution at its sources (including "nonpoint" sources as they occur in the drainage problem lands of the San Joaquin Valley) undermines any claims that the State Water Board has a serious commitment to protect and restore the Delta.

Meanwhile, the Delta and its tributary waters continue to receive increasing loads of an array of pollutants, many already identified as "impairing" beneficial uses. Indeed, the Central Valley Regional Board now proposes a 303(d) delisting of a portion of the San Joaquin River and Salt Slough for selenium. Selenium concentrations are below the current standard of 5 ppb, but U.S. Fish and Wildlife Service and National Marine Fisheries Service have identified that 2 ppb of Selenium would be required to protect endangered fish and wildlife.[8]

[8] U.S. Fish and Wildlife Service and National Marine Fisheries Service. Biological Opinion on Final Rule for the Promulgation of Water Quality Standards: Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California. March 24, 2000.

Additionally, the Central Valley Board is proposing a 303(d) delisting of the San Joaquin River below Vernalis for electrical conductivity (salinity), even though examination of USGS recording stations show ongoing violations of the electrical conductivity standard.

a. **NPDES Program.** The State Water Board continues in denial and silence about failures of the NPDES permitting program controlling discharge of almost two billion gallons per day into the Delta watershed (1.2 BGD in the actual Delta) from some 64 municipal wastewater treatment plants and 62 industrial dischargers. The Central Valley Board is allowing flow limits and, in many cases, the mass loading of pollutants to be increased in many, if not a majority, of permit renewals (every five years). Frequently, these renewed permits allow for increases in loading of pollutants identified as actually "impairing" a water body. This travesty, if allowed to continue, will only worsen as the Delta region urbanizes further.

State and federal antidegradation requirements are routinely ignored. For example, over the last three years, the Central Valley Board has allowed increased discharge of impairing pollutants into the Delta from Stockton, Manteca, Tracy and Lodi, among others. Indeed, they even issued a new permit to the new city of Mountain House to discharge impairing pollutants into Old River, one of the most degraded areas of the Delta.

The State Water Board continually fails to acknowledge or discuss the failure of the municipal stormwater programs to reduce mass loading of toxic and impairing pollutants. Not a single municipality discharging stormwater pollutants into the Delta or its tributaries can document or quantify any reductions in the mass loading of pollutants over the last twenty years. Neither has the Central Valley Board incorporated enforceable TMDL waste load allocations developed in TMDLs in recently issued MS-4 permits.

b. **Irrigated Lands Program.** Agricultural dischargers are the largest source of pollution to Central Valley waterways. The Periodic Review fails to acknowledge or discuss the failure of the Irrigated Lands Program to reduce the mass loading of toxic and impairing pollutants. The Irrigated Lands Program is implemented through waivers of Waste Discharge Requirements (WDRs). The Irrigated Lands Program is, perhaps, the single most graphic example of the failure of the State and Central Valley Boards to protect water quality.

Monitoring data collected by the Central Valley Board, University of California at Davis researchers, and agricultural coalitions, among others, establishes that discharges from irrigated lands represent the largest source of toxic and other pollutants to Central Valley waters. In 2007, The Central Valley Board released a landmark draft report presenting the first region-wide assessment of data collected pursuant to the Irrigated Lands Program since its inception in 2003. Data collected from some 313 sites throughout the Central Valley reveals that: 1) toxicity to aquatic life was present at 63 percent of the monitored sites (50 percent were toxic to more than one species), 2) pesticide water quality standards were exceeded at 54 percent of sites (many for multiple pesticides), 3) one or more metals violated criteria at 66% of the sites, 4) human health standards for bacteria were violated at 87 percent of monitored sites and 5) more than 80% of the locations reported exceedances of general parameters (dissolved oxygen, pH, salt, TSS). While the adequacy of monitoring (i.e., frequency and comprehensiveness of monitoring) varied dramatically from site to site, the report presents a dramatic panorama of the epidemic of pollution caused by the uncontrolled discharge of agricultural wastes.

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Since conditional waivers were originally adopted in 1982, and subsequently in 2003/4 and 2006, the Central Valley Board has been unable to identify a single improvement in water quality or, indeed, a single pound reduction in the mass loading of agricultural pollutants that has been achieved by the Program (other than a reduction in application of organophosphorus pesticides as farmers switched to more potent and less expensive pyrethroids).

Under the agricultural waivers, the Central Valley Board does not know:

- who is actually discharging pollutants,
- the points of discharge,
- the quantities or concentrations of discharged pollutants,
- the actual impacts of those discharges on local receiving waters,
- whether any management measures (e.g., best management practices) have been applied,
- Or whether applied best management practices are effective.

The monitoring programs established by agricultural coalitions are grossly deficient and incapable of identifying "bad actor" dischargers. Unfortunately, since the Central Valley Board does not know the actual identities of dischargers or the quantities or concentration of discharged pollutants, it must depend upon the goodwill of agricultural coalitions over which it has no enforcement powers other than the appropriate but now politically difficult step of revoking a waiver covering thousands of farms spread over millions of acres (Note: Cleanup & Abatement Orders, Cease & Desist Orders and Notices of Violation can only be issued to actual dischargers).

It should be noted that the waivers essentially ignore the required elements of the state's Nonpoint Source Control Program. These mandated requirements include: 1) a description of best management practices, the process used to select or develop best management practices and the process used to ensure and verify best management practice implementation; 2) specific implementation time schedules and quantifiable milestones to measure progress; 3) sufficient feedback mechanisms to ensure proper evaluation and determine whether additional best management practices are required and; 4) specific consequences for failure to achieve goals.

CSPA and San Francisco Baykeeper appealed the Central Valley Board's July 2006 adoption of agricultural waivers to the State Water Board. State Water Board technical staff reviewed the appeal and, in a series of draft reports concluded that: 1) discharges from irrigated agricultural lands have violated water quality standards; 2) agricultural coalitions have failed to comply with conditions of the waiver; 3) the Central Valley Board cannot or will not enforce fundamental waiver conditions; 4) the monitoring and reporting program is deficient; 5) the waivers lack specific time schedules for key elements of the program; 6) waiver conditions do not ensure pollution reductions by individual farms; 7) the size of coalitions is unmanageable and should be limited to subwatersheds; 8) the waiver should address groundwater protection; 9) the waiver is not consistent with the state's nonpoint source policy and; 10) the waiver should be remanded back to the Regional Board for recommended amendments.

However, in an astonishing disregard of the public trust and water quality, senior board management informed staff that they didn't want the waivers remanded and directed staff to prepare a final report upholding the waivers. CSPA and Baykeeper subsequently filed a lawsuit that is pending.

The State Water Board should order the Central Valley Board to rescind the July 2006 waiver for agricultural discharges and instead impose WDR's for all agricultural dischargers, perhaps even *before* a judge orders them to.

c. **Lack of staff resources.** The draft staff Periodic Review report fails to discuss or acknowledge the fact that the state has deprived the Central Valley Board of sufficient resources to carry out their statutory responsibilities to control discharges of toxic and other pollutants into the state's waters. We provided the information below to you last year, and to the best of our knowledge, we're unaware of conditions having meaningfully improved since that time.

The Executive Officer of the Central Valley Board, Ms. Pamela Creedon, acknowledged in a August 2007 presentation to the State Water Board title *State of the Central Valley Region* that the Board has only: a) 12 percent of the staff minimally necessary to regulate stormwater discharges (NPDES), b) 37 percent of those necessary to control municipal wastewater discharges (NPDES), c) 26 percent of those necessary to issue WDRs and d) 16 percent of those required to regulate dairies, e) 22 percent of the staff crucial to enforcing conditions of the controversial agricultural waivers, and f) only 11 of the 38 people necessary for the basin planning unit to update the Basin Plans that are fundamental to all Board actions. The Board's surface water ambient monitoring program has only 2 person-years (PYs), its enforcement unit is assigned only 3.5 PYs, the water quality certification unit has only 2.6 PYs to process more than 400 certifications annually.

Further, the underground storage tanks unit has only 17 of 41 staff needed for several thousand cases, the timber harvest unit has only 9.2 PYs to regulate and monitor discharges from thousands of timber projects covering 45 percent of the state's harvested timber and the Title 27 unit has only 40 percent of those needed to regulate leaking landfills and surface impoundments. And finally, the Board has only 16 PYs to develop, implement and monitor TMDLs covering over 300 waterbody/pollutant combinations identified as "impaired" throughout the Central Valley.

Given these serious staffing shortages, the Water Boards cannot claim to be serious about controlling the pervasive degradation of the Delta caused by increasing loads of a vast array of pollutants. Especially, as they have embraced more intractable stakeholder or voluntary programs throughout the Strategic Periodic Review. Stakeholder-driven voluntary programs require far more staff resources and considerably longer timeframes than direct regulatory permit issuance and enforcement. The history of water quality regulation in the Central Valley is littered with failed stakeholder programs. The plain fact is that neither the State nor Regional Board can identify a successful stakeholder process that has documented quantifiable reductions in pollutant loading and improvements in water quality. However, the Boards can point to regulatory successes that do result in documented quantifiable reductions in pollution (for example, Grassland WDRs and the Rice Herbicide Prohibition).

d. **Total Daily Maximum Loads (TMDLs).** The factual history of TMDL development and implementation in the Central Valley undermines the claims and goals for the 2006 Water Quality Control Plan. The State Water Board's descriptions of the goals and implementation of TMDLs resemble fiction more than fact. Adopted TMDL implementation plans rarely have enforceable load and waste load allocations. Indeed, the State and Central Valley Board have frequently employed TMDLs as "rabbit holes" in an effort to avoid the political repercussions that would likely accompany prompt direct action.

An example of such a "rabbit hole" is the Board's refusal to comply with the explicit requirements of the Bay Protection and Toxic Cleanup Program. In 1989, the California Legislature mandated a program requiring the State and Regional Boards to identify and clean up toxic hot spots (Water Code §§ 13390 et seq.). Ten years later, in 1999, the State Water Board belatedly identified the Delta as a toxic hot spot for mercury, low dissolved oxygen in the Stockton Ship Channel and pesticides from agricultural return flows and dormant spray runoff. The Sacramento and San Joaquin Rivers were identified as Toxic Hot Spots because of pesticides in agricultural return flows and dormant spray runoff. Stockton and Sacramento urban waterways were identified as Toxic Hot Spots because of pesticide runoff and low dissolved oxygen.

The Central Valley Board was granted variances for the pesticide cleanup plans. Following a successful lawsuit by Bill Jennings and Deltakeeper, revised pesticide cleanup plans were adopted in 2003. However, rather than comply with specific mandates to, within one year, reevaluate and revise WDRs of dischargers identified as causing or contributing to Toxic Hot Spots in order to prevent or eliminate these hot spots (Water Code § 13395), the Water Boards elected to implement the program through TMDLs. Little has changed in the ten years following adoption of the cleanup program; i.e., Toxic Hot Spots continue to plague the Delta and its tributaries.

Despite adopting TMDLs for selenium and boron, the State Water Board refuses to look realistically at land retirement and the issue of wasteful and unreasonable use related to irrigation of drainage problem lands in the western San Joaquin Valley. A graphic example is implementation of the San Joaquin River's Selenium TMDL. Despite a 2009 deadline for compliance with 5 ppm selenium (4 day average) standard for the Grasslands Bypass Project discharges into Mud Slough and the San Joaquin River, it appears that the State Water Board and Central Valley Board are more than willing to grant a 10-year delay through an upcoming Region 5 Basin Plan Amendment.

The additional 10-year waiver of the 5 ppb/4 day average selenium standard in the TMDL is proposed because neither technology nor funding is available to treat the toxic contamination created by irrigation of saline, seleniferous lands. Currently, discharges from the Grasslands Bypass Project (GBP) contain a monthly average discharge of 54 ppm of selenium. It also contains high levels of salt, boron and mercury. The GBP Draft EIS/EIR did not contain any alternative examining land retirement, as well as requirements for mandatory inclusion for all landowners within the GBP. The State Water Board and Regional Board refuse to examine the root cause of the drainage problems—applying good water to bad land. Now that Proposition 50 funding for the GBP's treatment (reverse osmosis) plant is not forthcoming due to the State budget, there is no justification for further leniency in implementing the TMDL other than to maintain the status quo. Land retirement remains the most feasible option here.

Numerous government studies identify the high economic and environmental cost of continuing to irrigate these lands, and that the only reliable solution to reverse the drainage problem is to halt irrigation of these lands. The National Economic Development analysis for the San Luis Drainage Feature Re-Evaluation found the alternative with the least amount of land retirement (In-Valley Groundwater Quality Land Retirement) had a negative benefit/cost summary amounting to $15.603 million/year in 2050 dollars, or a negative $780.15 million over the 50 year life of the project. Conversely, the alternative with the greatest amount of land retirement

(In Valley Drainage Impaired Land Retirement) had a positive benefit/cost summary of $3.643 million/year in 2050 dollars, or a positive $182.15 million over the 50 year life of the project.[9]

The U.S. Geological Survey[10] has been clear that any solution to drainage problems must include land retirement. In relation to the San Luis Feature Re-Evaluation and subsequent settlement negotiations convened by Senator Feinstein, the USGS has stated that

> *"Land retirement is a key strategy to reduce drainage because it can effectively reduce drainage to zero if all drainage-impaired lands are retired."*
>
> USGS also stated that
>
> *"The treatment sequence of reverse osmosis, selenium biotreatment and enhanced solar evaporation is unprecedented and untested at the scale needed to meet plan requirements."*

The State Water Board implies that TMDLs will achieve compliance with Basin Plan water quality standards. While the "technical TMDLs" adopted by the Water Boards are scientifically defensible, the crucial implementation plans are sadly lacking. To date, there have been no documented and quantified reductions in pollutant loading attributable to TMDL implementation. The only identified reductions in the mass loading of any impairing pollutant has only come about as a result of growers shifting from organophosphate (OP) pesticides to more potent and less expensive alternatives like the pyrethroids.

Unfortunately, there is no comprehensive monitoring program for pyrethroids comparable to the major monitoring effort launched by the Regional Board to identify the fate and transport of OP pesticides that began in the late 1980s and continued through the 1990s. Pyrethroid toxicity has become pervasive throughout the Central Valley but a Pyrethroid TMDL remains elusive.

The State Water Board creates the misimpression that effective, enforceable TMDL loading allocations are being incorporated into NPDES permits. The reality is that the Regional Board has failed to include TMDL wasteload allocations in a number of adopted and renewed NPDES wastewater permits. These include, Stockton, Manteca, Modesto, Tracy, Lodi and Mountain House for discharges directly into the Delta, as well as numerous permits for municipalities discharging into tributaries of the Delta. Nor has the Regional Board incorporated enforceable wasteload allocations in adopted MS-4 permits regulating urban stormwater discharges. While wasteload allocations in MS-4 permits are implemented through management measures, EPA regulations require they must still be achievable and enforceable.

The Central Valley Board has chosen to implement TMDL load allocations to agricultural dischargers through waivers of WDRs in the Irrigated Lands Program. The blatant failures of the Irrigated Lands Program are discussed above. Five years after adoption of the 2003 waiver, the Board cannot demonstrate that a single pound of pollutant loading has resulted from the program. Specific TMDL load allocations, incorporating the specific control elements of the state's Nonpoint Source Control Program, have yet to be assigned to the agricultural coalitions.

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[9] See http://www.usbr.gov/mp/nepa/documentShow.cfm?Doc_ID=2240. Page N-17

[10] See **U. S. Geological Survey Open File Report 2008-1210**, p1 Executive Summary http://pubs.usgs.gov/of/2008/1210/

C-WIN/CSPA Comments on Staff Report for Periodic Review of the 2006 WQCP for San Francisco Bay/Sacramento-San Joaquin Delta Estuary

The draft Staff report seriously mischaracterizes the San Joaquin River Salinity and boron TMDL. The SJR Salt TMDL is a poster child for the failures of the TMDL program to secure improvements in water quality. Salinity problems on the river have been recognized for over a century. The long-delayed salt TMDL is the first 100-foot TMDL in the nation's history, only protecting a short stretch of river below the San Joaquin's confluence with the Stanislaus River. Water quality violations continue to occur upstream of the confluence and downstream below Vernalis: this despite the fact that EPA regulations and the Central Valley Board's Basin Plan require that standards must apply throughout a waterbody, not simply at a single compliance point.

While TMDL implementation plans must ensure attainment of water quality standards, the salt TMDL contemplates a 19 percent exceedance of standards in critical years and a 7 percent exceedance in dry years. The TMDL fails to reserve any assimilative capacity, thus depriving downstream farmers of the ability to irrigate and discharge return flows. Although the State Water Board has expressly directed the Central Valley Board to control salt loading from municipal and industrial dischargers, the Board routinely allows massive increases in salt loading in recently adopted NPDES permits. An example of the Central Valley Board's inability to meaningfully address salt is the City of Modesto's NPDES wastewater permit renewal issued in April 2008. The permit does not require compliance with final salt limits until July 2022 or July 2026. The SJR TMDL assigns load allocations to agricultural coalitions operating under the irrigated lands waiver but fails to incorporate the control elements of the Nonpoint Source Control Program, thus ensuring failure.

The San Joaquin River Dissolved Oxygen TMDL is yet another poster child for the failures of the Central Valley Board's TMDL program. The causes and solutions to the chronic oxygen deficits in the Stockton Ship Channel have been known since, at least, the 1970s. Following the Central Valley Board's refusal to comply with the explicit requirements contained in the Bay Protection and Toxic Cleanup Program, the Board embarked on a convoluted process to develop a TMDL. Over a span of five years the process entailed:

1) more than ten updates, workshops or hearings by the Central Valley Board;
2) four draft plans circulated for comment,
3) a four-year stakeholder process involving more than 150 meetings of the steering and technical committees and
4) millions of dollars in special studies.

Since then, no meaningful actions have been taken to address the causes of the oxygen deficit, other than a state financed project to construct a demonstration aeration experiment at the Port of Stockton.

The Central Valley Board's Mercury TMDL is under development. While the technical work has been superb, there is major disagreement over the actual water quality objective and implementation plan. The outcome remains problematic. As presently proposed, the objective is not protective of subsistence fishermen and their families, those with impaired immune systems, pregnant women or children. Most dischargers are strenuously lobbying for loopholes, i.e., "offsets" to avoid having to implement source control or treatment measures. A number of local agencies and the Department of Water Resources are opposing the TMDL because it may regulate wetlands, which have been found to methylate Mercury (the most physiologically absorbable form of mercury). In fact, Department of Water Resources, in a strongly worded letter, claims "*The proposed BPA and implementation plan could seriously curtail agencies'*

ability to help with the recovery of endemic and specially protected species by limiting projects that could restore wetland habitat and provide seasonal food sources for such species."

Apparently, the possibility that species inhabiting such habitat might bioaccumulate mercury and pose a threat to both protected species and human health is of little concern to the state and regional water boards. Given increasing opposition, it is uncertain whether the proposed Mercury TMDL will lead to significant reductions in mercury concentration and methylation in Delta waterways.

e. **Once-through cooling.** Evincing its relaxed approach to resource protection, the State Water Board's 2008 Strategic Periodic Review acknowledges concern that once-through cooled electrical generating facilities in the Delta impinge and entrain significant numbers of fish and aquatic organisms and pelagic organisms and other threatened and endangered species. It then inexplicably proposes to address these imminent threats to listed species through development of a statewide policy. Presumably, the Central Valley Board will, following adoption of that policy and subject to some unspecified timeline, reissue NPDES permits for the power plants. The potential threats posed by these plants have been known for many years. The Mirant facility in Contra Costa County received an NPDES permit in 2001 that expired in April 2006. The State and Regional Boards have long had ample authority under the Water Code to require whatever studies were necessary to evaluate impacts to fisheries and to adopt measures protective of beneficial uses.

The State and Regional Board have known for decades that the Thermal Plan was inadequate. Indeed, Central Valley Board staff acknowledged as far back as the 1980s that the Delta-5 temperature standard is not protective and that biologically-based temperature criteria were necessary. Despite the fact that excessive temperatures have been identified as a serious limiting factor for listed species throughout the Central Valley, no funds have yet been provided to develop biologically-based temperature criteria. While we appreciate the fact that the State and Regional Boards are belatedly moving to address the once-through-cooling problem, we note that these problems have been known for a long time, should have been address years ago and will be deficient without biologically-based temperature criteria.

f. **Sediment Quality Objectives** Another example of the State Water Board's ambivalence in protection of public trust resources is the stop-and-go effort in developing sediment quality objectives. Toxic or potentially toxic sediments have been identified at a number of Delta locations.

In 1989, the California Legislature, as part of the Bay Protection and Toxic Cleanup Program, mandated that the State Water Board develop and adopt sediment quality objectives. The Board prepared a conceptual Periodic Review in 1991 but soon abandoned efforts to develop sediment objectives. However, in 1999, the Sacramento Superior Court ordered the Board to resume development of sediment objectives, pursuant to a lawsuit brought by Bill Jennings and Deltakeeper. The State Water Board elected to pursue development of sediment quality objectives through a lengthy and cumbersome stakeholder process. The majority of environmental participants withdrew in protest over the direction of the project, i.e., potentially responsible parties were insisting on a degree of monitoring and evaluation that was so extensive and expensive that it would be likely that only the very worst sites would ever be addressed. The developed approach envisions an extremely complicated three-pronged approach involving assessment of toxicity, bioaccumulation and biological assemblages. A scorecard will ultimately determine whether thresholds have been exceeded requiring cleanup.

Unfortunately, the complexity of the evaluation coupled with the substantial amount of expensive monitoring and assessment necessary to reach a conclusion means that potentially serious problems in the Delta may remain unaddressed. For example, fish tissue collected by DFG and analyzed by the San Francisco Estuary Institute revealed that catfish and largemouth bass caught in Stockton's Smith Canal contained concentrations of PCBs that exceeded OEHHA levels of concern. Results from a subsequent sampling demonstrated that the sediments were toxic and bioaccumulative. However, it is questionable whether anyone will ever be required to conduct the replicate sampling necessary to compel a cleanup.

g. **Invasive Species Management** The Bay-Delta estuary has been identified as the most "invaded" estuary in North America. Invasive species are one of the three major suspected causes of the pelagic species crash in the Delta. In the late 1990s, Bill Jennings and Deltakeeper petitioned the Central Valley Board to begin development of a general order addressing the increasing impacts caused by invasive species. The petition described the 212 confirmed exotics and 123 suspected exotics that had already invaded the estuary. It laid out the State Water Board's regulatory authority over ballast water discharges and proposed specific actions that would potentially reduce the accelerating increase in the number of invasive species establishing a foothold in the estuary. The petition was ignored. Both the State and Central Valley Boards opposed our repeated efforts to have the Delta and tributary waterways identified on the state's CWA 303(d) List of Water Quality Limited Segments as impaired by invasive or exotic species. Finally, the State Water Board acquiesced and included the Delta as an impaired waterbody because of exotic species on the 2006 list. The Board's belated acknowledgement of the damage caused by invasive species is appreciated. However, the proposed program and the one person-year allocated to the project (split between the three water boards) are seriously inadequate and betray a fundamental lack of concern regarding this serious threat to the Bay-Delta ecosystem.

h. **Blue Green Algae.** The toxicity of blue green algae poses a threat to both the Delta ecosystem and human health. The spatial distribution of these algal blooms has been rapidly expanding in the Delta over recent years. This expansion is likely fueled by increases in temperatures and nutrients and reduced flow. All three of these factors may be related to a failure to control nutrient loading into the Delta or provide necessary outflow to the Bay. Efforts to establish a monitoring and reporting program in order to better understand the fate and transport and environmental and human health effects are welcome. Unfortunately, the allocation of only one-third of a person year to this serious task is likely to prove seriously inadequate.

i. **Characterize Discharges from Delta Islands.** The discharge of some 430,000 acre-feet of return flow from approximately 680,000 acres of Delta farmland involving some 1800 diversions and hundreds of discharge points clearly suggests a management challenge to water quality regulation in the Delta. "Characterization" of the pollutants in these discharges is fundamental to any serious effort to protect Delta water quality. However, the proposed project is a searing indictment of both the Central Valley Board and the irrigated lands program. Had requirements to submit Reports of Waste Discharge not been waived for agricultural dischargers, outflow from Delta islands would have been "characterized" years ago. Similarly, had the Board insisted that agricultural dischargers, coalitions and water districts comply with the same monitoring requirements it routinely demands from virtually every other segment of society, i.e., municipalities, industries, businesses (even mom-and-pop operations), discharges would have already been "characterized." Indeed, had the Board complied with its regulatory responsibility

to protect the water quality and the public trust values of Delta waterways, the receiving waters would also have been fully "characterized" by now.

While the State Water Board seems focused on agricultural discharges in the Delta, it inexplicably ignores the agricultural discharges from millions of acres of farmland along waterways upstream of the Delta. Presser and Luoma[11] found that the aquifers of the western San Joaquin Valley contain so much selenium that even if the San Luis Drain were built and new additions of selenium halted (no irrigation), with an annual discharge to the Bay of 43,500 pounds of selenium per year it would still take 63 to 304 years to eliminate the accumulated selenium from the aquifers. Pollutants from these upstream discharges gather in the Delta and likely represent a far greater pollutant mass than those coming from Delta farmers. Targeting Delta farmers for their agricultural drainage discharges while ignoring those who discharge upstream is simply and obviously hypocritical. The State Water Board should direct the Central Valley Board to immediately issue 13267 letters requiring ***all*** agricultural dischargers to "characterize" their discharges immediately. This willed ignorance must cease.

III. C-WIN and CSPA's Specific Comments On The Staff Report for Periodic Review of the 2006 Water Quality Control Plan.

For the most part, C-WIN and CSPA agree with (and intend to participate in) the staff recommendations on Water Quality Control Plan issues previously identified for further review and the additional issues identified for further review in the draft staff Periodic Review report. C-WIN and CSPA also identify below additional issues that we believe warrant staff time. However, we retain little faith that State Water Board action will result in meaningful improvements to beneficial uses such as fisheries.

Again, we disagree strongly with the staff recommending no further review of fish screens and biological criteria (implementation plan for salmon doubling narrative in Water Quality Control Plan). Given all of the State and Central Valley Boards' failures noted above, C-WIN and CSPA believe it is time for U.S. Environmental Protection Agency to step in to promulgate its own water quality standards and implement them.

A. Issues Previously Identified for Further Review:

Evaluation of Southern Delta Salinity Objectives and Evaluation of San Joaquin River Flow Objectives

While we agree this is an issue warranting staff time and a potential Water Quality Control Plan amendment, Board member Art Baggett's 2008 temporary waiver in Order WR 2008-0029-EXEC of southern Delta salinity standards in D-1641, without hearings or evidence, indicates that the State Water Board is not interested in enforcing Southern Delta Salinity standards against the state and federal water projects in the South Delta. The 2009 request by Central

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[11] Theresa S. Presser and Samuel N. Luoma. 2007. **U.S. Geological Survey Professional Paper 1646. Forecasting Selenium Discharges to the San Francisco Bay-Delta Estuary: Ecological Effects of a Proposed San Luis Drain Extension.** http://pubs.usgs.gov/pp/p1646/

Valley Project and State Water Project operators to waive compliance while not complying and the State Water Board's inaction on those documented violations again supports that finding.

While allegedly done to address the Governor's drought emergency, this outrage occurs — again—just 2years after a failed attempt by a State Water Board enforcement team to enforce the law (D-1641) against the state and federal water projects. As the staff prosecution team in that case wrote in their 2006 letter to the Board: "*Government should be held accountable for environmental protection to the same extent as private parties and should be held to the same enforcement standards.*" Of course, that noble sentiment, and the law behind it, went out the window when the State Water Board ignored its own order and enforcement standards to politically please the Governor and the water projects.

For the aforesaid reasons, we ask the State Water Board to convene a hearing on the waiver of the agricultural water quality standards and in the meantime reinstate the permanent standards. As the Cease and Desist hearing record indicates, the projects can meet the standards by releasing water from reservoirs on the San Joaquin side of the Delta and by limiting pumping at the state and federal export projects.

Much more could be done to address south Delta salinity problems and San Joaquin River flow objectives. As D-1641 found, high salinity at Vernalis is caused by surface and subsurface discharges to the San Joaquin River of high saline water from agricultural lands and local wetlands. Below Mendota, the Department of Water Resources in 2006 attributed 67 percent of these saline flows to Grassland and northwestern areas of the western San Joaquin Valley. D-1641 clearly stated that regional management of drainage water is the preferred method of meeting these objectives.

The State Water Board has authority to initiate some effective actions toward this end. First, C-WIN and CSPA recommend that the Water Quality Control Plan be amended to eliminate the Vernalis Adaptive Management Program and reinstate the original D-1641 flow regime from 1995's Water Quality Control Plan. It is clear that the Vernalis Adaptive Management Program is a complete failure, as evidenced by continuing declines in San Joaquin River Chinook salmon stocks and the overall Pelagic Organism Decline.

Second, an appropriate hearing on this issue would also consider and adopt a land retirement program for drainage impaired agricultural lands in the two projects area of water use. C-WIN and CSPA hold to our position that irrigation of these saline seleniferous lands is a wasteful and unreasonable use of water in violation of Article X, Section 2 of the California Constitution.

The Pacific Institute, in its report *More With Less: Agricultural Water Conservation and Efficiency in California*[12] identified 1.3 million acres of drainage problem lands that could be retired, yielding up to 3.9 MAF in water savings. We believe that the State Water Board should initiate evidentiary hearings that study this problem and amend water right permit conditions so that these lands are no longer irrigated with imported surface water. Most of these lands were originally dry-farmed, or may have been irrigated with local sources of water.

According to information we have received from the Environmental Working Group, power subsidies to Westlands in 2002 and 2003 amounted to approximately $70 million each year[13].

[12] http://www.pacinst.org/reports/more_with_less_delta/more_with_less.pdf p 7, pp1
[13] http://www.ewg.org/node/20989

Water subsidies to Westlands in 2002 amounted to over $110 million[14]. If much of Westlands, as well as those impacted lands in other drainage-problem districts such as Broadview, Widren, Mercy Springs, Panoche, Pacheco as well as other lands within the State Water Project area were to be retired, it would free up 3.9 million acre-feet of water, as well as significantly reduce water and crop subsidies by tens of millions of dollars a year. Full analysis of such an alternative would provide meaningful disclosure to decision makers and the public about the true costs of continuing to deliver water to these problem lands.

Further investigation is needed to verify and refine these numbers, but clearly there is adequate justification to remove these lands from irrigation due to continuing drainage problems and salinization of land, in violation of Cal. Constitution, Article 10, Sec. 2 and Water Code Section 100- Wasteful and Unreasonable Use of Water.

B. Additional Issues Identified by Staff for Further Review

Delta Outflow Objectives- C-WIN and CSPA agree that this warrants a commitment of staff resources for a Bay-Delta Water Quality Control Plan. The Delta Smelt BO identifies that the Delta Outflow IS the habitat for smelt. It's not just a flow that "assists" fish traveling through, it's the only flow that's not subject to the influence of the Delta pumps, and IS the habitat for pelagic fish including Delta smelt, and certain life stages of longfin smelt

Export/Inflow Objectives- C-WIN and CSPA agree that this warrants a commitment of staff resources for a Bay-Delta Water Quality Control Plan. There are certain times of the year, for San Joaquin River fish, that there is a substantial additional inflow requirement necessary for them to be able to emigrate out through the Delta. It's therefore critical during the March through May salmon outmigration period from the San Joaquin River that the inflow number be 4 with export 1, in order for smolts to get past the Delta pumps and out through the Delta. This requires examination of the latest model runs from the California Department of Fish and Game (See appendix 5 of the June 4, 2009 Salmon Biological Opinion for more information). Particular attention should be made to recommended releases from Folsom, as recommended in the Salmon Biological Opinion.

The SWRCB should also consider significantly reducing summer Sacramento River inflows pursuant to recommendations in the Salmon Biological Opinion in order to improve outmigration of San Joaquin River salmon, maintain cold water storage in rim reservoirs and ensure that significant dewatering of Sacramento River Chinook redds does not continue.

Delta Cross Channel Gate Closure Objectives- C-WIN and CSPA agree that this warrants a commitment of staff resources for a Bay-Delta Water Quality Control Plan Amendment. There is a recommendation in the Salmon Biological Opinion that the gates be closed more often and in real time when the fish are moving.

Suisun Marsh Objectives - C-WIN and CSPA agree that this warrants a commitment of staff resources for a Bay-Delta Water Quality Control Plan. Operation of the salinity management gate on Montezuma Slough should be evaluated in the context of climate change.

Reverse Flow Objectives (Old and Middle River Flow Objectives) - C-WIN and CSPA agree that this warrants a commitment of staff resources for a Bay-Delta Water Quality Control Plan. It's clear that the existing flow objectives are inadequate to protect, let alone restore San

[14] http://www.ewg.org/reports/westlands

Joaquin River salmon. There are reverse flow objectives in both the salmon and smelt Biological Opinions, by the National Marine Fisheries Service and U.S. Fish and Wildlife Service, respectively.

Floodplain Habitat Flow Objectives- C-WIN and CSPA agree that this warrants a commitment of staff resources for a potential Bay-Delta Water Quality Control Plan Amendment. The recent Salmon Biological Opinion contains specific recommendations in this regard. However, the issue of mercury contamination needs to be closely examined to be sure that another problem is not being created in the name of creating habitat.

Changes to the Program of Implementation- Changes to the Monitoring and Special Studies Program - Comprehensive Monitoring Program

C-WIN and CSPA agree that the State Water Board's Comprehensive Monitoring Program warrants a commitment of staff resources for a Bay-Delta Water Quality Control Plan Amendment. However, CSPA has long pleaded with both the State and Central Valley Boards to establish a comprehensive Delta-wide monitoring program similar to those conducted by the San Francisco Estuary Institute in San Francisco Bay and the Sacramento River monitoring program conducted by the Sacramento River Watershed Program in the Sacramento River. In 2004, Bill Jennings and Dr. G. Fred Lee presented the State and Central Valley Boards with a report titled *Overview of Sacramento-San Joaquin River Delta Water Quality Issues*[15] that described the Delta's water quality problems and the need for a comprehensive monitoring program. As that report has been presented to the Board, we incorporate it by reference. Unfortunately, no serious monitoring program focused on chemical contaminants has been developed. The State Water Board needs to expedite development of a monitoring program funded by dischargers and exporters.

With the possible exception of salt and mercury, there is a serious lack of reliable information on the concentration, fate and transport of contaminants in the Delta, despite the fact that many of these pollutants are highly toxic and bioaccumulate in fish and wildlife. A comprehensive monitoring program is critical to improving water quality, restoring fisheries or evaluating the potential impacts of future projects that contemplate a modification of the Delta's hydrology. Water quality and water quantity are irrevocably connected and can be characterized as flip sides of the same coin, nowhere more so than in the Bay-Delta Estuary and its watershed. Alterations of flow inevitably alter assimilative capacity. Changes in assimilative capacity directly affect habitat and water quality.

3. Issues Not Recommended by Staff for Further Review

Ammonia Objectives- C-WIN and CSPA agree with staff that ammonia should be dealt with on a statewide basis, not in this Water Quality Control Plan. In regard to the effects of Ambient Ammonia Concentrations on Delta Smelt Survival and Algal Primary Production, while, the project to designed to identify the effects of pervasive ammonia concentrations is welcome, it is woefully underfunded and likely would not have been necessary had the Central Valley Board rigorously complied with state and federal antidegradation requirements and restricted ammonia pollutant loading. This issue points to an extremely serious and growing threat to Central Valley waterways: concentrations of pollutants that are deemed to be below water quality standards or at levels not perceived to be harmful are later revealed to be serious threats to beneficial uses. The Central Valley is one of the fastest growing areas of the state. Waters from north of

[15] See http://www.gfredlee.com/SJR-Delta/Delta-WQ-IssuesRpt.pdf

Redding to south of Fresno gather in the Delta. Renewals of municipal wastewater NPDES permits routinely allow significant increases in pollutant mass loading; often exceeding the identified assimilative capacity of receiving waters.

Therefore, not only are statewide water quality objectives for ammonia necessary, but a stricter NPDES permitting regime is also necessary for compliance and meaningful water quality improvement. C-WIN and CSPA have little confidence that this is nothing other than another meaningless paper exercise.

Toxicity objectives- C-WIN and CSPA agree that toxicity objectives should be dealt with on a statewide basis, not in this specific Water Quality Control Plan. Nonetheless, the Delta has experienced significant increase in the ambient concentration of a vast array of contaminants; some exceeding water quality objectives, some below the threshold. The potential harmful consequences of synergistic and additive interactions, bioaccumulative toxins, sublethal or chronic impacts and the cumulative effects of multiple stressors remain largely unidentified and unaddressed. Further, it is an inescapable fact that water quality standards have never been promulgated for a large number of known and potentially harmful constituents. Only by restricting the increase in pollutant loading through application of antidegradation requirements can we hope to avoid the emergence of a multitude of "new" water quality problems in the future.

Furthermore, we note that the Biological Opinion for the California Toxics Rule[16] requires U.S. Environmental Protection Agency to develop aquatic tissue criteria for selenium, mercury and other toxic substances. U.S. Environmental Protection Agency has yet to develop such criteria for selenium, and as a result, the California Toxics Rule is in violation of the federal Endangered Species Act. The lack of acute and chronic tissue criteria is resulting in erroneous recommendations to delist the San Joaquin River under Clean Water Act Section 303(d) for selenium.

Fish Screen Objectives—As stated above in great detail, C-WIN and CSPA strongly disagree with staff that this issue does not require additional review. If the CalFed Record of Decision's requirement to screen the federal and State pumps in the southern Delta, things might be very different for the Delta Smelt and other species. The CalFed Record of Decision required that these screens be installed, at the expense of the water contractors, ***prior*** to consideration of a Peripheral Canal. Now the canal is on the table, yet the pumps continue to take millions of fish.

Biological Indicators—The Salmon Doubling Narrative in the 2006 Water Quality Control Plan is merely lip service to both federal and state mandates to restore fisheries by 2002 to twice the levels found in salmon and steelhead during the period 1967-1991.[17] Instead, we find that salmon and steelhead have continued their decline, to the point that ocean fisheries dependent on Sacramento River Fall Chinook have been subject to unprecedented closures in 2008 and 2009. The Pelagic Organism Decline and the commercial salmonid fishery closures of 2008 and 2009 speak for themselves.

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[16] U.S. Fish and Wildlife Service and National Marine Fisheries Service. Biological Opinion on Final Rule for the Promulgation of Water Quality Standards: Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California. March 24, 2000.

[17] See California Fish and Game Code Section 6900-6924 and Public Law 102-575, Section 3406(b)(1), the Central Valley Project Improvement Act of 1992.

It is therefore imperative that the State Water Board develop an implementation plan for the Salmon Doubling Narrative found in the 2006 Water Quality Control Plan. Absent the commitment of funding to devising and implementing such a plan, it is evident that the State Water Board is not meeting its federal responsibilities under the Clean Water Act to protect beneficial uses. We think it warrants—along with the many other examples we list here—stripping the State Water Board of its Clean Water Act authorities by the U.S. Environmental Protection Agency

An implementation plan for the salmon doubling narrative would include activities to ensure that the State Water Project's and Central Valley Project's Methods of Diversion are Reasonable, Beneficial and Protect the Public Trust. Water Code Section 13550 provides a means for administrative enforcement of the reasonable use mandate. The State Water Board can seek enforcement through a number of statutory provisions. Among those statutory provisions is the reserved jurisdiction clause in water rights permits issued by the State Water Board (Water Code Section 1394). It retains jurisdiction for the State Water Board to revoke permits if a permittee should violate a permit term or condition. (23 C.C.R. 764.6)

Water Code Section 275 provides the State Water Board with expansive discretionary powers to take those actions necessary to eliminate water waste and to promote reasonable use. The State Water Board's decision as to whether to take action pursuant to Water Code Section 275 or to conduct investigations pursuant to Water Code Section 183 and/or 1051 is entirely up to the Board. The State Water Board's 2008 Strategic Plan intends to allow other agencies and stakeholders in the Bay Delta Conservation Plan and Delta Vision to exercise these statutory functions and leaves the State Water Board as a minor player whose only function is to evaluate and rubber-stamp whatever decision these processes produce. Such a plan is a sham and is not what the people of California deserve from the State Water Board. The reasonableness proceeding should be one of the first actions taken by the Water Board in the next year to provide the parameters for BDCP and Delta Vision, not the other way around. That was the purpose of the C-WIN and CSPA reasonable use complaint, which we filed in March 2008.

An implementation plan for the salmon doubling narrative would require water right investigation, enforcement, and other activities to ensure adequate fishery flows. As discussed previously, federal law (the Central Valley Project Improvement Act) waives federal sovereign immunity from state enforcement in regard to the Central Valley Project. Section 3406(b) of the Central Valley Project Improvement Act (Public Law 102-575):

> 3406(b) FISH AND WILDLIFE RESTORATION ACTIVITIES. "*The Secretary, immediately upon the enactment of this title, shall operate the Central Valley Project to meet all obligations under state and federal law, including but not limited to the federal Endangered Species Act, 16 U.S.C. s 1531, et seq., and all decisions of the California State Water Resources Control Board establishing conditions on applicable licenses and permits for the project.*"

The United States Congress made it very clear that the State Water Board can regulate the United States Bureau of Reclamation just like any other water rights permit holder in its operation of the Central Valley project. There is no excuse for the State Water Board to fail to examine the reasonableness of the methods of diversion of the Central Valley Project and State Water Project, nor is there any immunity from California and federal law for these projects. The State Water Board should hold such an enforcement proceeding immediately to change the project water rights in response to the continuing environmental crash in the Bay/Delta.

In order to determine what reservoir releases are necessary to remedy inadequate flow (to improve the changes of the salmon doubling requirements in law) in the San Joaquin River, the State Water Board should also examine the Bureau of Reclamation's permits at Friant Dam. Bureau permits presently allow the diversion of massive amounts of San Joaquin River water at Friant Dam away from the lower river and the Bay/Delta and send the water into the Kern/Friant canal for use by water users outside the San Joaquin watershed. The State Water Board should also investigate the damage done to the lower reaches of the Tuolumne River and the Bay/Delta from the present exports diverted around the Bay/Delta by the City of San Francisco.

A component of an implementation plan for the Salmon Doubling Narrative in the 2006 Water Quality Control Plan should include Delta tributary water quality objectives and implementation through water rights for Salmon. Only the Sacramento River below Keswick Dam has Basin Plan water quality objectives protective of salmon which are implemented through a water rights order. The Trinity River has similar water quality objectives in the Water Quality Control Plan for the North Coast Region, but they have yet to be implemented through a water rights order, despite such a commitment made 20 years ago by the SWRCB in Water Quality Order 89-18.[18]

Despite the fact that there are Basin Plan objectives for all of the Sacramento River salmon runs, which are implemented through Water Rights Orders 90-05 and 91-01, the State Water Board has dismally failed to protect Central Valley salmon, whose populations have utterly collapsed. A program which provides real benefits to salmon would also include multi-year management of the cold water pools in rim reservoirs to ensure that there will be adequate cold water resources to ensure survival of the various Central Valley salmon and steelhead runs and races especially through multi-year droughts. It was only by luck in 2009 that spring storms brought up cold water storage in Shasta and Trinity reservoirs enough to possibly avoid disaster for returning salmon.

Water Use Efficiency- The focus of water use efficiency should be on the major water users no matter where they are geographically in California. The Governor recently proposed a 20 percent cut in per capita water use statewide by 2020.

This State Water Board should include in its Bay-Delta water quality control planning efforts adopted state policy on water demand as well as water supply in order to protect water quality and beneficial uses. In most urban settings in California, more than 60 percent of water use is for outside uses, including water for lawns, pools, car washing, and other non-food or environmental uses. All of this information can be found, if the State Water Board cares to address it, in Department of Water Resources' Bulletin 160-05. It appears that the Water Board has never considered the possible remedies to the ever increasing export water demands contained in Department of Water Resources' Bulletin 160-05. Could it be that the State Water Board is moving so slowly to allow Bulletin 160-05 to quietly expire before it can be used to reduce demands on water diversions from the Bay-Delta? After all, if the 3 MAF of urban conservation water and the 2 MAF of agricultural conservation water identified in Bulletin 160-05 for urban areas is purposefully ignored, does the State Water Board hope these California water plan objectives will just go away, allowing exporters another opportunity to circumvent state and federal law in the Bay-Delta?

[18] http://www.swrcb.ca.gov/board_decisions/adopted_orders/water_quality/1989/wq1989_18.pdf p 18

In addition to urban water conservation, the State Water Board should be acting to ensure that agriculture does its part. The report on agricultural water conservation by the Pacific Institute[19] identified millions of acre-feet of water conservation from a variety of methods, including 3.9 million acre-feet from permanent retirement of drainage problem lands in the Western San Joaquin Valley. Investigation of both salt loading and implementation of a land retirement program would provide both water quality and water supply benefits to the Bay-Delta.

[19] http://www.pacinst.org/reports/more_with_less_delta/more_with_less.pdf

Public Comment
2009 Periodic Review
Deadline: 6/15/09 by 12 noon

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Re: Comments on the Draft Staff Report for the Periodic Review of the 2006 Bay/Delta Water Quality Control Plan.

Dear Ms. Townsend:

1. **Fish and Wildlife Objectives.**

The Central Delta Water Agency (CDWA) supports the Staff Report's recommendations to further review the various fish and wildlife objectives in the 2006 WQCP. As the CDWA explains in its October 1, 2008 comments on this topic (a copy of which are attached hereto), in particular, major consideration should be given to requiring both higher flows and lower exports for the protection of fishery resources.

2. **Program of Implementation.**

With regard to the "Program of Implementation," the Staff Report states at page 31:

> "Pursuant to the State Water Board's water right authority, the board has assigned responsibility primarily to DWR, the USBR, or both, for implementation of the flow-based water quality objectives and the salinity objectives in the Bay-Delta Plan. Other water rights holders are assigned responsibility for portions of the flow-related objectives. The State Water Board may reallocate responsibility for meeting these objectives among water right holders or other entities based on information it receives in a water right proceeding or water quality proceeding."

