Water Quality Control Plan
for the
San Francisco Bay/Sacramento-San Joaquin Delta Estuary

December 12, 2018

CALIFORNIA
Water Boards

State Water Resources Control Board

STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 2018-0059

ADOPTION OF AMENDMENTS TO THE WATER QUALITY CONTROL PLAN FOR THE SAN FRANCISCO BAY/SACRAMENTO-SAN JOAQUIN DELTA ESTUARY AND FINAL SUBSTITUTE ENVIRONMENTAL DOCUMENT

WHEREAS:

1. The State Water Resources Control Board (State Water Board) and the nine regional water quality control boards administer the Porter-Cologne Water Quality Control Act (Wat. Code, § 13000 et seq.) (Porter-Cologne Act) to achieve an effective water quality control program for the state and are responsible for the regulation of activities and factors that may affect the quality of the waters of the state. (Wat. Code, §§ 13000, 13001.)

2. The State Water Board is authorized to adopt a water quality control plan in accordance with the provisions of Water Code sections 13240 through 13244, insofar as they are applicable. (Wat. Code, § 13170.)

3. The State Water Board has undertaken a proceeding under its water quality authority to amend the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan), adopted in 1978 and amended in 1991, 1995, and in 2006. The Bay-Delta Plan establishes water quality objectives for the protection of beneficial uses in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta) and a program of implementation to achieve the objectives. Diversions of water within and upstream of the Bay-Delta are a driver of water quality in the Bay-Delta. As a result, much of the implementation for the Bay-Delta Plan relies upon the combined water rights and water quality authorities of the State Water Board.

4. The 2006 Bay-Delta Plan identified emerging issues requiring additional action by the State Water Board, including San Joaquin River flows and Delta salinity. In the 2008 Strategic Workplan for Activities in the San Francisco Bay/ Sacramento-San Joaquin Delta Estuary, 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 further reiterated its commitment in the 2009 Staff Report on the Periodic Review of the San Francisco Bay/ Sacramento-San Joaquin Delta Estuary.

5. Native fish species that migrate through and inhabit the Delta have experienced dramatic population declines in recent years, bringing some species to the brink of extinction. Approximately 70,000 fall-run Chinook salmon adults returned to the San Joaquin Basin in 1985. The number of returning adults dropped to approximately 40,000 in 2000 and dropped again to 8,000 returning adults in 2013. Returning fall-run adults were estimated to be approximately 10,000 in 2017. This is an 85 percent net loss in returning adult fall-run Chinook salmon from 1985 to 2017. While multiple factors are responsible for the decline, the magnitude of diversions out of the Sacramento, San Joaquin, and other rivers feeding into the Bay-Delta is a major factor in the ecosystem decline. The State Water Board has authority over both water quality and water diversion and use.

6. The State Water Board adopted the southern Delta salinity objectives for agriculture in the 1978 Delta Plan. The objectives are based on conditions, crops, and irrigation practices in the southern Delta at the time the objectives were adopted. Recent analysis of southern Delta water quality and crop salinity requirements shows that the existing salinity conditions in the southern Delta are suitable for all crops and that the existing April through August salinity objective is lower than what is needed to reasonably protect agricultural beneficial uses.

7. The State Water Board commenced the process to amend the Bay-Delta Plan to reasonably protect fish and wildlife beneficial uses in the Lower San Joaquin River (LSJR) and its three eastside salmon-bearing tributaries, the Stanislaus, Tuolumne, and Merced Rivers, and agricultural beneficial uses in the southern Delta in 2009 as follows:

    a. On February 13, 2009, the State Water Board issued a Notice of Preparation (NOP) and of Scoping Meeting for Environmental Documentation for the Update and Implementation of the Bay Delta Plan: Southern Delta Salinity and San Joaquin River Flows. The public had an opportunity to submit written comments and to participate in the scoping meeting held on March 30, 2009. On April 1, 2011, the State Water Board issued a revised NOP and notice of additional scoping meeting, which provided for a written comment period and a scoping meeting on June 6, 2011. The notice included potential draft language for the southern Delta salinity objectives, San Joaquin River flow objectives, and the program of implementation.

    b. On April 22, 2009, the State Water Board staff held a public staff workshop to receive information and conduct detailed discussions regarding potential amendments or revisions to the southern Delta salinity and San Joaquin River flow objectives included in the Bay-Delta Plan and their implementation. It held other workshops including two workshops to receive and respond to public comments on a draft study report on the salt tolerance of crops in the southern Delta on August 13, 2009, and November 4, 2009, and a workshop on a draft technical report on the scientific basis for alternative San Joaquin River flow and southern Delta salinity objectives on January 6 and 7, 2011.