While a water right holder other than DWR or USBR may voluntarily assume responsibility to meet one or more of the Bay-Delta water quality objectives, as explained in CDWA's October 1, 2008 comments, before the SWRCB can lawfully force such a water right holder to assume such responsibility the SWRCB must first consider, interpret and apply numerous state and federal laws, policies and principles applicable to DWR and USBR's operations, which, thus far, the SWRCB has not done. Examples of such laws, policies and principles are set forth on pages 4 and 5 of the attached October 1, 2008 comments.

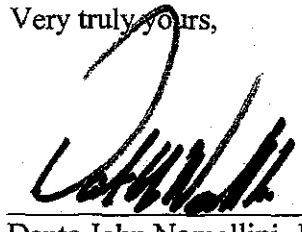
a. **Term 91 Must be Forthrightly Addressed in the Program of Implementation.**

As also explained in those October 1, 2008 comments, through the imposition of Term 91, the SWRCB is indeed forcibly imposing responsibility to meet the Bay-Delta water quality objectives on water right holders other than DWR and USBR. Such imposition, however, is taking place notwithstanding the lack of any mention of Term 91 in the implementation plans set forth in the 1995 or 2006 Bay-Delta WQCPs, and notwithstanding the SWRCB's lack of consideration, interpretation and application of those state and federal laws, policies and principles applicable to DWR and USBR's operations (as well as the lack of examination of threshold factual issues such as the identification of what particular objective the Term 91 water right holder is being held responsible for and whether that water right holder's water use actually negatively impacts that objective, etc.).

As explained more fully in the attached comments, the SWRCB's practice of imposing responsibility to meet the Bay-Delta water quality objectives through Term 91 outside of its Bay-Delta water quality control plan process and/or its subsequent water right proceeding to assign responsibility to meet the plan's objectives must cease. Such imposition is unlawful and will continue to be so until the SWRCB forthrightly embraces such imposition, and the propriety thereof, in a future water quality control plan and/or the subsequent water right proceeding to assign responsibility to meet the plan's objectives.

Thank you for considering these comments and concerns.

Very truly yours,



Dante John Nomellini, Jr.

DJR/djr
Enclosure

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October 1, 2008

Via First Class U.S. Mail
and Email: commentletters@waterboards.ca.gov

Jeanine Townsend, Clerk to the Board
State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812-2000

Re: Periodic Review Workshop for the 2006 Bay-Delta Water Quality Control Plan.

Dear Ms. Townsend:

The Central Delta Water Agency (CDWA) submits the following preliminary comments on matters that should be addressed in the SWRCB's review of the 2006 Plan.

1. **The Water Quality Objectives for Fish and Wildlife Beneficial Uses Should be Revisited.**

In light of the collapse and/or dire state of numerous fish species, the SWRCB should revisit the 2006 Plan's fishery objectives pertaining to salinity, Delta outflow, river flow, export limits and Delta Cross Channel gate operation.

The 2006 Plan acknowledges that:

> "[A]vailable information indicated that a continuum of protection [for fishery resources] exists. Based on that information, higher flows and lower exports provided greater protection for the bulk of estuarine resources up to the limit of unimpaired conditions." (2006 Plan, p. 11.)

With regard to export impacts, the SWRCB has previously acknowledged the following in its 1978 Water Right Decision, D-1485, at page 13:

> "To provide full mitigation of project impacts on all fishery species now would require the virtual shutting down of the project export pumps."

In light of the fact that the Projects export pumping has not shut down, but, instead, has steadily increased since 1978, and the fact that the SWP has failed to develop various projects on the North Coast Rivers to annually supplement the water supply in the Delta with 5 million acre feet of water by the year 2000, it should be no surprise that the Delta's fishery resources are having a hard time coping with diminished flows and higher exports.

Accordingly, the SWRCB should give major consideration to requiring both higher flows and lower exports for the protection of fishery resources in its updated plan.

2. **The Implementation Plan Needs to Be Modified to Forthrightly Address Term 91.**

In the recent administrative and legal proceedings over Term 91 in Phelps v. SWRCB (2007) 157 Cal.App.4th 89, it became clear that Term 91 is simply a mechanism to impose responsibility on an appropriative water right holder within the Delta watershed to meet the various Bay-Delta Water Quality Control Plan objectives. As the SWRCB explains in WRO 2004-0004, at pages 5 and 6:

> "In effect, Term 91 requires appropriators with this term in their water right permits or licenses to forego diverting natural flow that is needed to meet the flow-dependent water quality objectives. When there is insufficient flow to meet the water quality objectives, diversions by Term 91 appropriators could contribute to increased concentrations of salts in the Delta channels."

A major problem, however, is that the implementation plans set forth in the 1995 as well as 2006 Plans do not even mention Term 91. Instead, both plans state the following:

> "The State Water Board will consider, in a future water rights proceeding or proceedings, the nature and extent of water right holders' responsibilities to meet these objectives." (1995 Plan, p. 4; 2006 Plan, p. 3; emphasis added.)

For Phelps, et al., and presumably numerous other water right holders subject to Term 91, Term 91 was imposed on their water rights well *before* the 1995 and 2006 water quality control plans were even adopted, much less implemented. Moreover, the "future" water rights proceeding that was intended to establish the nature and extent of water right holders' responsibilities to meet the 1995 objectives, and which culminated in the SWRCB's Decision 1641, makes no mention of the assignment of responsibility to meet those objectives on Term 91 water right holders.

This practice needs to stop. If the SWRCB is going to impose responsibility on Term 91 water right holders to meet one or more of its water quality plan objectives, then the SWRCB must forthrightly address the propriety of such imposition in its water quality control plan and/or in its subsequent water right proceeding to assign responsibility to meet the plan's objectives. As

it stands, the SWRCB has been wrongfully imposing responsibility on Term 91 water right holders without any mention of such imposition in either its water quality control plans or the subsequent water right proceedings, much less any examination of issues such as the following:

(1) What specific water quality objective is the Term 91 water right holder being held responsible for?

(2) Does the Term 91 water right holder's water use actually negatively impact that water quality objective?

(3) Assuming it does, is it nevertheless legally proper to impose responsibility to meet that objective on that water right holder?

For example, with regard to the second question, it is not at all clear that Term 91 agricultural users in the Delta lowlands negatively impact any salinity objectives. In fact, the available evidence demonstrates that such use may actually *benefit* such objectives. As DWR's "Investigation of the Sacramento-San Joaquin Delta, Report No. 4, Quantity and Quality of Waters Applied to and Drained from the Delta Lowlands," dated July of 1956, explains at page 30:

> "The Delta lowlands act as a salt reservoir, storing salts obtained largely from the channels during the summer, when water quality in such channels is most critical and returning such accumulated salts to the channels during the winter when water quality there is least important. Therefore agricultural practices in that area *enhanced* rather than degraded the good quality Sacramento River water en route to the Tracy Pumping Plant." (Emphasis added.)

And similarly, with regard to outflow objectives, the available evidence demonstrates that agricultural water use in the Delta lowlands likely results in a net *benefit* to outflow. For example, as the SWRCB recognized in its Decision-990, at page 46:

> "The reclamation of the lands in the Delta has eliminated a large area of aquatic vegetation such as cat-tails and tules which consume three to four times as much water as the crops which are grown on these reclaimed lands. As a result, it appears probable that the consumption of water within the Delta has been decreased by reclamation development, and that a greater proportion of the stream flow entering the Delta now reaches the lower end of the Delta to repel saline invasion than before reclamation."

With regard to the third question set forth above, i.e., whether it is legally proper to impose responsibility to meet a Bay-Delta water quality objective intended to benefit fish and wildlife or any other beneficial use on a Term 91 appropriator, before it imposes any such responsibility, the SWRCB would have to ensure that it has complied with and honored all applicable laws and priorities associated with any such imposition and, in particular, ensure that the SWP and CVP are fully complying with their various legal obligations.

For example, and in general outline form, the SWRCB would have to take into consideration, among other matters, all of the following before it sought to lawfully impose responsibility to meet a water quality objective on a Term 91 appropriator (or on any water right holder within the Bay-Delta watershed for that matter):

(1) The SWP and CVP must bear full responsibility for full mitigation of their impacts including without limitation the impacts from reverse flows, reduced outflow, the drainage into the San Joaquin River from the westside of the San Joaquin Valley, and damage to spawning areas.

(a) Note: the impacts of ship channels are burdens of the State and Federal Government; and the burden of westside drainage is that of the CVP and should fall most heavily upon the San Luis Unit in that the unit was not to go forward without a drain.

(2) The SWP and CVP must provide adequate salinity control. (See e.g., Wat. Code, §§ 12200 et seq. & 11207; U.S. v. Gerlach Livestock Co. (1950) 339 U.S. 725; Ivanhoe Irr. Dist. v. McCracken (1958) 357 U.S. 275.)

(3) The CVPIA burdens are those of the CVP.

(4) Preservation of fish and wildlife is the responsibility of SWP and CVP with cost to be paid by users. Where possible enhancement must be incorporated with the cost of enhancement attributed to the State General Fund. (Wat. Code, § 11900 et seq.; Goodman v. County of Riverside (1998) 140 Cal.App.3d 900.)

(5) The SWP and CVP must to the maximum extent possible operate and manage releases from storage into the Delta to provide salinity control and maintain an adequate water supply in the Delta sufficient to maintain and expand agriculture, industry, urban and recreational development. (Wat. Code, § 12205.)

(6) In allocating the burden within the CVP and SWP, the uses within the Delta and other areas and watersheds of origin must be accorded priority over exports. (Wat. Code, §§ 10505 et seq., 11460 et seq. & 12200 et seq.)

(7) The remaining burden which would appear to be in the tributaries above the Delta is allocable among the other water users in accordance with water right priorities. The burden for bypass flows and other fish and wildlife requirements applicable under law to the various impoundments should not be shifted to other water users. Exporters other than the CVP and SWP must yield priority to the users within the Delta and other areas and watersheds of origin. (See Wat. Code, § 1215 et seq.; see also Wat. Code, §§ 12203 & 12205.)

///

(8) To the extent that a water user within the Delta and the other areas and watersheds of origin is required to yield water which can be replaced with CVP or SWP water, then the CVP or SWP water should be burdened provided that if the water is not unregulated flow, bypassed natural stream flow, return flow from upstream use, natural tidal flow or physical solution water, etc., and is truly "stored water," then a requirement of a contract or other mechanism for reasonable payment for the storage benefit may be appropriate. (See Wat. Code, §§ 11460 et seq.)

Up to this point the SWRCB has not even mentioned the assignment of responsibility to meet the Bay-Delta water quality plan objectives on Term 91 water right holders in its 1995 or 2006 water quality control plans or subsequent implementation proceedings, much less properly examined any of the above-listed three questions or any of the forgoing eight legal considerations. Accordingly, CDWA submit that the SWRCB's current imposition of responsibility to meet the existing water quality objectives on Term 91 water rights holders is contrary to law (as well as the express implementation language in the 1995 and 2006 plans) and any future imposition of such responsibility on such holders will continue to be unlawful unless and until the SWRCB forthrightly embraces such imposition, and the propriety thereof, in a future water quality control plan and/or the subsequent water right proceeding to assign responsibility to meet the plan's objectives.

Thank you for considering these comments and concerns.

Very truly yours,

Dante John Nomellini, Jr.

DJR/djr

Public Comment
2009 Periodic Review
Deadline: 6/15/09 by 12 noon

CVCWA
Central Valley Clean Water Association
Representing Over Sixty Wastewater Agencies

STEVE HOGG – CHAIR, FRESNO | **ED CROUSE – VICE CHAIR, RANCHO MURIETA CSD**
JEFF WILLETT – SECRETARY, STOCKTON | **HUMBERTO MOLINA – TREASURER, MERCED**

June 15, 2009

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SWRCB EXECUTIVE

Mr. Curtis Yip
State Water Resources Control Board
Division of Water Rights – Bay Delta Unit
P.O. Box 2000
Sacramento, CA 95812-2000
commentletters@waterboards.ca.gov

SUBJECT: Comments on Draft Staff Report 2009 Periodic Review of the 2006 Water Quality Control Plan for the San Francisco Bay/Sacramento San-Joaquin Delta Estuary

Dear Mr. Yip:

The Central Valley Clean Water Association (CVCWA) appreciates the opportunity to review the draft *Staff Report 2009 Periodic Review of the 2006 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary* (Draft Staff Report). In particular, CVCWA appreciates the State Water Resources Control Board's (State Water Board) efforts to obtain comments and information from the many diverse stakeholders that have an interest in Bay-Delta matters. Stakeholder involvement is crucial to the basin planning process, and CVCWA realizes that incorporating the input of so many stakeholders can be a difficult task. Thus, we appreciate the time and consideration the State Water Board staff has taken to review and incorporate the comments of all interested parties.

CVCWA is a non-profit association of 60 agencies that own and operate wastewater treatment facilities throughout the Central Valley Region. CVCWA and its member agencies have a keen interest in any changes to the Bay-Delta Plan. Wastewater discharge permits must be consistent with applicable water quality control plans, including at times the Bay-Delta Plan. State Water Board decisions with respect to the Bay-Delta Plan can have a significant impact on our members, and we applaud the Draft Staff Report's thoughtful analysis of these difficult and complex issues.

We appreciate your consideration of the comments provided in our letter of March 19, 2009. (See Section VI, Appendix A at p. 59.) However, CVCWA is concerned that the State Water Board intends to consider Water Code sections 13000 and 13241 only if water quality

objectives in the Bay-Delta Plan are further revised. In our March 19, 2009 comment letter, we pointed out that the State Water Board's 2006 amendments expanded the application of the salinity objectives, both in terms of geographic scope and by extending the regulatory reach to include wastewater dischargers. We noted that this expansion is inappropriate and unlawful as applied to municipal dischargers until such time as the State Water Board complies with sections 13000, 13241 and 13242 of the Water Code. Due to the implications associated with the 2006 amendments, the State Water Board must revisit such revisions even if objectives in the Bay Delta Plan are not further modified.

In general, CVCWA supports the recommendations in the Draft Staff Report with respect to "Additional Issues Identified for Further Review." In particular, CVCWA supports the staff's recommendation to forego establishing objectives for ammonia as part of its update of the Bay-Delta Plan. As noted in the Draft Staff Report, current Delta ammonia concentrations are far lower than what federal criteria suggest are fatal to even the most sensitive fish species, and much more work is needed to reduce the many uncertainties surrounding the effects of ammonia on the Bay-Delta. (See Draft Staff Report at p. 36.) Further, the Draft Staff Report appropriately identifies the Regional Water Quality Control Board as the entity with primary responsibility for developing and implementing control programs to address ammonia, including possible basin plan amendments. (Draft Staff Report at p. 37.)

With respect to toxicity objectives, CVCWA supports the Draft Staff Report's recommendation to *not* consider objectives for toxicity as part of its update of the Bay-Delta Plan. As the Draft Staff Report recognizes, additional research, further monitoring, and supplementary data are needed before determining the impacts of emerging contaminants, pyrethroids, and toxicity on the Bay Delta. Without a deeper level of information and understanding, setting objectives for toxicity would be premature and speculative. The State Water Board realizes the need for improved scientific data on this significant and important issue, and CVCWA supports its decision not to consider objectives for toxicity in relationship to the Bay-Delta Plan.

Overall, CVCWA commends State Water Board staff for preparing a Draft Staff Report that is balanced, well-written, and easily accessible. Moreover, CVCWA appreciates the consideration given to our previous comments. We look forward to working with the State Water Board in the future on this very important issue.

Sincerely,

Debbie Webster

Debbie Webster, Executive Officer
Central Valley Clean Water Association

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Enc.

Public Comment
2009 Periodic Review
Deadline: 6/15/09 by 12 noon

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June 12, 2009

VIA EMAIL AND HAND DELIVERY - COMMENTLETTERS@WATERBOARDS.CA.GOV

Jeanine Townsend, Clerk to the Board
State Water Resources Control Board
Cal/EPA Headquarters
1001 "I" Street, 1st Floor
Sacramento, CA 95814

Re: **2009 Periodic Review Staff Report Comments - Bay/Delta Plan**
Client-Matter No. 07547.00004

Dear Ms. Townsend and State Water Board Members:

The City of Tracy has the following comments on the 2009 Draft Staff Report for the Periodic Review of the 2006 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary ("Bay-Delta Plan").

A Timetable for Salinity Objective Modification Must be Adopted

The City of Tracy appreciates that the 2009 Draft Periodic Review document states that the State Water Board has committed to undertake a review of the southern Delta salinity objectives in the Bay-Delta Plan, but the City has serious concerns that there are no time parameters set for that review or a final result. As the Electrical Conductivity (EC) objectives have not been closely reviewed or modified since their initial adoption, the City feels that a timely and serious look needs to be undertaken and completed within the next year. This is particularly true when the State Board recently adopted an order requiring the City's permit to include final effluent limitations to implement these outdated objectives (*see* SWRCB Order No. WQ 2009-03), which were never intended to apply to municipal discharges.

Federal law requires that the Water Boards review and amend their Basin Plans and state-wide plans, like the Bay-Delta Plan, which contain "applicable water quality objectives" as defined by federal law, every three years. This triennial review has not resulted in any substantive changes to the numeric objectives for EC contained in the Bay-Delta Plan since at least 1991. The triennial review process is instead being used to set workplan priorities, rather than focusing on reviewing and modifying water quality standards under Water Code sections 13000 and 13241.

Courts have found this paper exercise of merely listing potential priority projects inadequate and not in compliance with law. Instead, a Superior Court declared that the Triennial Review required a public hearing for the express purpose of reviewing and, as appropriate, modifying water quality standards or adopting new standards. *See Cities of Arcadia, et al, v. SWRCB and LARWQCB,* Orange County Superior Court Case No. 06CC02974. Moreover, the Superior Court held that this process should not be considered concluded until the modified or new water quality standards are adopted.

Section 303(c)(1) of the Clean Water Act (CWA) expressly requires the State water pollution control agency (in California, the State and Regional Water Boards) to, at least every three years, hold public hearings "for the purpose of reviewing applicable water quality standards and, as appropriate, modifying and adopting standards. Results of such review shall be made available to the Administrator." 33 U.S.C. §1313(c)(1); *see also* Water Code §13240 (requiring periodic review of all basin plans). Instead of conducting the requisite triennial water quality standards review, the State Board's Draft Staff Report appears to have transformed this review into a priority setting process simply identifying issues for further review. While priority setting is an important task for any agency, this priority setting process does not comply with the triennial review requirements of the CWA.

As such, the City of Tracy requests that the State Board take action to specifically review the appropriateness of the water quality standards in the Bay-Delta Plan, particularly the agricultural uses and related EC objectives, and to take action to revise inappropriate uses and objectives set to protect those uses so that the Water Code's mandate of reasonable water quality regulation is upheld. *See* Water Code §13000, §13241; *see also* State Board Order No. WQ 2002-0015 (discussing removal of inappropriate uses). A schedule for when these actions are anticipated to occur should also be established so that all stakeholders can accurately calendar and participate in the process.

Proposed Modifications to the Salinity Objective

Alternative Constituents of Salinity: As stated to the State Water Board before, the City believes that, instead of focusing on EC, the actual constituents that predominantly make up the measurement of EC (*e.g.*, sodium, sulfur, metals, etc.)[1] and potentially adversely affect salt-sensitive agriculture should be the focus of the water quality objective review. Since not all constituents measured by EC affect salt-sensitive agriculture, regulating through EC is overbroad and imprecise. For this reason, the *scope* of the potential salinity objectives, not just the EC objective, should be explored.

[1] *See* Kenneth Barbalace http://klbprouctions.com/. Periodic Table of Elements - Sorted by Electrical Conductivity. EnvironmentalChemistry.com. 1995 - 2009. Accessed on-line: 4/3/2009 http://EnvironmentalChemistry.com/yogi/periodic/electrical.html

Alternative Objectives/Longer Term Averages: Notwithstanding the above, if a water quality objective for EC is retained, that objective should be re-set at 1600 µmhos/cm (i.e., the highest end of the allowable range of MCL values for EC in 22 C.C.R. Table 64449-B) for municipal wastewater dischargers, which only comprise a small percentage of the flows to the Delta, and this value should apply year round as an annual average.[2]

Applicable Only At Point of Use: Lower objectives in the 700-1000 range should only apply site-specifically where water from the Delta (or a particular waterbody therein) is actually being used for salt-sensitive agriculture and there are no management options that could allow for higher salinity water to be used (e.g., less salty water used for blending, irrigation management techniques, etc.). Blanket application of EC objectives without site specific ground-truthing of the need for such objectives is overbroad, arbitrary, and capricious.

The Bay-Delta Plan Must Be Clarified As To Its Application

The Bay-Delta Plan is considered a water quality control "general plan" for water quality in the Bay-Delta region of the State. It contains the legal standards for surface waters in the region. However, the State Water Board failed to properly conduct a legally required review of these standards as applied to municipal wastewater in 1991, 1995 or in 2006 when it purported to apply the EC objectives to all parts of the Delta, not just the four (4) originally intended compliance points. Therefore, these objectives are inappropriately applied to municipal wastewater discharges.

The originally adopted EC standards in the Bay-Delta Plan (which was last modified, although purportedly not substantively, in 2006) were never intended to apply to municipal wastewater. The record is very clear that these objectives were intended to be complied with by altering flow regimes. Table 1-1 of the 1991 Delta Plan specified water quality objectives for EC to protect agriculture in all areas covered by the plan, whether such protection was necessary or not.[3] The table included water quality objectives for EC applicable only at the Vernalis gauge station--and three other southern Delta locations--of 0.7 millimhos per centimeter (mmhos/cm) or 700

[2] Even the 700 µmhos/cm water quality goal was anticipated to be a long-term average. *See* Order No. R5-2007-0036 at pg. F-43; *Water Quality for Agriculture, Food and Agriculture Organization of the United Nations – Irrigation and Drainage Paper No. 29,* Rev. 1 (R.S. Ayers and D.W. Westcot, Rome, 1985).

[3] The agricultural (AGR) beneficial use is not a federally required use designation as under the Clean Water Act, only the so-called fishable/swimmable uses are required to be designated, and only where attainable. *See* 33 U.S.C. §1251(a)(2). Water quality standards under federal law need only consider the use and value of waters for agriculture and other purposes. 33 U.S.C. §1313(c)(2)(A). Agricultural uses also do not meet the federal definition of "existing" beneficial uses. EPA regulations define "existing use" as "those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards." 40 C.F.R. §131.3(e). The regulations' reference to "uses actually attained in the water" disqualifies an off-stream agricultural use as an "existing use" under 40 C.F.R. §131.3(e).

μmhos/cm from April 1 through August 31, and 1.0 mmhos/cm or 1000 μmhos/cm from September 1 through March 31.[4]

Although the Delta Plan was adopted in 1991, it did not require the EC objectives to be fully implemented until 1996. The table also included the statement that, if a contract has been negotiated between the Department of Water Resources, the U.S. Bureau of Reclamation, and the South Delta Water Association, that contract will be reviewed prior to implementation of the specified EC standard for the southern Delta, and appropriate revisions will be made to the objectives after considering the needs of other beneficial uses.

Rather than focusing primarily on meeting water quality objectives through regulation of discharges, the 1991 Delta Plan expressly provided "the State Board recognizes that the flow requirements and salinity objectives are largely to be met by the regulation of water flow." (1991 Delta Plan, pg. 2-2 (emphasis added).) With respect to reducing the quantity of salt in the southern Delta area, the State Board established a goal of reducing the salt load discharged to the San Joaquin River by at least 10 percent and estimated that goal could be met through increased irrigation efficiency to reduce subsurface drainage. The State Board referred to development of a salt load reduction policy, the goals of which "should be achieved through development of best management practices and waste discharge requirements for non-point source dischargers." (1991 Delta Plan pg. 7-5 (emphasis added).)

In May 1995, the State Board adopted a revised water quality control plan for the Delta. ("Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary, 95-1WR, May 1995" (1995 Delta Plan). The 1995 Delta Plan delayed the implementation date for the EC objectives in the southern Delta until December 31, 1997. (1995 Delta Plan, pg. 17, Table 2.) In discussing the implementation program for meeting the southern Delta agricultural salinity objectives, the Plan states:

> "Elevated salinity in the southern Delta is caused by low flows, salts imported in irrigation water by the State and federal water projects, and discharges of land-derived salts primarily from agricultural drainage. Implementation of the objectives will be accomplished through the release of adequate flows to the San Joaquin River and control of saline agricultural drainage to the San Joaquin River and its tributaries.[5] Implementation of the agricultural salinity objectives for the two Old River sites shall be phased in so that compliance with the objectives is achieved by December 31, 1997.
>
> "..... The SWRCB will evaluate implementation measures for the southern Delta agricultural salinity objectives in the water right proceeding."

[4] The values were specified as maximum 30-day running averages of mean daily EC.

[5] Water Code section 13242 requires implementation plans for all water quality objectives to identify what entities must undertake activities to come into compliance with the objective. Failure to identify particular entities implies that no implementation activities are required by those entities.

(1995 Delta Plan, pg. 29.)

On March 15, 2000, the State Board adopted Revised Water Right Decision 1641, which once again addressed the relationship between water diversions and implementation of Delta water quality objectives and determined that "the actions of the CVP are the principal cause of the salinity concentrations exceeding the objectives at Vernalis. *See* SWRCB Revised Decision 1641 at pg. 83. This State Board decision also states:

> "Water quality in the southern Delta downstream of Vernalis is influenced by San Joaquin River inflow; tidal action; diversions of water by the SWP, CVP, and local water users; agricultural return flows; and channel capacity. (R.T. pg. 3668; DWR 37, pg. 8.) The salinity objectives for the interior southern Delta can be implemented by providing dilution flows, controlling in-Delta discharges of salts, or by using measures that affect circulation in the Delta....
>
> "Even when salinity objectives are met at Vernalis, the interior Delta objectives are sometimes exceeded. (R.T. pg. 3677; SWRCB le, Figures [IX-19]-[IX-26]; SWRCB 76.) Exceedance of the objectives in the interior Delta is in part due to water quality impacts within the Delta from in-Delta irrigation activities. (R.T. pg. 7794.)
>
> "..... In 1987, DWR and SDWA identified flow barriers that could be constructed in the southern Delta to enhance water levels and circulation. The DWR, the USBR and the SDWA have agreed that the salinity problems in the southern Delta can be mitigated using the barrier program.... Since 1991, DWR has been installing and operating temporary barriers to assist SDWA diversions. Permanent barriers are proposed as components of the preferred alternative for the ISDP. (DWR 37.)
>
> "The DWR and the USBR are partially responsible for salinity problems in the southern Delta because of hydrologic changes that are caused by export pumping. Therefore, this order amends the export permits of the DWR and of the USBR to require the projects to take actions that will achieve the benefits of the permanent barriers in the southern Delta to help meet the 1995 Bay-Delta Plan's interior Delta salinity objectives by April 1, 2005. Until then, the DWR and the USBR will be required to meet a salinity requirement of 1.0 mmhos/cm [equivalent to 1000 μmhos/cm]. If, after actions are taken to achieve the benefits of barriers, it is determined that it is not feasible to fully implement the objectives, the SWRCB will consider revising the interior Delta salinity objectives when it reviews the 1995 Bay-Delta Plan...."

(Revised Water Right Decision 1641, pgs. 86-88, all emphasis added.)

Revised Water Right Decision 1641 summarized the State Board's conclusions regarding salinity problems in the southern Delta as follows:

> "..... Salinity problems in the southern Delta result from low flows in the San Joaquin River and discharges of saline drainage water to the river. The actions of the CVP are the principal causes of the salinity concentrations exceeding the objectives at Vernalis. Downstream of Vernalis, salinity is influenced by San Joaquin River inflow, tidal action,

> diversions of water by the SWP, CVP, and local water users, agricultural return flows, and channel capacity. Measures that affect circulation in the Delta, such as barriers, can help improve the salinity concentrations."

(Revised Water Right Decision 1641, pg. 89.)

Although the 1641 water right decision did not amend the water quality objectives in the 1995 Delta Plan, the decision redefined the responsibilities of the Department of Water Resources and the Bureau of Reclamation for implementation of several provisions of the plan, including the southern Delta EC objectives. Footnote 5 to Table 2 of the decision provides that:

> "The 0.7 EC objective [equivalent to 700 μmhos/cm] becomes effective on April 1, 2005. The DWR and USBR shall meet 1.0 EC at these stations year round until April 1, 2005. The 0.7 EC objective is replaced by the 1.0 EC objective from August after April 1, 2005 if permanent barriers are constructed or equivalent measures are implemented in the southern Delta and an operations plan that reasonably protects southern Delta agriculture is prepared by the DWR and the USBR and approved by the Executive Director of the SWRCB. The SWRCB will review the salinity objectives for the southern Delta in the next review of the Bay-Delta objectives following construction of the barriers."

(Revised Water Right Decision 1641, pg. 182.)

The State Board took action with respect to the EC water quality objectives in the southern Delta through the adoption of State Board Resolution No. 2004-0062 on September 30, 2004. The resolution adopted the staff report for the periodic review of the 1995 Delta Plan and affirmed the plan as it then existed until changed by action of the State Board. In adopting the staff report, the State Board accepted the recommendation to receive further information to help decide whether to amend several provisions of the plan, including the southern Delta EC objectives. The State Board also accepted the staff recommendation to consider amending the Program of Implementation section of the plan as necessary for implementation of any changes to the EC water quality objectives for the southern Delta or other revised objectives. *See* State Board Resolution No. 2004-0062, pgs. 1 and 2.[6]

Review of the documents discussed above leads to several conclusions regarding the southern Delta EC objectives from the 1991 and 1995 Delta Plans. First, the lengthy record of prior State Board decisions and water quality control plans for the Delta establishes that the salinity problems in the southern Delta are the result of many inter-related conditions, including water diversions upstream of the Delta, water diversions within the Delta for export and local use, high levels of salinity in irrigation return flows discharged to Delta waterways and tributaries, groundwater inflow, seasonal flow variations, and natural tidal conditions. Second, although discharges of treated wastewater to the Delta or its tributaries under NPDES permits might be

[6] The staff report adopted in State Board Resolution No. 2004-0062 recommended that the State Board not consider changes to the EC objectives upstream of Vernalis and several other provisions of the 1995 Delta Plan at this time.

demonstrated to affect EC in some very limited areas of the southern Delta near the discharge, previous State Board decisions and water quality control plans and related environmental documents did not discuss treated effluent discharges as a source of salinity in the southern Delta or consider the environmental, economic, or water quality impacts of using these EC objectives as end-of-pipe effluent limits as required under Water Code section 13241,[7] or as part of the implementation plan required under Water Code section 13242.

Similarly, previously adopted implementation programs for complying with the EC objectives in the southern Delta focused primarily on providing increased flows and reducing the quantity of salts delivered to the Delta and its tributaries by irrigation return flows and groundwater. The record also establishes that the implementation date for actions to implement the 0.7 mmhos/cm EC objective [equivalent to 700 µmhos/cm] for April through August was repeatedly postponed. In fact, revised Water Right Decision 1641 placed primary responsibility for meeting the EC objectives on the Department of Water Resources and the Bureau of Reclamation, and did not require those agencies to implement the 0.7 mmhos/cm [700 µmhos/cm] EC objective until April 1, 2005.

In 2006, the State Water Board purported to amend the Bay-Delta Plan to expand the application of the EC objectives from the four specific compliance locations to "all locations in that general area." (Bay-Delta Plan at p. 10.) Even though deemed a "non-substantive change," the State Board also purported to amend the implementation program to require "discharge controls on in-Delta discharges of salts by agricultural, domestic, and municipal dischargers." (*Id.* at p. 28.) However, the State Board in taking these actions failed to evaluate the requisite Water Code factors under Water Code section 13241 when modifying these water quality standards. Consequently, the salinity objectives and implementation program of the 2006 Bay-Delta Plan are unlawful and not appropriately applied to municipal dischargers. (*Cities of Arcadia, supra*, No. 06CC02974 at pp. 5-6 (water quality standards required review under factors and requirements of Water Code sections 13000 and 13241 where such standards were not previously considered as applied to stormwater).)

Unless and until these EC objectives and the associated implementation program are reviewed and modified in accordance with Water Code sections 13000 and 13241, these objectives are not properly applied to municipal wastewater. (*Ibid.*) Moreover, these modifications have not been approved by U.S. EPA and cannot be utilized as "applicable water quality objectives" under federal law for impairment determinations under Clean Water Act section 303(d) or for NPDES

[7] Under Water Code section 13170, the State Water Board must consider the factors in Water Code section 13241 when adopting or amending water quality objectives. Water Code section 13241 sets forth the general duty of reasonableness in that the Board must adopt objectives to "ensure the *reasonable protection of beneficial uses*." *See* Water Code § 13241 (emphasis added). Further, the State Water Board must consider the past, present and probable beneficial uses of water; environmental characteristics of the hydrographic unit; *reasonably achievable water quality conditions*; *economic consequences*; need to develop housing; and need to develop and use recycled water. *Id.*

permitting decisions under Clean Water Act section 402 and its implementing regulations. *See* 40 C.F.R. §131.21(c)(2); *Alaska Clean Water Alliance v. Clark*, No. C96-1762R, 1997 W.L. 446499 at *3 (W.D. Wash. 1997)(overturning a previous EPA regulation *presuming* approval of state water quality standards if not approved by EPA within statutory timeframe, and holding that "Congress did not intend new or revised state standards to be effective until after U.S. EPA had reviewed and approved them.").

The State Water Board Should De-Designate Salt-Sensitive Agricultural Use or Adopt A Variance Procedure In the Bay-Delta Plan

Assuming *arguendo* that the salinity objectives in the Bay-Delta Plan were valid and approved, it has not been demonstrated that attainment of these standards is reasonably or feasibly attainable. EPA regulations allow for States to de-designate unattainable uses or to include variances in their State water quality standards policies. *See* 40 CFR §131.10 and §131.13. Variance procedures are similar to the removal of a designated use, but are discharger and pollutant specific and are time-limited. *See* 1993 EPA Water Quality Standards Handbook at 5-11. With de-designation, the standard changes along with permit requirements that would no longer be required to meet that standard. With a variance, NPDES permits may be written so long as reasonable progress is made toward attaining the standards without violating Section 402(a)(1) of the Act, which U.S. EPA contends requires that NPDES permits must meet applicable water quality standards.

State variance procedures, as part of a State's water quality standards, must be consistent with the substantive requirements of 40 CFR Part 131, which is very similar to the use de-designation process. EPA has approved State-adopted de-designations or variances in the past where:

- Variances or de-designation are included as part of a revision to the water quality standard/Basin Plan.
- The standard is unattainable based on one of the grounds set for in 40 C.F.R. §131.10(g). Salinity may warrant an exemption under section 131.10's subsections:
  - (g)(1)(naturally occurring pollutant concentrations prevent the attainment of the use) Since saline water from the ocean and bay are tidally moved into the Delta, this must be a consideration;
  - (g)(2)(natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use) Given the flow requirements and interconnectivity, this provision may be applicable;
  - (g)(3)(human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied without environmental damage) The vast levee and canal systems of the Delta also contribute to salinity issues. For dischargers, the prescribed salinity levels cannot be met without reverse osmosis, which can be deemed damaging to the environment through excessive energy use and creation of a concentrated brine that must be disposed of.

- (g)(4)(dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in such a way that would result in the attainment of the use) The weirs and other flow controls in the Delta make this provision applicable and the decades of flow modifications demonstrate that the levels needed to protect this use have not been able be consistently attained Delta-wide.

Additional showings would need to be made if a variance was used, instead of a de-designation.

- Dischargers to whom the variance applies for EC would still be required to meet the applicable criteria for other constituents.
- The variance is granted for a specific period of time and must be re-justified upon expiration.
- Dischargers must meet the standard upon the expiration of this time period or must make a new demonstration of "unattainability."
- Reasonable progress is being made toward meeting the standard.
- The variance was subjected to public notice, opportunity for public comment, and public hearing. The public notice should contain a clear description of the impact of the variance upon achieving water quality standards in the affected stream segment.

For Any Modification of the Salinity Objectives, The State Board Must Include Compliance Schedule Authority.

If no other changes are made to the Bay-Delta salinity objectives, the State Board must make clear that its Compliance Schedule Policy applies to any modifications to the Bay-Delta Plan (even those made in 2006), or adopt specific compliance schedule authority in the Bay-Delta Plan to apply to dischargers receiving effluent limitations for EC for the first time.

The City of Tracy never had EC limits proposed in its NPDES permit until 2007, despite the fact that these objectives had been in the Bay-Delta Plan for decades. To comply with those standards, the City would have to design, construct and operate a reverse osmosis or other advanced treatment system. It would also have to go through the California Environmental Quality Act's (CEQA) procedural steps. These prerequisites could take years or decades depending on if litigation ensued under CEQA. Given the long lead time, a compliance schedule is warranted and should be explicitly provided, particularly for dischargers not expressly identified previously in the implementation plan for these objectives. Holding dischargers in violation of permit requirements because they cannot accomplish immediate construction and operation of reverse osmosis facilities to treat discharges from municipal wastewater treatment plants without a compliance schedule does not represent a reasonable regulatory approach.

In sum, the City would like to reiterate that the causes and potential solutions to the salinity problems in the southern Delta are highly complex subjects that must receive immediate and continuing attention from the State Water Board in the exercise of its coordinated authority over water rights and water quality. The City of Tracy hopes that the comments and suggestions contained in this letter will be given serious consideration and that no resolution approving the Staff Report be adopted without the modifications requested herein.

Respectfully submitted,

DOWNEY BRAND LLP

Melissa A. Thorme

1007288.1

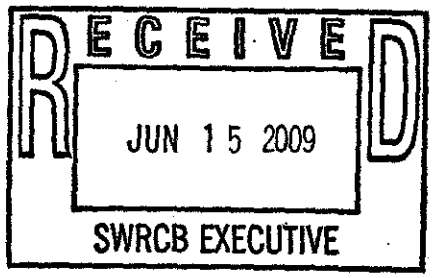
State of California

The Resources Agency

Public Comment
2009 Periodic Review
Deadline: 6/15/09 by 12 noon

Memorandum

Date: June 15, 2009



To: Jeanine Townsend, Clerk to the Board
State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812-0000

From: **Department of Water Resources**

Subject: Comments on the 2009 Draft Periodic Review Staff Report of the 2006 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary

Enclosed for the State Water Resources Control Board's (State Water Board) review are the Department of Water Resources (DWR) comments on the 2009 Draft 'Periodic Review Staff Report' (Staff Report) of the 2006 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (2006 Bay-Delta Plan). As requested in the Notice of Adoption Hearing, DWR also will be submitting 15 paper copies, including one with an original signature. DWR appreciates the opportunity to review and comment on this report.

DWR acknowledges the State Water Board's necessary involvement in the development of long-term solutions for the Bay-Delta and that the review and potential modification of the 2006 Bay-Delta Plan is critical if such plans are to succeed. As such, DWR supports the review process and the efforts of the State Water Board's staff to identify those objectives that may need to be either reconsidered or newly established. In particular, DWR continues to encourage the State Water Board to work closely with other agencies and stakeholders as the review of the 2006 Bay-Delta Plan and the development of the Bay-Delta Conservation Plan (BDCP) move forward concurrently. DWR also looks forward to working with the State Water Board and its staff to ensure that the State Water Board is fully apprised of and appreciates the potential impacts, beneficial and harmful, associated with any changes to existing objectives or implementation of new objectives.

In general, DWR has three major issues that it would like to bring to the State Water Board's attention regarding the Staff Report. First, the Staff Report identifies analyses which suggest that the operations of the State Water Project and Central Valley Project (collectively, Projects) have contributed to the decline of species listed under the federal and State endangered species acts (ESA), and perhaps to other estuarine species as well. The report, however, fails to mention the dramatic ecological effects that have occurred in the Estuary since the mid 1980's totally unrelated to water project effects. These include 1) the crash of primary production in the Suisun bay area due to the influx of the invasive clam Corbula, 2) the effects on improved water clarity to the detriment of delta smelt habitat due to the aquatic weed Egeria in the interior Delta, and 3) the reduced populations of good quality zooplankton food and the replacement with Limnoithona, which is now the most abundance zooplankton in the Estuary and a rather poor food source for fish and many others. The Staff Report needs to present a much more balanced assessment of the changes to the Bay-Delta

ecosystem that have occurred. In past State Water Board workshops DWR and the IEP agencies have presented some of these changes.

The Staff Report also points out that the National Marine Fisheries Service, the U.S. Fish & Wildlife Service and the California Department of Fish & Game have recently issued biological opinions and/or incidental take permits which have altered the Projects' operations to protect endangered species. However, DWR believes that the Staff Report should also clearly point out that the new incidental take requirements are already incorporated in the Projects' existing water rights license and permits, since those permits require compliance with the federal and State ESAs.

In addition, since the incidental take requirements relating to reverse flow objectives, Delta Cross Channel Gate closure objectives, and export/inflow objectives have already altered Projects' operations, DWR recommends that the State Water Board, as part of its review of the 2006 Bay-Delta Plan, analyze how the above requirements affect already established objectives. As part of this review, the State Water Board should consider whether the new ESA-related requirements make other objectives unreasonable.

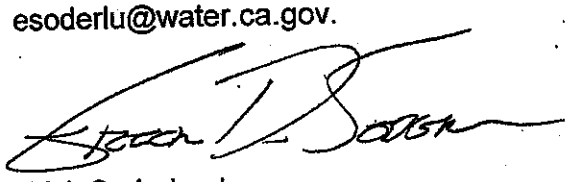
Second, DWR disagrees with the Staff Report and recommends that the State Water Board include ammonia and other toxics as part of its review and potential revision of the Bay-Delta Plan. As the regulating agency over water quality and water rights, the State Water Board is in the position to address water quality issues that directly affect fish and wildlife but are outside the purview of the ESA-related processes. Specifically, identifying and regulating contaminants in the Bay-Delta is something that the State Water Board is uniquely qualified to do and, in doing so, can directly contribute to a comprehensive approach for improving water quality and the sustainable use of water from the Delta.

DWR understands the State Water Board staffs' rationale for recommending that the Board not consider establishing objectives for ammonia or other toxics, but believes that excluding the review of the above is, at this time, premature. By including ammonia and toxics in its review of the 2006 Bay-Delta Plan, the State Water Board can use its unique position to move forward the understanding of the components, quantities and effects pollutants have on the ecosystem and public health in the Bay-Delta. DWR believes that addressing this area is critical when developing a strategy and plan to protect the beneficial uses in the Bay-Delta.

Lastly, DWR applauds the State Water Board staff's acknowledgment that the recommendation that certain issues be further reviewed does not mean that changes will be made to the 2006 Bay-Delta Plan related to those issues. DWR also appreciates the acknowledgement that additional issues may be identified, including changes required as part of the BDCP. Many of the issues identified in the Staff Report are still being developed in the BDCP process or are involved in litigation, in which the recent biological opinions are being challenged. As such, many issues are still in a state of flux and it is wise for the State Water Board to recognize this and not commit to a particular set of issues at this time.

Also, in light of the uncertainty as to what the BDCP will ultimately include and how the current, and future, litigation regarding the recent biological opinions will be resolved, DWR respectfully requests the opportunity to provide supplemental comments regarding this report as new information becomes available, even after the State Water Board adopts the Staff Report.

DWR appreciates the opportunity to comment on this draft and looks forward to working with the State Water Board as it proceeds through the basin planning process. If you or your staff have questions on these comments or would like additional information please contact me at (916) 653-8826 or esoderlu@water.ca.gov.



Erick Soderlund
Staff Counsel

Enclosure

DWR SPECIFIC COMMENTS
ON THE
2009 DRAFT PERIODIC REVIEW STAFF REPORT OF THE 2006 WATER QUALTIY CONTROL PLAN FOR THE SAN FRANCISCO BAY/SACRAMENTO-SAN JOAQUIN DELTA ESTUARY

Water Quality Control Plan Review Process

Page 10, Para. 2. In the first sentence and several other places in the report, reference is made to the implementation of the amended basin plan only through changes to water rights. It should be more clearly stated throughout the report that changes to water quality regulations will also be considered to implement the amended plan. That point is made in the last sentence of this paragraph, but it bears repeating whenever the amendment of the water rights is mentioned.

Southern Delta Salinity and San Joaquin River Flows

Page 12. General comment under 1st introductory paragraph (Southern Delta Salinity and San Joaquin River Flows). Change wording in the following sentence "Accordingly, there is no need for a staff recommendation *or conclusions* in this report". This will clarify why there are no conclusions given as in other sections.

Page 13, Para. 3. Delete last sentence, beginning with "Depending on SWP and CVP. . .", since this concept is repeated on page 14 and is more appropriately made under the Flow Related Concentration Effects section (see 3rd bullet).

Page 13. Comment under Source Loading & Evapo-Concentration, 1st bullet----- The bulleted sections correctly states that between Aug and Dec. 2008, 33 to 43% of the salt load into Clifton Court Forebay came from the San Francisco Bay, however, this statement is not put in context ie, that the total volume of seawater that came to the forebay during this time period ranged between 0.5% and 1.2% of the total volume of all water that came into the forebay.

Page 13. Same section as above. Since so much of the salt loading information presented in this and the next section is given in tons (i.e. WWTPs or industrial discharges into the San Joaquin), it would be beneficial to have the same units provided for Clifton Court as the SWP input rather than percentages only (as are discussed in the above paragraph) so that all sources could be evaluated equally. This would also allow comparison to the first bulleted paragraph under Flow Related Concentrations Effects that gives the load of salt provided from recirculation of San Joaquin river salts via the DMC.

Page 13. Same section as above. This report does not mention the salinity issues associated with the San Joaquin River's various branches and that salinity

issues may be more localized than the main stem of the river. See next comment for a specific example of this issue.

Page 13. Same section as above. This section notes that there is limited data associated with wetland discharge water quality data, however it does not mention that, at least with respect to the Old River, there is also limited agricultural discharge data associated with salinity.

Page 14, Para.1. First bullet point, define industrial water uses to differentiate between domestic, municipal and industrial. Providing a couple of examples of uses as in domestic water use text would be helpful.

Page 14. General comment under "Flow Related Concentration Effects" section. With recent publication of two major biological opinions for delta smelt (12/08) and salmon, steelhead and green sturgeon (6/09) the report may need to incorporate available information on how changes to the CVP/SWP operations may affect hydrodynamics in the South Delta and salinity loading from the operations.

Delta Outflow Objectives

The staff report recommends that the SWRCB consider changes to the Delta outflow objective, or alternatively Delta inflow as part of the possible revision of the Bay-Delta plan. This same issue is being discussed at length as part of the ongoing BDCP process and the issue is very complicated. Because the BDCP has not identified a preferred alternative, DWR believes that it is premature for the SWRCB to consider changes to the Delta outflow objectives at this time. The report notes that the FWS BO calls for additional X2 requirements in the fall. However, DWR disagrees with the basis for this conclusion and has requested reconsultation with FWS, with this being one of the larger issues. Given the uncertainty, DWR believes it would be inappropriate at this time for the SWRCB to propose such changes to the objective..

However, DWR Operations and Maintenance does advocate one possible revision to the existing X2 objectives. Footnote [a] of Table 4 (e.g. the number of days that X2 must be maintained at specific locations) reads, in pertinent part, the following:

> *"If salinity/flow objectives are met for a greater number of days than the requirements for any month, the excess days shall be applied to meeting the requirements for the following month...."*

DWR believes that if X2 days required for any given month are not met in full, then the number of deficit days shall be applied as additional requirements (X2 days) to the following month or the soonest month in which they would apply. Thus, the X2 requirement should be modified to allow for carrying over both

excess and deficit days to the following month or the soonest month in which they could be applied.

This proposed modification would allow for more operational flexibility and efficiency in modifying upstream reservoir releases of the SWP and CVP to meet the X2 requirements. It would smooth transitions which Project operators routinely face with regard to changing OMR requirements (per Delta smelt opinion), maintaining upstream cold water pools and rapid increases in upstream depletion rates that occur along the Sacramento and San Joaquin Rivers during peak irrigation periods (e.g. water released that is expected to reach the Delta but doesn't show up!).

Page 16, Para. 2. The text states the freshwater flow is a "significant factor in the survival of smolts moving downstream through the Delta." Note that the most statistically rigorous analysis of salmon survival data concluded that "the effects of flow were slightly positive but were confounded by salinity levels." (Newman and Rice. 2002. Journal of the American Statistical Association 97(460): 983-993).

Page 16, Para. 5. The text cites 2002 as the start of the POD. While the POD was apparent by 2002, the actual start of the decline was probably around 2000, with some variation depending on species (Sommer, T., C. Armor, R. Baxter, R. Breuer, L. Brown, M. Chotkowski, S. Culberson, F. Feyrer, M. Gingras, B. Herbold, W. Kimmerer, A. Mueller-Solger, M. Nobriga, and K. Souza. 2007. The collapse of pelagic fishes in the upper San Francisco Estuary. Fisheries 32:270-277.)

Page 17, Para. 2, lines 3-4. Regarding the statement that "low outflow also decreases the quality of delta smelt habitat", it is important to qualify this statement. First, the strongest results to date have only been for fall, not the entire year. Secondly, "quality" needs to be a bit more specific. Feyrer et al. (2007) reported that salinity and turbidity can affect habitat quality, but note that there are multiple other factors that their study did not evaluate. For example, prey availability and contaminants also affect habitat quality. Perhaps a better way to phrase things would be to simply say that outflow affects habitat availability for this species.

Page 17, Para. 2, lines 4-6. The statement that suitable summertime habitat for delta smelt has decreased over time also needs to be qualified. Nobriga et al. (2008) noted that there was a clear regional decrease in habitat in the south Delta, but no estuary-wide trend. Similarly, it is very misleading to state that water temperatures are directly related to outflow, at least for the estuary. Our understanding is that flow does not have a substantial effect on Delta water temperatures, particularly in summertime, when air temperatures dominate. Indeed, recent modeling by UC Berkeley shows that Delta water temperatures

are well-predicted by two simple variables: air temperature and the previous day's water temperature (Mark Stacey, UC Berkeley, unpublished data).

Page 17, Para. 3. "Moyle et al. 2009 in prep" is cited as evidence that greater salinity and habitat variability would help desirable fish species. While this may indeed be true, relatively little scientific support was provided in the cited document. Better scientific information is needed to resolve this issue.

Page 17, Para. 4. While the USFWS delta smelt BO identifies a fall X2 action that provides more Delta outflow in years following wet and above normal years, the report should also clearly recognize that an independent science review of that fall action concluded that "The degree to which moving X2 seaward will affect delta smelt habitat is not well supported by the analyses presented, and that the additional arguments presented for this action also seem weak." (Independent Peer Review of two Sets of Proposed action for the Operations Criteria and Plan's Biological Opinion, November 19, 2008. Prepared for USFWS by PBSJ)

Page 19, Para 3. The following is a better reference than Baxter ex al. (2008) for the entrainment-related information: Grimaldo, LF, Sommer, T, Van Ark , N, Jones, G, Holland , E, Moyle, P, Smith, P, and Herbold, B. 2009. Factors affecting fish entrainment into massive water diversions in a freshwater tidal estuary: Can fish losses be managed? North American Journal of Fisheries Management. In press.

Page 19, Para. 4, Last sentence. This statement should be qualified by life stage and season. Grimaldo et al. (2009).found that OMR flows were more important during winter upstream migration, and X2 was more of a factor during spring. We are not aware of similar evidence for summer or fall and doubt that the statement would apply.

Suisun Marsh Objectives

Page 22, Last Para. Replace third sentence with: "The objective of Suisun Marsh Salinity Control Gate operation is to decrease the salinity of the water in Montezuma Slough for water deliveries to seasonal wetlands. The Corps of Engineers permit for operating the gate requires that it be operated between October and May only when needed to meet Suisun Marsh salinity standards. Historically, the gate has been operated as early as October 1, while in some years (e.g. 1996, 2007) the gate was not operated at all. Assuming no significant long-term changes in delta outflow, recent operational frequencies (10 – 20 days per year) can generally be expected to continue to meet standards in the future; except perhaps during the most critical hydrologic conditions and/or other conditions that affect Delta outflow."

Page 22, Last Para. Line 9. Insert: Operation of the gates *for 5 – 7 consecutive days* can move the position of X2.

Page 23, Last Para. Replace "mid 2009" with "late 2009":

Page 23, Last Para. Precede third sentence with "Since implementation of the Suisun Marsh Plan could affect salinity conditions and beneficial uses, the SMCG has committed ...."

Page 24, Conclusion: last sentence. Insert "(and/or objectives proposed in the Suisun Marsh Plan)" as part of its potential revisions .....

Reverse Flow Objectives

The staff report recommends that the SWRCB evaluate establishment of Old River and Middle River (OMR) flow objectives as part of its update of the Bay-Delta Plan. The OMR requirements that are in both the FWS and NMFS Biological Opinions are prescribed as a range of possible requirements during different time periods. The specific implementation of these criteria are determined by drawing on the input of many interagency biologists that have expertise in protecting sensitive Bay-Delta fisheries that are listed under the Federal and State Endangered Species Acts. These biologists consider many real-time factors such as recent surveys/monitoring, temperatures in the Delta, existing flows and water project export rates.

SWRCB Bay-Delta objectives are somewhat rigid by nature and do not easily lend themselves to the "real-time adaptive management" process which is currently used to determine the specific protective criteria. These criteria can change in a matter of several days or in a week, depending on changing real-time conditions such as salvage at project export facilities. Moreover, the BDCP process is considering conveyance strategies which may fundamentally alter the need for reverse flow objectives. Therefore, DWR believes is it not appropriate for the SWRCB to consider reverse flow as a water quality objective.

Floodplain Habitat Flow Objectives

Page 26, Para. 2. The Opperman (2006) reference should be replaced by Sommer et al. (2001).

Page 26, Para. 4. Jassby and Cloern (2000) is a better citation than Schemel et al. (2004) regarding the possible use of floodplain to increase primary production. (Jassby AD, Cloern JE. 2000. Organic matter sources and rehabilitation of the Sacramento-San Joaquin Delta (California, USA). Aquatic Conservation: Marine and Freshwater Ecosystems 10: 323-352.)

Page 27, Para. 2. New evidence reveals that floodplain may be more beneficial to delta smelt than previously understood. As described in Sommer et al. (2009), there is evidence of "resident" delta smelt that remain year-round at the base of Yolo Bypass, principally Liberty Island. Hence, enhanced primary and secondary productivity from floodplain may benefit delta smelt more than might be expected based on their "typical" estuarine habitat. Since longfin smelt also occur seasonally in the Cache Slough Complex (DFG, unpublished data), they may also benefit from improved food production in the region. (Sommer, Ted, Kevin Reece, Francine Mejia and Matt Nobriga. 2009. Delta Smelt Life-History Contingents: A Possible Upstream Rearing Strategy? IEP Newsletter 22(1): 11-13)

Page 27, Para. 3-4. The discussion of mercury is appropriate in that it points out that floodplain habitat, like other types of wetlands, may increase mercury methylation. However, the text does not provide much context. For example, recent studies showed that the amount of methyl mercury bioaccumulated by young salmon migrating through Yolo Bypass was quite low in comparison to their whole life cycle, i.e. their ultimate adult size (Henery et al. 2009). Moreover, it is unclear whether restoration to promote aquatic organisms would result in substantially more methyl mercury production than existing land use activities in the region such as rice farming or waterflow wetlands and ponds. (Henery, R., T. Sommer, and C.R. Goldman. 2009. Growth and methylmercury accumulation in juvenile Chinook salmon (Oncorhynchus tshawytscha) in the Sacramento River and its floodplain the Yolo Bypass. Trans. Am. Fish. Soc. In press.)

Page 28, Para. 1. Here or elsewhere in this section it would be important to mention that managed Yolo Bypass floodplain inundation and fish passage are included in the RPA in the recently-released NMFS Biological Opinion for salmonids.

Changes to Program Implementation

Page 28. DWR agrees that the periodic review of the EMP program elements is helpful and needed. DWR does not agree that hydrologic monitoring should be a mandated component of the EMP program. The requirement to assess the impacts to ecosystem from the water projects is the mandated element. Meeting this mandate should be the objective. Various studies and analyses, as well as compliance actions do incorporate hydrodynamics and hydrology as needed, and the information is acquired from DWR or other sources. In some cases new stations are developed to collect the additional information. Both these existing water quality stations and flow stations can be used for other purposes, such as planning or performance management. But DWR and USBR should not be required under the WQCP to provide a mandated network of additional WQ stations or flow stations to meet other objectives such as the Delta Vision, the

RMP, BDCP, or recommendations from the non-regulatory processes such as SWAMP, or the California Water Quality Monitoring Council.

DWR will continue to strive for integration of its monitoring programs with other processes, as well as creating high quality data that is accessible and meets the required standards for QA/QC and metadata. However DWR and IEP should not be constrained in its achievement of the D-1641 alternative to provide data to the Board and stakeholders via the web. DWR and IEP are on track to meet this requirement and therefore transition away from the annual written report as stated in the agreement. This will allow staff to focus on long term trends analysis, a much more useful tool than any single year data set. Constraining the EMP and IEP program by dictating resources committed to CDEN or other as yet unproven or infancy stage data management or data sharing projects or structures could hamper our ability to achieve the objective stated above in the near term. Future data sharing and integration is a component of our current data storage and access objectives, so that other programs as developed may access our information. Integration should be encouraged, but not mandated.

Ammonia Objectives and Toxicity

Page 31. DWR agrees that integrated efforts through the IEP Contaminants Work Team (CWT) has led to a focused series of studies on ammonia issues, with involvement from various Board staff and stakeholders. The CALFED science program has also been integral in its development of the Ammonia Workshop, and involvement of the SAG in creating recommendations for studies. Depending upon the outcome of these studies, additional regulatory action may be needed. Unlike historical NPDES processes, impacts are now being assessed many miles from the point of discharge. This has created a new paradigm where traditional effluent effects localized to a discharge point may not be representative of effects miles from the source. This is the case for ammonia, where transformation to un-ionized ammonia can create a different toxicological effect than at the source. DWR recommends that State Board ensure that contaminant concerns for the Delta are addressed from point and non-point sources. Additionally, the data that is generated from the irrigated lands ag waiver program be made available as soon as possible for lands within the Delta or contributing to the water-sheds of the Delta.

Development and construction of fish screen devices

Page 43, Replace 2nd full paragraph with the following text.

> In 2000, the CALFED ROD called for development and construction of new, improved fish screening devices at the SWP and CVP export facilities in the southern Delta to reduce the fisheries impacts. In 2002, concerns that the collection, handling, transporting and release (CHTR)

processes may adversely affect the survival of salvaged fish and limit the benefits of new fish screening facilities led CALFED to propose studies to address critical data gaps on the survival and health of salvaged delta smelt. As a result, in 2004 and 2005, Department of Fish and Game conducted studies for evaluation of CHTR effects on delta smelt investigating acute mortality and injury, assessment of fish predation, and stress effects to salvaged delta smelt. Subsequently, the South Delta Fish Facilities Forum (SDFFF), formed by CALFED, recommended in 2005 not to pursue new screening activities due to concerns related to cost (as high as $1.7 billion) and effectiveness of screening these facilities. However, as one of the immediate actions, SDFFF recommended to complete the CHTR studies and identify current CHTR facility and operational actions to increase delta smelt survival. Therefore, in 2007 and 2008, the California Department of Water Resources (DWR) with support from the U.S. Bureau of Reclamation (USBR) and California Department of Fish and Game (DFG), conducted a field study to investigate the release phase of the CHTR process. The study was developed to gather useful information that could serve to reduce the potential vulnerability of sensitive fish species to mortality as a result of predation and/or injury during the release phase of the CHTR process, and also to develop criteria for the design of new facilities or large-scale improvements to the existing release facilities. The CHTR reports are being reviewed and expected to be published at the end of this year. The CHTR study team has been working with the Central Valley Fish Facility Review Team to analyze and develop recommendations. Based on the preliminary information, DWR has recommended a number of short-term and long-term actions to improve the salvage operation at the Skinner Delta Fish Protective Facility. These recommendations are based on field observations and hydraulic modeling as well as observations of current facility staff. Many of these recommendations have been included as actions in the recently issued biological opinion by the National Marine Fisheries Service on the long-term operation of the CVP and SWP.

Public Comment
2009 Periodic Review
Deadline: 6/15/09 by 12 noon

Wastewater Treatment

SRCSD

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June 15, 2009

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SWRCB EXECUTIVE

Mr. Curtis Yip
Environmental Scientist
Bay Delta Unit
Division of Water Rights
P.O. Box 2000
Sacramento, CA 95812-2000

Comments on Draft Staff Report 2009 Periodic Review of the 2006 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan)

Dear Mr. Yip:

The Sacramento Regional County Sanitation (SRCSD) appreciates the opportunity to provide information to the State Water Resources Control Board (State Water Board) for its use in the basin planning process to determine what, if any, changes should be made to the Bay-Delta Plan. SRCSD provides wastewater collection and treatment services to 1.3 million residents of the greater Sacramento area. Our mission is to protect human health and keep the Sacramento River clean and safe. We take our mission very seriously and work on a daily basis to meet our obligations to protect water quality and beneficial uses in the Delta. Our excellent compliance record with our NPDES permit speaks to this commitment and performance.

SRCSD applauds the effort of the State Water Board in preparation of the staff report, particularly in their use of the information supplied from the August 29, 2008 "Request for Written Input on Factual Issues Regarding the Bay-Delta." The staff report is written in a concise manner and organized to allow the reader to easily understand how the recommendations and conclusions were derived. The staff recommendations for issues worth further review as part of the basin planning process are very significant and important issues that need further review to protect beneficial uses of waters in the Delta. SRCSD appreciates the State Water Board's commitment to stakeholder involvement and pursuit of science based decisions.

The related proceedings of the staff report makes it very clear that the State Water Board has its own independent judgment in all the Delta efforts underway, and that implementation of the Bay Delta Conservation Plan will require changes to the Bay Delta Plan and water right permits that implement that plan. SRCSD has been an active participant in the Central Valley-Salinity Alternatives for Long Term Sustainability (CV-SALTS) basin planning process and is pleased to see the State Water Board recognize that the

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setting of salinity objectives for the South Delta must be integrated with CV-SALTS. SRCSD is concerned about the Water Board's ability to provide sufficient staffing and funding to stay actively engaged in Delta issues. While there are many priorities for the Water Boards, SRCSD contends that dedication of resources towards Delta issues is of critical importance. In providing funding, it is important to keep in mind that there are many diverse uses and beneficiaries of the Delta, and that everyone has an obligation to participate in developing and implementing solutions.

Overall, the staff report is balanced, well written and includes recommendations from stakeholders. SRCSD's comments on the various sections of the staff report are general for the subject areas of "Issues Previously Identified for Further Review" and "Additional Issues Identified for Further Review". For the subject area of "Issues Not Recommended for Further Review", SRCSD is providing very specific comments related to ammonia and toxicity that support the State Water Board's recommendations.

Issues Previously Identified for Further Review

- The review of the evaluation of Southern Delta Salinity Objectives is very helpful in understanding how the objectives were originally established in the 1970's. The reliance on assuming a 100 percent yield for estimating the maximum salinity concentrations needs review and updating. Permit writers at the Regional Water Quality Control Boards using this assumption in evaluating site specific salinity limits may be inappropriate. Granted the southern delta salinity objectives were never meant to be used as de facto permit limits, but when numeric objectives are established there is a tendency to apply those objectives in NPDES permits.

- SRCSD appreciates the clear discussion on San Joaquin River flows and the relationship to salinity in the south Delta.

Additional Issues Identified for Further Review

- The review of Delta outflow export/inflow objectives is appropriate and the discussion of why this must be reviewed is the most factual listing of the known effects of the State Water Project and Central Valley Project have on the beneficial uses of Delta water.

- SRCSD is very concerned with the impact of export volumes on flow conditions in the Sacramento River. The concern is that the magnitude and timing of withdrawals, as proposed in the Bay Delta Conservation Plan, would increase the frequency of river reversals and low flow conditions in the Sacramento River at the Sacramento Regional Wastewater Treatment Plant's (SRWTP) outfall. An increase in the frequency of reversals and low flow conditions would significantly impact the design and operation of the SRWTP. Additionally changes in flow will alter the ecosystem in unknown ways, which should be further reviewed.

- SRCSD strongly supports the conclusion that the State Water Board considers changes to the monitoring and special studies program that coordinate the multitude of monitoring programs in the Delta for assessment, data compatibility, and decision making.

Issues Not Recommended for Further Review

SRCSD is providing the following technical comments regarding ammonia and toxicity as these specific comments are based on current available information and are intended to provide more context on the current scientific understanding of ammonia and the Delta.

Ammonia Objectives

- Page 32, Paragraph 2: *"Additional sources of ammonium to the Delta and Suisun Bay include other wastewater treatment plants, agricultural run-off, atmospheric deposition, internal cycling, and possibly discharges from wetlands."*

  Comment: The SRCSD appreciates the acknowledgement of a broad view of all sources of ammonia/um and encourages inclusion of all potential sources of ammonium to the Delta and Suisun Bay in the research framework recommended by the experts who participated in the CalFED Science Program Ammonia Workshop in March 2009.

- Page 32 - "*Recent studies suggest that water quality objectives and effluent limits based on these criteria may allow concentrations of ammonia in surface water that could result in adverse effects on the Bay-Delta ecosystem. For example, two recently published studies found that elevated ammonium levels (>4 µmol/L or ~0.056 mg/L) in Suisun Bay, can suppress the growth of phytoplankton in this area even when there is sufficient light (Wilkerson et al. 2006, Dugdale et al. 2007). In response to these recent studies, the State and Regional Water Boards are investigating whether more stringent ammonia criteria may be necessary to protect aquatic life in the Delta."*

  Comment: Please note that an expert panel of invited scientists at the March 2009 CALFED Science Ammonia Workshop, questioned the validity of Dr. Dugdale's hypothesis that ammonium was a driving factor limiting algae growth in Suisun Bay. Dr. Dugdale's hypothesis was identified for further research to clarify the role of ammonium on algae growth in the Delta in the Framework for the following research topics:

  - Topic 1: Modeling analysis of historical controls on phytoplankton populations.
  - Topic 2: Sources and fates of N and P
  - Topic 7: Lag times in phytoplankton bioassays

  (http://www.science.calwater.ca.gov/pdf/workshops/workshop_ammonia_research_framework_final_041609.pdf).

  Also, note that the threshold limit for effects cited in the Dugdale and Wilkerson papers (2007, 2006), and cited on Page 34 as 0.056 mg/L, is not necessarily a "high ammonium level" as stated. This ammonium concentration is well below current EPA (1999) criteria.

- Page 33, Paragraph 3: *"Primary production rates and standing chlorophyll a levels associated with phytoplankton (openwater algae) in the Delta and Suisun Bay are among the lowest of all the major estuaries in the world"*

  Comment: The San Francisco Estuary (SFE) is commonly referred to as a "high nutrient/low productivity" estuary, owing in part to its position near the low end of the scale for an often-cited relationship between fishery yield and primary production for 36 marine systems published by Nixon

(1988)[1]. However, the above statement from the Staff Report exaggerates the ranking of the SFE with respect to phytoplankton biomass and world estuaries. The recent meta-analysis of chlorophyll-a patterns in 154 estuaries worldwide by Cloern & Jassby (2008) (see Figure 1 below from their publication) shows that annual mean chlorophyll-a levels in the SFE are actually intermediate on the global scale for aquatic ecosystems on the land/sea interface. Additionally, Cloern & Jassby found in their meta-analysis that most (73%) annual mean biomass values for chl. a in the global dataset fall within the range of 1-10 µg chl.a/L. The upper end of this range (10 µg/L chl. a) has been frequently referred to in pelagic organism decline (POD) literature as a critical threshold, below which estuarine zooplankton are likely to be food limited. However, the widespread occurrence of mean annual chl. a levels below 10 µg/L in estuaries occupying positions across the global spectrum of secondary productivity suggests that the trophic significance of chl.a levels below 10 µg/L has been exaggerated in the POD debate.

[1] Nixon, S. W. 1988. Physical energy inputs and the comparative ecology of lake and marine ecosystems. Limnol. Oceanor. 33: 1005-1025.

FIGURE 1

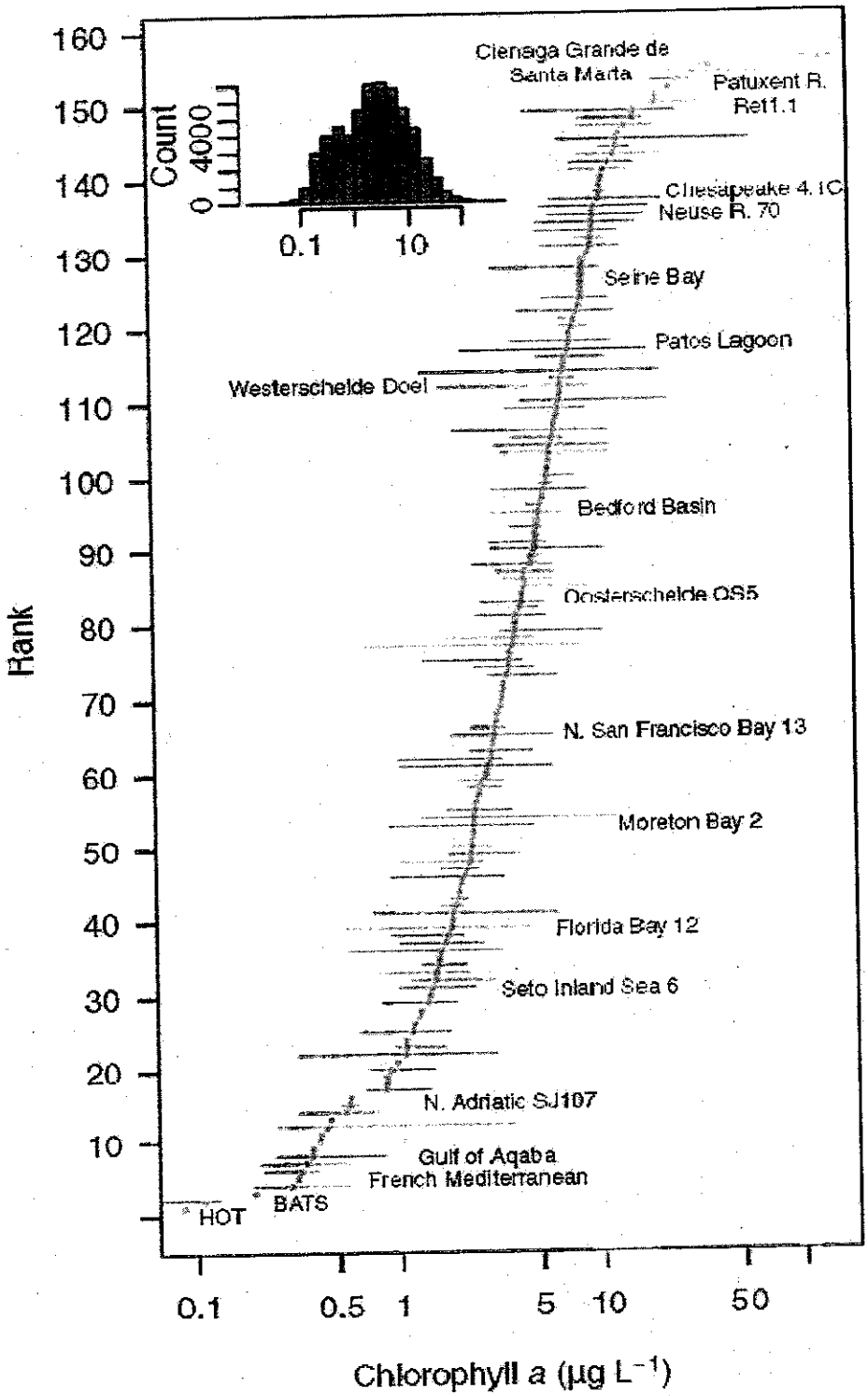

Figure 1. Median (red dots) and range (blue lines) of annual mean phytoplankton biomass (chl. a) at 154 sites representing land/sea interfaces such as estuaries, enclosed bays, tidal rivers, fiords, and coastal sites. Figure is from Cloern & Jassby (2008) Ecology Letters. (doi 10.1111/j/1461-0248.2008.01244.x).

- Page 35, paragraph 2: *"Questions remain about the potential for chronic (i.e., long-term, sub-lethal) impacts from ammonia as well as the impacts in sensitive delta smelt spawning areas (e.g., Cache Slough). Un-ionized ammonia concentrations in the Delta do exceed levels where histopathological effects have been observed (US EPA 1999)".*

  Comment: This passage in the Staff Report could be interpreted to mean that un-ionized ammonia concentrations in the Delta are routinely above levels where histopathological effects have been observed, according to the US EPA's 1999 Freshwater Ammonia Criteria document. In the EPA document[2], the low end of the range of chronic concentrations cited as affecting growth rates of salmonids is cited as 0.002 mg NH_3-N/L (un-ionized fraction only). Although the Interagency Ecological Program (IEP) Environmental Monitoring Program (EMP) ceased monitoring pH at its Delta monitoring stations in 1995 (preventing the calculation of unionized ammonia from total ammonia measurements), several *other* monitoring entities (USGS, DWR-MWQI, SRCSD) have measured total ammonia, water temperature, pH and electrical conductivity at a of variety freshwater and estuarine sites in the SFE during years subsequent to 1995. These data, summarized in Table 1 for freshwater stations for POD years (2000-2008), indicate that mean concentrations of un-ionized ammonia are below 0.002 mg NH_3-N/L at the majority of locations for which recent records exist.

  The cumulative probability function for the data set summarized in Table 1 puts the EPA low-end effects concentration (for growth) into further perspective. For Figure 2, data were combined for all freshwater stations listed in Table 1, with the exception of the Freeport stations (which were omitted owing to their position upstream from the SRWTP discharge). The figure shows that 80% of the individual records for un-ionized ammonia available from the freshwater Delta for POD years (N= 637 samples, 2000-2008) are below the low-end chronic effects concentration cited in EPA 1999 for salmonids.

  Additionally, "no apparent growth effect" concentrations for *non*-salmonid species are cited in EPA (1999) as ranging upward from 0.030 mg NH_3-N/L – a threshold which exceeds all of the un-ionized ammonia concentrations from the Delta summarized in Table 1 and Figure 2. Eddy (2005) supported the conclusion that concentrations less than 0.021 mg/L NH3-N should be considered protective of most marine and estuarine fish, including salmonids. Ambient concentrations are below this threshold level (Figure 2).

  The observations above suggest that it would be misleading to imply that, based on the available data for the Delta, un-ionized ammonia concentrations are typically above chronic effects concentrations discussed in the histopathological effects section of EPA (1999).

[2] Histopathological effects are discussed in Appendix 5 of EPA (1999).

Table 1. Unionized ammonia concentrations in surface water samples at monitoring stations in the freshwater Delta during POD years (2000-2008)[1].

Project	Station Code	Station Name	Number of Samples	Unionized Ammonia (mg-N/L)	
				Mean	Maximum
DWR-MWQI	B0702000	San Joaquin R. near Vernalis	58	0.0005	0.0032
USGS	11303500	San Joaquin R. near Vernalis	127	0.0017	0.0148
DWR-MWQI	B9591000	Contra Costa Pumping Plant #1	51	0.0006	0.0023
DWR-MWQI	B9D75351342	Old River near Byron	69	0.0006	0.0055
DWR-MWQI	B9D75811344	Old River at Bacon Island	66	0.0008	0.0031
DWR-MWQI	KA000000	Clifton Court Intake	21	0.0007	0.0016
USGS	381427121404901	Lower Yolo Bypass near Rio Vista	2	0.0004	0.0007
DWR-MWQI	KA000331	H.O. Banks Pumping Plants	100	0.0012	0.0075
USGS	11447650	Sacramento River at Freeport	108	0.0004	0.0048
SRCSD CMP	Freeport	Freeport	5	0.0007	0.0012
SRCSD CMP	River Mile 44	River Mile 44	40	0.0021	0.0094
DWR-MWQI	B9D82211312	Sacramento River at Hood	104	0.0032	0.0184

(1) All freshwater Delta stations are included in the table for which ammonia, pH, water temperature, and electrical conductivity were all measured in water samples taken during the POD years.

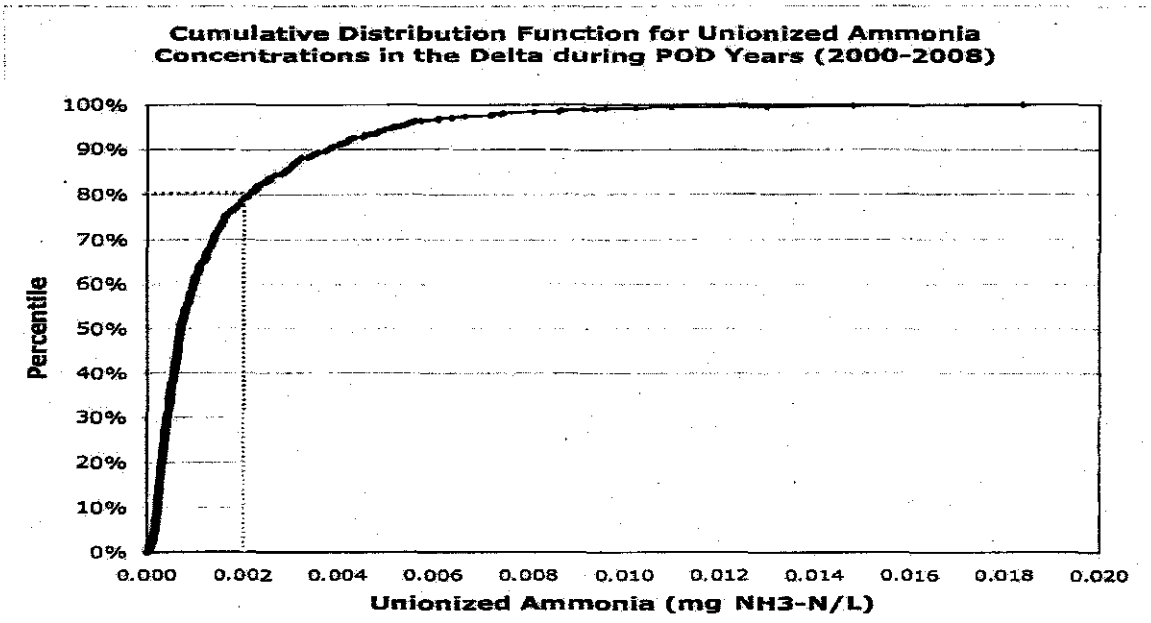

Figure 2. Cumulative distribution of un-ionized ammonia concentrations (N = 639) from freshwater Delta monitoring stations at which total ammonia, pH, water temperature and EC were measured during POD years (2000-2008). Station names and monitoring entities are identified in Table 1. Data for Freeport were omitted from the cumulative distribution.

- Page 35, second paragraph: *"In general, un-ionized ammonia levels in the Delta appear to be too low to cause acute mortality of even the most sensitive species."*

  Comment: It is appreciated that the Staff Report recognizes that ambient concentrations of ammonia downstream of SRWTP "is in compliance with the USEPA ammonia criteria." The ammonia/ium criteria, includes concentrations below which chronic and acute effects are unlikely to occur. The statement should be modified to properly reflect the known data by deleting "In general" and, in order to avoid misunderstanding and confusion with the details described in other sections, explicitly include chronic toxicity, as defined by the USEPA (1999).

  Of course, there are uncertainties regarding potential ammonia toxicity to species not tested and locations not sampled, but it is speculative to say that the EPA criteria are not protective of delta species until tests can show this. To date the data do not suggest any adverse effects. Dr. Inge Werner (UC Davis) is conducting toxicity testing with juvenile delta smelt and has found that they are about as sensitive as rainbow trout, which are protected by the EPA criteria. Therefore, current knowledge suggests that smelt are protected, since ambient ammonia/ium concentrations in the delta (pH and temperature corrected) are below both acute and chronic EPA criteria.

- Page 35, third paragraph: "*There may be the potential for toxic ammonia levels to be reached in very productive areas in the southern Delta or smaller productive sloughs or shallow areas throughout the Delta, when high concentrations of un-ionized ammonia coincide with warm temperatures and elevated pH (phytoplankton productivity increases pH that influences how Much un-ionized ammonia is present). The relatively few ammonium, temperature, and pH data available in many of these areas are currently being compiled and evaluated."*

  Comment: The statement that the potential for chronic effects are uncertain is contrary to the preponderance of data. There are only a handful of outliers in the 1000s of data that exceed or come close to exceeding the EPA criteria. If one includes the monitoring efforts of the USGS, IEP, and DWR-MWQI, over ten thousand measurements of total ammonia, pH and water temperature have been made at estuarine and freshwater sites in Suisun Bay and the Delta over the last three decades. The EPA chronic criterion is exceeded by ambient ammonia concentrations in less than five grab samples in this large historic dataset. Chronic toxicity derives from long term exposure; therefore, mean ambient conditions should be given more weight than isolated maximum concentrations. There have been no recorded exceedences of 30 day average USEPA chronic criteria in the Delta. Additionally, the USEPA ammonia chronic criteria are based on data for sensitive fish and an invertebrate species that have been carefully evaluated in accordance with national quality assurance guidelines.

- Page 36- Conclusions-The discussion above, regarding the potential for chronic effects from ammonia based on available data should be recognized and reiterated in the conclusion after mentioning the potential for acute ammonia effects.

Toxicity Objectives

- Page 37, last sentence of discussion: *"Another method of estimating exposure to contaminants is use of biomarkers, which is a measure of sub-lethal chemical endpoints such as enzyme activity or endocrine disruption that cannot be measured with standard toxicity tests."*

  Comment: The District supports continued research to identify contaminants in the Delta that are adversely affecting sensitive species.

  It should be noted that biomarkers are a useful tool for evaluating contaminant exposures, but do not necessarily mean that there is an adverse effect to the organism. Molecular indicators of exposure, such as biomarkers, are not well linked to adverse effects in organisms, population, and ecosystems. Therefore, as indicators, care must be taken in interpreting these data and they should not be considered on par with other sub-lethal effects more directly linked to organism health (e.g., growth, reproduction).

We hope that the State Water Board will consider the above comments as they continue activities to review the Bay-Delta Plan. As always, the District stands ready to participate in the process, and appreciates the effort the Water Boards have put forward to involve stakeholder's participation in this process. Thank you again for your consideration of our input. If you have any questions regarding our comments, please contact Terrie Mitchell at 916-876-6092.

Sincerely,

Mary K. Snyder
District Engineer

cc: Pamela Creedon, Central Valley Regional Water Quality Control Board
Debbie Webster, Central Valley Clean Water Association
Stan Dean, District Manager, SRCSD
Terrie Mitchell, Legislative and Regulatory Affairs Manager, SRCSD
Cliff Dahm, CalFED

Public Comment
2009 Periodic Review
Deadline: 6/15/09 by 12 noon

LATE COMMENT

Making San Francisco Bay Better

June 16, 2009

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Ms. Jeanine Townsend, Clerk to the Board
State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812-2000

SUBJECT: Comments on the 2009 Periodic Review Staff Report of the 2006 Water Quality Control Plan for San Francisco Bay/Sacramento-San Joaquin Delta Estuary

Dear Ms. Townsend:

On May 18, 2009, the Commission received a Notice of Adoption Hearing for the 2009 Periodic Review Staff Report of the 2006 Water Quality Control Plan for San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Periodic Review Staff Report). On July 7, 2009, the State Water Resources Control Board (State Water Board) will hold a hearing to consider adopting the Periodic Review Staff Report, which focuses on key issues concerning the Bay-Delta's ecology and water quality.

Although the San Francisco Bay Conservation and Development Commission (Commission) itself has not reviewed the Periodic Review Staff Report, the staff comments discussed below are based on the McAteer-Petris Act, the Suisun Marsh Preservation Act, the Commission's *San Francisco Bay Plan* (Bay Plan), the *Suisun Marsh Protection Plan* (Marsh Plan), the Commission's federally-approved coastal management plan for the San Francisco Bay, and the federal Coastal Zone Management Act (CZMA).

The Commission staff supports the Water Board's staff's recommendations to conduct further review of freshwater inflow standards for the Bay and Suisun Marsh as part of the basin planning process in light of new scientific information and actions taken by other agencies.

Jurisdiction. The Commission's permit jurisdiction includes all tidal areas of the Bay up to the line of mean high tide or, in areas of tidal wetlands, up to five feet above Mean Sea Level or the extent of tidal wetland vegetation; all areas formerly subject to tidal action that have been filled since September 17, 1965; and the shoreline band that extends 100 feet inland from and parallel to the Bay jurisdiction. The Commission also has jurisdiction over certain managed wetlands adjacent to the Bay, salt ponds, and certain waterways, and the Suisun Marsh.

Commission permits are required for placement of fill, construction, dredging, and substantial changes in use within its jurisdiction. Permits are issued when the Commission finds proposed activities to be consistent with its laws and policies. In addition to any needed permits under its state authority, federal actions, permits, licenses and grants affecting the Commission's coastal jurisdiction are subject to review by the Commission, pursuant to the federal CZMA, for their consistency with the Commission's federally-approved coastal management program for the Bay.

State of California • **SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION** • *Arnold Schwarzenegger, Governor*
50 California Street, Suite 2600 • San Francisco, California 94111 • (415) 352-3600 • Fax: (415) 352-3606 • info@bcdc.ca.gov • www.bcdc.ca.gov

From reviewing the Notice of Adoption Hearing, it appears that the following topics proposed for further review are most relevant to the Commission's Bay and Marsh jurisdictions: Delta Outflow Objectives, Export/Inflow Objectives, and Suisun Marsh Objectives.

Fresh Water Inflow. The Bay Plan and Marsh Plan policies call for adequate freshwater inflow to the Bay and Suisun Marsh. The Bay Plan recognizes the importance of fresh water inflows to the ecosystem of the Bay. The Bay Plan findings state that "conserving fish, other aquatic organisms and wildlife depends, among other things, upon availability of ...proper fresh water inflows, temperature, salt content, water quality, and velocity of the water."

The Bay Plan's Fresh Water Inflow policies state, in part:

> Diversions of fresh water should not reduce the inflow into the Bay to the point of damaging the oxygen content of the Bay, the flushing of the Bay, or the ability of the Bay to support existing wildlife....
>
> High priority should be given to the preservation of Suisun Marsh through adequate protective measures including maintenance of freshwater inflows....
>
> The impact of diversions of fresh water inflow into the Bay should be monitored by the State Water Resources Control Board, which should set standards to restore historical levels (1922-1967) of fish and wildlife resources. The Bay Commission should cooperate with the State Board and others to ensure that adequate fresh water inflows to protect the Bay are made available.

The Marsh Plan recognizes that the Suisun Marsh, located where salt water and fresh water meet and mix, contains "the unique diversity of fish and wildlife habitats characteristic of a brackish marsh."

Marsh Plan policies state, in part:

> There should be no increase in diversions by State or Federal Governments that would cause violations of existing Delta Decision or Basin Plan standards....
>
> Water quality standards in the Marsh should be met by maintaining adequate inflows from the Delta.

To address these policies, we recommend that the Water Quality Control Plan for San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan) include analysis of the fresh water flow needs of the entire estuary. This includes the need for peak flows that transport sediment and nutrients to the Bay, increase mixing of Bay waters, and create low salinity habitat in Suisun Bay, San Pablo Bay and the upper part of central San Francisco Bay.

The *Delta Vision Strategic Plan* (October 2008) included recommendations regarding adequate flows for the Bay-Delta ecosystem. Strategy 3.4 calls for restoring Delta flows and channels to support a healthy Delta estuary, including:

- Flows to produce sufficient volumes of open water habitat of the appropriate water quality, including salinity, temperature, and concentrations of dissolved oxygen and contaminants, e.g., adequate low salinity fall habitat for the Delta smelt;

- Flows to reduce fish entrainment in pumps and other water facilities; and
- Flows to provide adequate fish migration cues, e.g., high flows that trigger migration of salmonids.

The Commission staff supports the State Water Board staff recommendation to further review and consider changes to Delta outflow objectives, export/inflow objectives and Suisun Marsh objectives in the Bay-Delta Plan. The staff recommends that the State Water Board consider the flow recommendations in the *Delta Vision Strategic Plan* and other recent publications and resource agency biological opinions in order to determine the appropriate flows needed support ecosystem processes as well as the recovery of individual species in the Bay and Suisun Marsh.

Suisun Marsh Protection. The Commission manages natural resources in the Suisun Marsh pursuant both to its McAteer-Petris and its Suisun Marsh Preservation Act authorities. The Commission is currently participating in the Suisun Marsh Charter Group to develop a new Habitat Management, Preservation and Restoration Plan for Suisun Marsh. Our priorities for the new plan include enhancing seasonal and managed wetlands that provide essential wintering habitat for waterfowl of the Pacific Flyway, supporting tidal restoration, and supporting maintenance of Suisun Marsh levees.

Suisun Marsh Protection Plan policies state, in part:

> The diversity of habitats in the Suisun Marsh and surrounding upland areas should be preserved and enhanced wherever possible to maintain the unique wildlife resource....
>
> Where feasible, historic marshes should be returned to wetland status, either as tidal marshes or managed wetlands. If, in the future, some of the managed wetlands are no longer needed for private waterfowl hunting, they should be restored to tidal or subtidal habitat, or retained as diked wetland habitat and enhanced and managed for the benefit of multiple species....
>
> The Suisun Resource Conservation District should be empowered to improve and maintain exterior levee systems as well as other water control facilities on the privately owned managed wetlands within the primary management area.

Our staff urges the State Water Board to incorporate Marsh Plan policies, as well as the information in the Commission's draft staff report on climate change, as it considers changes in the Bay-Delta Plan in order to ensure that the Suisun Marsh continues to provide essential ecological functions.

Climate Change. Climate change and accelerating sea level rise could result in devastating impacts to the Bay and Suisun Marsh. As the Commission staff has noted in the draft staff report *Living with a Rising Bay: Vulnerability and Adaptation in San Francisco Bay and on the Shoreline* (April 2009):

> Salinity increases due to climate change may dramatically impact the brackish and freshwater marshes found in Suisun Marsh.... Since brackish and freshwater tidal marshes tend to be more productive and provide habitat for a greater diversity of plants than salt marshes, elimination of these valuable wetlands or their

> conversion to salt marshes could reverberate throughout the food web and reduce the habitat available to rare and endangered species (Callaway et al. 2007, Newcombe and Mason 1972, Baye et al. 2000, Lyons et al., 2005).
>
> Efforts to use water control structures, such as salinity gates, to artificially reduce salinity in Suisun Marsh in dry years are likely to become increasingly difficult in the face of climate change. The Suisun Marsh Salinity Control Gates restrict the flow of higher salinity water from incoming tides and retain [lower salinity] Sacramento River water from the previous outgoing tide. An eastward shift of the salinity gradient caused by sea level rise will likely reduce opportunities for importing freshwater into the Suisun Marsh.

We therefore request that the State Water Board consider changes to the Bay-Delta Plan in relation to potential climate change impacts on the estuary, particularly on the brackish wetlands of the Suisun Marsh.

Multiple Levee Failures. The Delta Risk Management Strategy and other recent publications have explored the potential impacts of multiple levee failures and the simultaneous flooding of several Delta islands. These analyses focused on the disruption of water exports and economic consequences. As the DRMS report states, "Impacts to aquatic species were not quantified in the DRMS Project and require further study." Similarly, impacts to water quality were not quantified in the DRMS Project. The State Water Board should consider the potential impacts of multiple levee failures on the ecosystems of the estuary, including Suisun Marsh and the Bay, and how those impacts might vary in different conveyance and water project operations scenarios as part of its potential revisions to the Bay-Delta Plan.