    c. On December 31, 2012, the State Water Board released for public review and comment a draft substitute environmental document (2012 Draft SED) in support of proposed changes to the Bay-Delta Plan to adopt new and revised narrative and numeric flow water quality objectives for the LSJR, including the Stanislaus, Tuolumne, and Merced Rivers, a revised salinity water quality objective in the southern Delta, and a program of implementation to achieve the objectives (2012 Draft Amendments). On March 20 and 21, 2013, it held a public hearing on the 2012 Draft SED and 2012 Draft Amendments. The deadline for written comments was March 29, 2013, and the State Water Board received numerous comments.

    d. On September 15, 2016, the State Water Board recirculated for public review and comment a revised draft substitute environmental document (Recirculated SED) in support of revisions to the 2012 Draft Amendments (2016 Draft Amendments). The Recirculated SED and 2016 Draft Amendments made substantial changes to the 2012 Draft SED and 2012 Draft Amendments in consideration of the large number of public comments received concerning those drafts, in light of additional information,

including information learned from the recent drought, and in response to the state's adoption in 2014 of a state policy for sustainable groundwater management (Wat. Code, § 113) and passage of the Sustainable Groundwater Management Act (Wat. Code, §§ 10720 et seq.), which provide a roadmap and directive for sustainable local groundwater management.

e. The State Water Board held a five-day public hearing, commencing in November 2016 and concluding in January 2017, on the Recirculated SED and 2016 Draft Amendments. State Water Board staff also held numerous workshops and outreach meetings. The State Water Board provided a six-month written comment period that closed on March 17, 2017. The State Water Board received thousands of comments.

f. On July 6, 2018, the State Water Board released the proposed final SED (Final SED), which includes proposed final amendments to the Bay-Delta Plan (Plan Amendments) and written responses to comments on the Recirculated SED and the 2016 Draft Amendments. It also provided notice of a public meeting to consider the adoption of the proposed Plan Amendments and Final SED, and solicited comments on the changes to the regulatory language in the proposed Plan Amendments. The Final SED, including the Plan Amendments, includes modifications that clarify, amplify, or refine information, primarily in response to comments. These modifications do not result in new significant environmental effects or a substantial increase in the severity of effects disclosed in the Recirculated SED.

g. At a public meeting on August 21-22, 2018, the State Water Board heard oral comments and considered the adoption of the proposed Plan Amendments and Final SED. The State Water Board continued final action to December 12, 2018. Change Sheets 1 to 3 were released to the public on August 20, 2018, and October 25, 2018, and include modifications to the Plan Amendments and the SED. Neither those changes nor the changes made by the State Water Board to this Resolution at the December 12, 2018, meeting result in new significant environmental effects or a substantial increase in the severity of effects disclosed in the Final SED.

8. The Plan Amendments' new and revised flow water quality objectives for the LSJR and a revised southern Delta salinity water quality objective are based on sound scientific rationale and contain sufficient parameters to protect fish and wildlife and agricultural beneficial uses.

9. Pursuant to Health and Safety Code section 57004, the scientific basis of the Plan Amendments underwent external scientific peer review through an interagency agreement with the University of California. Peer review was solicited on August 12, 2011, and completed on November 21, 2011.

10. In establishing and revising the flow water quality objectives for the LSJR and the salinity water quality objective for the southern Delta, the State Water Board has duly considered the factors set forth in Water Code section 13241. These factors include: (1) past, present, and probable future beneficial uses of water; (2) environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto; (3) water quality conditions that could reasonably be achieved through the coordinated control of all factors that affect water quality in the area;

(4) economic considerations; (5) the need for developing housing within the region; and (6) the need to develop and use recycled water. The information supporting the State Water Board's consideration of these factors is in the Final SED, including the comments and responses to comments contained therein.

11. The Plan Amendments include a program of implementation for achieving the LSJR flow water quality objectives and the salinity water quality objective for the southern Delta in accordance with Water Code section 13242. To help ensure transparency and accountability in evaluating compliance with the water quality objectives, to inform ongoing implementation, and to foster and accommodate the development of scientific information, the Plan Amendments require monitoring and reporting on annual and longer-term bases.

12. The water quality control planning program is a regulatory program that has been certified by the State's Secretary for Resources as exempt from the requirements of the California Environmental Quality Act (CEQA) (Pub. Resources Code, § 21000 et seq.) to prepare an environmental impact report (EIR) or negative declaration. (Cal. Code of Regs., tit. 14, § 15251, subd. (g); Cal. Code of Regs., tit. 23, § 3775.) The Final SED is in lieu of an EIR and has been completed in compliance with the requirements applicable to the State Water Board's certified exempt regulatory programs. The State Water Board has evaluated the potential environmental effects of reasonably foreseeable methods of compliance with the Plan Amendments in accordance with Public Resources Code section 21159 and California Code of Regulations, title 14, section 15187.