Minimize Harmful Effects to the Bay. The potential revisions to the State Water Board's Bay-Delta Plan would need to be consistent with all applicable San Francisco Bay Plan policies. The Bay Plan policies on fish, other aquatic organisms, and wildlife, state that marshes, mudflats, and subtidal habitat should be "conserved, restored, and increased." The Commission staff recommends that the State Water Board consider how changes to the Bay-Delta Plan will affect the hydrology, sediment dynamics, water quality and biological resources of the Bay. As mentioned above, the Board should analyze how climate change impacts, including the potential impacts of sea level rise, precipitation patterns, and changes in air and water temperature, will affect the need for freshwater inflow to the Bay and Suisun Marsh. The Board should also consider the potential impacts of other projects being planned for the Bay-Delta estuary and its watershed, such as a peripheral canal or dual conveyance of water through and around the Delta, dam construction, habitat restoration, levee repairs and upgrades, and the deepening of the Stockton and Sacramento Ship Channels, and how those projects may affect flow requirements.

Water Quality. Pursuant to the Commission's water quality policies in the Bay Plan, pollution in the Bay's water "should be prevented to the greatest extent feasible." The State Water Board should analyze the impacts of potential changes in the Bay-Delta Plan on salinity, temperature and concentrations of dissolved oxygen and contaminants in the Bay and Suisun Marsh.

Mitigation. In the event that the potential changes in the Bay-Delta Plan would result in adverse environmental impacts that cannot be avoided, the State Water Board should discuss mitigation measures. The Commission's policies regarding mitigation state, in part, that "projects should be designed to avoid adverse environmental impacts to [the] Bay" and, further, that "[w]henever adverse impacts cannot be avoided, they should be minimized to the greatest extent practicable....[and] measures to compensate for...impacts should be required."

Thank you for the opportunity to comment on the Periodic Review Staff Report. If you have any questions regarding this letter or the Commission's policies, please call me at (415) 352-3660 or email me at jessicah@bcdc.ca.gov.

Sincerely,

JESSICA HAMBURGER
Coastal Program Analyst

JH/rca

Public Comment
2009 Periodic Review
Deadline: 6/15/09 by 12 noon

O'Laughlin & Paris LLP

Attorneys at Law

VIA US MAIL AND ELECTRONIC MAIL (commentletters@waterboards.ca.gov)

June 12, 2009

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JUN 12 2009
SWRCB EXECUTIVE

Jeanine Townsend, Clerk of the Board
State Water Resources Control Board
PO Box 100
Sacramento, CA 95814

Re: 2009 Periodic Review Staff Report Comments

Dear Members of the Board:

The San Joaquin River Group Authority offers the following comments on the Draft Staff Report for the Periodic Review of the 2006 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary ("Draft Periodic Review Staff Report') with respect to which issues the State Water Resources Control Board ("SWRCB") should and should not consider and what the issue should and should not encompass.

The recently released NMFS Biological Opinion ("BIOP") will significantly dictate baseline conditions for the Delta. It will dictate flow regimes for the San Joaquin River, thereby affecting water quality, storage, available supply for competing demands, and which implementation actions may be prohibited due to issues related to the Federal Endangered Species Act. However, flows required by the NMFS BIOP should not be perceived as objectives, as they are also established for the State Water Project ("SWP") and Central Valley Project ("CVP") to mitigate for their activities. Moreover, flows and other activities required by the NMFS BIOP may change given the likelihood of further litigation. If the SWRCB begins its Periodic Review now, by the time it finishes the project baseline and existing conditions will change. The SJRGA therefore recommends that the SWRCB wait until the NMFS BIOP litigation reaches finality and existing conditions are relatively stable and predictable.

South Delta Salinity and San Joaquin River Flows

The SWRCB has already initiated the process to review the Water Quality Objective for Agricultural Beneficial Uses for the Southern Delta ("South Delta Salinity Objectives") and for San Joaquin River Flow Objectives. These processes should be completed.

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With the Vernalis Adaptive Management Plan ("VAMP") due to expire in 2011, the SWRCB needs to establish scientifically-based objectives adopted in an open process, as opposed to the current objectives, which were based on the 1994 *Principles for agreement on Bay-Delta standards between the State of California and the Federal Government* and a "subjective determination of the reasonable needs of all the consumptive and non-consumptive demands on the waters of the Estuary."[1] *Principles for Agreement* were not intended to establish water quality objectives with regulatory effect. Additional water needs would be provided by the Federal government on a willing seller basis financed by federal funds; not regulatory re-allocations. (*Principals for Agreement*, p. 5.)

However, when the SWRCB adopted the same flows called for in the *Principals for Agreement* as objectives, it was required to fully implement them. (*St. Water Resources Control Bd. Cases* (2006) 136 Cal.App.4th 674, 729-734.) Consequently, if parties who had agreed to provide water under the *Principals for Agreement* lacked sufficient did not have enough water, the SWRCB would have been required to amend other water rights so there would be enough water. The SWRCB therefore effected a regulatory reallocation that was not on a willing seller basis. The SWRCB should nonetheless consider the results of the VAMP study and adopt the previous recommendations of the SJRGA to:

- Better align the X2 flow requirement and water availability with a San Joaquin River Basin type of Index;
- Eliminate the X2 flow requirement for the San Joaquin River for February through June, because the San Joaquin River does not contribute to Delta outflow; and
- Subject current and proposed San Joaquin River flow objectives to a fact-finding hearing to ensure that the SWRCB not only obtains information, but information that is more reliable that would be obtained through less formal processes.

For South Delta Salinity, the SWRCB should revise its review schedule to permit time for completion and public review of the report currently being drafted by Dr. Glenn Hoffman and survey the water rights in the South Delta. Although, the Third District Court of Appeal held in *United States v. State Water Resources Control Board*, (1986) 182 Cal.App.3d 82, that a water quality control plan must protect water quality rather than water rights, the degree to which irrigators may legally divert and use water for irrigated agriculture defines the nature, scope, and extent of agricultural beneficial uses in the South Delta. In some months of some years few persons, if any, may have rights to legally divert and use water. If nobody can legally divert and use water, then irrigated agriculture, although a beneficial use, would not be a reasonable use of water and should not be protected. Even if a small number of diverters still have rights to divert and use water, competing beneficial uses may be more critical and "trump" South Delta agricultural beneficial uses.

[1] The *Principals of Agreement* were exhibit number SWRCB 134 in the D-1641 proceeding, accepted into evidence on July 1, 1998.

Reverse Flow Objectives in Old River and Middle River

Reverse flows in Old River and Middle River are primarily caused by the SWP and CVP operations. The issue is closely tied to the NMFS BIOP. However, the SWRCB should also consider the impact of illegal diversions, because such activities would impact compliance with such objectives. Every cubic foot per second illegally diverted deprives the beneficial use protected by reverse flow objectives of that much flow.

Dissolved Oxygen in the Stockton Deep Water Ship Channel

The SWRCB should review the Dissolved Oxygen ("DO") Objective for the Stockton Deep Water Ship Channel ("Ship Channel"). The DO Objective for the Ship Channel is 5.0 mg/l all year, except from September through November when the objective is 6.0 mg/l. (2006 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary ("2006 Bay-Delta Plan") (SWRCB Resolution 2006-0098), p. 14 table 3.) The criteria for 5.0 mg/l was based on the work of Richard J. Hallock, who observed that "after four years of investigation, II... no salmon moved past Stockton until the dissolved oxygen had risen to about 4.5 ppm, and the run did not become steady until oxygen levels were above 5 ppm." (1991 Water Quality Control Plan for Salinity in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary ("1991 Salinity Plan") (SWRCB Resolution 91-24), p. 5-23.) However:

> To address the problem of low dissolved oxygen levels in the San Joaquin River, an agreement was reached in 1969 between the USFWS, USBR., DWR, and DFG, in part, to take specific actions... to maintain the dissolved oxygen content in the Stockton Ship Channel generally above 6 ppm when necessary....

(Id.)

As a result, if DO levels dropped below 6 mg/l, DWR began installing a temporary rock barrier across the head of Old River to increase San Joaquin River flows past Stockton, thus improving DO levels. (Id.) Considering the lack of biological basis for the 6.0 mg/l criteria, it appears to have been a "trigger" for implementation rather than an objective. DWR installed the barrier when DO dropped below 6.0 mg/l to complete installation before DO could drop below 5 mg/l. The implementation measure, however, became part of the objective. The SJRGA therefore recommends reviewing the 6.0 mg/l objective to determine whether it has a scientific and biological basis or if it was an implementation action inadvertently incorporated into the objective.

Program of Implementation

The program of implementation will be substantially affected by the recently released NMFS Biological Opinion ("NMFS BIOP") for the Central Valley Project ("CVP") and State Water Project ("SWP") will have significant impacts that must be considered. The NMFS BIOP applies to the CVP and SWP and may or may not permit certain actions. For example, the NMFS BIOP lacks a reasonable and prudent alternative

for the South Delta Improvement Project ("SDIP"). Consequently, the SDIP, as currently contemplated, may not be a feasible alternative for implementing the South Delta Salinity Objectives. Since the SWRCB must fully implement its water quality control plans it must revise the objectives if there are no realistic alternative implementation actions capable of fully implementing them.

Conclusion

The SWRCB has established an ambitious schedule for Periodic Review. Given its time and staffing restriction, the SJRGA recommends that the SWRCB limit the issues to refining and reviewing current aspects of the Bay-Delta Plan, rather than addressing wholly new issues.

Very truly yours,
O'LAUGHLIN & PARIS LLP

By: Kenneth Petruzzelli
KENNETH PETRUZZELLI

Cc: SJRG (e-mail only)

Public Comment
2009 Periodic Review
Deadline: 6/15/09 by 12 noon

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June 15, 2009

Via Email: commentletters@waterboards.ca.gov
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RECEIVED
JUN 15 2009
SWRCB EXECUTIVE

Jeanine Townsend, Clerk
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Sacramento, CA 95812-2000

Re: 2009 Periodic Review Staff Report Comments

Dear Ms. Townsend:

The San Luis & Delta-Mendota Water Authority ("Authority") and Westlands Water District ("Westlands") reviewed the State Water Resources Control Board ("State Water Board") draft staff report on the Periodic Review of the 2006 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary ("Draft Staff Report"). The Authority and Westlands support the State Water Board's undertaking of the periodic review and many of the recommendations in the Draft Staff Report. Notwithstanding, for the reasons explained below, the Authority and Westlands respectfully submit the Draft Staff Report must be substantially revised before it is adopted.

The State Water Board and its staff are well aware, the State Water Board must balance competing demands when adopting a water quality control plan. As the State Water Board wrote in 1995, within a water quality control plan:

> Objectives and recommendations are intended to attain the goal of the highest water quality which is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible.

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(1995 Bay Delta Plan, pp. 3-4.) As a result of the mandates reflected in that sentence, the periodic review process must be one of information gathering – one that allows for the development of information that can be used by the State Water Board to ensure objectives are, in the view of the State Water Board, reasonable. If the Staff Report were adopted as currently drafted, this effort would be hindered. The Draft Staff Report goes beyond information gathering, and fails to present an objective review of existing data, an objective scientific synthesis of the data, or balanced perspectives.

The over-reach of the Draft Staff Report is problematic for two reasons. First, the Draft Staff Report pre-judges many important issues which skews the objectives considered by the State Water Board during the proceedings leading to a new water quality control plan. As currently drafted, the Draft Staff Report attempts to analyze data and render conclusions. The analyses and conclusions are often based on an incomplete record or an inconsistent application of studies.

Second, the Draft Staff Report reflects many policy decisions, cloaked as scientific findings. Many of the statements made in the Draft Staff Report are not based on definitive science. Instead, they are based on data for which absolute conclusions cannot be rendered. To make the statements, exercises of judgment are undertaken, which must be left to the State Water Board, after it has the opportunity to hear from all stakeholders and review all available information. It cannot be done at this early stage by State Water Board staff.

Thus, if the State Water Board is inclined to adopt a Staff Report at its July 7 meeting, the Authority and Westlands recommend the State Water Board only identify those objectives that it will re-consider/consider. It should not include discussions of scientific analyses or accept the conclusions based thereon. The Authority and Westlands attach to this letter a copy of the Draft Staff Report, which reflects the changes the Authority and Westlands propose to address their concerns. Additions are presented in highlighted underlined text and deletions are presented as strike out text. By excluding from the Draft Staff Report data analyses and conclusions, the State Water Board would likely benefit from information now being developed, including information being developed by the State Water Board, Regional Water Quality Control Board, the Bay Delta Conservation Plan.

Presented below are several examples of deficiencies from the Draft Staff Report, which demonstrate the bases for the Authority's and Westlands' concerns.

1. Recommendation to Exclude Ammonia and Other Toxics

The Draft Staff Report states: "the State Water Board should not consider establishing objectives for ammonia as part of its review and potential revision of the Bay-Delta Plan." As reflected in the "Discussion" and "Conclusion" sections, the basis for the recommendation appears to be a belief that insufficient data exist to support a finding that ammonia might impair the beneficial use of water within the Delta. That conclusion is not consistent with science. There are data that indicate discharges of ammonia are impeding the beneficial use of water in the Delta. (See comments from the State Water Contractors submitted for July 7, 2009 State Water Board meeting.) The same is true with other toxics.

Indeed, notwithstanding the statement quoted above, the Draft Staff Report appears to concede the point. The Draft Staff Report provides:

> Elevated ammonium concentrations potentially contribute to harmful algal blooms (e.g., Microcystis) that have been occurring with increasing frequency and biomass in some parts of the Delta (Lehman et al. 2005). A recent study in the San Francisco Bay Estuary found that low stream flow and high water temperature were strongly correlated with the seasonal variation of Microcystis cell density, total microcystins concentration (cell-1) and total microcystins concentration (chl a-1), while ambient nutrient concentrations and ratios were of secondary importance (Lehman et al. 2008).
>
> As has been shown elsewhere, elevated levels of ammonium and other nutrients may also benefit invasive rooted and floating aquatic plants in the Delta, such as the water hyacinth (Eichhornia crassipes) and the Brazilian waterweed (Egeria densa) (Reddy and Tucker 1983, Feijoó et al. 2002). Both species are now widely distributed across the Delta (Hestir et al. 2008) and are controlled in Delta channels through chemical herbicides and mechanical removal by the California Department of Boating and Waterways.

Based on the existing level of concern with ammonia discharge and relevant data, it seems appropriate to have the State Water Board consider whether an ammonia objective(s) is (are) appropriate.

2. Outflow and Reverse Old and Middle Rivers Flow Objectives

Two other examples of the potentially adverse effects caused by an overreaching Draft Staff Report relate to the discussion of outflow and reverse Old and Middle Rivers flow objectives. The Draft Staff Report concludes consideration of outflow objectives is appropriate because: "Changes to Delta outflow patterns have likely contributed to the POD and are likely having an impact on the abundance of other species of concern." That conclusion contradicts later statements in the Draft Staff Report. When discussing ammonia, the Draft Staff Report references a CALFED Science Program workshop. According to the Staff Report, as a result of the workshop, a panel of experts assesses data and concluded:

> The most important gap to be filled in the Bay-Delta research program is the development of an over-arching, integrative model of the major drivers controlling the Bay-Delta ecosystem (Meyer et al. 2009). Of prime importance to this effort is an integration of the understanding of the roles of hydrology, nutrients, and herbivory in the temporal dynamics of phytoplankton production and community composition (Meyer et al. 2009).

The Staff Report also indicates that the panel recognized "crucial knowledge that needs to be generated and/or expanded . . . [is] . . . an understanding of factors that control POD populations, including various forms of nitrogen and a combination of other stressors, including chemicals, food availability and hydrology (including water-withdrawal systems)." Thus, the Draft Staff Report concludes in one section that the POD is understood and attributable to outflow caused by the Central Valley Project and State Water Project and in another section, based on a panel of experts, that the basis or bases for the POD have yet to be identified.[1]

Likewise, the Draft Staff Report recommends consideration of reverse flow objectives in Old and Middle Rivers. The Draft Staff Report presents the unsubstantiated conclusion: "[t]he continued decline in the populations of several Delta fish species . . . also suggests that the export limits in the Bay-Delta Plan are not sufficient to protect aquatic species." It therefore recommends consideration of Old and Middle Rivers reverse flow objectives as a mechanism to affect exports. The Draft Staff

[1] Not only does the Draft Staff Report reflect inconsistent conclusions of POD data, but it also reflects differing policy decisions based on the data and conclusions. As discussed above, in one section the Draft Staff Report recommends excluding consideration of ammonia objectives for lack of data and in another recommends including outflow and Old and Middle River reverse flow objectives in light of data with the same (or greater) uncertainty.

Report reflects NO independent evaluation of data to support its statements. If one were conducted, the Draft Staff Report would likely reflect the fact that data show the rate of pumping by the Central Valley Project and State Water Project has a direct impact on fish abundance, but that the impact is verified to be minimal.

In fact, if the Draft Staff Report independently analyzed the data and conclusions rendered by other regulators, it would likely reflect the fact that the existing regulations of Old and Middle River flows are based, at least in part, upon an excerpt of an unpublished dissertation by a UC Davis graduate student, Grimaldo. And, a review of the dissertation would show that at the time of regulation, the dissertation was not to be cited, and that the peer reviews recommended significant scientific disclosure and explanation before publication. Thus, while there will undoubtedly be debate over the merits of reverse flow objectives in Old and Middle Rivers, the debate must not be prejudiced by a discussion presented in the Draft Staff Report based on an incomplete record.

For the reasons stated above, the Authority and Westlands respectfully request that the State Water Board adopt the Draft Staff Report, as revised in the attached document.

Thank you for your time and consideration of the comments and proposed revisions.

Very truly yours,

DIEPENBROCK HARRISON
A Professional Corporation

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Jon D. Rubin
Attorneys for the San Luis & Delta-Mendota
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Attachment

Staff Report

PERIODIC REVIEW
OF THE
2006 WATER QUALITY CONTROL PLAN FOR THE SAN FRANCISCO BAY/SACRAMENTO-SAN JOAQUIN DELTA ESTUARY

DRAFT

STATE WATER RESOURCES CONTROL BOARD

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ACRONYMS AND ABBREVIATIONS

AFRP	Anadromous Fish Restoration Program
Bay-Delta	San Francisco Bay/Sacramento-San Joaquin Delta Estuary including Suisun Marsh
Bay-Delta Plan or Plan	Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary
BDCP	Bay Delta Conservation Program
BO	Biological Opinion
Central Valley Water Board	Central Valley Regional Water Quality Control Board
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
cfs	cubic feet per second
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CVRWQCB	Central Valley Regional Water Quality Control Board
CWT	Contaminants Work Team
DCC	Delta Cross Channel
Delta	Confluence of the Sacramento River and San Joaquin River (as defined in Water Code section 12220)
DFG	California Department of Fish and Game
DSM2	Delta Simulation Model 2
DWR	California Department of Water Resources
E/I	Export/ Inflow ratio
EC	Electrical Conductivity
EIS/EIR	A joint Environmental Impact Statement prepared by lead State and federal agencies
EMP	Environmental Monitoring Program
ERP	Ecological Restoration Program
ESA	Endangered Species Act
IEP	Interagency Ecological Program
µmol/L	micromoles per liter
mg/L	milligrams per liter
mmhos/cm	millimhos per centimeter
Monitoring Program	Monitoring and Special Study Program
MWQI	Municipal Water Quality Investigations program
NDOI	Net Delta Outflow Index
NOAA Fisheries	National Marine Fisheries Service
NOP	Notice of Preparation
NPDES	National Pollutant Discharge Elimination System
NWQAP	National Water-Quality Assessment Program
OCAP	Operations Criteria and Plan
OPs	Organophosphate pesticides
POD	Pelagic Organism Decline
PYs	Personnel Years
PPIC	Public Policy Institute of California
ppt	parts per thousand
RMP	Regional Monitoring Program
ROD	Record of Decision

SEW	Suisun Ecological Workgroup
SJRA	San Joaquin River Agreement
SJRGA	San Joaquin River Group Authority
SMCG	Suisun Marsh Charter Group
SMSCG	Suisun Marsh Salinity Control Gate
SRCD	Suisun Resource Conservation District
SRWTP	Sacramento Regional Wastewater Treatment Plant
Staff Report	Periodic Review Staff Report
State Water Board	State Water Resources Control Board
SWAMP	Surface Water Ambient Monitoring Program
SWP	State Water Project
SWRCB	State Water Resources Control Board
Task Force	Blue Ribbon Task Force
The Delta	Sacramento River and San Joaquin River
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
USBR	United States Bureau of Reclamation
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VAMP	Vernalis Adaptive Management Plan

STAFF REPORT
2009 PERIODIC REVIEW
OF THE
2006 WATER QUALITY CONTROL PLAN FOR THE SAN FRANCISCO BAY/SACRAMENTO-SAN JOAQUIN DELTA ESTUARY

Executive Summary

The State Water Resources Control Board (State Water Board) initiated its periodic review[1] of the 2006 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta; Bay-Delta Plan), on August 29, 2008, by issuing a notice of public workshop to receive comments from agencies and members of the public regarding potential modifications of the Bay-Delta Plan. In addition to the information received at the workshop[2], State Water Board staff also reviewed scientific literature and other pertinent information to develop recommendations concerning what issues should be further evaluated during the basin planning process to determine what, if any, changes should be made to the Bay-Delta Plan. This Periodic Review Staff Report (Staff Report) focuses on key issues concerning the Bay-Delta's ecology and water quality, including those that were identified in the State Water Board's August 29, 2008 "Request for Written Input on Factual Issues Regarding the Bay-Delta." Of the issues discussed in the Staff Report, staff recommends further review in the basin planning process of the following:

Delta Outflow Objectives
Export/Inflow Objectives
Delta Cross Channel Gate Closure Objectives
Suisun Marsh Objectives
Reverse Flow Objectives
Floodplain Habitat Flow Objectives
Ammonia Objectives
Toxics Objectives
Changes to the Monitoring and Special Studies Program
Other Changes to the Program of Implementation

The Staff Report also includes a discussion of two issues that have already been identified for further review in the basin planning process: southern Delta salinity and San Joaquin River flow objectives.

Staff recommends that the following issues not be reviewed further in the basin planning process at this time, but instead be addressed as recommended in the associated discussion for each issue:

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[1] Water Code section 13240 requires that water quality control plans be periodically reviewed. Federal Clean Water Act section 303(c) (33 U.S.C. § 1313(c)) requires a triennial review of state water quality "standards." Under the terminology of the Clean Water Act, water quality standards include designated uses and water quality criteria based on those uses. The review under Water Code section 13240 ordinarily is combined with any review required under federal law.

[2] While staff reviewed the comments that were submitted for the periodic review workshop and related proceedings (including comments submitted in response to the State Water Board's August 29, 2008 "Request for Written Input on Factual Issues Regarding the Bay-Delta"), the staff report summarizes and responds only to those comments relevant to the current periodic review.

~~Ammonia~~
~~Toxicity~~
Fish Screens
Biological Indicators

While staff recommends that certain issues be further reviewed in the basin planning process, such a recommendation does not necessarily mean that changes will be made to the Bay-Delta Plan related to these issues. Further, the State Water Board may review and consider other changes to the Bay-Delta Plan not included in the above list if new information warrants such a review. ~~Specifically, additional changes may need to be considered where objectives are linked through flow and water quality. For example, the Sacramento River flow objective at Rio Vista is not discussed in the Staff Report but changes could be considered to this objective to make it consistent with any potential changes to the Delta Outflow Objectives. All such potential changes to the Bay-Delta Plan are not identified because they are not the primary drivers for changes to the Bay-Delta Plan, and the analyses required to identify all such changes have not been done. As the State Water Board proceeds through the basin planning process, additional issues may be identified, including changes required as part of the Bay Delta Conservation Plan (BDCP).~~

The State Water Board has already begun the basin planning process for southern Delta salinity and San Joaquin River Flow objectives and will begin the planning process for other issues recommended for further review immediately following adoption of this Staff Report. The State Water Board held an initial California Environmental Quality Act (CEQA) scoping meeting for the potential update and implementation of the Bay-Delta Plan and a basin planning workshop on the southern Delta salinity and San Joaquin River Flow objectives in spring 2009. The State Water Board may issue a supplemental notice of preparation (NOP) and conduct one or more additional scoping meetings as necessary for any other issues recommended for further review once this Staff Report is adopted. Staff will review information received at those meetings and workshops, and other available scientific information in order to develop recommendations for any needed changes to the Bay-Delta Plan. Staff will then prepare draft Plan amendments or a draft revised Plan for consideration by the State Water Board and any required environmental documentation. At that time, interested persons will have the opportunity, at a public hearing, to comment on staff's recommendations and on the environmental analysis. After the hearing, the State Water Board will consider adopting any proposed changes.

The Bay-Delta Plan and other related documents are posted on the State Water Board's Division of Water Rights' website at:
http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/.

I. Introduction

On December 13, 2006, the State Water Board adopted the current Bay-Delta Plan. The Bay-Delta Plan identifies beneficial uses of the Bay-Delta, including Suisun Marsh, water quality objectives for the reasonable protection of those beneficial uses, and a program of implementation for achieving the water quality objectives. The Bay-Delta Plan also identifies a number of emerging issues that require additional evaluation and basin planning activities: the pelagic organism decline (POD), climate change, Delta and Central Valley salinity, and San Joaquin River flows.

The California Water Code and the federal Clean Water Act require, respectively, a periodic review of water quality objectives and a triennial review of standards. Accordingly, the State Water Board is conducting this review of the Bay-Delta Plan. This Staff Report identifies water quality issues that should be addressed through the basin planning process. It recommends investigating whether certain existing elements of the Bay-Delta Plan should be revised, and identifies potential new elements that should be considered for inclusion in the basin plan. The Staff Report also identifies issues that should not be considered further in this basin planning process, but should instead be addressed through other venues. The Staff Report provides recommendations regarding several of the most significant issues of concern in the Bay-Delta watershed that could be addressed in the Bay-Delta Plan. The Staff Report does not provide recommendations for all elements of the Bay-Delta Plan or other potential issues. Additional issues may be considered for potential basin plan amendment at a later date, as appropriate.

With respect to the emerging issues identified in the Bay-Delta Plan, the Staff Report reiterates the State Water Board's commitment to continue ongoing basin planning efforts relating to southern Delta salinity and San Joaquin River flows. Basin planning activities related to the POD and climate change will be encompassed in the basin planning activities for all of the objectives being reviewed. As appropriate, additional objectives may also be considered to address the POD and climate change during the basin planning process.

II. Background

The Bay-Delta includes the Sacramento-San Joaquin Delta (Delta), Suisun Marsh, and the San Francisco Bay. The Delta is composed of about 738,000 acres of which about 48,000 acres are water surface area; Suisun Marsh comprises approximately 85,000 acres of marshland and water ways; and San Francisco Bay includes about 306,400 acres of water surface area. The Delta and Suisun Marsh are located where California's two major river systems, the Sacramento and San Joaquin Rivers, converge to flow westward, meeting incoming seawater from the Pacific Ocean through San Francisco Bay. The Delta is bordered by the cities of Sacramento to the north, Stockton and Tracy to the south, and Pittsburg to the west. This former wetland area has been reclaimed into more than 60 islands and tracts that are now devoted primarily to farming. The Delta is interlaced with about 700 miles of waterways. A network of levees protects the islands and tracts from flooding, most of which lie near or below sea level. The Sacramento and San Joaquin river systems drain water from about 40 percent of California's land area and support a variety of beneficial uses. The Bay-Delta Estuary is one of the largest, most important estuarine systems for fish and waterfowl production on the Pacific Coast of the United States. About 90 species of fish are found in the Delta. The Delta's channels serve as a migratory route and nursery area for Chinook salmon, striped bass, white and green sturgeon, American shad, and steelhead trout. These anadromous fishes spend most of their adult lives either in the lower bays of the estuary or in the ocean. The Delta is a major nursery area for

most of these species. Other resident fishes in the estuary include delta smelt, longfin smelt, Sacramento splittail, catfish, largemouth bass, black bass, crappie, and bluegill.

Given the Bay-Delta's importance to California's economy and environment, the State Water Board and its predecessors have undertaken numerous proceedings regarding water quality and water rights within the Bay-Delta's tributary watersheds and the protection of beneficial uses in the Bay-Delta. The 2006 Bay-Delta Plan was adopted in December of 2006 following a review of the 1995 Bay-Delta Plan, which superseded the Water Quality Control Plan for Salinity (adopted in May 1991) and the Water Quality Control Plan for the Sacramento-San Joaquin Delta and Suisun Marsh (adopted in August 1978).

Related Proceedings

Other planning and recovery efforts are currently underway to address concerns related to protection of beneficial uses in the Bay-Delta, water supply and reliability, and other issues. The State Water Board will consider and refer to information developed during preparation of other agencies' Bay-Delta related processes during its own water quality control planning and environmental review processes. The State Water Board, however, may determine that information developed by other agencies in these concurrent Bay-Delta processes does not sufficiently inform the board's own water quality planning or environmental review processes, including its review of environmental impacts of proposed amendments and alternatives. It may then prepare additional analyses. Any final environmental document will reflect the independent judgment of the State Water Board.

The BDCP is being developed under the State and federal endangered species acts and other laws in order to address ecological needs of at-risk Delta species, primarily fisheries, while improving and securing a reliable water supply. A joint Environmental Impact Statement/Environmental Impact Report (EIS/EIR), to be prepared by lead State and federal agencies, will include an analysis of the environmental impacts of improved water conveyance infrastructure and habitat conservation measures. Implementation of the BDCP will likely require changes to the Bay-Delta Plan and water rights implementing that plan.

The Central Valley Regional Water Quality Control Board's (Central Valley Water Board) environmental review for establishment of standards and a Total Maximum Daily Load (TMDL) for salinity and boron in the lower San Joaquin River upstream of Vernalis may also inform the State Water Board's project and environmental review. The Central Valley Water Board and State Water Board have also initiated a comprehensive effort to address salinity and nitrate problems in California's Central Valley and to adopt long-term solutions that will lead to enhanced water quality and economic sustainability. The Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS) effort is a collaborative basin planning effort aimed at developing and implementing a comprehensive salinity and nitrate management program. State Water Board salinity efforts will be integrated with CV-SALTS.

By Executive Order S-17-06, Governor Schwarzenegger established the Delta Vision Blue Ribbon Task Force (Task Force), which was charged with developing both a long-term vision for sustainable management of the Delta and a plan to implement that vision. The Task Force recommended, in part, two co-equal goals: restore the Delta ecosystem and create a reliable water supply for California. The Delta Vision Strategic Plan was approved and adopted by the Task Force on October 17, 2008. As part of the Strategic Plan, the Task Force recommends implementation of a dual conveyance approach to carry water to export pumps, construction of storage facilities, and large scale ecosystem restoration in the Delta. The Delta Vision Committee, a Committee consisting of five of the Governor's Cabinet Secretaries, reviewed the

Delta Strategic Plan and made implementation recommendations to the Governor and Legislature on December 31, 2008, that should be undertaken in the next two years.

In July of 2008, the State Water Board adopted a Bay-Delta Strategic Workplan (Workplan) for activities by the State Water Board, Central Valley Water Board, and San Francisco Bay Regional Water Quality Control Board to protect beneficial uses in the Bay-Delta (State Water Board 2008a). The Workplan calls for a comprehensive review of the Bay-Delta Plan, water rights, and other activities to protect fish and wildlife beneficial uses. Preparation and adoption of this Staff Report are part of that process. Per the Workplan, 4 or 5 Personnel Years (PYs) per year will be needed to conduct this comprehensive review. In addition, the Workplan commits to a review and potential amendment of the southern Delta salinity and San Joaquin River flow objectives. Per the Workplan, 3 PYs per year and $2.7 million in contract resources will be needed to conduct this southern Delta salinity and San Joaquin River flow work.

Fisheries Declines

Marked declines in four pelagic fishes in the Delta (delta smelt, longfin smelt, striped bass, and threadfin shad) became collectively known as the POD, following record and near-record lows in abundance indices that abruptly began around 2000. In response to the declines, the Interagency Ecological Program (IEP), consisting of various state and federal water and fisheries agency representatives formed a POD work team in 2005 to evaluate the potential causes of the decline. Many studies initiated by the POD work team and others are still in progress.

Central Valley salmonids have experienced significant declines while various pelagic species have continued to decline. ~~Declines in pelagic and salmonid fish species have resulted in litigation, court-imposed requirements restricting water diversions, and additional Endangered Species Act (ESA) restrictions. In December of 2008, the U.S. Fish and Wildlife Service (USFWS) issued a revised biological opinion (BO) for delta smelt for operations of the State Water Project (SWP) and Central Valley Project (CVP) in the Delta. On December 11, 2008, National Marine Fisheries Service (NOAA Fisheries) issued its draft BO for Central Valley Chinook salmon and green sturgeon for the long-term SWP and CVP operations criteria and plan (OCAP). Following an extension of time, the final BO is expected by June 2009 and will supersede the 2004 OCAP BO.~~

~~Most recently,~~ On March 4, 2009, the Fish and Game Commission voted unanimously to list the longfin smelt as a threatened species under the California Environmental Species Act (CESA) because longfin smelt abundance has declined substantially since the 1980s due to entrainment and loss at water diversions, increased salinity, loss of habitat, toxicity, predation by managed fishes, and other threats that could endanger its long-term survival and recovery in its native habitat and range. The commissioners also voted to list delta smelt as endangered, rather than a threatened species.

As a result of the fisheries decline in the estuary, multiple recovery plans have been initiated to help restore native fish species. The Anadromous Fish Restoration Program (AFRP) was tasked by the Central Valley Project Improvement Act (CVPIA) to make all reasonable efforts to at least double natural production of anadromous fish in California's Central Valley streams on a long-term, sustainable basis (USFWS 2001). The Resources Agency released a Pelagic Fish Action Plan in March 2007. This report builds on the Delta Smelt Action Plan, which was released in 2005. The Delta Smelt Action Plan (CA Resources Agency 2005) is a 14-point science-based framework to address declines in the Sacramento-San Joaquin Delta's native fish species, including the delta smelt. The Pelagic Fish Action Plan report was prepared in

response to a directive by the Legislature to the Natural Resources Agency to report on proposed actions to address the POD and stabilize the ecosystem in the Delta (CA Resources Agency 2007).

NOAA Fisheries prepared an outline to help facilitate the development of recovery plans 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 (NOAA Fisheries 2007). NOAA Fisheries has developed a Draft Recovery Plan for review, and plans to follow with a full public and peer review draft. The CALFED Science Program, Department of Fish and Game (DFG) and NOAA Fisheries have also worked on broader-scale restoration plans such as the CALFED Ecosystem Restoration Plan (ERP). A draft version of the ERP conservation strategy was made available in August 2008 (DFG 2008). The conservation strategy is currently being developed together with numerous other planning efforts for the Delta.

Climate Change

Climate change is already having an impact on all aspects of water management in the Bay-Delta system. Spring snowpack has decreased about 10 percent over the last century and sea level has risen about seven inches. The projected future effects of climate change on water supplies and water quality are numerous. Likely outcomes of climate change include continued sea level rise, more precipitation falling as rain, further reductions in snowpack, an earlier runoff season, increases in droughts and floods, increased water temperatures, and decreased water quality (DWR 2008a).

Increased sea water intrusion will result in decreased water quality in the Delta and will increase the need to release water from upstream reservoirs if freshwater conditions are to be maintained. Increasing severity and frequency of floods along with sea level rise will increase the risk of catastrophic levee failures and associated water quality and water supply impacts. Increasing temperatures and reduced inflow will increase stress on the ecosystem and put threatened and endangered species at greater risk. Improved scientific understanding of the effects of climate change will be needed to make appropriate and effective water management decisions.

The State and Regional Water Boards are committed to reducing the impact of climate change on the environment. In accordance with AB 32 (2006) and State Water Board Resolutions 2008-0011 (State Water Board 2008b) and 2008-0030 (State Water Board 2008c), climate change impacts and effects will be considered in basin planning and water right proceedings. In addition to considering the effects of changing climate on water supply and ecosystems identified above, the State Water Board will also consider opportunities to reduce greenhouse gas emissions through reduced energy use, enhancement of local water supplies, water conservation, storm water reuse, and recycling.

III. Water Quality Control Plan Review Process

Discussion

California Water Code section 13170 authorizes the State Water Board to adopt water quality control plans in accordance with the provisions of Water Code sections 13240 through 13244. Water quality control plans identify the beneficial uses of a water body, specify numeric or narrative water quality objectives to protect those beneficial uses and include a program of implementation for achieving the objectives (Wat. Code, § 13050, subd. (j)). Plans adopted by

the State Water Board supersede regional water quality control plans for the same waters to the extent of any conflict. The State Water Board's adoption of this Staff Report will mark the completion of the current periodic review. The State Water Board will then proceed with the process that may lead to a revised Plan or amendments to the Bay-Delta Plan.

The basin plan amendment process and potential amendment of water rights to implement the plan require preparation of environmental documentation in accordance with CEQA. Accordingly, the State Water Board will be the lead agency and will prepare environmental documentation for potential revisions to the Bay Delta Plan and its implementation. The proposed project under CEQA may include the review and potential amendment of water quality objectives, including flow objectives, and the program of implementation in the Bay-Delta Plan, as well as changes to water rights and water quality regulation consistent with the program of implementation.

The State Water Board intends to stage its environmental review of the Bay-Delta Plan and water rights implementation for this plan. The State Water Board will prepare a substitute environmental document for the water quality control plan components of the project that pertain to southern Delta salinity and San Joaquin River flows. The State Water Board anticipates preparing one or more EIRs to evaluate the environmental effects of any changes to water rights to implement the Bay-Delta Plan.

Public Notice

The State Water Board initiated its periodic review of the Bay-Delta Plan on August 29, 2008, by issuing a notice of a public workshop to receive comments on elements of the Bay-Delta Plan that may need amendment, new elements that should be added, or whether the entire plan should be revised. Because the State Water Board previously had committed to review the southern Delta salinity and San Joaquin River flow objectives, the notice informed the public that it did not need to address those issues in comments. The State Water Board accepted written comments through October 1, 2008, and held a public workshop on October 8, 2008.

Pursuant to a commitment included in the State Water Board's 2008 Bay-Delta Strategic Workplan, at the same time the State Water Board issued the notice for the periodic review, it made a request for written input on critical factual issues regarding the Bay-Delta's ecology and the impacts of water pollution and diversions. The purpose of the request was to solicit recommendations concerning the critical factual issues that the State Water Board should consider during proposed fact-finding proceedings on these issues. The information obtained from the fact-finding proceedings would then have been used to inform the State and Regional Water Boards' basin planning and environmental review activities and other State Water Board processes. However, after the close of the comment period on these factual issues, the State Water Board decided not to proceed with the fact-finding proceedings at that time. Comments received on the fact-finding issues, to the extent that they are relevant to the periodic review, are however discussed below and in Appendix A, "Responses to Comments."

Comments Received

The State Water Board received written comments in response to the periodic review notice discussed above, and oral comments at the periodic review workshop held on October 8, 2008, from the following organizations:

- The Bay Institute
- Central Delta Water Agency
- Central Valley Clean Water Association

- Community Clean Water Institute
- Department of Fish and Game
- Department of Water Resources
- The San Francisco Public Utilities Commission
- Stockton East Water District
- Northern California Water Association
- Sacramento Valley Water Districts
- San Joaquin River Group and San Joaquin River Group Authority
- San Luis & Delta-Mendota Water Authority and Westlands Water District
- South Delta Water Agency
- United States Department of the Interior

In addition to the periodic review comments, the State Water Board also received comments in response to the August 29, 2008 request for input on factual issues concerning the Bay-Delta from the following organizations:

- The Bay Institute
- California Farm Bureau Federation
- California Water Impact Network and California Sportfishing Protection Alliance
- Central Delta Water Agency
- Central Valley Clean Water Association
- City of Antioch
- Contra Costa Water District
- County of Sacramento & Sacramento County Water Agency
- Department of Fish and Game
- Department of Water Resources
- East Bay Municipal Utility District
- Northern California Water Association
- Sacramento Regional County Sanitation District
- San Joaquin River Exchange Contractors
- San Joaquin River Group
- San Luis & Delta-Mendota Water Authority, Westlands Water District, State Water Contractors & Kern County Water Agency
- South Delta Water Agency
- Stockton East Water District
- United States Department of the Interior

The periodic review notice, fact finding request, transcript from the October 8, 2008 workshop, and the written comments in response to the periodic review notice and the fact finding request are posted on the State Water Board's Division of Water Rights' website at: http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/periodic_review/index.shtml. In addition, Appendix A to this report includes a summary of the comments and responses to those comments as they apply to the periodic review of the Bay-Delta Plan.

Next Steps

Following adoption of the Staff Report, State Water Board staff will immediately begin a detailed review of the issues that the board has determined should receive further consideration. The State Water Board will hold one or more additional CEQA scoping meetings and basin planning workshops, and staff will review information received at those meetings, and other available scientific information, in order to develop recommendations for any needed changes to the Bay-Delta Plan. Staff will then prepare draft plan amendments or a draft revised plan for

consideration by the State Water Board and any required environmental documentation. Prior to certification of the environmental documentation and adoption of any revised Bay-Delta Plan, interested persons will have the opportunity, at a public hearing, to comment on staff's recommendations and on the environmental analysis. After the hearing, the State Water Board will hold a board meeting to consider adopting any proposed changes.

To avoid duplication of effort, to the extent feasible, the State Water Board will consider relevant analyses conducted for BDCP and other sources in its planning and environmental review efforts. When considering any other such analyses, however, the State Water Board will independently evaluate the information in the analyses. Any documents produced, or actions taken, by the State Water Board will reflect the independent judgment of the State Water Board.

IV. Issues

ISSUES THE STATE WATER BOARD HAS ALREADY COMMITTED TO REVIEW

Southern Delta Salinity and San Joaquin River Flows
In the State Water Board's 2008 Bay-Delta Strategic Workplan, the State Water Board committed to undertake a review of the southern Delta salinity and San Joaquin River flow objectives and their implementation. The State Water Board has already begun to evaluate these objectives through various processes. Accordingly, there is no need for a staff recommendation in this report. ~~Nonetheless, this report includes a summary of these issues, as well as specific information regarding sources of salinity to the southern Delta, in order to provide an overview of the wide range of water quality issues that will, and should be, considered further in the basin planning process.~~

~~*Evaluation of Southern Delta Salinity Objectives*~~
~~The State Water Board established salinity objectives at four locations in the southern Delta as part of its 1978 Bay-Delta Plan. The southern Delta salinity objectives have remained unchanged since 1978. The State Water Board based these objectives on methodologies available at that time for estimating the maximum salinity of applied irrigation water that would sustain 100 percent yield of important salt sensitive crops grown in the southern Delta. The objectives were also based on the assumption that the Department of Water Resources (DWR) would install permanent operable barriers at four locations in the southern Delta. For numerous reasons these barriers have not been constructed, and their future is uncertain.~~

~~In the Bay-Delta Plan, the State Water Board determined that there was inadequate scientific information on which to base any changes at that time, but that additional information should be developed to determine what, if any, changes should be made to the southern Delta salinity objectives or their implementation to reasonably protect agricultural beneficial uses. In January 2007, the State Water Board held a workshop soliciting the latest scientific information and comments on the southern Delta salinity objectives from interested persons. Since then, State Water Board staff has contracted with a consultant specializing in agricultural water management to evaluate the latest scientific literature concerning factors related to crop salt tolerance and make recommendations regarding methodology for establishing salinity objectives appropriate for southern Delta agriculture. Staff is also working with DWR modelers to analyze water supplies needed to meet current salinity objectives through dilution. Staff held a Southern Delta Salinity Forum meeting in November 2008 on this work, and, later in 2009, intends to hold additional staff-level meetings to discuss the results of these analyses and other~~

~~information that may inform review of the southern Delta salinity objectives and their implementation. This process will be conducted in coordination with the Central Valley Water Board's establishment of standards and a Total Maximum Daily Load (TMDL) for salinity and boron in the lower San Joaquin River upstream of Vernalis, and integrated with CV-SALTS.~~

~~Sources of Salinity to Southern Delta~~
~~Agricultural beneficial use is negatively impacted if salinity concentrations in the surface waters of the southern Delta - the primary irrigation water supply for the agriculture beneficial use – exceed levels that could cause a reduction in crop yields. Identifying factors that increase salinity in the southern Delta is important for developing the implementation of salinity objectives established in the Bay-Delta Plan.~~

~~Salinity concentrations in the southern Delta are governed primarily by salinity in the San Joaquin River entering at Vernalis and by activities within the southern Delta, both of which are affected by a number of other factors as described below. The relative importance of these two factors is poorly understood at this time. Increased salinity in these areas is due to activities that either increase salt loads discharged in the watershed or otherwise act to accumulate or concentrate existing salts. Depending on SWP and CVP export operations, temporary barrier operations, and hydrologic conditions, there can also be occasional inputs of Sacramento River water to the southern Delta that may reduce salinity in the southern Delta (DWR 2006).~~

~~Source Loading & Evapo-Concentration~~
~~Factors controlling the loading and/or concentration of salts from various sources include:~~

- ~~Salt loads resulting from seawater intrusion: DWR fingerprint modeling estimates that between August and December 2008 the percentage of salt present at Clifton Court Forebay (intake to the SWP) that originated from San Francisco Bay ranged between 33 percent and 43 percent (DWR 2008b). To the extent this water is entrained by the SWP pumps and is then transferred to the Delta-Mendota Canal (DMC) as part of joint SWP and CVP operations, this salt from San Francisco Bay is effectively imported to the San Joaquin River.~~
- ~~Salt loads to the San Joaquin River from surface agricultural discharges are estimated at between 410,000 and 540,000 tons of salt per year (Central Valley Water Board 2004a). These salts then reach the river either through direct discharge of return flows and tile drainage or accretions from shallow groundwater into which salts have percolated. Agricultural activity and water use both increase the load of salts and increase their concentration by:~~
  - ~~Evapo-concentration of salt resulting from consumptive water use by crops (i.e. evapotranspiration).~~
  - ~~Mobilization of naturally occurring salt otherwise bound in soils of marine origins, particularly on the west side of the San Joaquin River (CALFED Bay Delta Program 2007).~~
  - ~~Importation and distribution of salts contained in fertilizers and other soil amendments.~~
- ~~Managed wetland operations concentrate and discharge salt delivered from a mix of CVP deliveries, groundwater, and agricultural tail water returns. Although limited data is available on wetland discharge water quality, mean net discharge from approximately~~

170,000 acres of wetlands in the San Joaquin River watershed is estimated at 101,000 tons per year (Central Valley Water Board 2004b).

- Industrial water use increases salinity concentrations in the watershed by both the addition of salts contained in raw material inputs and evapo-concentration of salts due to consumptive use. Industrial uses contributed an average of 38,000 tons per year to the San Joaquin River upstream of Vernalis between 1995 and 2002 (including salinity already in supply water). Depending on how a mass balance is calculated, a subtraction may be appropriate for salinity already contained (from other sources) in the industrial water supply. Industrial salt loads are either discharged directly, or via municipal collection and treatment systems, with approximately 40 percent being discharged directly to the San Joaquin River or its tributaries and the remainder discharged by land irrigation or processed through wetlands (Central Valley Water Board 2004a). Salt loads from industrial activities may also be mobilized to surface waters via stormwater runoff.

- Domestic water use is estimated to increase total dissolved solids concentrations (a measure of salinity) from 150 to 380 mg/L over and above the salinity of the water supply (Metcalf and Eddy 1991). This increase is attributable to a combination of imported salts (e.g. detergents, water softener salts) and evapo-concentration of salts due to consumptive use. Domestic water use contributed an average of 16,000 tons per year to the San Joaquin River upstream of Vernalis between 1995 and 2002 (including salinity already in supply water). Of domestic related salt loads discharged via municipal wastewater treatment plants, approximately 50 percent was discharged directly to the San Joaquin River, with the remainder discharged by land irrigation or processed through wetlands (Central Valley Water Board 2004a). Salt loads from domestic activities may also be mobilized to surface waters via stormwater runoff.

Flow Related Concentration Effects

The way flow is managed in the watershed leads to conditions that either result in accumulation of salt in soils and groundwater or otherwise have an effect on salinity concentrations in the San Joaquin River watershed and southern Delta.

- Under most hydrologic conditions, the CVP pumps near Tracy entrain much of the flow from the San Joaquin River at the head of Old River; the associated salt load is then re-circulated back to the river via the DMC, effectively trapping and accumulating salt within the watershed. Between 1977 and 1997 the DMC contributed approximately 513,000 tons or 47 percent of the total annual salt load in the San Joaquin River at Vernalis (Central Valley Water Board 2004b).

- Water exports out of the basin and diversions to storage from low salinity sources and subsequent consumptive use act to increase salinity concentrations in downstream surface waters of the watershed. For example, the export of Hetch Hetchy water from the Tuolumne River removed from the San Joaquin River watershed an average of 250,000 acre-feet per year between 1985 and 1994, which is estimated to have increased salinity concentration in the San Joaquin River during that period from 506 microsiemens/cm (µS/cm equal to micromhos/cm) to 570 µS/cm (Central Valley Water Board 2006). Conversely, activities that provide relatively lower EC water to the river system (i.e. reservoir operations at certain times of the year) can result in lower salinity.

- Occasional inputs of Sacramento River water to the interior southern Delta can occur depending on Sacramento and San Joaquin River hydrology, SWP and CVP operations, and temporary barrier operations. DWR fingerprint modeling analysis shows these

~~inputs occur primarily at Old River near Tracy, and Old River near Middle River. When these inputs occur there is typically a corresponding decrease in salinity concentrations at those same locations (DWR 2006).~~

~~The averaging periods and temporal occurrence of the above loading information varies. Therefore it is not intended to be provided for direct comparison, but rather to demonstrate the relative effect of each factor. Better information and analysis regarding the above conditions will be needed to develop a comprehensive salt balance for the southern Delta. Such analyses will inform development of a program of implementation for salinity objectives in any updates to the Bay-Delta Plan.~~

~~Evaluation of San Joaquin River Flow Objectives~~

~~San Joaquin River flow objectives were first established at Vernalis in the 1995 Bay-Delta Plan to protect fish and wildlife beneficial uses. The State Water Board set different objectives for three time periods: February through June, excluding April 15 through May 15 (spring flows); April 15 through May 15 (pulse flows); and October (fall flows). The spring flows are intended to provide minimum net downstream freshwater flows in the San Joaquin River to address habitat concerns from reduced flows and water quality. The pulse flows were principally developed to aid in cueing Chinook salmon smolt out-migration from the San Joaquin River. The fall flows were developed to provide attraction flows for adult salmon returning to the watershed to spawn. These objectives were based on the limited scientific information available at the time. As a result, in order to obtain additional scientific information, in D-1641, the State Water Board approved conducting the Vernalis Adaptive Management Plan (VAMP) experiment proposed in the San Joaquin River Agreement (SJRA), in lieu of meeting the pulse flow objectives included in the 1995 Plan, until 2012.~~

~~The San Joaquin River flow objectives were unchanged in the Bay-Delta Plan due to insufficient scientific information on which to base any changes at the time. The program of implementation, however, was amended to allow the VAMP experiment to be conducted in lieu of the pulse flows. In addition, the State Water Board concluded that additional scientific information should be developed to determine what, if any, changes should be made to the objectives or their implementation to reasonably protect fish and wildlife beneficial uses. In order to gather this information, the State Water Board conducted a workshop in September of 2008 to receive additional information including an update on the salmon escapement model for the San Joaquin River that the California Department of Fish and Game (DFG) developed as a tool for developing revised flow objectives. The State Water Board also requested that the San Joaquin River Group Authority (SJRGA) conduct a peer review of the VAMP to determine whether changes may be needed to the study to obtain necessary data points and to ensure the protection of San Joaquin River and Delta species. The State Water Board intends to hold additional staff level meetings later this year to obtain additional information concerning the San Joaquin River flow objectives and their implementation.~~

ADDITIONAL ISSUES IDENTIFIED FOR FURTHER REVIEW

Delta Outflow Objectives

Issue: Delta outflow and/or inflow objectives for the protection of fish and wildlife beneficial uses.

Staff Recommendation: Staff recommends that the State Water Board consider changes to the Delta outflow objective, or alternatively Delta inflow from the Sacramento Basin, based on available information as part of its review and possible revision of the Bay-Delta Plan.

Discussion: The Delta outflow objective is intended to protect estuarine habitat for anadromous fish and other estuarine dependent species. Delta outflows affect migration patterns of both estuarine and anadromous species and the availability of habitat (State Water Board 1999). Freshwater flow is an important cue for upstream migration of adult salmon and is a significant factor in the survival of smolts moving downstream through the Delta. The populations of several estuarine-dependent species of fish and shrimp vary positively with flow as do other measures of the health of the estuarine ecosystem (Kimmerer 2004). Freshwater inflow also has chemical and biological consequences through its effects on loading of nutrients and organic matter, pollutant concentrations, and residence time.

The Delta outflow objective includes requirements for calculated minimum net flows from the Delta to Suisun and San Francisco Bays (the Net Delta Outflow Index or NDOI) and maximum salinity requirements (measured as electrical conductivity or EC). Since salinity in the Bay-Delta system is closely related to freshwater outflow, both types of objectives are indicators of the extent and location of low salinity estuarine habitat. Listed in Table 3 of the Bay-Delta Plan, the Delta outflow objective varies by month and water year type. With some flexibility provided through a limited set of compliance alternatives, the basic outflow objective sets minimum outflow requirements that apply year round.

In addition to the basic outflow objective, Table 4 of the Bay-Delta Plan includes a set of salinity requirements that apply from February through June, often referred to as the X2 objectives. X2 is defined as the distance in kilometers from the Golden Gate Bridge of the 2 parts per thousand (ppt) isohaline at a depth of one meter from the bottom of the channel, which is approximately equivalent to a surface EC of 2.64 millimhos/cm (mmhos/cm). The X2 objectives are designed to restore a more natural hydrograph and salinity pattern by requiring maintenance of the low salinity zone at a specified point and duration based on unimpaired flow conditions. The X2 objectives are based on the concept of "X2 days": the number of days in a month that the objective must be met at a specified location through any one of three alternatives. The alternatives for meeting the X2 objective on any given day include meeting the maximum daily average EC requirement (2.64 mmhos/cm), the 14-day running average maximum EC, or the specified 3-day average NDOI requirement for the specified location. As with the Delta outflow objective in Table 3, Table 4 includes compliance alternatives that can provide some operational flexibility in meeting the objectives.

Several species of fish that depend on the Delta have experienced significant declines in recent years. There is evidence that these declines are due in part to the impact of SWP and CVP operations (Baxter et al. 2008, NOAA Fisheries 2008). As indicated previously, since 2002, the abundance of four species of pelagic fish, including delta smelt, have declined dramatically (Sommer et al. 2007). Decline of these four pelagic species has been accompanied by declines in other fish species and has raised concerns about the ecological health of the estuary (Feyrer et al. 2007, Baxter et al. 2008, Lund et al. 2008, Nobriga et al. 2008). Understanding of the factors contributing to the POD and the health of the Delta ecosystem has improved since the last review of the Bay-Delta Plan and continues to expand with ongoing research.

Monitoring of fish and invertebrate abundance in the estuary continues to show the importance of flow. The relationships between outflow and several measures of the health of Bay-Delta estuary have been known for some time (Jassby 1995) and are the basis for the current X2

objectives. A more recent study determined that updated abundance-X2 relationships were similar to those previously reported and are seen in a wide variety of estuarine fish species (Kimmerer et al. 2009). Abundance of the upper estuary shrimp, *Crangon franciscorum*, an important invertebrate species in the Bay-Delta ecosystem, is also strongly correlated with flow (IEP 2008). Stream flow and Delta outflow are also important factors in the survival of Chinook salmon (NOAA Fisheries 2008).

With respect to delta smelt, outflow probably has two distinct but related impacts. Low outflow shifts the preferred habitat for many of the POD species closer to the area influenced by the SWP and CVP export facilities, thereby contributing to entrainment. Low outflow also decreases the extent and quality of delta smelt habitat (Baxter et al. 2008). Water temperature, salinity, and clarity have been shown to influence the distribution of delta smelt, and suitable summertime physical habitat for this species has likely decreased over time (Nobriga et al. 2008). Water temperature and salinity are directly related to outflow.

A PPIC report hypothesizes that increased variability in Delta geometry would lead to more variability in residence time and other habitat parameters, which in turn would be more favorable to desirable species (Lund et al. 2007). The concept of habitat variability includes the hypothesis that more seasonal and year-to-year variability in salinity could be beneficial for native estuarine species (and striped bass) and less favorable for undesirable introduced species. A CALFED workshop explored these concepts and generally concluded that the evidence supporting the benefits of variable salinity was mixed; that habitat variability needs to include more than just salinity, and additional study at multiple scales is needed to test these ideas (CALFED Science Program 2007). The concept of a Delta with more diverse habitats, flows, and salinity, and the potential ecosystem benefits of these, has been explored further using available data and computer modeling (Lund et al. 2008). A Delta with greater habitat variability, variability in tidal and riverine flows, variability in water chemistry (especially salinity), over multiple scales of time and space, would likely support greater populations of desirable fish species (Moyle et al. 2009 in prep). The benefits of habitat variability (including flow and salinity variability), and provisions for testing and monitoring these hypotheses should be considered during development of any new or modified outflow objectives.

In its BO on the effects of SWP and CVP operations on delta smelt, the USFWS agrees with the studies that show, in addition to entrainment, the amount and quality of habitat are important factors in the survival of smelt, particularly in the fall. For much of their life cycle, the preferred habitat for delta smelt is the low salinity zone (indicated by the position of X2). The location, lateral extent, and quality of this habitat depend on outflow but it is usually centered somewhere in the western Delta or Suisun Bay. The BO for delta smelt on operations of the SWP and CVP in the Delta finds that outflow over and above that required by the Bay-Delta Plan is needed to insure the survival of the species. Specifically, the BO calls for meeting X2 objectives during September and October following wet and above normal water years, and the release of November Sacramento basin reservoir inflows to provide more Delta outflow in the fall (USFWS 2008).

The effects of Delta outflow objectives on other species, regions, and water uses must also be considered. In addition to reduced supplies available for municipal/industrial and agricultural uses, existing and any increased outflow requirements could reduce the amount of cold water available in SWP and CVP reservoirs available for temperature control (the coldwater pool). In particular, revisions to the existing outflow objectives should consider potential impacts on flow and temperature control affecting salmonids upstream (NOAA Fisheries 2008). For this reason,

~~the State Water Board could decide to also review Delta inflow from the Sacramento Basin as part of its review of Delta outflow objectives.~~

~~**Conclusion:**~~ The available information indicates that further review and change of Delta outflow objectives may be required. ~~Changes to Delta outflow patterns have likely contributed to the POD and are likely having an impact on the abundance of other species of concern. Actions taken under the federal ESA are already changing outflow requirements for the SWP and CVP and additional species protection actions are imminent. Additional~~ Delta outflow recommendations are likely to come from the BDCP and other planning efforts currently under way. ~~Based on current scientific information, recent regulatory actions, and expected recommendations from agencies and stakeholder groups, staff recommends the State Water Board conduct a detailed review of the Delta outflow objectives for possible revisions to the Bay-Delta Plan. Any revisions should also consider the need for Delta inflows.~~ Some of this review could be provided by DWR to the State Water Board, in coordination with State Water Board planning efforts, as part of the environmental analyses conducted for the BDCP.

Export/Inflow Objectives
Issue: Export Limits for the Protection of Fish and Wildlife Beneficial Uses

Staff Recommendation: Staff recommends that the State Water Board consider changes to export limits based on available information as part of its review and possible revision of the Bay-Delta Plan.

~~**Discussion:** The objective for export limits in the Bay-Delta Plan protect fish and wildlife beneficial uses, including the habitat of estuarine-dependent species, in part by reducing the entrainment of various life stages by the major export pumps in the southern Delta.~~

~~The export limits (also known as the ratio of exports to inflow or E/I ratio) limit the combined amount of water that may be exported from the Delta by the SWP and CVP water project facilities in the southern Delta relative to total Delta inflow. The limit is 35 to 45 percent of Delta inflow for February (depending on total inflow conditions during January), 35 percent from March through June, and 65 percent of Delta inflow from July through January. Additional limits of 1,500 cfs or 100 percent of San Joaquin River flow apply from April 15 through May 15 (spring pulse flow period). These spring flow limits may be adjusted upon the agreement of the fishery agencies and upon notice to the Executive Director of the State Water Board. The spring flow limit specifies that flexibility in allowing variations in the maximum export rate be intended to result in no net annual loss of water supply within the water quality and operational requirements of the plan.~~

~~The spring flow period export limit restricts the combined pumping at the SWP and CVP Delta pumping facilities to 1,500 cfs or the measured flow of the San Joaquin River at Vernalis, whichever is greater. During the spring pulse flow period export limits generally reduce the amount of pumping at the SWP and CVP Delta pumping facilities in concert with increasing San Joaquin River flow meant to improve survival of downstream migrating juvenile salmon. For the remainder of the year, the percent of allowable inflow diverted is calculated using a formula that divides SWP and CVP Delta pumping by the sum of Delta inflows. The 35 percent (and up to 45 percent in February) limit reduces pumping from February through June to protect a variety of fish species that use the Delta for spawning, rearing, and migration during the spring months (State Water Board 2006). The 65 percent limit during the remainder of the year (primarily~~

summer and fall) is important for maintenance of habitat conditions for estuarine dependent species in the western Delta and downstream in Suisun Bay (State Water Board 1995).

The impacts of SWP and CVP pumping on Delta fish species and other biota have long been recognized. The environmental analysis conducted with the 1995 Bay-Delta Plan identified the benefits of the export limits, including the spring pulse flow objective, to salmon, striped bass, delta smelt, splittail, and other estuarine species. The spring E/I ratio of 35 to 45 percent was designed to reduce the risk of entrainment of eggs, larvae, and fish when they are most likely to be present in the Delta (State Water Board 1995). Further environmental analysis conducted for the 1995 Bay-Delta Plan determined that, through entrainment, SWP and CVP export pumping also reduced the amount of fish food organisms (phytoplankton and zooplankton) available in the Delta. The analysis also identified the relationship between export limits and reverse flows in southern Delta channels and their significance to the biological impacts of SWP and CVP pumping (State Water Board 1999).

Recent studies provide additional evidence of the likely role of SWP and CVP export pumping in the continued decline of several Delta fish species. The POD, first identified in 2002, has been the subject of intensive study, legal actions, and regulatory changes and a catalyst for more intensive study of physical and biological processes related to the Delta. A comprehensive overview of open water processes in the Delta found that export pumping may have a considerable cumulative effect on fish and other relatively slow growing biota (Kimmerer 2004). This study also found that losses of larval fish are roughly proportional to the fraction of Delta volume diverted. In its most recent annual POD synthesis report, the IEP found that winter losses at the SWP and CVP export facilities of adult delta smelt, longfin smelt, and threadfin shad (three important pelagic fishes in the Delta) may be an important factor related to the overall decline of these species (Baxter et al. 2008a). The POD synthesis report also identifies the potential use of reduced reverse flows in Old and Middle Rivers near the SWP and CVP export facilities as one method of decreasing winter entrainment of adult delta smelt. More recently, estimates of the population of delta smelt and losses at the SWP and CVP southern Delta export facilities indicate that a significant fraction of the population may be lost due to export pumping (Kimmerer 2008). Additional analyses by Kimmerer and Nobriga in 2008, using the particle tracking component of the Delta Simulation Model 2 (DSM2) to simulate movement of larval Delta smelt, found that losses to the pumps could be substantial. This study also found that the E/I ratio is a useful predictor of entrainment.

As one of several objectives for Delta flow, the export limits work in concert with outflow, river flow, and water quality objectives to govern storage, release, and pumping operations of the SWP and CVP export facilities both within and upstream of the Delta. Several studies have noted the relationship between Delta outflow, E/I ratio and entrainment of fish and other biota. Higher flows combined with reduced exports are designed to reduce salmon mortality during the spring pulse flow period by speeding passage through the Delta and reducing the risk of entrainment at the pumps (State Water Board 1995). Conversely, lower outflows can shift the distribution of delta smelt and other fish species (including salmon) closer to the pumps and, combined with reverse flows in Old and Middle Rivers, increase the risk of entrainment at the SWP and CVP export facilities (IEP 1996, State Water Board 1999). The recent USFWS BO for delta smelt finds that predicted entrainment depends on both outflow (as measured by X2) and reverse flows in Old and Middle Rivers (USFWS 2008).

Information indicating that the populations of several key Delta fish species remain at dangerously low levels has continued to emerge since adoption of the 2006 Bay-Delta Plan. Recent studies indicate that although there are multiple causes, export pumping remains a likely

~~factor in the decline of several pelagic fish species in the Delta (Baxter et al. 2008a). Various entities have suggested measures to address the issue. For example, in its Delta Vision Strategic Plan, the Governor's Task Force recommended that the State Water Board revise the export criteria applicable to the SWP and CVP water projects (Delta Vision 2008). The 2008 PPIC report on the future of the Delta suggests that reducing or ending the use of the southern Delta pumps may prevent fish entrainment and altered flows harmful to fish (Lund et al. 2008). In 2007 the federal district court imposed an interim order reducing SWP and CVP pumping to protect Delta smelt (Wanger 2007). The USFWS BO on delta smelt (USFWS 2008) requires new actions related to flow for the protection of delta smelt (see reverse flows section). Conservation measures currently under consideration in the BDCP process will likely require additional modifications to operating criteria for a number of existing and planned facilities. These changes may require re-evaluation of the export limit objectives as well as other Delta flow objectives in the Bay-Delta Plan (BDCP 2008).~~

~~In addition to reducing entrainment, the existing export limits are intended to provide general protection of the Delta ecosystem and a variety of fish and wildlife beneficial uses by limiting the portion of freshwater that may be diverted by the SWP and CVP export facilities. Additional ecosystem benefits beyond reducing entrainment may include reduction in losses of nutrients and other materials important for the base of the food web, food organisms, habitat suitability, fishery management, and more natural flow and salinity patterns.~~

~~**Conclusion:**~~ The available information indicates that new or changed export limits may be necessary to adequately protect beneficial uses in the Delta. ~~Recent analyses of the impact of export pumping on Delta fish species of concern show that more restrictive limits may be required. The export limits are closely related to reverse flow limitations described in the recent delta smelt BO. Staff recommends that the State Water Board evaluate the possible modification of the export limits objectives in the Bay-Delta Plan based on current scientific information concerning pelagic organisms, salmonids, other species, and other appropriate information. This review will likely require an assessment of issues associated with exports that may arise in connection with proposals in the BDCP process to modify existing diversions or construct new diversions.~~ Some of this review could be provided by DWR to the State Water Board, in coordination with State Water Board planning efforts, as part of the environmental analyses conducted for the BDCP.

Delta Cross Channel Gate Closure Objectives
Issue: Delta Cross Channel Gate objective for the protection of fish and wildlife beneficial uses in the Bay-Delta

Staff Recommendation: Staff recommends that the State Water Board consider changes to the Delta Cross Channel (DCC) gate objective based on available information as part of its review and possible revision of the Bay-Delta Plan.

~~**Discussion:** The DCC gate is located near Walnut Grove and at times allows for the transport of up to 3,500 cfs of water from the Sacramento River to Snodgrass Slough and the North Fork Mokelumne River to the interior Delta. The DCC was constructed in the early 1950s to convey Sacramento River water to the interior and southern Delta to improve water quality at the SWP and CVP export facilities. The DCC also benefits recreational uses by providing boat passage.~~

~~The DCC gate objective was designed to protect fish and wildlife beneficial uses (specifically Chinook salmon) while simultaneously recognizing the need for fresh water to be moved~~

through the interior Delta to the southern Delta for SWP and CVP uses. The current objective states that the DCC gate shall be closed for a total of up to 45 days for the November through January period, stay closed from February through May 20, and be closed for a total of 14 days for the May 21 through June 15 period. The United States Bureau of Reclamation (USBR) is required to determine the timing of gate closures after consultation with NOAA Fisheries, USFWS, and DFG. As the owner and operator of the DCC gate, USBR is required to meet the DCC objective. In addition, USBR closes the DCC gate for flood control purposes when flows are high on the Sacramento River (greater than 20,000 to 25,000 cfs) to avoid channel scouring within the interior Delta.

Closure of the DCC gates is important for the protection of salmon survival. Opening the DCC gates during winter and spring months can negatively affect juvenile Chinook salmon survival by causing straying into the interior and then southern Delta (Brandes and McLain 2001). The proportion of the juvenile winter-run Chinook salmon population lost at the SWP and CVP export facilities each year has been found to be correlated to the proportion of Sacramento River flow diverted through the DCC during the time juvenile winter-run Chinook are emigrating through the lower Sacramento River in the vicinity of the DCC and Georgiana Slough (Low and White 2006).

Opening the DCC gate significantly improves water quality (e.g. lowers salinity) at the SWP and CVP export facilities, particularly in the fall when Delta outflow is low. A CALFED assessment of the sources and causes of salinity at the Banks and Tracy pumping plants reinforced the association of DCC gate closure with increased intake EC (CALFED Bay-Delta Program 2007).

During the periodic review and plan review resulting in the current Bay-Delta Plan, amendment to the DCC gate objective was considered, but at that time the State Water Board determined that it had not received adequate information to support amending the DCC gate objective. Since the adoption of the Bay-Delta Plan, additional information has become available and studies have been completed or are in process.

The most recent studies indicate that greater than 69 percent of out-migrating salmon move at night (Perry and Skalski 2008). This study suggests that closing the DCC gate only at night should result in similar fish protection as 24-hour closure, while improving water quality at the pumps. In the ongoing North Delta Salmon Outmigration Study led by Jon Burau, preliminary results show that less than ten percent of juveniles enter the DCC when the gate is open during the day only (Burau 2008 draft results). Data from such studies will improve the understanding of route selection and survival of the Sacramento River juvenile Chinook salmon in the Sacramento/San Joaquin Delta with respect to DCC gate operations. These studies will help provide management tools capable of predicting impacts on salmon out-migrants considering operations of existing facilities in the Delta, such as the DCC, and proposed conveyance alternatives (USGS 2008). Staff recommends reviewing these studies and other information when considering any changes to the DCC gate objective, especially with respect to partial day closures or modification to timing and duration of gate closures.

NOAA Fisheries is under court order to complete a revised OCAP BO for listed salmonids (which includes steelhead) and green sturgeon, now expected in June 2009. A preliminary draft of the BO includes prescriptive closure of the DCC gate beginning on December 15 and ending on January 15. Additional requirements for DCC gate operations may also be included in the BO. The BDCP process has reviewed operations of the DCC gate and is also developing recommendations that may include additional closure of the gate.

Conclusion: The DCC gate, if opened, can negatively impact fish and wildlife beneficial uses. Opening the gate, however, can benefit municipal, industrial, and agricultural beneficial uses. Updated information, including studies regarding partial gate closures and potentially new requirements from the NOAA Fisheries OCAP BO for salmonids and green sturgeon should be available during the basin plan amendment process. Additionally, BDCP is reviewing DCC gate operations for potential modification. Given likely availability of new information and the importance of the DCC gate to overall Delta water quality conditions, staff recommends the State Water Board review the DCC gate objective in the Bay Delta Plan. Some of this review could be provided by DWR to the State Water Board, in coordination with State Water Board planning efforts, as part of the environmental analyses conducted for the BDCP.

Suisun Marsh Objectives

Issue: Suisun Marsh water quality objectives for the protection of fish and wildlife beneficial uses in the Bay-Delta.

Staff Recommendation: Staff recommends that the State Water Board consider changes to the water quality objectives that apply to the Suisun Marsh region as part of its review and potential revision of the Bay-Delta Plan.

Discussion: Suisun Marsh is the largest contiguous brackish wetland in the western US, situated between the fresh water Delta ecosystem and the saline ecosystem of San Francisco Bay. Suisun Marsh, which includes a combination of tidal wetlands, diked seasonal freshwater and brackish water wetlands, sloughs, and upland grasslands, represents about 10 percent of California's remaining wetlands. These wetlands provide many important ecological functions, including wintering and nesting area for waterfowl and water birds of the Pacific Flyway, nursery habitat for native fish, and essential habitat for other fish, wildlife, and plants, including several threatened, endangered, or sensitive species (e.g. Delta smelt, splittail, and the salt marsh harvest mouse). Many of these species are dependent upon specific estuarine conditions for their survival.

As a result of Suisun Marsh's location in the Bay-Delta, water quality in the marsh affects, and is affected by, the SWP and CVP export facilities, and other upstream diversions. The aquatic habitat of Suisun Marsh continues to be under significant pressure from a variety of stressors including the effects of water diversions, pollutants, invasive species, and climate change (DWR 2007, Moyle and Bennett 2008, O'Rear and Moyle 2008). These factors have made Suisun Marsh one of the most highly regulated wildlife habitat areas in California. Protecting, restoring, and enhancing beneficial uses in and around Suisun Marsh is important, especially given recent declines in species listed under endangered species laws.

In 1988, construction and operation of physical facilities to control channel water salinity were completed, including the Suisun Marsh Salinity Control Gate. The gate is located in Montezuma Slough just downstream of the confluence of the Sacramento and San Joaquin rivers. The gate is left open when water flowing out of the Delta is fresh (generally in winter) and is operated (closed) with the tides during times when saltier water moves back up the Bay (generally in summer and fall) (The Center for Land Use Interpretation 2009). The gate uses tidal pumping to push fresher water into the marsh by opening to let Delta water flow in with the outgoing tide and closing during the incoming tide which tends to push saltier water out of the marsh. Operation of the gates, however, can move the position of X2 upstream (IEP 2001). Delta outflow is the primary source of fresh water for Suisun Bay and Suisun Marsh and limits the intrusion of saline ocean water into the marsh.

The Suisun Marsh salinity objectives were first adopted in the State Water Board's 1978 Bay-Delta Plan. The DWR and USBR were assigned responsibility for meeting the objectives in State Water Board Decision 1485 (D-1485). In the 1995 Bay-Delta Plan, the State Water Board amended the salinity objectives included in the 1978 Bay-Delta Plan. The 1995 Bay-Delta Plan lists numeric salinity objectives at seven locations within the Marsh and includes a narrative objective for the brackish tidal marsh areas.

The purpose of the Suisun Marsh numeric salinity objectives is to provide water of sufficient quality to the managed wetlands to achieve soil water salinities capable of supporting the plants characteristic of a brackish marsh. The D-1485 objectives were based on research that investigated the salinity tolerance of alkali bulrush *(Scirpus maritimus)* and other important waterfowl food plants in the Suisun Marsh. The research identified the maximum mean applied water salinity that would provide an average of 90 percent of the maximum alkali bulrush seed production and a 60 percent seed germination rate. At that time, the D-1485 salinity objectives were thought to represent the most saline water that can be applied regularly to well-managed wetlands without loss of alkali bulrush seed production (State Water Board 1995; State Water Board 2000). The range of brackish water for Suisun Marsh, as defined by the 1995 Bay-Delta Plan objectives is 8-19 mmhos/cm.

In the 1995 Bay-Delta Plan Program of Implementation, the State Water Board called for the convening of an ecological work group to reassess the water quality objectives in Suisun Marsh. As a result, the Suisun Ecological Workgroup (SEW) was convened as a Project Work Team under the IEP. The SEW is composed of representatives from DWR, DFG, USBR, USFWS, Suisun Resource Conservation District, and State Water Board. Among several goals of the SEW are: evaluate the beneficial uses and water quality objectives for the Suisun Bay and Suisun Marsh ecosystem; identify specific measures to implement the narrative objective for tidal brackish marshes of Suisun Bay; and make recommendations to the State Water Board regarding achievement of the objective and development of numeric objectives to replace it.

In response to the recommendations contained in the 1995 Bay-Delta Plan, the SEW submitted a final report in 2001 summarizing nearly four years of technical research and discussions, with a range of ecological perspectives, goals, and views. The recommendations were based on conceptual models detailing the ecological relationships between the physical, chemical, and biological factors affecting the health of the resource (e.g. salinity level, habitat availability). Recommendations included, but were not limited to: maintaining Suisun Marsh salinity standards as written in the 1995 Bay-Delta Plan, revising the narrative standard, and establishing new flow-based salinity standards (IEP 2001).

In 2001, after the CALFED Record of Decision (ROD) was issued, the interagency Suisun Marsh Charter Group (SMCG) was formed to develop the Suisun Marsh Plan. The Suisun Marsh Plan is intended to provide a long term plan for tidal marsh restoration and managed marsh enhancements to balance threatened and endangered species recovery with maintenance of existing land and water use practices in the marsh (SMCG 2004b). The SMCG has begun developing a programmatic EIS/EIR for the Suisun Marsh Plan. A public draft is expected in mid 2009, with a final EIS/EIR in early 2010. The SMCG has committed to providing a proposed plan for potential changes to the water quality objectives following completion of the EIS/EIR. State Water Board staff will consider the Suisun Marsh Plan during review of the objectives for the Suisun Marsh region.

In addition to efforts by the SEW and the SMCG, the BDCP is currently looking into restoration activities in Suisun Marsh as part of its larger plan for Bay-Delta ecosystem restoration. The State Water Board will consider all of these investigations, discussions, and recommendations in any review of the objectives.

Conclusion: The available information indicates that possible changes in Suisun Marsh objectives should be investigated. Suisun Marsh provides important habitat for nesting waterfowl, juvenile fish, and other fish, wildlife, and plants, including several threatened, endangered, and sensitive species. These essential ecological functions are under significant pressure from a variety of stressors, including the effects of water diversions, pollutants, invasive species, and climate change. Staff recommends that the State Water Board review the Suisun Marsh objectives as part of its potential revisions to the Bay-Delta Plan.

Reverse Flow Objectives (Old and Middle River Flow Objectives)

Issue: Reverse flows in Old River and Middle River in the southern Delta

Staff Recommendation: Staff Recommends that the State Water Board evaluate establishment of Old River and Middle River flow objectives as part of its update of the Bay-Delta Plan.

Discussion: The Bay-Delta Plan currently includes flow-based objectives for the protection of fish and wildlife beneficial uses including a Delta outflow objective, river flow objectives, and export limits. In light of the continued fishery declines in the Bay-Delta, however, the State Water Board should consider adopting flow objectives for Old and Middle Rivers to protect estuarine dependent fish species.

The continued decline in the populations of several Delta fish species, as indicated by reductions in survey indices (Armor et al. 2007), also suggests that the export limits in the Bay-Delta Plan are not sufficient to protect aquatic species. Although other potential contributing causes to the fishery decline have been identified (toxic substances, invasive species, temperature, and other factors), SWP and CVP exports have been identified as a major contributing factor in the decline of Delta smelt and other pelagic species (Jassby 2005, Kimmerer 2002 and 2008). Diversions in the southern Delta, particularly the large SWP and CVP export facilities, can cause the net flow in nearby reaches of Old and Middle Rivers to reverse from the natural northward direction and flow south towards the SWP and CVP pumps. These "reverse flows" can draw fish, especially the weaker swimming young of pelagic species, into the SWP and CVP export facilities where there can be significant mortality.

The effects of reverse flows in Old River and Middle River in the south Delta have been addressed in both judicial and regulatory venues. In May 2007, Judge Oliver Wanger of the United States District Court ruled that reverse flows in Old River and Middle River were caused by diversions from the SWP and CVP and have contributed to the decline of Delta smelt. He issued an interim remedial order in December 2007 that among other things required seasonal reverse flow restrictions in Old and Middle rivers in the Delta (Wanger 2007). This order effectively required the Banks and Jones facilities to reduce pumping in winter and spring to protect various life stages of Delta smelt. The interim order also directed the USFWS to prepare a revised BO for protection of Delta smelt that applies to operations of the SWP and CVP. The Delta smelt BO was transmitted to the Court on December 15, 2008 and contains restrictions on Old and Middle River flows that are very similar to those in the interim order (USFWS 2008).

~~The purpose of the export limits contained in the Bay-Delta Plan (see the previous discussion on E/I Ratio) is similar in intent to the Old and Middle River flow restrictions imposed by Judge Wanger, and contained in the 2008 Delta smelt BO. Both are primarily intended to reduce the impact of the SWP and CVP export facilities on fish and other aquatic species.~~

~~The existing export limit objectives and the Old and Middle River flow constraints prescribed in the Wanger decision and the Delta smelt BO differ in one key technical respect. The export limits are generally expressed as a percentage of total Delta inflow (except during the spring VAMP flow period). The Wanger and BO Old and Middle River flow limits are in terms of net flow based on continuous direct measurements of flows in these rivers adjusted to account for the tidal movement of water. These different approaches to reducing the impact of SWP and CVP export facilities on aquatic life will need to be considered in the water quality control planning process.~~

Conclusion: ~~The most recent analyses of the impacts of south Delta diversions on fish and other aquatic species indicate that Old and Middle River flow restrictions are potentially an effective way to reduce the entrainment impacts of the south Delta SWP and CVP export facilities.~~ Staff recommends that the State Water Board consider and evaluate the merits of adding Old and Middle River flow objectives to the Bay-Delta Plan. Some of this review could be provided by DWR to the State Water Board, in coordination with State Water Board planning efforts, as part of the environmental analyses conducted for the BDCP.

Floodplain Habitat Flow Objectives
Issue: Flow objectives to support floodplain habitat and other fish and wildlife beneficial uses.

Staff Recommendation: Staff recommends that the State Water Board investigate establishing water quality standards for flow or other flow-related requirements to support inundated floodplain habitat in the Bay-Delta watershed as part of the update of the Bay-Delta Plan. Establishing any standards would require careful evaluation of potential impacts to beneficial uses, water quality effects, and other concerns such as water availability and fish passage (in coordination with the Regional Water Quality Control Boards, fisheries agencies, flood control authorities and other appropriate groups). Staff also recommends that the State Water Board work closely with the BDCP parties during development of any standards or related requirements.

~~**Discussion:** The Bay-Delta is the largest estuary and among the most biologically important ecosystems on the West Coast. Dams, extensive levee systems, and other riverine alterations, however, have reduced floodplain habitat and resulted in extreme losses of aquatic-dependent and terrestrial species (Moyle et al. 2007). Flood management in the Delta has severed nearly 297,000 acres (460 square miles) of historic Central Valley floodplains from their parent rivers and streams (Healy et al. 2008). Viers et al. (2007) from the Cosumnes Research Group estimated that less than 5 percent of the Central Valley's original riparian forest remains intact. Levees now impede periodic flooding of areas that previously provided valuable habitat and food supply for fish and other organisms. Levees also block the distribution of receding waters rich in nutrients, sediment, and organic materials that can help support biological productivity in the Bay-Delta estuary (Healey and Mount 2007). Important geomorphic, hydrologic, and ecological functions and values provided by floodplains in the Delta, including the capacity to sustain viable populations of native and desired species, have been fundamentally changed and degraded, and continue to decline (Okamot 2000).~~

Properly managed floodplains have the potential to provide widespread benefits at multiple levels ranging from individual organisms to ecosystems (Feyrer et al. 2006). Floodplain inundation substantially increases the total availability of shallow water habitat consisting of a wide range of substrate types and low velocities that are suitable for spawning and rearing of native and desired fishes, including splittail and Chinook salmon (Sommer et al. 2001a, Sommer et al. 2004). Splittail are frequently found in flooded areas because they require flooded vegetation for spawning and rearing (USFWS 2003). The Yolo and Sutter bypasses and the Cosumnes River floodplain, for example, serve as important splittail spawning and early rearing habitat (Sommer et al. 1997).

Floodplain habitats are important to Chinook salmon because they provide rearing habitat, provide increased foraging opportunities and reduce energy expenditure (Sommer et al. 2001a, Sommer et al. 2005). Opperman (2006) found that floodplain habitat promotes rapid growth and increases survival of juvenile Chinook salmon. Recent studies hypothesize that fish migrating to and through the Delta may be protected from various risks, including major water diversions, by using the Delta's primary floodplain, the Yolo Bypass (Sommer et al. 2001a, USFWS 2003).

Seasonal flooding creates river-floodplain connectivity, allowing a diverse mixture of flood-dependent species, including pisciverous birds and mammals, bats, and insects to co-exist (Brown 1997). Following flood events, nutrient rich litter from adjacent forested areas support insect populations, thereby providing an important winter source of food for large numbers of migratory birds and waterfowl on the Pacific Flyway (Nichols et al. 1986, Sommer et al. 2003). Flood-dependent native plant and invertebrate species require hydrologic variability for propagation and reproduction (Feyrer et al. 2006, Opperman 2008). A study in the Yolo Bypass, for example, found that a newly identified midge, *Hydrobaenus saetheri,* rapidly develops once dried floodplain sediments are rehydrated (Benigno and Sommer 2008). Native fish species such as splittail and salmon are adapted to seasonal flooding during winter and early spring and thus are favored over non-native species, which tend to appear later in the spring (Sommer et al. 2004). Therefore, floodplains could be managed to help control non-native fish species that are not adapted to winter and early spring inundation (Sommer et al. 2004, Moyle et al. 2007).

Due to the lack of river-floodplain connectivity throughout much of the Delta and its watershed, restoration of floodplains and other shallow water habitats have been proposed to maintain biodiversity of native aquatic species and restore fisheries in the San Francisco Estuary by increasing phytoplankton abundance (Schemel et al. 2004). Declines in fishes and other aquatic species have been linked to reduced phytoplankton production and abundance. Sommer et al. (2001b) suggests that floodplain restoration could support the downstream food web as a result of enhanced production of phytoplankton and detritus material (Sommer et al. 2004). Phytoplankton enrichment has been documented following high flow years when the Sacramento River inundates its floodplains thereby stimulating the food web of fisheries and other biological resources (Schemel et al. 2004).

Historically, restoration efforts have been used to address fishery declines, including two major efforts in the estuary: the CVPIA and the CALFED Bay-Delta program. The listing of splittail in 1999 was the impetus for CALFED-funded floodplain restoration (Sommer et al. 2007a) in an effort to restore and enhance splittail spawning and rearing habitat lost due to Federal, State, and private water development projects (USFWS 2003). The total amount of habitat protected or restored was 45,700 hectares (ha), 6,500 ha of which was for floodplain. Since 1995, programs to support native fishes have invested $335 million in habitat restoration and water allocations in the Delta (Sommer et al. 2007a, Sommer et al. 2007b). The splittail was the first

extant fish ever to be removed from the list of threatened species following a court-ordered review of its original listing in 2003, when the USFWS determined that past habitat losses were offset by CALFED and the CVPIA efforts that enabled greater spawning and rearing opportunities, increased the population size, and reduced threats to a level below the point at which the splittail would meet the definition of a threatened species (USFWS 2003).

New research on native fishes has identified that restoration should consider different needs of different species. The initial proposal to list splittail assumed that the species was declining for reasons similar to other native fishes, including delta smelt and longfin smelt. Assemblages of species respond differently to environmental change and different cues, and therefore could pose a conflict in managing the Delta for different species (Sommer et al. 2007b, Moyle and Bennett 2008). Whereas splittail are perhaps the most floodplain dependent species in the estuary, Sommer et al. (2007b) states that longfin smelt and delta smelt that are found in the upper estuary do not make extensive use of floodplain habitat and therefore would probably derive little direct benefit from floodplain inundation.

Although there are many benefits to floodplain inundation, there are also concerns that must be addressed. Fish passage is a concern for sturgeon (Sommer et al. 2003) and areas with engineered water control structures may result in stranding (Sommer et al. 2005). Contamination of water and sediment, including organic carbon and natural organic matter, mercury (and methylmercury), pesticides, toxicity, and pathogens including bacteria is another major area of concern that would need to be considered before increasing floodplain inundation. Floodplain waters returning to the Delta contribute natural organic matter to the water, which when treated for potable use may react to form cancer-causing disinfection byproducts (Bergamaschi et al. 2000, Brown 2003).

Mercury contamination in fish is associated with floodplain areas and wetlands in the Bay-Delta system. Mercury contamination results from the conversion of inorganic mercury (Hg) to toxic methylmercury (MeHg) especially in the sediment of wetlands. Delta wetland environments and marsh regions, rather than open water areas, provide ideal conditions for the production of methylmercury, and wetland sites with the highest MeHg sediment concentrations also have highest MeHg concentrations in water (Stephenson et al. 2008). When the Yolo Bypass is flooded, it becomes the dominant source of methylmercury to the Delta (Foe et al. 2008). Flooding produces elevated methylmercury concentrations in the Yolo Bypass and San Joaquin and Cosumnes Rivers (Foe et al. 2008), which result in increased fish tissue concentrations (Slotton et al. 2008). Findings from fish mercury studies have found that episodic flooding of normally dry soils may increase production of methylmercury (Davis et al. 2007). Episodic flooding of usually dry soils is a primary factor leading to elevated methylmercury concentrations in the food web (Slotton et al. 2008).

Research suggests that restoration activities could exacerbate the existing mercury problem (Davis et al. 2007). As large new areas of wetland restoration are implemented in the Bay-Delta, there are concerns that newly flooded habitats will enhance mercury methylation and food chain exposure (Slotton et al. 2008). In addition, increased methylation may occur if restoration projects re-expose, accrete, or use dredged Hg-laden sediments (Takekawa et al. 2006), especially in anoxic conditions that transform inorganic Hg to MeHg. Foe et al. 2008 recommends that studies should be conducted to identify areas with large mercury deposits that may complicate downstream wetland restoration and increase methylmercury production. Careful selection of restoration projects may help minimize the extent of increased concentrations of methylmercury and mercury bioaccumulation.

~~The collapse in fish species in the Delta, including pelagic organisms, salmonids, and other native and game fish species, has provided the impetus for planned efforts to restore the Bay-Delta ecosystem to include consideration of inundation of seasonal floodplains to improve habitat quality and quantity in the watershed. Recognizing the importance of floodplains and riparian vegetation for numerous aquatic and terrestrial species, BDCP, the Delta Vision Strategic Plan, The Nature Conservancy (TNC), and CALFEDs ERP all include conservation strategies to restore important functions and values provided by floodplains in the Delta.~~

~~During the water quality control planning process, staff will need to consider efforts that support inundation of floodplain habitat in an attempt to find solutions for the fishery decline and to provide reasonable protection of beneficial uses. The BDCP planning process includes a core element listed in the current Draft Conservation Strategy to increase frequency and duration of floodplain inundation. Implementation of this core element is intended to increase habitat quality, quantity, connectivity, accessibility, and food supply, thereby enhancing covered species' productivity, abundance, distribution, diversity, growth and survival. Additionally, a recent PPIC report recommends that the State Water Board consider an experimental floodplain restoration program to evaluate the effects of inundation on desirable species (Lund et al. 2008). Other processes, such as the ongoing development of a statewide Wetland and Riparian Area Protection Policy and the California Water Quality Monitoring Council formed as a result of SB1070, should also be considered.~~

Conclusion: Staff recommends that the State Water Board investigate establishing water quality standards for flow or other flow-related requirements to support inundated floodplain habitat in the Bay-Delta watershed. At a minimum, this evaluation would include consideration of flow standards for the Yolo Bypass. Establishing any standards would require evaluation of potential impacts to beneficial uses, water quality effects, and other concerns such as water availability and fish passage. Development of floodplain standards should be closely coordinated with the Regional Water Boards, fisheries agencies, flood control authorities and other appropriate stakeholders. Staff also recommends that the State Water Board work closely with the BDCP parties during development of any floodplain standards or related requirements.

Changes to the Program of Implementation

Environmental Monitoring Program

Issue: Changes to Monitoring and Special Studies Program in the Bay-Delta Plan.

Staff Recommendation: Staff recommends that the State Water Board consider changes to the Monitoring and Special Studies Program based on available information as part of the review and potential revision of the Bay-Delta Plan.

Discussion: In the Bay-Delta Plan, the State Water Board requires a Monitoring and Special Study Program (Monitoring Program) to provide baseline physical, chemical, and biological information, and to determine compliance with the water quality objectives. It also requires studies that evaluate the response of aquatic habitat and organisms to the objectives, and increase understanding of large-scale characteristics and functions of the Bay-Delta ecosystem to better predict system-wide responses to management options. The water quality compliance and baseline monitoring portion of the Monitoring Program is referred to as the Environmental Monitoring Program (EMP). Pursuant to D-1641, DWR and USBR are required to perform baseline and compliance monitoring (Table 7 of Bay-Delta Plan) and to conduct the special studies. This work is coordinated through the IEP.