13. The Final SED comprises Volumes I to III (which includes responses to comments), as amended by change sheets; Comment Summary and Responses released in August 2018 to respond to comments solicited on July 6, 2018, on the changes to the language in the proposed Plan Amendments; Comment Responses released in October 2018 to respond to oral comments at the August 21-22, 2018, public meeting; and this resolution and its attachments, as amended by Change Sheet 1. (Cal. Code Regs., tit. 23, § 3779.5, subd. (b).) The Final SED includes sufficient environmental and technical analysis to satisfy the requirements of CEQA and other applicable laws.

14. In accordance with California Code of Regulations, title 23, section 3779.5, subdivision (c), and California Code of Regulations, title 14, section 15091, subdivision (a), Attachment 1 sets forth the CEQA Findings and Statement of Overriding Considerations Prepared for Amendments to the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary and is incorporated herein. It includes findings for each significant environmental effect that may occur from implementation of the Plan Amendments and describes measures to reduce significant effects. The State Water Board recognizes that despite mitigation measures described in the Final SED and in Attachment 1, implementation of the Plan Amendments would have significant and unavoidable effects on the environment. As explained in the statement of overriding considerations in Attachment 1, the specific economic, legal, social, technological, or other benefits, including region-wide or statewide environmental benefits, of the Plan Amendments outweigh the unavoidable significant environmental effects of the Plan Amendments. Attachment 2 is the Mitigation and Monitoring Program that sets forth and ensures implementation of mitigation measures within the State Water Board's authority and is incorporated herein.

15. It is the policy of the State of California that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes. (Wat. Code, § 106.3 and State Water Board Resolution No. 2016-0010.) The State Water Board has considered this policy and the Plan Amendments include a statement that the State Water Board "will take actions as necessary to ensure that the implementation of the flow objectives does not impact supplies of water for minimum health and safety needs, particularly during drought periods." The State Water Board will continue to consider this policy through the technical and financial assistance programs it administers for at-risk communities, including disadvantaged communities within the area covered by the Plan Amendments.

16. Adoption of the Plan Amendments is consistent with the state Antidegradation Policy (State Water Board Resolution No. 68-16) and the federal Antidegradation Policy (40 C.F.R. § 131.12).

17. The Bay-Delta Plan, as amended by the Plan Amendments, supplements the other water quality control plans that cover the Bay-Delta Estuary watershed. Together they include all necessary elements of water quality control plans in accordance with the Porter-Cologne Act and federal requirements. The Bay-Delta Plan supersedes any regional water quality control plans for the same waters to the extent of any conflict. (Wat. Code, § 13170.)

18. The Bay-Delta Plan will be reviewed every three years in compliance with Water Code section 13240 and federal Clean Water Act section 303(c) (33 U.S.C. § 1313(c)).

19. The State Water Board has complied with all notice and hearing requirements and carefully considered all timely oral and written comments, responses to comments, the Final SED, and all of the evidence in the administrative record. The Final SED reflects the independent judgment and analysis of the State Water Board.

20. The Plan Amendments will be submitted to the Office of Administrative Law (OAL) and become effective upon OAL approval. The water quality standards, as defined under the federal Clean Water Act, in the plan also will be submitted to the U. S. Environmental Protection Agency (U.S. EPA) in accordance with the federal Clean Water Act (33 U.S.C. § 1251 et seq.). Other portions of the Bay-Delta Plan, such as the program of implementation, are to be submitted to U.S. EPA as part of the continuing planning process, but do not require approval.

21. The State Water Board is aware of ongoing negotiations between interested stakeholders and various other state agencies to achieve voluntary agreements to implement the Plan Amendments. In particular, robust voluntary agreements can help inform and expedite implementation of the LSJR flow objectives and provide durable solutions in the Bay-Delta watershed while also providing reasonable protections for fish and wildlife.

    a. The State Water Board encourages stakeholders to continue to work together to reach voluntary agreements that incorporate a mix of flow and non-flow measures that meet or exceed the new and revised water quality objectives and protect fish and wildlife beneficial uses, and to present those voluntary agreements to the State Water Board for its review as soon as feasible.