Since 1974, as required by the State Water Board, DWR and USBR monitor water quality conditions as well as phytoplankton, zooplankton, and benthos abundance and distribution in the Bay-Delta. The EMP is a valuable long-term environmental monitoring program, providing data and information for resource management and scientific understanding of estuarine processes. With more than three decades of uninterrupted data collection, the EMP has provided a consistent and comprehensive long-term environmental data record.

D-1641 requires review of the EMP every three years. The last full review of the EMP was conducted in 2003 (IEP 2003). Since the 2003 review, the benthic element portion of the EMP has been reviewed and a draft report is expected in spring 2009. Plans for a full review are being discussed within IEP. Additional reviews of other IEP elements include the upcoming planned review of the hydrologic and salmon elements.

The 2003 review included the following recommendations:

- Improve the ability to characterize spatial and temporal variability of ambient concentrations and fluxes of physicochemical and biological constituents
- Examine important constituents' concentrations and fluxes in key habitats
- Collect appropriate data for modeling
- Provide timely EMP data to decision makers

Monitoring activities in the Delta have changed since the last update to the Bay-Delta Plan, including many relevant monitoring activities that occur outside the legal boundary of the Delta. New monitoring activities are planned as part of ongoing processes that affect the Bay-Delta. Pursuant to the 2008 Bay-Delta Strategic Workplan, new monitoring activities include a proposed Regional Monitoring Program (RMP) for the Delta. Additionally, new or changed monitoring and assessment needs may also be identified in the BDCP process.

~~Ongoing monitoring efforts in the Bay-Delta and watershed include IEP POD-related studies, US EPA's San Joaquin River Monitoring and Assessment Strategy, the Water Board's Surface Water Ambient Monitoring Program (SWAMP), TMDLs, efforts related to fisheries and monitoring required under the ESA and the CESA, the United States Geological Survey's (USGS) National Water Quality Assessment Program (NAWQA), the San Francisco Bay Regional Monitoring Program (RMP), and monitoring associated with proposed Sediment Quality Objectives of Enclosed Bays and Estuaries. Other examples include the San Francisco Bay Study, the VAMP, and DWR's Municipal Water Quality Investigations program (MWQI). The San Francisco Bay Study monitors the abundance and distribution of fish and mobile crustaceans in the Bay-Delta, primarily downstream of the Delta. The VAMP is a 12-year experimental management program to obtain scientific information concerning the effects of flows, exports, and barrier operations on Chinook salmon migrating from the San Joaquin River through the Bay-Delta. The MWQI mission is to monitor, protect, and improve the drinking water quality of water delivered to the urban State Water Contractors and other users of Delta water. This program focuses on monitoring and issues related to drinking water and includes monitoring both in the Bay-Delta watershed and downstream in the distribution system.~~

~~Although the Bay-Delta Plan does not specifically require monitoring of the hydrology of the Bay-Delta and its watershed, necessary flow and other flow data is collected, managed, reported and analyzed so that compliance with flow-related objectives may be determined. Flow information is extremely important because it provides the hydrologic record for the Bay-Delta upon which decisions can be made regarding the use and proper management of~~

~~water resources. Many of the flow stations in the Bay-Delta and its watershed are owned, maintained and operated by the USGS. DWR and USBR, among others, also maintain flow stations that provide hydrologic and related information (California Data Exchange Center 2009). The USGS San Francisco Bay Hydrodynamics Study conducts hydrodynamic transport investigations, in collaboration with a broad coalition of state and federal agencies (DWR, State Water Board, DFG, USBR, and USFWS), by using a combination of three components: Delta Flows Monitoring, Process-Based Field studies and Three-dimensional Modeling (USGS 2009). The Delta Flows Network provides long-term flow data at 21 stations throughout the Delta and uses newer technologies for measuring and modeling flow including the Acoustic Doppler Current Profiler (ADCP). Data from hydrologic monitoring stations are used on a daily basis by the water project operators. Data are also analyzed to understand how the tidal currents, river inflows, water project exports, temporary barriers, and DCC gate operations impact transport within the upper estuary. These data are also used routinely for numerical model calibration and validation and are regularly leveraged into large interdisciplinary process-based studies.~~

~~The numerous monitoring activities occurring in the Bay-Delta for a wide variety of purposes are a challenge to coordinate, especially with respect to data management, storage and assessment. Access to compatible data collected for multiple uses is important when several regulatory processes (e.g. control of point and non-point sources, control of flow related stressors, and addressing endangered species concerns) rely on the information collected. The California Water Quality Monitoring Council (2008) has recently made recommendations to help address these data management issues on a statewide level, including: (1) improve data accessibility; (2) standardize methods for monitoring, assessment, and data management to increase comparability; and (3) form theme-based workgroups that center monitoring and assessment programs around consistent performance measures.~~

~~The Delta Vision Committee Implementation Report (2008) recommends beginning comprehensive monitoring of Delta water quality and fish and wildlife health by 2010. The committee also recommends that legislation be enacted to streamline and simplify water diversion and use reporting requirements and that a pilot project be mandated to install real-time telemetered monitoring devices on surface water diversions in and tributary to the Delta. To the extent that comprehensive monitoring for the Bay-Delta and water use information help to inform decisions regarding the protection of beneficial uses of the Bay-Delta, the State Water Board should consider including these actions in the Bay-Delta Plan. In addition, the BDCP process has recognized the need for a monitoring and assessment element in any BDCP plan (2008). These recent planning activities for the Bay-Delta, together with newly prescribed monitoring and assessment needs related to ESA and CESA compliance, support further review and potential changes to the Monitoring and Special Studies Program.~~

Conclusion: Staff recommends that the State Water Board consider changes to the Monitoring and Special Studies Program as part of its review of the Bay-Delta Plan. Specifically, for reasons discussed above, the State Water Board should consider recommendations developed during reviews of the IEP/EMP, and other recommendations for modification that are available during the basin planning process. Requirements for flow measurements and hydrologic modeling should also be considered. The State Water Board should also consider new monitoring and assessment needs for the Bay-Delta, integration with other processes such as BDCP, and enhanced coordination with monitoring and assessment components of other water quality control programs to improve data compatibility.

Other Changes to the Program of Implementation

Issue: Changes to the program of implementation for the Bay-Delta Plan (other than the Monitoring and Special Studies Program)

Staff Recommendation: Staff recommends that the State Water Board consider changes to the program of implementation for the Bay-Delta Plan based on available information as part of its review and potential revision of the Plan.

Discussion: The Bay-Delta Plan includes: (1) beneficial uses to be protected, (2) water quality objectives for the reasonable protection of beneficial uses, and (3) a program of implementation for achieving the water quality objectives. The Bay-Delta Plan's program of implementation identifies five general categories for implementation actions: (1) measures within State Water Board authority, (2) measures requiring a combination of State Water Board authorities and actions by other agencies, (3) recommendations to other agencies, (4) a monitoring and special studies program (discussed in a separate section), and (5) other studies conducted by other entities that may be relevant to future proceedings.

Any change to the water quality objectives may require a corresponding change in the program of implementation. Moreover, in light of changed conditions in the Delta ecosystem and the regulatory environment since adoption of the Bay-Delta Plan, such as constraints imposed to protect endangered species, the State Water Board should consider whether the program of implementation should be updated, regardless of whether a particular objective is changed.

Pursuant to the State Water Board's water right authority, the board has assigned responsibility primarily to DWR, the USBR~~, or both, for implementation of the flow-based water quality objectives and the salinity objectives in the Bay-Delta Plan. Other water rights holders are assigned responsibility for portions of the flow-related objectives~~. The State Water Board may reallocate responsibility for meeting these objectives among water right holders or other entities based on information it receives in a water right proceeding or water quality proceeding.

Conclusion: If the State Water Board considers amending, deleting, or adding a particular objective as part of its review of the Bay-Delta Plan, then it should also consider modifying the program of implementation for that objective. Additionally, it should consider whether the program of implementation should be updated for objectives that are unchanged.

~~ISSUES NOT RECOMMENDED FOR FURTHER REVIEW~~

Ammonia Objectives

Issue: Ammonia concentrations in Delta and Suisun Bay waters

Staff Recommendation: The State Water Board should ~~not~~ consider establishing objectives for ammonia as part of its review and potential revision of the Bay-Delta Plan. The State Water Board should~~, however,~~ continue coordination with the San Francisco Bay and Central Valley Regional Water Boards on ammonia and related Bay-Delta issues and continue its programs to develop regulations addressing toxicity and nutrients.

~~**Discussion:** In water, ammonia primarily exists in two forms, un-ionized ammonia (NH_3) and ammonium ion (NH_4^+), which are in equilibrium according to $NH_4^+ \leftrightarrow NH_3 + H^+$. The equilibrium between ammonium and un-ionized ammonia depends primarily on pH, and also on temperature and salinity. Collectively, ammonium and un-ionized ammonia are often referred to~~

as total ammonia or sometimes simply ammonia (although this can lead to confusion). Un-ionized ammonia is a gas that is toxic to animals and occurs in the water and in the air. Ammonium ion is an important nutrient for plants and algae that is dissolved in water.

Ammonia discharged into the waters of the Bay-Delta and tributary watersheds is currently regulated through the State's water quality control programs based on US EPA (1999) criteria. Recent studies suggest that water quality objectives and effluent limits based on these criteria may allow concentrations of ammonia in surface water that could result in adverse effects on the Bay-Delta ecosystem. For example, two recently published studies found that elevated ammonium levels (>4 µmol/L or ~0.056 mg/L) in Suisun Bay, can suppress the growth of phytoplankton in this area even when there is sufficient light (Wilkerson et al. 2006, Dugdale et al. 2007). In response to these recent studies, the State and Regional Water Boards are investigating whether more stringent ammonia criteria may be necessary to protect aquatic life in the Delta. Of specific concern are potential toxicity to delta smelt and impacts on algae that are the base of the Delta food web.

Ammonia Sources, Concentrations, Fate and Transport

Both ammonium and un-ionized ammonia are present in effluent from wastewater treatment plants that employ secondary treatment methods, but also in some types of agricultural run-off from the use of nitrogenous fertilizers, and as a result of atmospheric depositions. Many hydrodynamic, chemical and biological processes, affect the transport, fate, and effects of un-ionized ammonia and ammonium after discharge into waterways.

The Sacramento Regional Wastewater Treatment Plant (SRWTP) is the largest point source of ammonium and ammonia in the Delta. The SRWTP's output has increased with human population growth and it has contributed to an increase in ammonium concentrations in the Delta downstream of the discharge. The discharge from the SRWTP accounts for 90 percent of the ammonium load in the Sacramento River at Hood (Jassby 2008). The Central Valley Water Board's current total ammonia requirements for the SRWTP are based on the US EPA (1999) aquatic toxicity guidance that is designed to protect the most sensitive aquatic species. The receiving environment downstream of SRWTP's effluent discharge is in compliance with the US EPA ammonia criteria. When writing a permit, Regional Water Board staff evaluates effluent concentrations, concentrations of total ammonia already in the river, and available dilution. Limitations in permits are, therefore, site specific. The SRWTP's permit allows for discharge of relatively high concentrations of total ammonia because the Sacramento River provides considerable dilution. SRWTP uses large storage basins to hold wastewater for short periods of time when there is not sufficient dilution in the river because of reverse tidal flows. The City of Stockton, on the other hand, has lower effluent ammonia limits because little dilution is available in the San Joaquin River. The Central Valley Water Board required Stockton in its 2002 permit (R5-2002-0083) to upgrade its wastewater treatment facility to add treatment processes to remove ammonia. These facilities are now operational, resulting in a significant reduction in the amount of ammonia discharged. Additional sources of ammonium to the Delta and Suisun Bay include other wastewater treatment plants, agricultural run-off, atmospheric deposition, internal cycling, and possibly discharges from wetlands.

There are several municipal and industrial wastewater discharges in the vicinity of Suisun Bay that are regulated by the San Francisco Bay Water Board. As permits for these facilities come up for renewal, Water Boards staff will evaluate the need for ammonia limits using currently applicable objectives in accordance with the basin plan. If ammonia limits are indicated, they will be proposed for inclusion in the NPDES permit. Ammonia monitoring is routinely done by dischargers and under the San Francisco Bay Regional Monitoring Program (RMP). The RMP

is also investigating the scientific information on the potential impacts of ammonia in Suisun Bay and San Francisco Bay.

The IEP EMP has been monitoring ammonium concentrations at monthly or biweekly intervals at 10 stations in the Delta and Suisun Bay since 1975. The EMP did not collect simultaneous pH measurements after 1995, so it is not possible to calculate un-ionized ammonia and compare ambient levels to US EPA (1999) acute and chronic criteria at these stations after 1995. In addition to the IEP, several other programs and investigators are collecting ammonium and associated water quality data from around the Delta (e.g., DWR Municipal Water Quality Investigation stations, USGS monitoring stations, NPDES permit receiving water monitoring stations, and ongoing UC Davis research). Various entities are currently compiling a summary of sources and concentrations of ammonium in the Delta based on readily available data collected by existing monitoring programs. The goals of these compilations are to better characterize sources, trends, and data gaps, and to support development of an ammonium fate and transport model. Additional work may be needed to improve hydrodynamic modeling and conduct more in-depth investigations of chemical, biological, and hydrodynamic conversion and mixing rates downstream of discharge points and throughout the Delta and Suisun Bay.

The Central Valley Water Board is currently conducting an ammonia sampling program in the Delta. The purpose of this study is to collect additional nutrient data, including ammonium and un-ionized ammonia, for the Delta to determine whether ambient concentrations are potentially toxic, and to support development of a fate and transport model. A spatial emphasis is placed on the lower Sacramento River and northern Delta as ammonia levels from the SRWTP are likely to be highest here. However, other areas of the San Francisco Bay Estuary are also proposed for sampling as SRWTP is not the only source of ammonia/ammonium.

Ammonium Effects on Delta Phytoplankton

Primary production rates and standing chlorophyll *a* levels associated with phytoplankton (open water algae) in the Delta and Suisun Bay are among the lowest of all the major estuaries in the world (Boynton et al. 1982, Jassby et al. 2002, Cloern and Jassby 2008, Jassby 2008). Chlorophyll *a* and primary productivity levels in the Delta declined from 1975 to 1995, but have increased significantly from 1996-2005, while Suisun Bay levels remained relatively unchanged over the last decade (Jassby et al. 2002, Jassby 2008).

The composition of the phytoplankton community has generally shifted from diatoms toward green algae, cyanobacteria, and miscellaneous flagellate species (Lehman 2000). Blooms of *Microcystis aeruginosa*, a cyanobacterial harmful algal bloom species that can produce toxic substances, have been observed in Delta waters since 1999 (Lehman et al. 2005). The changes in phytoplankton composition and especially the now regularly occurring *Microcystis* blooms have been implicated as possible factors in the decline of important Delta pelagic fish species including delta smelt (Baxter et al. 2008a), but the connection with ammonia is not clear.

Low light availability and high grazing rates have been identified as important factors controlling overall phytoplankton production and biomass in the Delta. Much of the interannual variation in phytoplankton biomass can be attributed to the effects of precipitation and associated river flows on nutrient and suspended solids loads (Cloern 2001, Jassby et al. 2002, Lehman 2004). Nutrients are generally thought to be of lesser importance in this turbid, nutrient-rich estuary, although one study (Van Nieuwenhuyse 2007) found an association between an abrupt decline in total phosphorus concentrations due to reductions in urban phosphorus discharges in the

mid-1990s and a decline in chlorophyll *a* levels at three Delta EMP stations (D26, D28A, and MD10).

Ammonium is known as an important, but also "paradoxical" nutrient (Britto and Kronzucker 2002) because it can stimulate plant growth, but also suppress plant uptake of another important nutrient, nitrate, and ultimately suppress growth of some sensitive plants. This type of sensitivity to ammonium is well established for many agricultural crops. Two recently published studies show that high ammonium levels (>4 µmol L^{-1} or ~0.056 mg L^{-1}) in Suisun Bay, once considered one of the most productive areas of the San Francisco Bay Estuary, can suppress the growth of phytoplankton in this area even when there is sufficient light (Wilkerson et al. 2006, Dugdale et al. 2007). Diatoms appear to be particularly affected by relatively low levels of ammonium in Suisun Bay. It is not known whether the same effect is manifested in the freshwater portions of the Delta.

Pilot level investigations conducted by the Dugdale and Wilkerson Laboratory in 2007 and 2008 have repeatedly shown suppression of phytoplankton growth in the lower Sacramento River near Rio Vista and a site on the lower San Joaquin River downstream of Stockton. Two tests conducted in 2008 with Sacramento River water collected near the discharge point of the SRWTP, however, showed good phytoplankton growth in spite of high ammonium concentrations. The reasons for different growth responses in the Sacramento River near the SRWTP discharge compared to samples near Rio Vista and from the San Joaquin River stations are unclear and investigations will continue with increased intensity in 2009. Once the results of these studies are complete, further work may be needed to determine the relative importance of the effect of ammonia mass loading and concentrations on the Delta food web.

Ammonium Effects on Harmful Algal Blooms and Invasive Aquatic Plants

Elevated ammonium concentrations potentially contribute to harmful algal blooms (e.g., *Microcystis)* that have been occurring with increasing frequency and biomass in some parts of the Delta (Lehman et al. 2005). A recent study in the San Francisco Bay Estuary found that low stream flow and high water temperature were strongly correlated with the seasonal variation of *Microcystis* cell density, total microcystins concentration (cell^{-1}) and total microcystins concentration (chl *a*$^{-1}$), while ambient nutrient concentrations and ratios were of secondary importance (Lehman et al. 2008).

As has been shown elsewhere, elevated levels of ammonium and other nutrients may also benefit invasive rooted and floating aquatic plants in the Delta, such as the water hyacinth *(Eichhornia crassipes)* and the Brazilian waterweed *(Egeria densa)* (Reddy and Tucker 1983, Feijoó et al. 2002). Both species are now widely distributed across the Delta (Hestir et al. 2008) and are controlled in Delta channels through chemical herbicides and mechanical removal by the California Department of Boating and Waterways.

Ammonia Effects on Delta Smelt

In the spring of most water years, larval delta smelt are captured in trawl net surveys about 30 miles downstream of the City of Sacramento, near the confluence of the Sacramento River and Cache Slough. Recent studies of toxicity in the Sacramento River and Delta led to the hypothesis that larval delta smelt may be particularly sensitive to ammonia (Baxter et al. 2008b).

In 2008, UC Davis Aquatic Toxicology Laboratory (UCD-ATL) conducted a pilot study to assess the potential acute toxicity of ammonia and treated wastewater effluent from the SRWTP to larval delta smelt. The bioassay results suggest that ammonia concentrations present in the Sacramento River below the SRWTP were not acutely toxic to 55-day old delta smelt (Werner et

al. 2009). The results from this study were consistent with total ammonia and un-ionized ammonia effect concentrations established for 50-day old delta smelt using filtered hatchery water (UCD ATL unpublished data, Werner et al. 2009). At 50 days old, delta smelt are about as sensitive to total ammonia and un-ionized ammonia as salmonid species, and about five times more sensitive than larval fathead minnow (UCD ATL unpublished data, Werner et al. 2009), a common toxicity test species used by the SRWTP and other dischargers in accordance with their discharge permits.

Ammonia may contribute to the POD if its concentrations in Delta waters are high enough to cause direct toxicity to the POD fishes or their food organisms. It is well known that salmonids are particularly sensitive to ammonia (US EPA 1999). In general, un-ionized ammonia levels in the Delta appear to be too low to cause acute mortality of even the most sensitive species.

Questions remain about the potential for chronic (i.e., long-term, sub-lethal) impacts from ammonia as well as the impacts in sensitive delta smelt spawning areas (e.g., Cache Slough). Un-ionized ammonia concentrations in the Delta do exceed levels where histopathological effects have been observed (US EPA 1999); however, it is unclear whether these effects translate to effects on survival, growth or reproduction. In addition, there is some evidence that actively swimming and unfed fish may be several times more sensitive to ambient un-ionized ammonia levels than these laboratory exposures indicate (Eddy 2005).

There may be a potential for toxic ammonia levels to be reached in very productive areas in the southern Delta or smaller productive sloughs or shallow areas throughout the Delta, when high concentrations of un-ionized ammonia coincide with warm temperatures and elevated pH (phytoplankton productivity increases pH that influences how much un-ionized ammonia is present). The relatively few ammonium, temperature, and pH data available in many of these areas are currently being compiled and evaluated.

In addition, the potential for combined effects of un-ionized ammonia with other toxicants and stressors, and differences in fish sensitivity depending on health status, age, and physiological state, add uncertainty to data analyses. While un-ionized ammonia interactions with other toxicants and variable sensitivity have been demonstrated for a variety of species (e.g., Eddy 2005, Camargo and Alonso 2006), similar studies for the POD fishes are in their initial stage. Much more work is needed to reduce the many uncertainties about chronic toxicity effects of ammonia on the POD fishes in various Delta regions and discern population level effects.

Ammonia Workshop

The CALFED Science Program hosted a workshop on March 10th and 11th 2009 to provide a venue for open discussion among interested persons to identify data and science gaps and develop a research framework to determine the role of ammonium/ammonia within the Bay-Delta ecosystem. A panel of national experts in riverine and estuarine nutrient dynamics, food web processes, and ecotoxicology was convened and tasked with assessing the best available science in a workshop setting and preparing the research framework with input from local experts, stakeholders, and the interested public.

According to the research framework, the most important gap to be filled in the Bay-Delta research program is the development of an over-arching, integrative model of the major drivers controlling the Bay-Delta ecosystem (Meyer et al. 2009). Of prime importance to this effort is an integration of the understanding of the roles of hydrology, nutrients, and herbivory in the temporal dynamics of phytoplankton production and community composition (Meyer et al. 2009). The expert panel identified the following as crucial knowledge that needs to be

generated and/or expanded to support the model: (1) an analysis of sources (exogenous and endogenous, or from outside of and within the system), sinks, and transformations of nitrogen along the Delta-to-Bay continuum, and controls on those pools and processes; (2) an understanding of factors that control POD populations, including various forms of nitrogen and a combination of other stressors, including chemicals, food availability and hydrology (including water withdrawal systems); and (3) field observations of POD species and other potentially interacting and/or sensitive taxonomic groups (Meyer et al. 2009). In addition, a suite of more specific recommendations concerning the types of research projects that could address these research gaps are provided.

The research framework, combined with input obtained during workshop discussions and the upcoming Ammonia Summit (see below), will be used to develop a Data and Science Gap Analysis (Analysis). The Analysis will be prepared by the workshop planning committee, which is comprised of agency staff and interested stakeholders. It is intended to identify the specific research needs that are not already being addressed and answer questions and uncertainties concerning the role of ammonia/ammonium within the Bay-Delta ecosystem. After addressing comments provided by the expert panel, the Analysis will be provided to the POD Contaminants Work Team (CWT) for distribution to POD investigators and funding agencies. The intent is that this document will be updated by the POD-CWT as studies are completed, new understanding is generated, and new research questions are developed.

Ammonia Summit

The Central Valley Water Board is planning to hold a conference in the summer of 2009, as a follow-up to the CALFED ammonia workshop. This summit is intended to provide a broader and more in-depth forum for presenting findings of current research and gathering scientific information relevant to the study of the role of ammonia/ammonium in the Bay-Delta ecosystem. The conference will include scientific presentations and facilitated discussions grouped into three main topic areas: sources, concentrations, fate and transport of nutrients; food web effects; and toxicology. The conference is currently in the initial planning phase, and additional details will be released as they become available.

Related Regulatory Programs

The State Water Board is in the process of state policy to address toxicity and the impacts of nutrients on surface waters statewide. Either or both of these regulatory approaches could be applied to limit ammonia concentrations in Delta waters; one through limits on ammonia as a plant nutrient, the other through limits on the toxic effects of ammonia in surface waters. The State Water Board has developed a methodology, the Nutrient Numeric Endpoints framework, for translating narrative limits on biostimulatory substances into numeric objectives for streams, rivers, and lakes. The NNE framework takes into account the impacts on beneficial uses by measuring the effects of nutrients rather than just the concentrations (i.e. effects on dissolved oxygen, pH, algal biomass etc.). The NNE framework also accounts for secondary or indirect, factors such as residence time, scouring flows, shading, and temperature which can change the assimilative capacity for nutrients. This framework is currently being adapted for application to estuarine waters. The State Water Board is also developing numeric objectives for toxicity as part of its Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California. If adopted, these objectives would place limits on toxicity levels in receiving waters based on standardized toxicity tests.

Conclusion: In general, current Delta ammonia concentrations appear to be far lower than concentrations that US EPA (1999) guidance indicates may cause acute mortality of even the most sensitive fish species. If current and follow-up studies indicate that US EPA's (1999) water

~~quality criteria do not ensure reasonable protection of beneficial uses in the Bay-Delta, the Central Valley and San Francisco Bay Water Boards will evaluate the need for stricter requirements on all sources of ammonia and ammonia precursors. Primary responsibility for developing and implementing control programs addressing ammonia, including possible basin plan amendments, should remain with the Regional Water Boards so they can be integrated into their other water quality control programs. The State Water Board will continue to monitor efforts related to this issue and may decide to take additional actions through any of its water quality programs if warranted.~~

Toxicity objectives
Issue: Toxicity to fish and other aquatic organisms in the Delta.

Staff Recommendation: The State Water Board should ~~not~~ consider objectives for toxicity as part of its update of the Bay-Delta Plan. The State Water Board should~~, however,~~ continue coordination with the San Francisco Bay and Central Valley Regional Water Boards on toxicity and related Bay-Delta issues and continue its efforts to develop statewide regulations addressing toxicity.

~~**Discussion:** Toxicity to aquatic life can be defined and measured in various ways. Direct toxicity to test organisms under controlled laboratory conditions estimates the total toxicity present in a sample by measuring an organism's response compared to clean control water. Endpoints measured with toxicity tests include mortality, growth, and reproduction, and a variety of species may be used depending on the objectives of the testing. Histopathological (tissue) analyses of organisms from water bodies of interest can also provide evidence of exposure to toxic chemicals. Histopathologists evaluate tissue samples for evidence of contaminant exposure including lesions or evidence of disease or infection. Another method of estimating exposure to contaminants is use of biomarkers, which is a measure of sub-lethal chemical endpoints such as enzyme activity or endocrine disruption that cannot be measured with standard toxicity tests.~~

~~Toxicity in the Delta~~
~~Toxicity (estimated with standard laboratory toxicity tests) in water and sediments in the Delta and upstream watersheds has been reported since the late 1980s (Kuivila and Foe 1995; Giddings et al. 2000; Werner et al. 2000; Weston et al. 2004). Young striped bass mortality caused by discharge of agricultural drainage water containing rice herbicides into the Sacramento River (Bailey et al. 1994) led to new regulations on those discharges. Bioassays using caged fish revealed DNA strand breakage associated with runoff events in the watershed and Delta (Whitehead et al. 2004). Kuivila and Moon (2004) found that peak densities of larval and juvenile delta smelt sometimes coincided in time and space with elevated concentrations of dissolved pesticides that could have detrimental effects in the spring. While the concentrations of individual pesticides were low, and much lower than would be expected to cause acute mortality, the effects of exposure to the complex mixtures of pesticides are unknown.~~

~~Historically, contaminants have not been a focus of the IEP. Discovery of the severe decline in abundance of four pelagic fish species and some zooplankton in the Delta stimulated interest in investigating contaminants as a potential causal factor. Since 2005, UC Davis has conducted toxicity testing of waters collected from the Bay-Delta as part of the IEP's studies of the role of contaminants in the POD. Studies in 2005 and 2006 focused on the summer months when juvenile delta smelt are present in the Delta. To better characterize toxicity during the smelt~~

spawning period, bi-weekly toxicity screening was initiated in January 2007 and continued through 2008.

In 2005 and 2006, low (<5 percent) frequency of occurrence of toxicity was observed in laboratory toxicity tests using the amphipod *Hyalella azteca* (Armor et al. 2006). The frequency of toxic events was higher in 2007, and observed in locations where delta smelt larvae were present and where delta smelt were presumed to be spawning (i.e., lower Sacramento River and the Cache Slough complex). The screening tests suggested organophosphate (OP) pesticides or pyrethroid pesticides were potential causes of the toxicity to *H. azteca;* however, follow-up studies were inconclusive and chemical analyses either detected no pesticides, or the concentrations detected were not high enough to cause toxicity to the test species.

Larval delta smelt toxicity tests were conducted simultaneously with a subset of the *H. azteca* toxicity tests. Results from 2006 indicate that delta smelt may be more sensitive to toxicants, or perform poorly (e.g. higher mortality due to physical stress) in laboratory toxicity tests, when waters tested were of low turbidity and salinity. There is preliminary indication that disease organisms may play a role in reducing survival under low salinity conditions (Werner et al. 2008a). No significant mortality of larval delta smelt was found in the 2006 bioassays, but there were two instances of significant mortality in June and July of 2007 (Werner et al. 2008a). In both cases, the water samples were collected from sites along the Sacramento River and had relatively low turbidity and salinity. Neither of these instances coincided with toxicity to *H. azteca*. The delta smelt toxicity test procedures are under development and continue to be refined. As yet, no toxicity identification evaluation methods are available to determine the cause of the observed toxicity.

In 2008, few incidents of toxicity to *H. azteca* or delta smelt were observed (Werner et al. 2009, Werner et al. unpublished data). In April and May 2008 *UC* Davis conducted a pilot study with the copepod *Eurytemora affinis,* an important food species for delta smelt and other larval fish. Significant toxicity was observed in samples from the lower Sacramento River and Cache Slough area (Teh et al. 2009). The same samples were not toxic to *H. azteca*, indicating that *E. affinis* may be more sensitive than the standard test species.

The POD investigations into potential contaminant effects also include the use of biomarkers that have been used previously to evaluate toxic effects on POD fishes (Bennett et al. 1995, Bennett 2005). The results to date have been mixed. Foott et al. (2006) reported no histological abnormalities associated with toxic exposure or disease in both longfin smelt and threadfin shad. Adult delta smelt collected from the Delta during winter 2005 also were considered healthy, showing little histopathological evidence for starvation or disease (Teh et al. unpublished data). However, there was some evidence of low frequency endocrine disruption. In 2005, nine of 144 (six percent) of adult delta smelt males were intersex, having immature oocytes in their testes (Teh et al. unpublished data).

In contrast, preliminary histopathological analyses have found evidence of significant disease in POD and other fish species collected from the Delta. Intestinal infections were found in yellowfin goby *(Acanthogobius flavimanus)* collected from Suisun Marsh. Severe viral infections were found in inland silverside *(Menidia beryllina)* and juvenile delta smelt collected from Suisun Bay during summer 2005 (Baxa et al. in prep.). Ostrach et al. (in prep.) found high occurrence and severity of parasitic infections, inflammatory conditions, and muscle degeneration in young striped bass collected in 2005, and lower occurrence of these parameters in fish collected from 2006. Further, striped bass may be especially vulnerable to contaminant effects because the

long lived females can sequester contaminants bioaccumulated over several years in egg yolk that can result in contaminant effects in developing embryos and larvae (Ostrach et al. 2008).

As with ammonia, discussed in the previous section, the San Francisco Bay Water Board has been working with the Central Valley Water Board and others to determine the extent, magnitude, and ecological impacts of observed toxicity in the Bay-Delta system. Although most of the monitoring and investigation effort has taken place in the Delta, a few instances of toxicity have been observed in Suisun Bay.

Sources of Toxicity

As noted above, pesticides from agricultural and stormwater runoff are one source of toxicity in Delta waters. The Central Valley Water Board has been concerned about OP and other pesticides in Delta water since the late 1980s. In the early 1990s, toxic concentrations of OP pesticides were present in the rivers and Delta channels for several days at a time (Deanovic et al. 1996). In response, the Central Valley Water Board developed and adopted TMDLs to reduce concentrations of diazinon and chlorpyrifos in the Delta and tributaries. The OP TMDLs also include provisions designed to ensure that replacement pesticides, such as pyrethroids, do not become a problem. Urban uses of the OP pesticides have been phased out, the overall agricultural use of diazinon and chlorpyrifos has been significantly reduced, and new label restrictions have been adopted to reduce the amount of these pesticides that enter waterways from agricultural operations. Implementation of the TMDLs by the Central Valley Water Board, other State agencies, and stakeholders, has resulted in a decrease in concentrations of diazinon and chlorpyrifos in the Delta and upstream tributaries.

Pyrethroids are of particular interest because use of these pesticides has increased (Amweg et al. 2005, Oros and Werner 2005) as use of some OP pesticides has declined. Toxicity of sediment-bound pyrethroids to macroinvertebrates has also been observed in watersheds upstream of the Delta (Weston et al. 2004, 2005, 2009). There is limited information about concentrations of pyrethroids in the Sacramento River and Delta channels. Preliminary information from studies in urban areas suggests that toxicity associated with pyrethroids is mostly confined to the sediment and that the area of impact is not far downstream from the source (Weston et al. 2005). These studies have prompted the California Department of Pesticide Regulation to place pyrethroid pesticides under re-evaluation, and to work with registrants to gather more information on fate and transport to evaluate whether revisions to current label restrictions are warranted. These limited studies and datasets suggests that there is a need to conduct more monitoring for pyrethroids in the Delta to better characterize potential impacts.

Irrigated agriculture is one source of pesticides in our waterways. The Central Valley Water Board has been working with agricultural water quality coalitions, through the Irrigated Lands Regulatory Program, to identify constituents of concern through monitoring, identifying sources of pollutants, and developing and implementing corrective actions when needed. Much work remains to be done, but monitoring data have not shown toxic concentrations of pesticides in Delta waterways that would indicate that runoff from agricultural lands is a definitive cause of the POD.

National Pollutant Discharge Elimination System (NPDES) permits for most wastewater treatment plants in the Delta adopted over the last decade have become more stringent over time after recognizing the critical conditions of the Delta, including limited dilution, receiving water toxicity, low dissolved oxygen, and the presence of endangered species. Many treatment plants have either completed major upgrades to include tertiary filtration and

nitrification/denitrification to remove ammonia, or are nearing completion of the upgrades. Stockton, for instance, recently completed a major expansion of their facility that includes upgrading of its tertiary filtration system and installation of ammonia removal systems. The upgrades address toxicity and dissolved oxygen issues. One notable exception is the SRWTP, which has less stringent permit requirements due to the large dilution effects of the Sacramento River to which they discharge. As noted in the section on ammonia discharges, the Central Valley Water Board is working with the SRWTP to evaluate the potential impacts of their discharge on delta smelt and algal primary production in the Delta. The need for more stringent permit requirements will be evaluated once the studies are complete.

While increased regulatory requirements on waste discharges to the Delta and upstream tributaries have reduced the frequency and severity of documented toxicity in the Delta, toxic events, at a reduced frequency and intensity, continue to occur. Currently, UC Davis is compiling available data on toxicity and contaminants in the Delta, and the Central Valley Water Board is developing a framework for regularly compiling, assessing, and reporting on available data from existing monitoring programs. These products will be evaluated to identify sources of toxicity and contaminants to Delta waterways and determine whether there is need to establish more stringent regulatory requirements on discharges. Requirements could be implemented in the form of additional restrictions in permits (waste discharge requirements), conditional waivers of waste discharge requirements, or basin plan amendments to establish water quality objectives for toxic constituents. In addition, in San Francisco Bay, including Suisun Bay, the Regional Monitoring Program has been monitoring numerous (over 100) pollutants and toxicity since 1993.

Additional research is needed to determine the effects of emerging contaminants, such as endocrine disrupting compounds, on the Delta ecosystem. Further studies designed to validate the ecological relevance of biomarkers are also warranted. The identification of causal mechanisms and ecological relevance associated with the results of biomarker studies are necessary to evaluate the need for additional regulation. As these issues are not unique to the Delta, they are better addressed on a statewide basis.

Related Regulatory Programs

State Water Board staff is currently working on revising the toxicity control provisions contained in the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California. Elements of the proposed revisions include establishing numeric toxicity objectives, establishing the appropriate statistical methods to use in determining whether a sample is toxic and establishing minimum test frequencies for inclusion in permits. Staff is also exploring possible revisions in determining when toxicity limits must be incorporated into permits (i.e. when a discharger has reasonable potential to cause or contribute to an exceedence of the objectives).

Conclusion: Since toxicity is likely linked to discharges from sources regulated by the Regional Water Boards, primary responsibility for implementing control programs addressing toxicity, including possible basin plan amendments, should remain with the Regional Water Boards. State Water Board development of statewide numeric objectives for toxicity would support Regional Water Board implementation by providing targets for program implementation and simplifying the process of developing toxicity limits in discharge permits. The State Water Board will continue to monitor efforts related to this issue and may decide to take additional actions through any of its water quality programs if warranted.

ISSUES NOT RECOMMENDED FOR FURTHER REVIEW

Fish Screen Objectives
Issue: Fish screening requirements for the protection of fish and wildlife beneficial uses in the Bay-Delta

Staff Recommendation: Staff does not recommend that the State Water Board consider establishing uniform requirements for fish screens as part of its review and potential revision of the Bay-Delta Plan. Instead, fish screens should be considered on a case-by-case basis through the water rights process.

~~**Discussion:** Staff review of fish screens and diversions for both SWP and CVP export facilities (project) and non-project diversions in the riverine and in-Delta portions of the Bay-Delta watershed relies principally upon the following scientific literature: Moyle and Israel 2005, Nobriga et al. 2004, Hanson 2001, and Kimmerer 2008. In addition, staff considered information from CALFED, Delta Vision, and other sources.~~

~~Non-project Diversions~~
~~As of 1997, there were over 3,500 diversions in the Bay-Delta watershed, of which approximately 98.5 percent were unscreened or screened insufficiently to prevent fish entrainment (Herren and Kawasaki 2001, pg. 343). The impacts of these diversions on fish populations is believed to be highly variable based on the location, size, timing of diversions, and other issues (Moyle and Israel 2005). In addition, the risk to specific species appears to be strongly affected by fish habitat use, size, and diet behavior (Nobriga et al. 2004). Very few quantitative analyses, however, have been conducted related to the effectiveness of fish screens in preventing fish losses or population level effects (Moyle and Israel 2005).~~

~~Moyle and Israel (2005) present the most comprehensive review of the literature to date on the effectiveness of screening non-project diversions for conservation of fish populations. The general findings from the review were that there have been few studies that have attempted to evaluate the effectiveness of fish screens and even fewer that have evaluated the effects of screening related to fish populations in the Central Valley and throughout the United States, even though millions of dollars are spent on installing and maintaining screens. At the same time, considering the large number of diversions and amount of water diverted, even small diversions can be a significant source of fish mortality given the large number of diversions and quantity of water diverted.~~

~~In their review of literature produced prior to 2000, Moyle and Israel found only one paper that evaluated the effects of unscreened riverine diversions in the Sacramento and San Joaquin Rivers (Hallock and Van Woert 1959). This paper attempted a broad, though not rigorous, evaluation of fish losses attributable to unscreened diversions. The findings from that report, related to the Sacramento River, indicate that: (1) larger diversions entrain more fish; (2) total numbers of salmon entrained by the diversions were surprisingly small, which was attributed to lack of overlap between the primary agricultural diversion season and the primary salmon out-migration periods; (3) numbers of fish entrained were highly variable between diversions and over time, but was often quite low; (4) many species were entrained and that entrainment was in order of abundance, and many entrained individuals were invasive species. With regard to diversion on the Sacramento River, the authors concluded that there were few locations upstream of the City of Meridian where appreciable losses of salmon or steelhead occur from irrigation diversions. They also concluded that individual diversions do not destroy many salmonids, but diversions collectively take considerable numbers of fish. In contrast, Hallock and Van Woert's analyses on the San Joaquin River showed that all of the large diversions were destroying large numbers of salmon fry, likely related to the fact that 20 to 40 percent of~~

San Joaquin river flow is diverted during salmon out-migration periods. Despite mixed results from this study, Hallock and Van Woert recommended that all diversions be screened due to cumulative effects (Moyle and Israel 2005).

A paper by Dr. Charles Hanson relating to the rate of juvenile Chinook salmon entrainment at unscreened diversions on the Sacramento River compared to the volume of water diverted, showed that the rate of juvenile salmon entrainment was not proportional to the volume of water diverted. Tests at two different pumping plants on the Sacramento River showed that on average the percentage of marked juvenile salmon entrained was one tenth of the corresponding percentage of Sacramento River water that was diverted. The results, however, were limited due to the low percentage of Sacramento River water diverted, the use of hatchery fish, the short distance between the release locations and diversions, and the size and configurations of the diversions (Hanson 2001).

Relating to in-Delta agricultural diversions, there are approximately 2,200 diversions all of which are shore-based and almost all are small (30 to 60 cm pipe diameter) and unscreened (Nobriga et. al 2004). Although the literature is limited, studies reviewed by Moyle and Israel indicate that loss of larvae and eggs in small diversions were proportional to their densities in the surrounding water bodies and the amount of water diverted, and that fish screens can greatly reduce the loss of fish in diversions. Studies also indicated that a large proportion of the fish captured in diversions in the Delta are non-native warm water fishes, and benthic fishes are more likely to be entrained than pelagic fishes. Regarding Suisun Marsh, the most intensive study relating to entrainment from small diversions indicates that most diversions in the marsh "are likely not diverting many fish and are having a negligible impact on fish populations" (Moyle and Israel 2005).

Nobriga et al. (2004) published results of the longest continuous monitoring of fish entrainment at Delta agricultural facilities to date. Results from that study indicate that vulnerability of fish to diversions varies by species, habitat use, size, and time of day and that additional information is needed to understand the effects of tidal dynamics, channel size, distribution of fish over time, and other issues. This study also found that a large number of larval and post-larval fishes were entrained in unscreened diversions and that installation of fish screens reduced entrainment by 99 percent or more. More than 99 percent of the species entrained in the unscreened diversions, however, were non-native. Nobriga et al. found that few delta smelt were captured at unscreened diversions even though they were captured at higher numbers in adjacent trawl surveys, likely due to the fact that delta smelt do not generally inhabit near shore habitat where diversions are located, and that small diversions have likewise small hydrodynamic influences. Nobriga et al. concludes: "[u]ltimately, a modeling approach will probably be needed to confirm that a large-scale screening program for delta irrigation diversion is an effective component of a comprehensive restoration strategy for delta smelt and other species."

SWP and CVP Export Facilities

Regarding the SWP and CVP export facilities, there are numerous and complicated factors related to their operations that lead to mortality for fish species of concern. The SWP and CVP export facilities can cause direct mortality to large numbers of fish and aquatic organisms due to entrainment and impingement. This direct mortality is related to the effectiveness of the existing louver devices to exclude fish from direct diversion (screening). In addition, the SWP and CVP export facilities also contribute to potentially significant causes of indirect mortality, resulting from the location, timing, and magnitude of the diversions and effectiveness of salvage operations (non-screening factors). These factors include: changes in flow paths through the

~~Delta that results in straying and stranding of fish into less desirable habitat areas; prescreening mortality in Clifton Court Forebay from predation; salvage mortality from predation, handling, and potentially other factors; and removal of food sources from the Delta which adversely affects populations that rely upon these depleted food sources. Fish losses related to these indirect factors can be substantial, but the effects on the ecosystem are not known (CALFED 2008).~~

~~Recent attempts by Dr. Wim Kimmerer to quantify potential population losses of Sacramento River Chinook salmon and delta smelt at the SWP and CVP export facilities indicate that proportions of Chinook salmon salvaged at the export facilities increase with increasing exports and may be as high as 10 percent of the total migrating population. Losses of delta smelt to entrainment are associated with Old and Middle River flows and are estimated to vary widely, the range of loss of population in a single year was calculated to be from near zero to as high as 69 percent for adults and 62 percent for larvae. Pre-salvage survival of fish and survival of fish after being released from salvage is not known, but believed to be low due to high predation rates. In addition, indirect losses related to changes in hydrodynamics and other factors may be large but have not yet been estimated, nor has a method been developed to estimate them. Kimmerer concludes that systemic problems with the State and Federal Water Project fish facilities may make it impossible to understand all of their effects, and more importantly, to reduce them to an acceptable level (Kimmerer 2008).~~

~~In 2000, the CALFED ROD called for development and construction of fish screening devices at the SWP and CVP export facilities in the southern Delta. However, due to concerns related to cost (as high as $1.7 billion) and effectiveness of screening these facilities, screening activities were not pursued (CALFED 2005). Current discussions relating to development of a long-term solution to the impacts of the SWP and CVP export facilities on fisheries (Delta Vision and the BDCP) are centered around construction of an alternate point of diversion on the Sacramento River with sophisticated screening devices. In the interim, the Delta Vision Strategic Plan also calls for construction of a demonstration fish protection screen at Clifton Court Forebay, and conduct of a pilot study to determine the effectiveness of the screens in reducing fish kills and predation losses (Delta Vision 2008).~~

~~**Conclusion:** There is limited available information regarding the effectiveness of fish screens in protecting populations of aquatic species of concern. The literature indicates that the location, timing, magnitude, and other issues associated with the diversion largely dictates the effectiveness of installing fish screens in providing protection. Accordingly, the available information does not support establishing a uniform screening requirement through the basin planning process. Establishment and implementation of a uniform requirement to install fish screens on all diversions in the Bay-Delta watershed would require significant resources and time on the part of the State Water Board and the diverters and may not yield significant results in maintaining or improving populations of interest. Instead, screening requirements should be considered on a case-by-case basis, whether for an individual diversion or group of diversions with common attributes, through the water right process.~~

~~Accordingly, s~~Staff recommends that the State Water Board consider any screening requirements in coordination with DFG and as a part of its water rights processes. Specifically, as DFG identifies diversions of concern or groups of diversions, it may request the State Water Board to consider whether to require screening or other measures through the water right process. Alternatively, DFG may choose to require screening through its own regulatory processes. In addition, as the State Water Board evaluates water right compliance in the Bay-Delta watershed, it may consult with DFG on the need for screening and related issues. In an effort to

better understand the effects that unscreened diversions have on native and migratory fish, staff recommends that the State Water Board actively pursue the activity identified in the Bay-Delta Strategic Workplan: to work with the fisheries agencies to further evaluate these issues, (potentially as part of a monitoring program).

~~Concerns related to mortality from the SWP and CVP export facilities in the southern Delta should focus not just on screening but rather comprehensively on the specific locations, timing, magnitude, and methods of diversion. Regardless of whether the SWP and CVP export facilities in the Delta are screened, the current dead-end location, magnitude, and timing of these diversions would continue to draw large numbers of fish and other aquatic species to these locations where chances of survival are very low due to predation, poor habitat conditions, and related factors. The State Water Board, however, may wish to defer dedicating significant resources toward establishing screening requirements at the existing location because of concerns related to sea level rise and levee stability that could have a major long-term impact on their continued operation. The State Water Board should carefully evaluate the specific design (including fish screening) and operations of potential alternate diversion facilities to assure the protection of fish and wildlife beneficial uses as part of its water quality planning and water right processes. Staff also recommends that the State Water Board consider issues related to location, timing, magnitude, and methods of diversion in its review of export/inflow objectives and in the program of implementation for the export/inflow objectives. Any such consideration could help determine whether additional measures may be needed to address SWP and CVP export facilities in the Delta in the interim (if and until any new facilities are constructed), and in the long-term, to the extent the existing facilities are planned to continue operating.~~

Biological Indicators

Issue: Establishing biological indicators or triggers as water quality objectives for the protection of fish and wildlife beneficial uses in the Bay-Delta.

Staff Recommendation: Staff does not recommend that the State Water Board consider setting biological indicators or triggers as water quality objectives as part of its review and potential amendment of the Bay-Delta Plan. Rather, the State Water Board should consider available biological indicators or triggers, as well as other physical or chemical indicators, when considering the establishment or update of numeric flow or flow-related objectives in the Bay-Delta Plan.

~~**Discussion:** The biotic condition of an ecosystem is one important measure of overall ecological condition and environmental health, and provides useful information for environmental decision-making. Biological indicators are one of several attributes within an ecosystem that may be measured to provide environmental health information. To ascertain ecologic condition, other indicators such as chemical, physical, hydrologic and geomorphologic, and natural disturbance regimes may be used conjunctively.~~

~~Biological indicators are numerical values derived from actual measurements and have known statistical properties. The presence, condition, and numbers of the types of fish, insects, algae, plants and other aquatic life can provide accurate information about the health of a specific water body such as a river, stream, lake, wetland, or estuary. Assessing the condition of biological communities provides a basis both to determine ecological potential (managing the water body to achieve the ecological conditions that can be achieved given the changed conditions) and to measure success in achieving that potential. As such, biological indicators~~

and data can help set protection or restoration goals, determine what to monitor, interpret what is found, prioritize stressors, and assess and report the effectiveness of management actions (US EPA 2002).

Currently there is only one objective that uses only a biological indicator in the Bay-Delta Plan. The narrative Salmon Protection objective states "water quality conditions shall be maintained, together with other measures in the watershed, sufficient to achieve a doubling of natural production of Chinook salmon from the average production of 1967-1991, consistent with the provisions of State and federal law." The State Water Board did not require specific actions to implement the narrative objective because it expected that the objective would be effected through implementation of numeric flow-dependent objectives and other non-flow measures.

In the Delta, pelagic fish such as delta smelt are used as indicator species whose abundance may reflect the overall health of the ecosystem. Metrics used to help ascertain the health of the estuary include abundance, distribution, and diversity of fish and wildlife. Metrics related to aquatic habitat such as food production and use by indicator species are also important and are often paired with population measurements, especially when new or restored habitat is needed for the restoration of a fishery.

One limitation of setting objectives using only biological indicators is that measured impacts are often a result of multiple factors. Uncertainty regarding the predominant cause of a particular impact can lead to difficulty in reaching consensus on management plans, and make implementation difficult. In other words, using biological indicators as enforceable objectives is complicated by the fact that the interaction of environmental attributes can result in different changes in the system depending on the variables. For example, in the Delta, freshwater flow and other factors may combine to contribute to mechanisms for population responses to flow (Kimmerer 2002). Moreover, determining what actions should be taken if the objective is not met can be difficult.

There are many challenges associated with assessing the health of the Bay-Delta ecosystem due to chemical, physical and biological complexities (Jassby et al. 1995). The POD exemplifies these challenges. Since 2004, the IEP POD work team has identified many factors that may have contributed to the POD including: (1) mismatch of larvae and food; (2) reduced habitat space; (3) adverse water movement/transport; (4) entrainment; (5) toxic effects on fish; (6) toxic effects on fish food items; (7) harmful *Microcystis aeruginosa* blooms; *(8) Corbula amurensis* effects on food availability; and (9) disease and parasites. The IEP has focused its effort on three main factors; water management operations (diversions), invasive species, and toxicity problems in the Delta. However, uncertainty remains with respect to the magnitude of each of these effects on the POD. The IEP has only just begun to look at how stressors act upon a species, as well as considering how stressors may interact in their effects on each species (Baxter et al. 2008a). It may not be possible to establish biological indicators as meaningful objectives without adequate understanding of the relative importance of multiple complex stressors.

A prime example of just one complex stressor related to the POD is invasive species in the Delta and their associated ecosystem effects. Invasive species have caused a decline in estuarine health by altering both the top-down (consumer controlled) and bottom-up (producer controlled) structure; in part because of overgrazing by the invasive clam *Corbula* on phytoplankton, thus reducing the amount of food available to Delta fishes (Baxter et al. 2008a). The large clam population increases have also led to a higher selenium contamination in the benthic food web due to the bivalve's ability to bioaccumulate selenium quickly and lose it slowly

(Linville et al. 2002). Numerous complexities such as these add to the challenges of regulating based on biological indicators, if such an approach was to be considered.

Using biological indicators as objectives may have the unintentional effect of inadequately protecting beneficial uses. Whereas numeric objectives for chemical and physical parameters (e.g. flow) can be used to establish the conditions that are critical to the protection and enhancement of the ecosystem, biological indicators protect the indicator itself, which may also protect the ecosystem at large. When there is non-compliance with the indicator objective two compounding issues arise. First, the reason for non-compliance may be due to either of two factors: (1) the chemical and/or physical conditions needed for the indicator were not sufficient or realized within the system; or (2) some unknown factor other than a chemical or physical condition has caused the decline in the indicator (e.g. unforeseen invasive species or disease). The second issue is that once compliance becomes an issue, the effect on the indicator (objective) has already occurred and may be difficult if not impossible to reverse. As such, objectives based on chemical or physical conditions necessary to protect the ecosystem may be more desirable because they can be used to manage the system to a desired state predicted to protect beneficial uses, and control the conditions of greatest importance to the ecosystem while also recognizing that some factors are beyond control.

Therefore, a preferable approach would be to use all available physical, chemical and biological information in establishing flow and flow-related objectives for the protection of fish and wildlife beneficial uses. Studies indicate that biota of the San Francisco estuary may have one of the strongest and most consistent responses to flow among estuaries examined (Kimmerer 2004). By setting numeric flow objectives based on the State Water Board's understanding of biological indicators, the board would be able to address a variety of different fish and wildlife beneficial uses, which may help to restore declining Delta fish populations.

A key benefit of using biological indicators is that they can help measure overall ecosystem integrity and are a direct assessment of biological health. In addition, they can integrate effects of multiple stressors, are useful for trend analyses, and can identify unknown sources of stress. Delta outflow objectives are based on statistically significant relationships between fish species abundance and distribution, and Delta outflow. Although important, outflow is only one of many factors related to fishery health in the Delta. Staff believes it is important to continue to include using biological indicators and metrics in any flow-related objectives for the Delta. Establishment of flow objectives should be based on a variety of indicators (including those for other essential attributes). This will allow for integration of complicated drivers that affect multiple individual species, and protection of a wide variety of fish and wildlife beneficial uses.

Conclusion: Staff does not recommend establishing specific biological indicators or triggers as enforceable water quality objectives in light of the following factors: (1) the biological complexity within the estuary; (2) a need to consider indicators for other essential attributes and functions; (3) multiple causes of declines in estuarine species; (4) multiple causes in the decline of habitat; and (5) the interaction between the complexities above and the causes themselves. With respect to the decline of conditions within the Bay-Delta, it is important to gather more information on each specific driver before using biological indicators as objectives. For these reasons, staff recommends using biological and other indicators (e.g. ecological indicators) to: (1) inform the process of setting numeric flow and flow-related objectives; (2) evaluate the efficacy of numeric flow and flow-related objectives; and (3) use as triggers for defining when and how a numeric objective is applied, to facilitate adaptive management.

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VI. APPENDIX A

[redacted]	[redacted]	[redacted]
Bay Institute		
Restoring the natural salinity variability of the Bay-Delta estuary is desirable, but should be based on historical conditions and organism tolerance ranges.	~~See Delta outflow section.~~	Yes
Freshwater flows continue to be the most strongly evidenced driver of ecological conditions in the Bay-Delta estuary, and the most reliable also be considered as part of the and habitats.	~~See Delta outflow and San Joaquin River flow sections. Reviewing river flow requirements on the Sacramento River at Rio Vista may tool for protecting estuarine species also be considered as part of the and habitats review of the Delta Outflow objectives. Tributary flows (other than San Joaquin River) upstream of the Bay-Delta are not recommended to be included as part of the Bay-Delta Plan review, but could instead be considered during separate water right proceedings.~~	Yes
Eliminating or reducing the adverse effects on Bay-Delta species and habitat quality of the deficient fish screens at the state and federal water project pumping facilities are the first priority, before screening unscreened diversions.	~~See fish screens section.~~	No
Biological objectives should be considered by the Board as a tool for improving adaptive management and guiding the development of new management tools and permit conditions.	~~See biological objectives section.~~	No.

Central Delta Water Agency (CDWA)		
The water quality objectives for fish and wildlife beneficial uses should be revisited.	~~The State Water Board intends to consider modification of the various water quality and flow objectives for the protection of fish and wildlife beneficial uses through its basin planning activities. Specifically, the Delta Outflow, Export/Inflow, and Delta Cross Channel Gate Closure objectives are recommended for further review in the Staff Report. Additional objectives for Old and Middle River Flows are also recommended for review. In addition, other existing or new objectives will also be considered if supported by available information.~~	Yes
The Implementation Plan needs to be modified to forthrightly address Term 91.	~~The State Water Board will take these comments under consideration when considering any modifications to the Program of Implementation for the Bay-Delta Plan.~~	Not explicitly, but will be considered.
Central Valley Clean Water Association (CVCWA		
The application of salinity objectives to municipal wastewater dischargers without proper consideration and implementation of Water Code sections 13000 and 13241 must be evaluated.	~~The State Water Board will take these comments under consideration when considering any modifications to salinity objectives s and the program of implementation for those objectives.~~	Yes
Any considerations of modifying the Bay-Delta Plan to address constituents of concern for drinking water quality should be deferred to the Central Valley Drinking Water Policy development process currently underway with the Central Valley Regional Water Board.	~~The Staff Report does not expressly address these constituents, but is consistent with the recommendation.~~	N/A
Community Clean Water Institute (CCWI)		
When modifying the Bay-Delta Plan, the State Water Board should use an approach that is sustainable to both the economy and the Delta's ecosystem. A peripheral canal could provide such an approach, but only if it is actively monitored and regulated by a government agency that is proactive and financially prepared to react to changes in the Delta.	~~These comments will be considered when the State Water Board considers any modifications to the Bay-Delta Plan~~.	N/A

Department of Fish and Game (DFG)		
The State Water Board should consider including acute and chronic water quality objectives for ammonia and other nutrients in the Bay-Delta Plan for the protection of fishery resources and primary production.	~~See ammonia section.~~	No
DFG supports the State Water Board's continuing effort to review the San Joaquin River flow objectives.	~~Comment noted.~~	Yes
The State Water Board should continue to participate in the development of the Bay Delta Conservation Plan (BDCP) and to consider mechanisms for initiating review of the Bay-Delta Plan when the BDCP is nearing completion in order to facilitate efficiency.	~~The State Water Board intends to continue to coordinate with BDCP and other agencies as appropriate and to work to provide the most efficient and effective protection of beneficial uses.~~	N/A
DFG continues to support the Water Board's efforts to develop a regional monitoring program.	~~Comment noted.~~	N/A
The Water Board should consider developing a more complete assessment of the numbers, impacts, and timing of agricultural diversions in the Delta.	~~The State Water Board will consider these comments when developing monitoring and assessment requirements for the Bay-Delta Plan.~~	Not explicitly, but will be considered
Department of Water Resources (DWR)		
DWR is undergoing many different processes and reserves comments on the Bay-Delta Plan until those processes are completed or near completion.	~~Comment noted.~~	N/A
The State Water Board should consider changing the compliance period for the chloride objective at Rock Slough from a calendar year basis to a water year basis, though there may not be a strong argument for such a change.	~~The State Water Board considered such a change in the review of the 1995 Plan, but did not receive adequate information to support such a change. If additional information becomes available on which to base such a change, the State Water Board will consider such information.~~	No
Once additional monitoring information is available and DWR, USBR, and CCWD have additional opportunity to negotiate, the State Water Board should consider modifying the compliance location for chloride objectives at Pumping Plant #1.	~~Once additional information is available and negotiations are completed, the State Water Board will consider whether modifications should be made to compliance location.~~	No

DWR recommends that the Program of Implementation for the X2 portion of the Delta Outflow objectives be modified to allow for short term, temporary deviations from operations when implementing the objectives. DWR provided additional background and scheduling information concerning Suisun Marsh, the Franks Tract Project, Los Vaqueros Reservoir Expansion, and projects related to southern Delta salinity.	~~The State Water Board will consider proposals by DWR or others for modifying implementation of the Delta outflow objectives as part of its basin planning activities.~~	Yes
~~Northern California Water Association (NCWA) and Sacramento Valley Water Users~~ (~~separate comment letters with the same comments~~)		
The State Water Board should prepare several different sets of potential draft plan amendments or revised plans for consideration prior applicable statutes and regulations to adoption of a revised plan in compliance with CEQA.	~~Comment noted. The State Water Board will comply with all requirements of CEQA and other applicable statutes and regulations when preparing any revisions to the Bay-Delta Plan.~~	N/A
The State Water Board should recognize that the Bay-Delta Plan can not address all of the various stressors affecting the Bay-Delta.	~~Comment noted.~~	N/A
~~San Francisco Public Utilities Commission (SFPUC)~~		
SFPUC provided comments and questions regarding the previously planned fact finding hearings.	~~These comments do not pertain to periodic review of the Bay-Delta Plan.~~	N/A
~~San Joaquin River Group Authority (SJRGA)~~		
There needs to be a better alignment between X2 flow requirement and water availability tied to a San Joaquin River Basin type of Index.	~~The State Water Board will take these comments under consideration when reviewing the San Joaquin River flow objectives and their implementation.~~	Yes
X2 flow requirements from the San Joaquin River for February through June need to be eliminated because San Joaquin River flow does not contribute to Delta outflow	~~The State Water Board will take these comments under consideration when reviewing the San Joaquin River flow objectives and their implementation.~~	Yes

The State Water Board should clarify the narrative objective for salmon protection on Table 3 in the Bay-Delta Plan. Specific recommendations include: defining production consistent with Fish & Game Code section 6911; specifying that the objective is a goal and not an absolute; the goal is for the entire basin; and requiring installation of the Head of Old River barrier for any requested change permit by DWR or USBR at the export pumps.	~~At this point, staff does not recommend that the State Water Board prioritize review of the salmon narrative objective, but instead focus on review of the quantitative flow and other water quality parameters that are intended to protect fish and wildlife beneficial uses. However, if supported by adequate information during the basin planning process, the State Water Board may consider potential modifications to the salmon narrative objective. Regarding the Head of Old River Barrier, upon receipt of any petition by DWR or USBR to change their permit/license conditions, the State Water Board will review the specific information concerning the request and will act in compliance with applicable statutes and regulations to ensure the protection of fish and wildlife (including consideration of whether to require installation of barriers or other measures).~~	No
The dissolved oxygen objective for the Stockton Deep Water Ship Channel should be revised to protect a warm water fishery from June 15 through September 15 since cold water fish are not present in the ship channel at those times.	~~These comments pertain to the Central Valley Regional Water Board's Water Quality Control Plan for the Sacramento and San Joaquin River Basins.~~	No
San Luis and Delta Mendota Water Authority (SLDMWA) and Westlands Water District (WWD)		
The State Water Board should work with other ongoing planning efforts to address issues in the Bay-Delta The Board should approach the periodic review of the Bay-Delta plan in two phases with the first phase focused on interim changes to the plan and the second phase focused on longer-term changes.	~~Comment noted. The State Water Board intends to continue to coordinate its work with other planning efforts, as appropriate.~~	N/A

When reviewing the Bay-Delta Plan, the State Water Board should conduct analyses to measure the benefits and costs of the various objectives. The Board should also consider increasing the flexibility of the objectives in order to allow for more protection at a lower cost.	~~Comment noted.~~	Not explicitly, but will be considered
~~Stockton East Water District (SEWD)~~		
The State Water Board should extend the salinity objectives for the San Joaquin River at Vernalis upstream to also apply between the Newman Wasteway and Vernalis in order to protect beneficial uses in this reach and reduce impacts to storage in New Melones Reservoir.	~~The State Water Board is actively coordinating with the Central Valley Regional Water Board to establish salinity objectives upstream of Vernalis. While this work has been delayed in the past, resources to complete this work have been secured by the Regional Board and work is expected to progress in a timely manner on this issue in coordination with the State Water Board's review of the southern Delta salinity objectives.~~	No
~~United States Department of the Interior (DOI)~~		
The State Water Board should review the following elements of the Bay-Delta Plan following completion of biological opinions for delta smelt and listed salmonids and green sturgeon due to fisheries issues, water supply issues, or potential beneficial use conflicts:	~~Responses to the corresponding numbered recommendations are provided below:~~	
1. Water quality compliance and baseline monitoring program	~~1. Recommended for review~~	1. Yes
2. Chloride objectives, compliance location at Contra Costa Pumping Plant #1, and potential new objectives	~~2. Please see response to DWR comment above.~~	2. No
3. Export limits objectives	~~3. Recommended for review~~	3. Yes
4. Delta Cross Channel gates closure objective	~~4. Recommended for review~~	4. Yes
5. Salmon protection objective	~~5. Please see response to SJRGA comment above~~	5. No
6. Delta outflow objectives	~~6. Recommended for review~~	6. Yes
7. River flow objectives: Sacramento River at Rio Vista	~~7. Please see response to Bay Institute comment above~~	7. No
8. River flow objectives: San Joaquin River at Airport Way Bridge, Vernalis, Spring Flow objectives for February - April 14 and May 16 - June	~~8. Review underway~~	8. Yes

9. River flow objectives: San Joaquin River at Airport Way Bridge, Vernalis, 31-day Pulse Flow objectives for April 15 – May 15	~~9. Review underway~~	9. Yes
10. Southern Delta Electrical Conductivity objectives	~~10. Review underway~~	10. Yes
11. Relevant parts of the Program of Implementation for each of the above	~~11. Recommended for review~~	11. Yes

Fact Finding Comments	Responses
This section summarizes and responds to comments received as part of the State Water Board's previously proposed Fact Finding proceeding related to Periodic Review of the Bay-Delta Plan. To the extent the comments pertain to the Periodic Review of the Bay-Delta Plan, they were considered in development of the Staff Report and will be considered as appropriate in the other Water Board processes. ~~Due to the cancellation of that proceeding, responses are only provided to comments that potentially relate to Periodic Review of the Bay-Delta Plan.~~	
California Farm Bureau Federation (CFBF)	
The CFBF provided recommended clarification of fish screening and ammonia fact finding topics.	~~To the extent this comment pertains to Periodic Review of the Bay-Delta Plan, see the fish screens and ammonia sections regarding the State Water board's consideration of these issues as related to the Periodic Review.~~
The CFBF recommended addition of the following topics for the fact finding proceedings: invasive species, temperature, predation, alteration in food web dynamics, turbidity and other physical factors of the water column, and exogenous factors such as climate change, ocean conditions, and drought cycles	~~This comment is primarily related to the fact finding proceedings. To the extent this comment is related to the Periodic Review they were considered in development of the Staff Report and will be considered as appropriate in the other Water Board processes.~~
Central Delta Water Agency (CDWA)	
CDWA recommended that the State Water Board hold fact finding proceedings to quantify the impacts of CVP and SWP facilities and operations on the Bay-Delta ecosystem and quantification of what flow, water quality and other requirements are needed to fully mitigate those impacts.	~~To the extent this comment pertains to Periodic Review of the Bay-Delta Plan, it was considered in preparation of the Periodic Review Staff Report and will be considered as appropriate in other Water Board processes.~~
Central Valley Clean Water Association (CVCWA)	
CVCWA recommended that the State Water Board include invasive species as a fact finding topic.	~~To the extent this comment pertains to Periodic Review of the Bay-Delta Plan, it was considered in preparation of the Periodic Review Staff Report and will be considered as appropriate in other Water Board processes.~~
CVCWA recommended that the State Water Board include fish entrainment by CVP and SWP diversions as a fact finding topic.	~~To the extent this comment pertains to Periodic Review of the Bay-Delta Plan, see the fish screens and export/inflow sections.~~

CVCWA recommended that the State Water Board include nutrient management and potential advantages and disadvantages of nutrient source control that may be harmful to the foodweb in its fact finding proceedings.	~~To the extent this comment pertains to Periodic Review of the Bay-Delta Plan, see the ammonia section.~~
CVCWA recommended that the State Water Board consider DSM2 modeling when evaluating potential impacts of waste-water treatment plants as a source of salinity into the Delta.	~~To the extent this comment pertains to Periodic Review of the Bay-Delta Plan, see the southern Delta salinity section.~~
Contra Costa Water District (CCWD)	
CCWD recommended that the State Water Board review historical salinity variability and fish abundance in the Delta before conducting fact finding proceedings related to the effects of constant or variable salinity on the estuary. CCWD provided information related to these issues and identified additional information that it will provide.	~~To the extent this comment pertains to Periodic Review of the Bay-Delta Plan, see the Delta outflow section.~~
County of Sacramento & Sacramento County Water Agency (Sac. County)	
Sac. County commented that the State Water Board must consider Area of Origin protections and the water right priority system when addressing potential future impacts of water diversions and outflow objectives.	~~Comment noted. To the extent this comment pertains to Periodic Review of the Bay-Delta Plan, see the Program of Implementation section.~~
Sac. County commented that the scope of the Bay-Delta Plan and D-1641 are amended. The fact finding hearings were too limited and the State Water Board should also look at potential terrestrial effects, local Delta communities, and economic effects.	~~This comment is primarily related to the fact finding proceedings. To the extent this comment is related to the Periodic Review, they were considered in development of the Staff Report and will be considered as appropriate in other Water Board processes.~~
Sac. County specifically recommended not using any Sacramento County storm drain data in its fact finding proceedings and instead recommended relying on monitoring data from the Delta.	~~Comment Noted~~
Department of Fish and Game (DFG)	
DFG recommended that the State Water Board consider issues related to San Joaquin River flows as a fact finding hearings topic.	~~To the extent this comment pertains to Periodic Review of the Bay-Delta Plan, see the San Joaquin River Flow section.~~
DFG recommended that the State Water Board use the San Joaquin Chinook Salmon Population Escapement Model to assess the adequacy of the San Joaquin River flow objectives.	~~Comment noted. To the extent this comment pertains to Periodic Review of the Bay-Delta Plan, see the San Joaquin River flow objectives section.~~

Department of Water Resources (DWR)	
DWR recommended that sources of salinity to the southern Delta be a high priority for the fact finding proceedings and that no additional work on salinity take place until the Bay-Delta Plan and D-1641 are amended.	~~To the extent this comment pertains to Periodic Review of the Bay-Delta Plan, see the southern Delta salinity section.~~
DWR recommended not holding fact finding proceedings on the biological impacts of constant or variable salinity and Delta outflows until various Endangered Species Act processes are completed. DWR stated that the State Water Board's involvement in which is currently involved in addressing these issues.	~~To the extent this comment pertains to Periodic Review of the Bay-Delta Plan, see the Delta Outflow section. The State Water Board will continue to coordinate with other ongoing related processes on this and other related Bay-Delta issues as needed. this issue would disrupt the BDCP process~~
DWR recommended that the State Water Board conduct a study on the effects of fish screens on pelagic organisms and then, if necessary, hold fact finding proceedings on this subject with opportunity for potentially affected parties to participate.	~~To the extent this comment pertains to Periodic Review of the Bay-Delta Plan, see the fish screens section.~~
DWR recommended that ammonia be one of the first issues the State Water Board address when amending the Bay-Delta Plan and recommended that the Central Valley Regional Board provide information related to this issue.	~~To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the ammonia section. The State Water Board will continue to coordinate with the Central Valley Regional Water Board on this and other related Bay-Delta issues as needed.~~
DWR recommended that toxicity be given a high priority in the fact finding proceedings.	~~To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the toxicity section.~~
San Luis & Delta-Mendota Water Authority, Westlands Water District, State Water Contractors & Kern County Water Agency (Contractors)	
The Contractors recommended that specific issues related to sources of salinity be investigated in the fact finding proceedings.	~~To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the southern Delta salinity section.~~
The Contractors recommended that fish screens be investigated in the fact finding proceedings.	~~To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the fish screens section.~~
The Contractors provided a list of 10 additional issues recommended for investigation in the fact finding proceedings including impacts of:	~~Responses to the corresponding numbered recommendations are provided below:~~
1. CVP/SWP diversions	~~1. To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the exports/inflow and fish screens sections.~~
2. Changes in temperatures	~~2. To the extent this comment pertains to periodic review of the Bay-Delta Plan, to the extent appropriate, this issue will be considered in the review of other objectives.~~

3. Changes in turbidity	~~3. To the extent this comment pertains to periodic review of the Bay-Delta Plan, to the extent appropriate, this issue will be considered in the review of other objectives.~~
4. Endocrine disruptors	~~4. To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the toxicity section.~~
5. Dredging	~~5. This issue is and will continue to be addressed through other Water Board processes.~~
6. Changes in net Delta outflow	~~6. To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the Delta outflow section.~~
7. Changes in export/inflow ratio	~~7. To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the export/inflow section.~~
8. Suisun Marsh salinity management	~~8. To the extent this comment pertains to periodic review of the Bay-Delta Plan, Bay-Delta Plan and D-1641 are amended, see the Suisun Marsh section.~~
9. Toxics	~~9. To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the ammonia and toxicity sections.~~
10. Invasive species	~~10. This issue is and will continue to be addressed through other Water Board processes.~~
~~East Bay Municipal Utility District (EBMUD)~~	
EBMUD recommended that the State Water Board conduct fact finding proceedings on the effects of ocean conditions on the Bay- Delta.	~~To the extent this comment is related to Periodic Review of the Bay-Delta Plan, since the State Water Board does not have direct regulatory authority over this issue, the State Water Board will consider this issue as appropriate when providing recommendations to other agencies in the Program of Implementation.~~
~~Stockton East Water District (SEWD)~~	
SEWD recommended that the State Water Board conduct fact finding proceedings on ocean conditions and harvesting of fisheries.	~~To the extent this comment is related to Periodic Review of the Bay-Delta Plan, since the State Water Board does not have direct regulatory authority over this issue, the State Water Board will consider this issue as appropriate when providing recommendations to other agencies in the Program of Implementation.~~

SEWD recommended that Bay-Delta Plan and D-1641 are amended and that the State Water Board hold a hearing soliciting information regarding the state of non-native species in the Bay-Delta and the effect of these species on native fishery population.	~~To the extent this comment is related to Periodic Review of the Bay-Delta Plan, this issue will be considered in review of other objectives, including Delta outflow. However, it is not recommended for review as a stand alone issue, but instead will be addressed through other efforts by the Water Boards and other agencies.~~
SEWD recommended that the Board hold a hearing on sources of salt to the Delta.	~~To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the southern Delta salinity section.~~
San Joaquin River Exchange Contractors (Exchange Contractors)	
The Exchange Contractors recommended a fact finding proceeding on: 1. The effects and impacts of application of the Endangered Species Act on the operations of California's water storage and delivery system. 2. The benefits and detriments of an alternative procedure in lieu of the current procedure of issuing biological opinions. 3. The subject of flow and temperature requirements on the Yuba, Feather, and Sacramento Rivers in order to determine if fisheries are showing greater survivability and returning adults than streams without these requirements.	~~Comment noted.~~
Northern California Water Association (NCWA)	
No comments related to periodic review.	
California Water Impact Network and the California Sportfishing Protection Alliance (C-WIN & CSPA)	
CSPA recommended that the State Water Board re-regulate export pumps by taking the following steps:	~~Responses to the corresponding numbered recommendations are provided below:~~
1. Provide fish passage at Central Valley Watershed Rim Dams	~~To the extent this comment pertains to periodic review of the Bay-Delta Plan, this issue is not proposed for review. However, the State Water Board may consider this issue as appropriate in its other water right and water quality activities.~~
2. Dedicate reservoir storage as cold water habitat for endangered fish.	~~Same as above.~~
3. Change hourly reservoir flow releases and prevent additional depletion of reservoir storage that impacts salmon and steelhead.	~~Same as above.~~
4. Change temperature of reservoir flow releases to provide cold water for fish trapped below project dams that are exposed to unnaturally high water temperatures.	~~Same as above.~~

5. Establish additional cold water reservoir storage.	~~Same as above.~~
6. Evaluate water quality in rivers leading Into the Bay-Delta	~~6. The State Water Board will continue to coordinate with the Central Valley Regional Water Board on this and other related Bay-Delta issues as needed.~~
7. Evaluate biological effects of salinity in the Bay-Delta.	~~7. To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the southern Delta salinity section.~~
8. Establish salinity objectives upstream of Vernalis .	~~8. To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the southern Delta salinity section. The State Water Board will continue to coordinate with the Central Valley Regional Water Board's effort to establish salinity objectives upstream of Vernalis.~~
9. Establish interim X2 Bay-Delta fall outflow requirements for all year conditions.	~~9. To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the Delta outflow section.~~
10. Determine biological effects of project pumping.	~~10. To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the exports/inflow and fish screens sections.~~
11. Establish effective fish screens at project pumping facilities in the Bay-Delta.	~~11. To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the fish screens section.~~
12. Determine whether the head of Old River barrier is in or out in the future	~~12. Comment noted.~~
13. Establish inflow-outflow weekly ratio for all weeks of the year	~~13. To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the Delta outflow and exports/inflow sections.~~
14. Evaluate cross channel gate and Suisun Marsh salinity control gate operations	~~14. To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the Delta Cross Channel Gate and Suisun Marsh sections.~~
15. Prevent Bay-Delta operational effect on The Trinity and other rivers	~~15. These comments will be considered when the State Water Board considers any modifications to the Bay-Delta Plan.~~
Sacramento Regional County Sanitation District (SRCSD)	
SRCSD requested that the State Water Board address the following issues in this order during its fact finding proceedings:	
1. Export pump fish screen entrainment	~~1. To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the fish screens section.~~
2. Delta outflows	~~2. To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the Delta outflow section.~~

3. Invasive species	~~3. To the extent this comment is related to Periodic Review of the Bay-Delta Plan, this issue will be considered in review of other objectives, including Delta outflow. However, it is not recommended for review as a stand alone issue, but instead will be addressed through other efforts by the Water Boards and other agencies.~~
4. Salt loading	~~4. To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the southern Delta salinity objectives section.~~
5. Salt biological impacts	~~5. See Delta outflow section.~~
6. Ammonia	~~6. To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the ammonia section.~~
7. Toxic substances	~~7. To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the toxicity section~~
8. Fish screens in the Delta	~~8. To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the fish screens section.~~
9. Nutrients	~~9. The State Water Board will continue to coordinate with the Central Valley Regional Water Board on this and other related Bay-Delta issues as needed.~~
SRCSD also provides specific information on studies it recommends the State Water Board review as related to export fish screen entrainment, invasive species, ammonia, and nutrients.	~~Noted.~~
San Joaquin River Group (SJRG)	
SJRGA recommended that San Joaquin River flows be a subject of the fact finding hearings. SJRG proposed various facts and issues the Board will need to address to establish San Joaquin River flow objectives, including competing reasonable and beneficial uses, and the factors affecting fall-run chinook salmon smolt survival through the Delta.	~~Bay-Delta Plan and D-1641 are amended. To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the San Joaquin River flows section.~~
City of Antioch (Antioch)	
Antioch referred to an analysis of historic salt water intrusion and its impacts to the Bay-Delta, related to net outflow objectives for consideration in the fact finding proceedings.	~~Comment noted. To the extent this comment pertains to periodic review of the Bay-Delta Plan, see the Delta outflow section.~~
Antioch commented that Bay-Delta Plan and D-1641 are amended. It is critical to consider the source of water in the central and western Delta, including the inflow of tributaries, such as the Mokelumne and Sacramento Rivers to the western San Joaquin River, which control salinity and water quality in the western and south Delta.	~~Comment noted.~~

Antioch recommended that the State Water Board consider the significant adverse impacts on fish and the environment if Sacramento River flows into the San Joaquin River are reduced by anticipated upstream projects.	~~Comment noted.~~
~~South Delta Water Agency (SDWA)~~	
SDWA commented that the State Water Board should determine the extent to which new and additional regulation is necessary to address the effects of the SWP and CVP on the fisheries and the Delta ecosystem.	~~To the extent these comments pertain to Periodic Review of the Bay-Delta Plan, these comments will be considered when the State Water Board considers any modifications to the Bay-Delta Plan.~~
SDWA recommended that the State Water Board hold a fact finding hearing to determine how much Delta outflow is necessary, and when it should be made available in order to protect fishery beneficial uses since current levels are not adequate.	~~To the extent these comments pertain to Periodic Review of the Bay-Delta Plan, see the Delta outflow section.~~
SDWA recommended that the State Water Board conduct fact finding proceedings on exports to address fisheries concerns from historically high exports.	~~To the extent these comments pertain to Periodic Review of the Bay-Delta Plan, see the export/inflow section.~~
SDWA comments that the examination of what is needed to protect fishery beneficial use needs (and other beneficial use needs) should include a determination of the amount of water needed to supply areas of origin and Delta Protection Act needs.	~~To the extent these comments pertain to Periodic Review of the Bay-Delta Plan, they will be considered when the State Water Board considers modifications to the Bay- Delta Plan.~~
~~United States Department of the Interior (Interior)~~	
Interior voiced support for conducting fact finding proceedings on the previously proposed list of fact finding issues.	~~All of the previously proposed fact finding topics are addressed in this Staff Report. For information about specific issues, see the individual sections.~~

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Arnold Schwarzenegger, Governor

California Environmental Protection Agency
LindaS.Adams, Secretary

State Water Resources Control Board
Charles R. Hoppin, Chair

Public Comment
2009 Periodic Review
Deadline: 6/15/09 by 12 noon

SOUTH DELTA WATER AGENCY

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June 15, 2009

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SWRCB EXECUTIVE

Via E-mail commentletters@waterboards.ca.gov

Ms. Jeanine Townsend, Clerk to the Board
State Water Resources Control Board
P. O. Box 100
Sacramento, CA 95812-2000

Re: Draft Staff Report on Periodic Review of the 2006 Bay-Delta WQCP

Dear Board Members:

The following are the South Delta Water Agency's comments to the draft staff report for the Periodic Review of the 2006 Bay-Delta Water Quality Control Plan.

1. Southern Delta Salinity and San Joaquin River Flows. The Report makes no recommendations regarding southern Delta salinity objectives (or standards) or San Joaquin River flows in light of the fact that the Board has already decided to review those issues. The Report does set forth some history and facts regarding those issues.

On page 13 the Report lists those factors affecting salinity concentrations or loads in the southern Delta, and includes "fertilizers" and "soil amendments." It is common to hear at both Regional Board and State Board hearings and workshops that fertilizers and soil amendments contribute salt to the River. However, inquires as to the basis of such statements reveal no studies supporting the claim. If the SWRCB staff has some citation to support their conclusion that these contribute to Delta salts in any significant way, they should reference that support.

The Report also fails to mention a number of very significant regulatory actions or inactions that affect Delta salinity. There is no mention of the Regional Board's failure to set upstream salinity standards on the San Joaquin. There is also no mention of the Boards' failure to address municipal discharges which have in the past allowed significant amounts of discharges of water in excess of the standards into areas of little or no net flow.

Finally with regard to southern Delta salinity, the Report should make the distinction between processes that add salt to the system and those which concentrate salts through use of River water. The former should never preclude or hinder the latter.

With regard to San Joaquin River flows, the Report should reference the recent testimony of DFG regarding its continued belief that higher flows are associated with higher survivability. This is especially important because the current standards have never been fully implemented and the period of VAMP has corresponded to a sharp decrease in San Joaquin River salmon populations.

2. Outflow. The Report correctly identifies outflow as a significant factor in the health of the estuary, but should be much more forceful in its recommendation to make changes. There is little dispute that the system is currently operated to maximize exports at the expense of the ecosystem. The insufficiency of water for the estuary (and the corresponding excessive export pumping) has been known for many years (see attached paper by L. Leopold which was part of previous SWRCB Bay-Delta efforts).

The Report wrongly cites to the PPIC report regarding its conclusions about the need for variable salinity and diverse habitat in the Delta. PPIC conclusions were based on its finding that the Delta is now kept "fresher" than it was historically. CCWD corrected this error and showed that PPIC had it backwards; the Delta is now saltier that it was. Hence the idea that we should periodically "salt up" the Delta to improve fisheries should have been discarded some time ago. Allowing ocean salts to intrude higher into the estuary does not create "more diverse habitats," rather it decreases both the mixing zone habitat which prevailed well downstream and the fresh water habitat that prevailed in the Delta. If there is one thing that is clear, it is that the inflow and outflow of the Delta have been radically decreased over time, especially during hydrologic years classified as below normal, dry and critical.

The Report should emphasize that the recent BO for smelt also recommends increased outflow as necessary to protect the estuary.

3. Exports. The Report is weak in its recommendation to review export restrictions. After the POD Synthesis Report, the Wanger Decision, the Smelt BO and the Salmon BO, there can be no uncertainty. Every process which included opposing views has concluded that fishery protections require decreased export levels. In light of the crash of various species, the Report should be much more forceful. A clear example of the Report lacking the necessary recommendations is its treatment of the spring export limits. The 2006 Plan's (as well as the 1995 Plan's) limits on exports do not even match the limitations in the BO's recently thrown out or replaced much less the new Opinions. The Report should specifically recommend new restrictions and the deletion of the "no-net loss" to exports footnote.

The Report references the PPIC report again, for the proposition that southern Delta exports should be moved to a new location. The many factual errors of the PPIC can be addressed in other forums. However, if the Report is going to reference PPIC as supporting the idea that the projects should divert from some other location, it should also reference Water Code Section 12205 and the Delta Corridors Proposal which provide both legal guidance for such changes and alternatives thereto.

4 Suisun Marsh. The Report should discuss how current operations have decreased the historic mixing zone habitats in and around the Marsh.

5. Old River/Middle River flows. It is appropriate for the Report to reference the recent restrictions on these parameters under the Wanger Decision and the recent smelt BO. However, the topic requires an analysis of the recent CCWD information which suggests that net flows are irrelevant, rather the existence of ebb flow is the key. Per CCWD, outmigrating salmon use the ebb flow to travel downstream regardless of the net flow. It is only when the ebb flow reaches zero, that the fish necessarily end up at the export pumps.

The Report should also note that the recent smelt BO notes that although other factors affect fish populations, those other factors are important only due to the alteration of the hydrodynamics of the system by the projects.

6. Screens. The Report contains a fair review of fish screen issues, excepting as to the screening of the export pumps. Without any citation whatsoever, the Report concludes that concerns about sea level rise and levee stability argue against requiring new screens at the export facilities. Proposals for new diversions place them in a similar circumstance for both sea level rise and levee problems. Further, there is little doubt that the current screening at the CVP and SWP facilities results in significant mortality of many species. All the evidence (including the CalFed ROD referenced in the Report) points to the need for new, better screens for the projects.

7. Biological Indicators. This portion of the Report mentions the narrative salmon doubling standard. In light of the crash of the fisheries (including salmon) and in light of the CVPIA's requirement that numerous species (including salmon) be doubled, the Report should include a recommendation regarding a specific new standard and how it should be implemented.

SDWA also joins in the comments of the Central Delta Water Agency. Please feel free to contact me if you have any questions.

Very truly yours,

JOHN HERRICK

Enclosure

SACRAMENTO DELTA WATER SUPPLY AND REVIEW OF THE TIBURON REPORT

Luna B. Leopold
Consulting Engineer

California must take heed of well documented experience in the Soviet Union where diversion of fresh water from the natural supply to an estuary has resulted in immense economic loss and the near destruction of an important estuary. Regulation of the Don River has resulted in an increase of salinity of the Azov Sea by a mere 7 percent and the result was to reduce total fish production from about 15 to 3 thousand tonnes annually. This has been documented in detail by Volovik (1986) and reviewed in the Tiburon report here being discussed.

The Tiburon report as it will here be called is a detailed study of the water situation in the Sacramento Delta. The reference is:

Rozengurt, M., Herz, M.J., and Feld, S.,1987, Analysis of the influence of water withdrawals on runoff to the Delta-SanFrancisco Bay ecosystem (1921-1983): Paul F. Romberg Tiburon Center for Environmental Studies, Tech. Rept. No 87-7.

This voluminous study cannot be either read or taken lightly for it is statistical, detailed, and in many places less than clear. Nevertheless the more one studies it the more impressive is the informational content. The present review deals only with the discussion and data dealing with annual flow data whereas the Tiburon report analyses both annual and monthly data.

The present discussion is an attempt to bring out those points that seem most significant and to present some reanalysis to clarify and emphasize some of the important conclusions.

The data base is reviewed in some detail. It appears that during the planning and construction stages of water development and diversion in the Sacramento system, two somewhat shortcut data compilations were used. The "Four River Index" is a data base that includes runoff from only 75 % of the total drainage area. A "modified method" had previously been employed also relecting less than the full runoff. Finally a compilation was made that estimated the runoff not only from the major rivers but included runoff from the foothill areas and is thought to represent a good approximation of the full runoff volume of 100% of the basin area. The Tiburon report shows that the planning done in the early years based on these less than full runoff volumes have given an over-optimistic picture of the water available for diversion from the Delta system.

Tiburon Center for
Environmental Studies
Exibit 22

Then using the most uptodate data base that most realistically decribes what water is really available, the report introduces a statistical analysis of this water supply. Generally this analysis is couched in the form of deviations above and below the mean or average value of the runoff series, and expressed among other ways as probability of occurrence. When values of deviation from the mean are plotted as the probability of being equalled or exceeded, the differences in actual runoff quantities among different data sets can be eliminated so that the particular length of the record becomes unimportant.

The method of analysis will be demonstrated below to help explain and support the major conclusions in the report. First, however, it would be desireable to summarize the major findings of the study.

First, the role of fresh water runoff is of highest importance in controlling salinity and the functioning of the "nutrient trap", that zone of an estuary where fresh water with its load of sediment and nutrients interacts with the saline water from the ocean. This is the area richest in plankton production where many fish species thrive as juveniles (see pp. I.3, I.6, and Fig. I.2). In the Delta area, this is between Chipps Island and Benicia. Reduction of fresh water reaching the Bay has made the saline zone move upstream and is the cause of the historic increase in salinity. The loss of fish populations, a well documented fact, is related to these complex changes. Salinity in the Delta has increased in the present century from an original value of .01-2.0 grams per liter to a present value of 1.0-14. The increase in salinity experinced in the Sea of Azov of the Soviet Union was less than two-fold whereas the increase in the Delta has been ten-fold. Even with the modest increase in the Sea of Azov the result has demonstably been disasterous in that country.

Second, the Tiburon report shows that use of an unsatisfactory data set to describe the available water has in the planning and construction stages of water development seriously underestimated the probability of critically dry conditions in the estuary. Further, the use of frequency curve analysis is necessary to evaluate properly the effect of the already operative water diversions that deplete the fresh water supply so essential to the continued functioning of the ecosystem.

Third, the report shows what should be an obvious fact, that continued diversion of the same magnitude of fresh water in dry years as well as wet years makes a much larger percentage change in available water in a dry period than in a wet one. Yet there is no attempt to adjust the amount of diversion in response to the available supply.

Fourth, the amount of water diverted has continued to increase with time despite the data on biologic populations and salinity that have given ample warning that even the present amount of diversion is impacting the ecosystem .

Both to check quantitatively the results presented on annual flows in the Tiburon report, and to explain in new words its findings, I have reanalysed some of the data. My results are in qualitative agreement with those in the report though my numbers are not as exact. One reason for this is that I have generally rounded the data to three significant figures, for my work was done by hand whereas the Tibruron computations were made on a computer.

Four sets of data were used in my analysis. They are a) the list of annual flows representing natural, unimpaired inflows to the delta; b) the regulated annual inflow to the Delta; c) the natural or unimpaired outflows from the Delta, and d) the regulated or altered outflow annual values. These tabulations of basic data are included as printed tables in this study. The annual natural inflow data are those representing the flow from all or 100% of the drainage area as previously stated as being necessary for a correct analysis.

The method of analysis is similar to that used in the Tiburon report. The data array was retabulated in order of magnitude of the values. For each the recurrence interval was calculated as n+1/m where n is the number of years of record, and m is the rank order of the value or runoff quantity. The reciprocal of recurrence interval is the probability of occurrence, that is m/n+1 is the probability. For example, the value of probability of 0.10, that is 10 chances out of 100, means that in 100 years, it is probable that 10 years will experience a flow less than the quantity specified.

To make this more specific consider Figure 1 of the present study. Four graphs are plotted. They show the probability that any value of annual flow will be equalled or exceeded. The four graphs describe the annual natural inflow to the Delta, the regulated inflow, the natural outflow, and the regulated outflow.

Consider first, the graph of natural inflow, plotted as the symbol x. There is a 50 percent probability that the annual natural inflow will be equal to or less than 25,000,000 acre feet. This is the median value of the array, that is half the annual values are larger and half smaller. The arithmetic mean is somewhat larger, about 28.1 million. Now look at the value 25% on the bottom scale. At a probability of 25% the annual runoff value is about 37 million acre feet. This says that there is a 25% chance, one in four, that the annual value of natural inflow will be equal to or larger than 37 million. By the same token, the

upper scale says that there is a 75% chance, 3 out of 4, that the annual value will be equal to or less than 37 million. In other words it is less than likely that any given year will have as large a flow as 37 million.

Now look at the lower part of the curve which is the significant part from the standpoint of the estuarine ecosystem. Where the lower scale reads 90, the graph reads 13 million acre feet. Thus 9 years out of 10 or 90 years out of 100 it is probable that the natural inflow would equal or exceed 13 million. Or from the upper scale, 10 years out of 100 can be expected to have a natural inflow less than 13 million.

The average natural inflow to the delta is about 28.1 million acre feet. It should be obvious that this average value has but little significance. Of interest is the year of short supply and the frequency with which it might be expected. This is the reason both the Tiburon report and the present analysis concentrate on frequency curves.

Consider now the comparison of the curves for the natural inflow and the natural outflow to the Delta. In Fig. 1 the former is the crosses x, and the latter is the solid circle. The two curves are nearly identical. To the extent they are the same the data show that under natural conditions water coming into the Delta was nearly the same as that amount leaving the Delta. At the scale of this graph the amount of loss by seepage or evapotranspiration cannot be seen.

But now consider the comparison of natural inflow to the regulated inflow shown on the graph by open circles. Regulated inflow is the water allowed to flow into the Delta after diversion and after the construction of upstream dams. Diversions to southern California are the primary cause of depletion. The average regulated or man-influenced inflow is about 22.8 million acre feet. This is an average reduction of 28.1-22.8 or 5.3 million or 19 percent of the natural. Again this average reduction is not very informative. Compare the curves on the lower scale at 75 percent probability. The natural inflow expected to be equalled or exceeded 75 percent of the time or 75 years out of 100 is about 18 million acre feet. But the regulated flow will only produce 13 million, a depletion of 5 million out of the naturally expected 18 million, a reduction of nearly 30 percent.

Now consider that low flow expected 10 percent of the years or once every ten years. At this frequency the natural inflow was 12 million acre feet. The expected regulated outflow once in ten years is only 7.5 million. At this frequency the depletion of the flow into the Bay is nearly 40 percent.

The above comparisons deal with the probability of experiencing any given quantity and do not mean to apply to any particular year. However, when one looks at the probability of one in ten, it means that next year or any given year in the future has a one in ten chance of experiencing an outflow to the Bay of less than 7.5 million acre feet. Like tossing a coin, each toss has the same chance of coming up heads.

Note also that the regulated outflow to the Bay is considerably less than the regulated inflow to the Delta. This means that after regulation the losses or depletions within the Delta have increased. Before regulation the losses within the Delta were negligible as previously stated.

The Tiburon report wisely makes an important issue of the number of dry and critical years under natural as compared with regulated conditions. To check and extend those findings I have prepared Figure 2. I have used the same definitions of wet, abnormal, subnormal, dry, critically dry, and drought as used by the Dept. of Resources Bulletins 23-62 and 130-70s (see Tiburon report Table 1-9 p 1.45). I have added a category of very dry so that all years may be described. The definitions are given in Figure 2.

In my tables with the annual flows arranged in order of magnitude it is easy to count the number of years in each category. As Figure 2 shows, regulation and diversion of water have increased the number of years in the dry categories and reduced the number of years in the wet categories. The Figure refers to annual values of inflow to the Delta.

Years in which the inflow is considered wet have decreased from natural conditions from 17 to 9, or from 30 percent of all years to 15 percent of years.

Subnormal years have changed from 11 to 7 or from 19 percent of all years to 12 percent.

The important change is in the number of critically dry years, an increase from 8 to 23 in the period of record or from 14 percent of all years to 39 percent. Thus the amount of diversion and depletion under present conditions has doubled the number of years considered critically dry.

Further, the increase in depletion has been continuous over time. A measure of depletion is the difference between natural and regulated values of outflow from the Delta. The depletion by periods of time is shown below.

Natural outflow less Regulated Outflow
Average values in millions of acre feet

Time Period	Depletion
1921-1929	3.77
1930-1939	3.79
1940-1949	4.73
1950-1959	6.64
1960-1969	8.74
1970- 1979	10.94
1980-1982	12.70

In conclusion, my studies confirm the general conclusions in the Tiburon report. The depletions have been massive and continue to increase. They have greatly increased the percentage of years of critical drought in the Delta and the Bay.

It is my professional opinion that no set of standards of water quality can be written that can have the practical effect of protecting the ecosystem from further degradation if diversions increase over the present level. Because forecasts of runoff are imperfect the effect of diversions in a year that turns out to be dry will already have taken its toll on the ecosystem before water quality measurements can compare the condition with the standards.

The logical and in my opinion the imperative step is to preclude henceforth any additional diversions of water from the Delta system.

Public Comment
2009 Periodic Review
Deadline: 6/15/09 by 12 noon

June 15, 2009

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Ms. Jeanine Townsend, Clerk to the Board
State Water Resources Control Board
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David Okita
Solano County Water Agency

Ray Stokes
Central Coast Water Authority

General Manager
Terry Erlewine

Re: State Water Contractors' Comments on the 2009 Periodic Review Staff Report

Dear Ms. Townsend:

Introduction

The State Water Contractors (SWC)[1] has reviewed the State Water Board staff's Report for the upcoming periodic review of the 2006 Bay-Delta water quality control plan. Quite frankly, we are very disappointed by its tone, its incomplete and often one-sided depiction of the state of the science, its lack of balance regarding matters the Board is statutorily required to consider in developing water quality objectives, and its recommendation that ammonia and other toxics issues be excluded from the process. In summary, for the reasons outlined below, the SWC urges the Board to (a) approve periodic review of the topics recommended by its staff, (b) add to the topics to be reviewed those related to ammonia and other toxics, and (c) explicitly not adopt, accept, or in any manner approve the text of the Staff Report, as such an action could be interpreted as prejudging the state of the science and the proper balance among competing beneficial uses before all the information has been provided for your consideration.

The Board Should Not Equate Water Quality Control Planning With ESA Compliance

The Staff Report contains numerous references to the ongoing Bay-Delta–related ESA processes and to the federal court litigation on the Delta smelt and salmonid biological opinions. While it is certainly appropriate to apprise the Board of the on-going administrative and court proceedings that involve these issues, it is not appropriate to imply, as the Staff Report does, that limitations imposed upon the SWP and CVP through the ESA provide an equivalent foundation for amending the WQCP.

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1 The SWC is a non-profit association of 27 public agencies from Northern, Central, and Southern California that purchase water under contract from the California State Water Project (SWP). The SWP is the state's largest water delivery system, and collectively, members of the SWC deliver SWP water to more than 25 million residents throughout the state and more than 750,000 acres of highly productive agricultural land.

Although it is never mentioned in the Staff Report, California's Porter-Cologne Act includes substantially different standards for the adoption or amendment of a WQCP than those applicable to ESA determinations. Among other things, the Legislature makes it plain in the Porter-Cologne Act that water quality control plans result from a *balancing* process and that the objectives included as a part of such plans are to ensure the "reasonable protection of beneficial uses." Water Code Section 13241. To this end, the Legislature specifically enumerates the factors that are to be considered in establishing or amending water quality objectives and includes the following: "Past, present and probable future beneficial uses of water", "economic considerations", and "the need for developing housing within the region". This statutory authority follows the California Constitution's requirement that the waters of the State must be put to reasonable and beneficial use to the fullest extent possible in the interests of the public. As Judge Racanelli stated in comprehensively describing the Board's role in developing and implementing water quality objectives, the guiding policy—the "touchstone"—is the public interest." None of these factors are elements of the ESA from which the delta smelt and salmon biological opinions were recently developed. Yet, the Staff Report never once mentions the concept of *balance* in its entire 51 pages.

The Staff Report's apparent embrace of the ESA requirements as surrogates for balanced water quality objectives is contrary to Porter-Cologne Act and the Racanelli opinion and ignores the water costs of the recent Delta smelt and salmonid biological opinions. DWR has determined that, collectively, the two biological opinions will reduce combined SWP and CVP exports to the farms and millions Californians who rely upon them by an average of more than 2,000,000 acre feet as compared to D-1641. That is not obviously compatible with the balancing requirements of the Porter-Cologne Act.

The Board needs to follow the public interest balancing and reasonableness dictates of the water quality planning statutes, and recognize that the ESA agencies are not subject to the same legal mandates related to the balancing of beneficial uses as is the Board. We urge the Board to avoid conflating water quality objectives and ESA actions promulgated ostensibly to avoid jeopardy to listed species. Their underlying statutory frameworks cannot be reconciled to support such an approach.

Topics To Be Considered

In general, the SWC does not dispute that each of the topics suggested by Board staff warrant review. A great deal of new, and sometimes quite conflicting, science has been developed because the pelagic organism decline ("POD") has prompted a flurry of activity. The SWC believes, however, that the Staff Report is inconsistent when selecting some topics for Board consideration while rejecting others. For example, at page 22, in discussing the Delta Cross Channel, the Report states that updated information should become available during the basin planning process and, therefore concludes: "Given likely availability of new information and the importance of the DCC gate to overall Delta water quality conditions, staff recommends the State Water Board review the DCC gate objective in the Bay Delta Plan." In contrast, the Report later recommends that the ammonia issues not be reviewed at this time because studies are ongoing and final data are not yet available. Yet, the fact is that new information on ammonia will be available this year on a time schedule similar to that for the Delta Cross Channel.

"Given the likely availability of new information and the importance of" ammonia "to overall Delta water quality conditions" the SWC urges the Board to reject the staff recommendation and add consideration of establishing ammonia objectives to the list of topics. The evidence that ammonia and ammonium concentrations are having a detrimental impact on aquatic species is compelling and should not be so readily dismissed as was done in the Staff Report.

The conclusions in the Staff Report for the ammonia objectives relate only to the direct toxicity effects of ammonia that are covered under US EPA's 1999 Update of Ambient Water Quality Criteria for Ammonia. In so doing, it misses the mark. The focus should also be on the apparently detrimental affect that ammonium concentrations are having on the food web. There is significant evidence that ammonium is a limiting factor in spring algae bloom formation in areas under the jurisdiction of the State Board and the WQCP. The evidence strongly suggests that ammonium at levels far lower than the protective levels specified in the US EPA's 1999 criteria are impairing important spring diatom production in Central, San Pablo and Suisun Bay, critical rearing habitat for delta smelt, longfin smelt, and other species of concern (Dugdale, *et al.* 2007). Further investigations will only clarify how far upstream the effect is observed. That information should be available during the basin plan amendment process.

Instead of recognizing the relationship between ammonium and algal community composition, the Staff Report minimizes the role of ammonium in harmful algal blooms by citing a study by Lehman, *et. al.* 2008, that found ambient nutrient concentration and ratios are of secondary importance to *microcystis* and *microcystin* variation in the San Francisco Estuary. The Staff Report fails to mention that the study by Lehman came to this conclusion because nutrient concentrations were consistently an order of magnitude higher than limiting values throughout the water column. In contrast to the Staff Report description, the recent CALFED Science Ammonia Expert Panel describes the role of ammonium in harmful blooms as follows:

> Because the dominant cyanobacterial genus in the Delta (*Microcystis*) does not fix N_2, these increasingly more common and extensive cyanobacterial blooms indicate sufficient and possibly excessive N loading to the Delta. Increases in NH_{4+} concentrations specifically might exacerbate this situation. Compared to NO_3 and N_2 (via fixation) as N sources, NH_{4+} produces the highest growth and primary production rates for microcystis aeruginosa and other cyanobacteria (*Aphanizomenom flos-aquae* and *Anabaena flosaquae*) in laboratory studies (Ward and Wetzel 1980). (Meyer, *et. al.*, 2009, p. 4.)

It is well known that the Sacramento and San Joaquin rivers already regularly exceed the U.S. EPA nutrient criteria for rivers and streams, Ecoregion I (Central Valley) reference conditions of 0.047 mg/L and 0.31 mg/L, respectively (U.S EPA, 2001). The reference condition is meant to represent the nutrient concentrations in minimally impacted water bodies. The evidence suggests that this nutrient loading is having impacts on the food web. There is extensive literature that relates excessive anthropogenic nutrient loading to detrimental shifts in algal community composition and growth rates. For example, Glibert, *et al.*, 2008, states:

> Documented impacts of nutrient pollution in the U.S. and worldwide have included habitat change, decreases in biodiversity, and increases in hypoxia and [Harmful Algal Blooms] (*e.g.*, Nixon 1995, Bricker et al. 1999, NRC 2000, Burkholder 2001, Cloern 2001, Rabalais 2002, Anderson et al. 2002, Breitburg 2002, Glibert et al. 2005a, b).

The Staff Report also fails to acknowledge the research addressing the potential for chronic ammonia toxicity. Research by Werner, *et. al.* 2009 suggests that the Sacramento River immediately below the Sacramento Regional County Sanitation District ("Sanitation District") Wastewater Treatment Plant ("SRWTP") already exceeds the potentially safe chronic levels for delta smelt. Werner, *et al.*, 2009, states that:

> The US EPA (1999) reports mean acute-to-chronic ammonia/ium ratios for warm water fish range between 2.7 (channel catfish, *Ictalurua punctatus*) and 10.9 (flathead minnow, *P. promelas*). Cold water species such as rainbow trout, with acute ammonia/ium sensitivity similar to delta smelt, have a ratio between 14.6 and 23.5, respectively (US EPA, 1999; Passell *et. al.*, 2007). If a safety factor of 23.5 were applied to acute ammonia effect concentrations for delta smelt larvae (ammonia 96-h LC_{50} : 0.15 mg/L) then the resulting concentration would be 0.0064 mg/L ammonia. Reported unionized ammonia concentrations in the Sacramento River immediately below the SRWTP are 0.0085+/-0.005 and would exceed potentially chronic safe values for delta smelt. During January-June 2008, maximum ammonia concentrations measured down river at Hood and Grand Island (POD site 711) were 0.019 mg/L and 0.021 mg/L, respectively (Werner, I., UCD-ATL, unpublished data). The chronic values derived above are similar to those reported by other studies. Dodds and Welch (2000) suggest that chronic effects of ammonia on fish may occur at concentrations as low as 0.005 mg/L.

The ongoing research is also addressing whether multiple stressors increase susceptibility to ammonia toxicity. The existing science suggests that actively swimming and unfed fish may be several times more sensitive to ambient un-ionized ammonia levels than laboratory exposures indicate. (Eddy 2005)

In light of the existing evidence that ammonia and ammonium concentrations are having an impact on aquatic species, the SWC believes that the State Board should have an active role in developing ammonia criteria. While the SWC truly appreciates the consideration the ammonia/um issue is receiving from the Regional Board, it believes the State Board should be similarly engaged. The science linking ammonia/um to potentially harmful effects on aquatic species is developing rapidly. As noted above, a significant amount of new information on ammonia/um is expected to be available by the end of summer 2009.

The SWC would also point out that failing to take ammonia impacts into account during the upcoming basin plan review will make it much more difficult, if not impossible, for the Board to decide, on balance, whether the public interest calls for trying to mask or dilute the impacts of ammonia by mandating flows from the CVP and SWP or whether more stringent water quality objectives and discharge controls better balances the use of Delta waters for the competing beneficial uses. This is also true for toxics other than ammonia.

There are several recent studies available that provide evidence of significant toxicity in the Delta. The Staff Report does not mention any fish kills such as the one that occurred on the San Joaquin River west of Stockton in 2008 following a storm event. In addition, Lavado et al. 2009 found estrogenic activity in water from Lower Napa River, Lower Sacramento River and Carquinez Strait near Benicia. Brander et al. 2008 observed choriogenin induction in male silversides from Suisun Marsh. Riordan et al. 2008 reported endocrine disruption in male fathead minnows following in-situ exposures below the Sacramento WTP. And, Johnson (pers. comm. with USFWS) reported vitellogenin induction in 100% of male splittail from Suisun Bay.

The Central Valley Regional Water Board's own Irrigated Lands Regulatory Program has detected significant occurrence of toxicity in Central Valley waterways (see Table 1 Attachment). While many of the sample locations of the Irrigated Lands Regulatory Program are small sloughs and agricultural drainage canals, according to NMFS 2008, "Juvenile salmonids rely upon a variety of non-main channel habitats that are critical to rearing. All listed salmonids use shallow, low flow habitats at some point in their life cycle" (p. 229). In addition, "Diverse, abundant communities of invertebrates (many of which are salmonid prey items) also populate these habitats and, in part, are responsible for juvenile salmonids reliance on off-channel habitats" (p 236).

All of this evidence and the Board's need to have a complete picture of the multiple stressors impacting the Delta fishery call for inclusion in the basin planning process of ammonia and other toxics. The SWC, therefore requests that these topics be included as additions to the staff recommended topics.

The Board Should Adopt Only the Issues Recommended in the Staff Report, Along with Those Suggested by the SWC, But Not Otherwise Approve the Staff Report

As noted at the beginning of this letter, the SWC strongly believes that the text of the Staff Report presents an incomplete and, as a result, a misleading picture of what are recognized as established scientific facts. The express purpose of the water quality objective hearings that the Board is about to begin is to establish a comprehensive record of the best available science upon which the Board can make its critical decisions. The Staff Report's selective summary of the staff's estimation of the state of the science at this point is incompatible with that record making process and should be removed from the Report. The SWC may provide the Board with a redline of the Staff Report prior to the July 7, 2009, hearing to further demonstrate our concerns in this respect. At this time, however, we will present a couple of key examples.

At page 19, the Staff Report states "recent studies provide additional evidence of the likely role of SWP and CVP export pumping in the continued decline of several Delta fish species." That same paragraph continues: "estimates of the population of delta smelt and losses at the SWP and CVP export facilities indicate that a significant fraction of the population may be lost due to export pumping," citing Kimmerer 2008.

What is not included in the Staff Report is Kimmerer 2008's statement that "no effect of export flow on subsequent midwater trawl abundance is evident." Further, the POD synthesis report, at page 19, states:

> "Manly and Chatkowski ...(2006) used log-linear modeling to evaluate environmental factors that may have affected long-term trends in the Fall Midwater Trawl abundance index of Delta smelt. They found that monthly or semi-monthly measures of exports or Old and Middle rivers flow had a statistically significant effect on delta smelt abundance; however, individually they explained a small portion (no more than a few percent) of the variability in the fall abundance index of delta smelt across the entire survey area and time period. Hence, there are other factors that dominate the long-term trends of delta smelt fall abundance. Similarly, Kimmerer et al. (2001) estimated that entrainment of young striped bass were sometimes vey high (up to 99%), but they did not find evidence of that entrainment losses were a major driver of long-term striped bass population dynamics."

The Staff Report fails to recognize the difference between entrainment percentages and the population level affects of such entrainment. Similarly, the Staff Report's E/I ratio discussion neglects to mention the minor fractional population level effect of the pumps, including the authors of all the cited papers that are quoted as purporting to show the harmful effects of exports. The scientists are struggling to find answers, but a review of the synthesis report shows carefully chosen wording to the effect that most of what is out there today are hypotheses looking to be verified or rejected. The Staff Report, too often, improperly implies that these hypotheses are established facts, which they are not.

Another example of overstatement appears a page 24: "SWP and CVP exports have been identified as a *major* contributing factor in the decline of Delta smelt and other pelagic species" (Italics added.) A reference for this statement is Kimmerer 2008. In fact what Kimmerer stated was "manipulating export flow (and, to some extent, inflow) is the only means to influence the abundance of delta smelt that is both feasible and supported by the current body of evidence, *even though export effects are relatively small.*" (Italics added.)

The Staff Report, unfortunately, is replete with statements that imply an established fact when only a hypothesis, at best, is at play. This is also true with respect to Bennett's "big mama" theory of Delta smelt reproduction for which there is as yet no written report in existence and the new fall X2 hypothesis of a correlation to smelt abundance that has been significantly questioned in the broader scientific community. The Staff Report lacks fundamental balance, evidenced by repeated failures to recite or even allude to the full scope of the ongoing scientific debate.

Therefore, the SWC believes that any action by the Board to endorse the textual materials would prejudice the upcoming hearings and workshops. Further, such an endorsement or other approval is not needed at this time, as simply approving the scope of the issues to be considered is sufficient.

Conclusion

The SWC is disappointed that it felt compelled to provide a somewhat negative response to the Board's staff work product, as we, as always, want to work with the Board and its staff to develop the best possible balanced approach to water quality planning for the Delta. We look forward to the hearings that will follow and will provide more detailed data on the current science and the impacts of water quality proposals on the important beneficial uses of SWP water.

Very Truly Yours,

Terry Erlewine
General Manager

Attachment

Table 1. Observed Significant Toxicity

Species tested	Number of sites with ≥ 1 toxic sample	Number of sites tested	Percent of sites with at least one toxic
Pimephales promelas	26	186	14.0%
Ceriodaphnia dubia	69	185	37.3%
Selenastrum capricornutum	60	157	38.2%
Hyalella azteca	54	139	38.8%
All species combined	119	201	59.2%

Table compiled from data within CVRWQCB, 2007.

Public Comment
2009 Periodic Review
Deadline: 6/15/09 by 12 noon

HERUM\CRABTREE
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June 14, 2009

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VIA ELECTRONIC MAIL

Ms. Jeanine Townsend
Clerk to the Board
State Water Resources Control Board
1001 I Street, 24th Floor
Sacramento, California 95814

Re: Staff Report Periodic Review of 2006 Water Quality Control Plan

Dear Ms. Townsend:

Stockton East Water District has the following comments on the Draft Staff Report for the Periodic Review of the 2006 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Draft Staff Report). The Draft Staff Report fails to include two very important issues that the District believes are adversely affecting both the health of the Bay-Delta Estuary and the overall fishery population in the Bay-Delta Estuary and tributaries to the estuary.

Impacts of Non-Native, Imported Species on Fishery Populations

Since implementation of the 1995 Bay-Delta Water Quality Control Plan, releasing water from upstream reservoirs has been the primary focus for increasing fishery populations. Clearly, this has not worked. The affects of the introduction of non-native species into the Bay-Delta has not been fully explored. The State Water Board should include as part of the periodic review an evaluation of the state of non-native species in the Bay-Delta and the affect of these species on native fishery population. The State Water Board must evaluate the historical and current information on the affects these species are having on the native population.

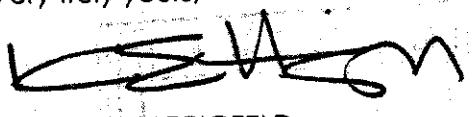
Impacts of Ocean Conditions and Harvesting on Fishery Populations

The State Water Board should include as part of the periodic review the affects ocean conditions are having on the fishery population. Moreover, a review of local and ocean harvesting practices and the resulting affect on fishery populations should be

evaluated. The State Water Board should also review the current information available to evaluate the potential affects of climate change on ocean conditions.

We appreciate the opportunity to comment on these very important issues.

Very truly yours,



KARNA E. HARRIGFELD
Attorney-at-Law

KEH:lac

cc: Kevin M. Kauffman

Public Comment
2009 Periodic Review
Deadline: 6/15/09 by 12 noon

United States Department of the Interior

2009 Periodic Review Staff Report Comments

June 15, 2009

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Introduction

The United States Department of the Interior (Interior) on behalf of the Bureau of Reclamation (Reclamation) and the Fish and Wildlife Service (Service) is pleased to provide these comments on the Staff Report for the Periodic Review of the 2006 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary. In this Staff Report, the State Water Resources Control Board (Board) staff is recommending that the Board further review the following objectives: Delta Outflow; Export/Inflow; Delta Cross Channel Gate Closure; Suisun Marsh; Reverse Flow; and Floodplain Habitat Flow. The staff is also recommending changes to the 2006 Water Quality Control Plan's (WQCP) Program of Implementation. Specifically, staff recommends changes to the Monitoring and Special Studies Program, as well as updating programs of implementation for objectives that the Board ultimately determines merit amendment.

The Board staff is not recommending any changes to the 2006 Water Quality Control Plan's objectives for: Ammonia; Toxicity; Fish Screens; or establishing Biological Indicators. The Staff Report includes a discussion on southern Delta salinity and San Joaquin River flow objectives, but the Board is already undertaking a separate process to review those objectives.

As we understand the process, if the Board adopts the Staff Report at its regularly scheduled July 7, 2009, meeting, that will conclude the 2009 Periodic Review. The Staff Report will set priorities for the Board to further investigate. Amendments to the Plan are not proposed at this time, but may occur following further investigation by the Board.

Southern Delta Salinity and San Joaquin River Flows

We understand that the Board is not undertaking a review of these objectives in the Board's 2009 Periodic Review because the Board is already undertaking a separate review of these objectives. Nonetheless, the Staff Report includes a discussion on these objectives which in our estimation is incomplete and inaccurate. The discussion does not accurately describe the physical setting which contributes to salt loading in the San Joaquin Basin. The Staff Report does not recognize the connection between salinity in the Delta and salinity in the San Joaquin River. The Staff Report misses critical elements of this relationship: the geographic location of the two major export facilities and the intertwined operational effects on slat accumulation in the water distribution facilities. The SWP export facilities are part of the salt loading equation and therefore, must be part of the salt loading solution. The Board has recognized these elements in the past by regulating the two facilities as a single entity.

Clifton Court Forebay is located immediately northwest of the Tracy export facilities. Clifton Court Forebay operations are designed to be tidally influenced. Generally, the gates at Clifton Court are opened near and through high tide and then closed for lower height periods of the tidal cycle. This operation draws water into the forebay to be pumped by the SWP facilities during off peak power periods, in order to pump water with lower priced power. This operation also generally improves the water quality being pumped. This occurs because generally high tide water has the greatest concentration of Sacramento River sourced water, or ocean-based salts. Therefore, simply due to the geographic location being slightly north-west of the Tracy facilities, the SWP generally receives better water quality or a greater percentage of Sacramento River water contributions.

Conversely, due to the operation of Clifton Court Forebay, the federal Tracy export facilities receive a much higher "fingerprinting" of San Joaquin River water source. Clifton Court effectively "gulps" large amounts of the better quality Sacramento River or less ocean-based salts simply due to operationally timing and geographic location.

The combined export facilities and upstream reservoir water resources of the CVP-SWP system are managed to control ocean-based salts in the western delta. Therefore, the ocean-based salts proximity to the export pumps is an effect of combined project operations and the combined project operations contributes to salt loading influences at each of the export facilities. The DCC creates a pathway for Sacramento River water quality to enter the interior delta and is operated, to a degree, to manage ocean-based salt balances. Clifton Court, as a matter of "fingerprinting" receives the largest benefit of the DCC salt balance influences, (although it is a federal facility designed to improve water quality effects in the southern delta).

Simply due to geography, Federal Tracy export facilities receive less "fingerprinting" of Sacramento River water quality and therefore receive a larger percentage of San Joaquin River water quality.

For the reasons stated above, the two facilities cannot be separated in describing their influence on the contribution of salts to the environment south of the export facilities. This includes consideration of the myriad of factors that contribute to salt concentration and loading at the export facilities, including any review of DCC operations or Delta flows for fishery protection.

The SWP export facilities are part of the salt loading equation and must be part of the salt loading solution. The intertwined effects of the CVP-SWP operations on salt distribution cannot be separated. Therefore, the statement "Between 1977 and 1997 the DMC contributed approximately 513,000 tons or 47 percent of the total annual salt load in the San Joaquin River at Vernalis (Central Valley Water Board 2004b)" is overly simplistic as to the how and why the long-term salt balances have been distributed as they have, without recognizing the actual influences in the Delta and its watersheds. Such an overly simplistic statement does not recognize the significant impacts that salinity and flow regulation in the Delta play in salinity management in the San Joaquin basin. This statement is also somewhat out of date, failing to recognize the effects of the implementation of the Westside Regional Drainage Plan over the past twelve years, which has successfully managed agricultural drainage and significantly reduced the

influence of CVP salts on the San Joaquin River, and the fact that Reclamation has met its commitment in D-1641 to meet Vernalis salinity objectives.

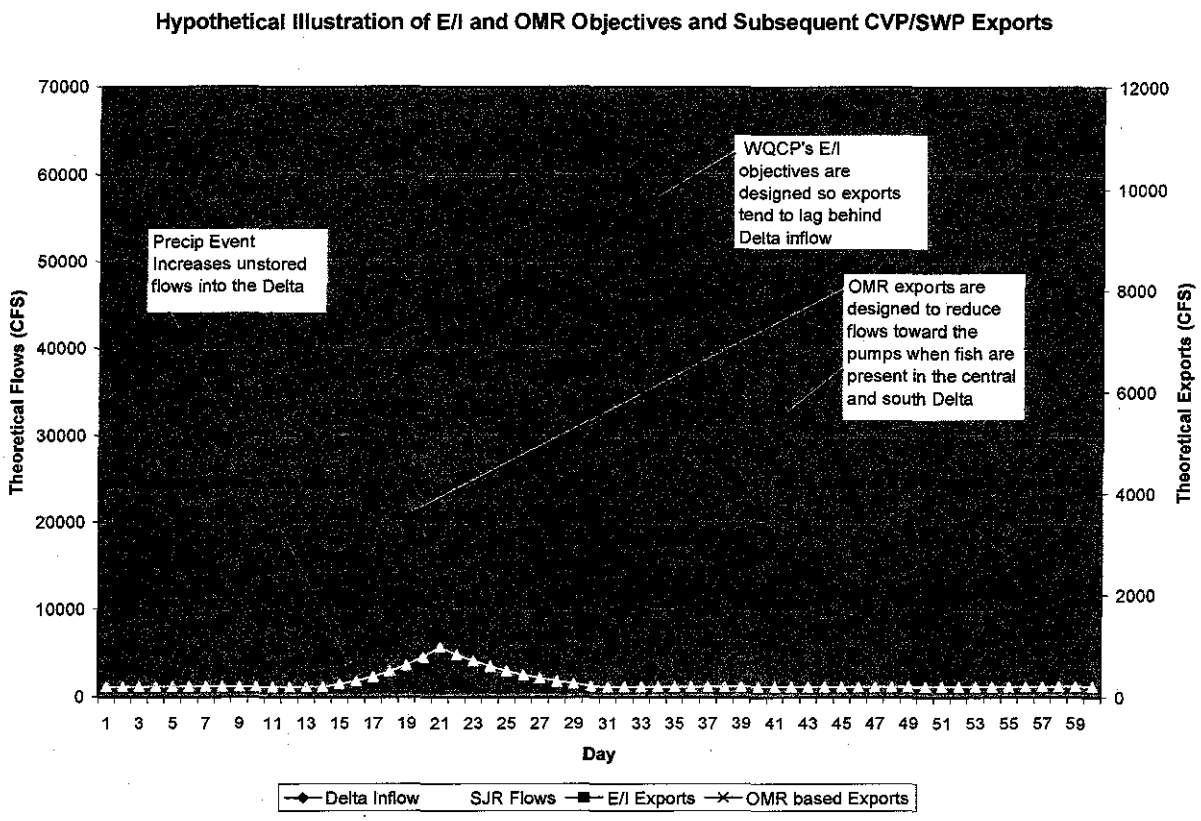
Export/Inflow (E/I) Objectives and Reverse Flow (OMR) Objectives

These two sections are attempting to address very similar fishery management objectives; how to manage the export rates and concurrently improve habitat conditions for fish in the Delta and minimize/avoid the salvaging or take of fish at the export facilities.

In general, the WQCP's E/I objectives contribute to the fishery management objectives by lagging in time or delaying the export of water until after the flows entering the Delta have had an opportunity to help provide suitable conditions for the transport of fish to the western Delta.

In general, Old and Middle rivers (OMR) flow objectives contribute to the fishery management objectives by reducing the hydraulic draw on the Old and Middle river channels towards the CVP and SWP export facilities, when fish of concern are indicated to be in the central and south Delta environment. This action also helps to provide suitable conditions for fish to move to the western Delta.

Generally, the two Delta objectives (E/I and OMR) for fishery protection affect CVP/SWP export management capabilities in different ways. It is important that the Board consider this interaction between these objectives when it conducts the hydrologic modeling for the E/I and OMR objectives. A conceptual illustration helps to describe or illuminate this relationship.



In this hypothetical example, a rain event produces substantial inflow into the Delta. To meet the E/I criteria, exports would increase on a lagged time delay of approximately14 days. This helps provide suitable conditions to give fish an opportunity to move with the flow to the western Delta environment, while allowing the CVP/SWP exports to pump the benefits of the water supply. For the illustration purposes, exports begin to increase on day 16, in response to the precipitation event, and maximize on day 29, returning to previous levels on day 45.

In this hypothetical example, to meet the OMR criteria, CVP/SWP exports would likely be curtailed on the rising limb of the hydrograph due to presence of fish at the export facilities or information regarding the presence of fish in the interior Delta. For illustration purposes, exports are reduced by OMR criteria on day 18 and are held near constant for a 14-day period and the presence of fish has diminished. Exports are allowed to increase the OMR value on day 31 for a 14 day period through day 43 before returning to previous values.

CVP/SWP exports volumes under the E/I objective only would be the E/I export trace. Exports volumes under the OMR objective only would be the OMR export trace. Export volumes under both the E/I and OMR criteria would be the lesser of the two traces.

The main point to this hypothetical is to illustrate that how Delta flow objectives are designed may affect the determination of how much water can be exported by the CVP/SWP on a daily

basis. It is important that the Board consider the interactions of these flow objectives and evaluate them holistically.

Another significant point to this illustration is that a monthly model of the CVP-SWP and Delta environment will not be able to accurately represent this interface of Delta flow objectives on a daily basis. This makes it very difficult to quantify the effects on all the beneficial uses, using monthly models, because the export volumes are highly variable due to daily variations of inflow. Again, it is important that the Board evaluate these Delta flow objectives holistically and consider using a shorter time step when conducting the hydrologic modeling for the E/I and OMR objectives.

Programs of Implementation

Interior strongly recommends the Board consider amending the 2006 Water Quality Control Plan to include the expectation of the need for flexibility in implementing the objectives in the aggregate. Interior believes that this flexibility should be available for protection of Delta and San Joaquin fisheries, as well as protection of water supplies.

This year has shown the difficulty in meeting all goals and objectives set forth in the 2006 Water Quality Control Plan after three consecutive years of drought. The Board needs to think about whether and how it could implement objectives in a manner that can be responsive to crises of fish protection or preservation of drought management supplies.

Public Comment
2009 Periodic Review
Deadline: 6/15/09 by 12 noon

June 12, 2009

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SUBMITTED ELECTRONICALLY

Jeanine Townsend
Clerk to the Board
State Water Resources Control Board
P.O. Box 100
Sacramento, California 95812

RE: 2009 Periodic Review Staff Report Comments

Dear Ms. Townsend:

The United States Environmental Protection Agency, Region 9 (EPA) has reviewed the draft Staff Report for the Periodic Review of the 2006 Water Quality Control Plan (WQCP) for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Staff Report). We appreciate the substantial resource investment represented by the Staff Report, especially given the fiscal constraints on State Water Resources Control Board (State Board) activities created by the ongoing state budget crises.

Overall, we agree with and support the Staff Report recommendations identifying topics for additional review. As we are all too keenly aware, conflicts over water use in the Bay Delta are at a critical stage, and we look forward to the State Board's leadership as it seeks to restore the environmental productivity of the estuary while enabling appropriate consumptive uses of Bay Delta waters. As we stated in our March 19, 2009 letter (attached), it is critical that the WQCP be modified to adequately protect the uses of Bay Delta waters.

Specific Comments

There has recently been significant ESA regulatory activity affecting Bay Delta resources. We have noted in the past, and reiterate here, our belief that the State Board's responsibilities and authorities for protecting beneficial uses are broader and more comprehensive than the regulatory programs of the state and federal fish and wildlife agencies. Both recent biological opinions on project operations (from the United States Fish and Wildlife Service and the National Marine Fisheries Service) explicitly acknowledge this broader State Board role. We recommend that the State Board coordinate closely with the fish and wildlife agencies. These biological opinions are supported by substantial current peer-reviewed science that the State Board should consider in evaluating changes to the WQCP. Given the different authorities and statutory mandates of the various agencies, we do not necessarily foresee a "single plan" coming from coordination between the State Board and the ESA processes. Nevertheless, EPA believes that the several regulatory agencies have an obligation to reconcile their missions to the extent possible, to work from a similar scientific understanding of the issues, and to forge compatible regulatory responses to the challenges in the Bay Delta.

EPA agrees with the Staff Report recommendation to not pursue additional review of ammonia and toxicity in this basin planning process. EPA believes that both of these parameters warrant considerable attention, given preliminary scientific information about their effects on multiple beneficial uses. However, it is our understanding is that these issues are being evaluated in other State and Regional Board processes already underway. We recommend that the State Board carefully monitor the progress of those other processes so that issues surrounding ammonia and toxicity can be resolved as soon as possible.

EPA also agrees with the Staff Report recommendation to exclude Fish Screens from this basin planning effort. We agree that the site-specific/fact-intensive nature of fish screens in the Delta and its tributaries suggests a case-by-case approach to Board action.

Finally, EPA defers to the Staff Report's conclusions about the need for "biological indicators" in this basin planning process. We note, however, that the absence of stated biological goals and objectives has frequently been cited as a shortcoming of the several planning efforts in the Bay Delta over the past decade. Biological indicators have been successfully used in other states to serve as the "stated goals and objectives" for environmental or water quality improvement efforts. Nevertheless, EPA recognizes that establishing biological goals and objectives is not mandatory under the Clean Water Act, and that there is merit to the Staff Report suggestion that implementing actual remedial measures may more expeditiously address the serious impairments of beneficial uses in the Bay Delta. EPA recommends that the State Board follow the progress of biological indicator development in other processes, and consider using any resulting biological indicators to measure the success of State Board actions.

We look forward to working with the State Board as it conducts its basin planning process. In particular, we would like to work together to identify where EPA assistance could most usefully be employed to support the State Board's efforts.

If you have any questions about our comments, please call me at (415)972-3472.

Sincerely,

Karen Schwinn
Associate Director
Water Division

Attachment

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

VIA ELECTRONIC SUBMISSION AND MAIL March 19, 2009

Anne Short
State Water Resources Control Board
Division of Water Rights
P.O. Box 2000
Sacramento, California 95812-2000

RE: "Comment Letter - South Delta Salinity and San Joaquin River Flow NOP"

Dear Ms. Short:

We have received the State Water Resources Control Board's (Board's) February 13, 2009, scoping notice and notice of a March 30 Workshop to discuss the update and implementation of the Bay-Delta Water Quality Control Plan (WQCP). The Board's intention is to conduct a staged review of the WQCP, first examining the issues of South Delta Salinity and San Joaquin River Flows. Our brief comments below for the most part respect that staged approach, although we do flag some other issues that are particularly timely.

Even the most casual observer of Bay-Delta issues recognizes that we are experiencing a major crisis in water resources management. The rapid decline of pelagic species first documented in the early 2000's has been followed by a more recent collapse of the salmonid populations throughout the estuary. As a result, the commercial and recreational fishing industries are facing a second year of fishing bans and other restrictions. Delta water exporters are also confronting challenges as a third year of natural drought combined with increased environmental protection measures imposes limits on the system's ability to deliver water to consumptive users. Overlaying these immediate problems is the increased realization that climate change and the related rise in sea levels will be forcing major changes in how California protects and uses the Delta - its ecological functions, water resources, and levee system.

Given these challenges, EPA believes that a comprehensive evaluation of the WQCP is very timely. In the parlance of the Clean Water Act (and state counterpart legislation), EPA believes that there is a significant question as to whether the designated uses of the Bay-Delta are being protected, and whether the current regulatory provisions of the WQCP can provide adequate protection of designated uses as California moves into a new century of Bay-Delta resource management.

In initiating its comprehensive review of the WQCP, EPA believes the Board should consider at least the following issues:

1. **Drinking Water Uses of the Delta**. The Delta supplies some or all of the drinking water for two-thirds of Californians, yet there are still no standards in place to explicitly protect that drinking water use. The State and Regional Boards have recognized this problem, and have initiated the development of the Central Valley Drinking Water Policy. Any comprehensive review of the WQCP should accelerate the Drinking Water Policy and incorporate it into appropriate revisions to the WQCP.

2. **Restoration of the San Joaquin River.** Although the exact language is unknown, it is likely that Congress will enact significant legislation this year that directs the restoration of the San Joaquin River. The legislation and related stakeholder discussions are focusing on the San Joaquin River upstream of the confluence with the Merced River, but any restoration effort of this magnitude will have major ramifications for Delta management. EPA believes the Board's analysis should, at a minimum, consider (a) how the regulatory provisions in the Delta will complement the fishery restoration program, and (b) whether and how the restoration of a functional San Joaquin River will affect Delta drinking water and aquatic ecosystem values.

3. **Replacing VAMP**. The Vernalis Adaptive Management Program, as it has been incorporated in the WQCP and related implementation plans over the past decade or so, has generated crucial information on the interplay between San Joaquin flows and fishery health. Nevertheless, both experiment design factors and the overall advance of the scientific debate suggest that it is time to develop a replacement for the VAMP. EPA believes that the Board staff is uniquely situated to work with the stakeholder groups to identify the best next steps on the VAMP, and that the Board should incorporate those next steps into the WQCP review.

4. **San Joaquin Tributaries**. Allocating responsibility for meeting WQCP provisions is solely within the Board's discretion. At the same time, however, EPA believes that there is a legitimate question as to whether protecting designated uses in the lower San Joaquin and Delta and protecting salmonids in the tributaries can be better achieved by taking a more integrated view of San Joaquin River tributary water management. This issue should be evaluated as the Board reviews the San Joaquin River flows issue in its forthcoming review.

5. **Reviewing the Delta Outflow Standard (X2)**. The Board has recently received and acted on a Petition for Temporary Urgency Changes to Delta Outflow Criteria (commonly known as the X2 criteria) submitted by the U.S. Bureau of Reclamation and the Department of Water Resources. A significant portion of that petition was a broader concern about the biological underpinnings of the X2 criteria. EPA believes that the proper forum for a broad review of a significant standard is the triennial (or periodic) review, not a temporary change petition. That said, EPA believes that there has been substantial new biological information concerning Delta outflow developed over the last 15 years (since the adoption of the X2 criteria by the Board in the 1995 WQCP). We believe that this triennial review is the right time to reevaluate and confirm or revise this important standard. The review should include not only the existing spring outflow regime, but also consider fall X2 requirements to protect designated uses.

6. **Integrated Consideration of Upstream Regulatory Measures.** EPA commends the State and Regional Boards for their substantial efforts to coordinate State Board and Regional

Board activities affecting the Bay-Delta watershed. We believe that your intent to coordinate this process with the Central Valley Board's process for developing and implementing upstream salinity/boron objectives offers the best basis for making sound water quality regulatory decisions in a complicated basin.

EPA looks forward to working with the Board in this triennial review of the WQCP. If you have any questions about our comments, or have thoughts about how we might be of assistance in the Board's review, please call me at (415) 972-3472.

Very truly yours,

Karen Schwinn
Associate Director
Water Division

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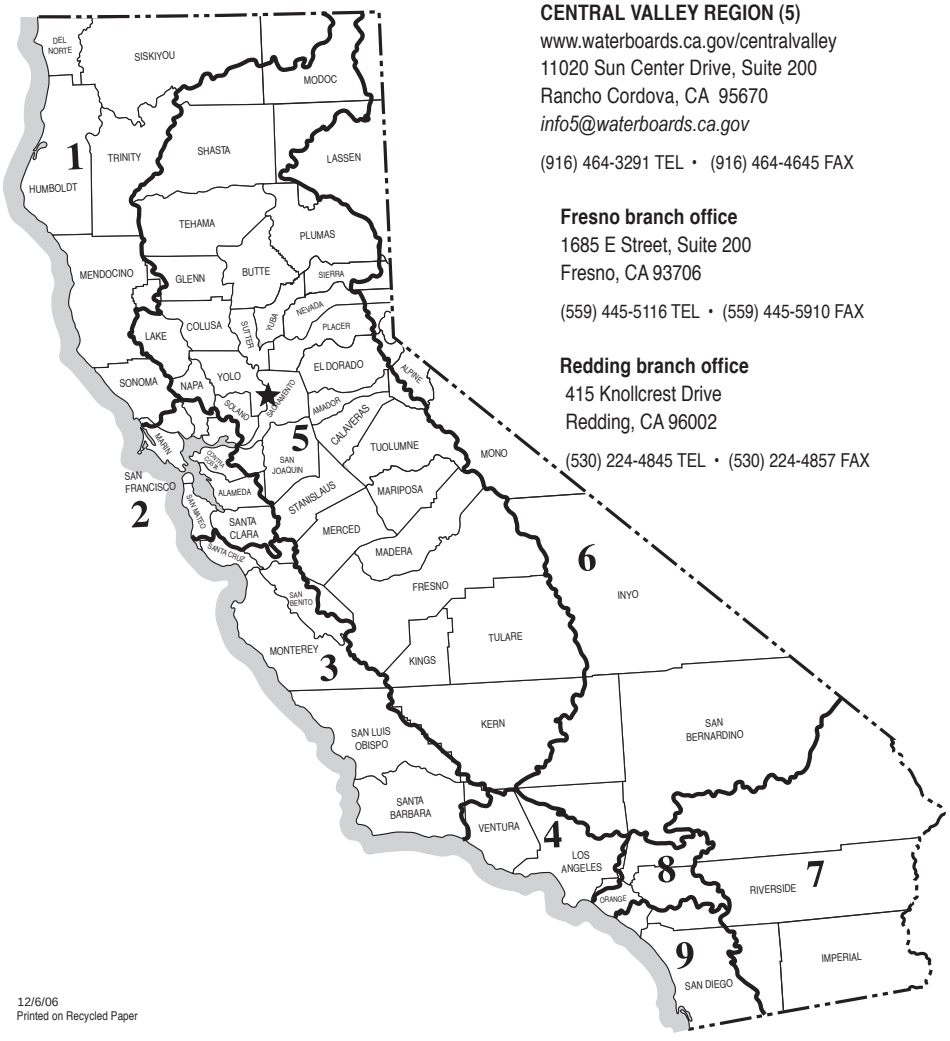

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