b. At the December 12, 2018 meeting, the California Department of Water Resources and California Department of Fish and Wildlife presented updated information on voluntary agreements and the contours of a potential Delta watershed-wide agreement. The Delta watershed-wide voluntary agreement is a discrete project encompassing a larger area than the LSJR flow objectives and within the LSJR project area only includes the Tuolumne River. Additional work is necessary to develop an enforceable agreement, join additional parties, analyze the agreement and how it interacts with the Bay-Delta Plan, and assess what, if any, changes may be necessary to the Bay-Delta Plan for the agreement to serve as an implementation mechanism to reasonably protect beneficial uses in the Tuolumne River and applicable portions of the Bay-Delta watershed, while providing a suitable regulatory backstop. Final incorporation of a voluntary agreement that requires changes to the Bay-Delta Plan, as contemplated by Resolved ¶ 7 below would require additional public process, including compliance with procedures under the Porter-Cologne Water Quality Control Act and environmental review under CEQA.

c. Regardless of whether the current negotiations ultimately result in an agreement, the State Water Board will consider voluntary agreements as part of its proceedings to implement the Plan Amendments, consistent with its obligations under applicable law. In evaluating any proposal, the State Water Board will consider whether the agreement will help achieve the water quality objectives, help protect the beneficial use, and be enforceable through Board action.

d. If a voluntary agreement is reached after the adoption of the Plan Amendments, the State Water Board will consider the voluntary agreement and determine what, if any, actions are necessary to consider the agreement as a means of implementing the Bay-Delta Plan objectives, including a public process.

THEREFORE BE IT RESOLVED THAT:

1. The State Water Board hereby approves and adopts the Final SED, including the Findings and Statement of Overriding Considerations (Attachment 1), and the Mitigation and Monitoring Program (Attachment 2) and the mitigation measures set forth therein.

2. The State Water Board hereby adopts the Plan Amendments, which are set forth in Appendix K to the Final SED.

3. The State Water Board authorizes the Executive Director or designee to submit the Plan Amendments and the administrative record to OAL for review and approval.

4. The State Water Board authorizes the Executive Director or designee to make minor, non-substantive modifications to the language of the Plan Amendments or the supporting documentation, if the State Water Board, State Water Board staff, or OAL determines that such changes are needed for clarity or consistency, and to inform the State Water Board of any such changes.

5. The State Water Board directs staff, upon approval by OAL, to file a Notice of Decision with the Secretary for Natural Resources and transmit payment of the applicable fee as may be required to the Department of Fish and Wildlife pursuant to Fish and Game Code section 711.4.

6. The State Water Board directs the Executive Director or designee to submit the Plan Amendments to the U.S. EPA for approval in accordance with requirements of the federal Clean Water Act (33 U.S.C. § 1251 et seq.).

7. The State Water Board directs staff to provide appropriate technical and regulatory information to assist the California Natural Resources Agency in completing a Delta watershed-wide agreement, including potential flow and non-flow measures for the Tuolumne River, and associated analyses no later than March 1, 2019. State Water Board staff shall incorporate the Delta watershed-wide agreement, including potential amendments to implement agreements related to the Tuolumne River, as an alternative for a future, comprehensive Bay-Delta Plan update that addresses the reasonable protection of beneficial uses across the Delta watershed, with the goal that comprehensive amendments to the Bay-Delta Plan across the Delta watershed may be presented to the State Water Board for consideration as early as possible after December 1, 2019.

8. The Plan Amendments adopted by this resolution are not self-implementing. Subsequent regulatory actions are required to implement the objectives and make them enforceable. The December 1, 2019 date of Resolved ¶ 7 provides a path for acceptance and approval of a voluntary agreement before regulatory actions to amend the water rights of water users on the Tuolumne River would occur and with sufficient time to complete any additional planning actions well in advance of the date that the LSJR flow objectives will be fully implemented.

CERTIFICATION

The undersigned Clerk to the Board does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on December 12, 2018.

AYE:	Chair Felicia Marcus Board Member Tam M. Doduc Board Member E. Joaquin Esquivel Board Member Sean Maguire
NAY:	Board Member Dorene D'Adamo
ABSENT:	None
ABSTAIN:	None

Jeanine Townsend

Jeanine Townsend
Clerk to the Board

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ACRONYMS AND ABBREVIATIONS

AFRP	Anadromous Fish Restoration Program
Board	State Water Resources Control Board
BOD	Biochemical Oxygen Demand
BPA	Basin Plan Amendment
CALFED	aka California Bay Delta Authority
CALFED OPS	CALFED Water Operations Management Team
CBDA	California Bay Delta Authority
CEQA	California Environmental Quality Act
cfs	cubic feet per second
COP	Comprehensive Operations Plan
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
DBP	Disinfection by-product
DCC	Delta Cross Channel
DFG or DFW	California Department of Fish and Wildlife (formerly California Department of Fish and Game)
DO	Dissolved Oxygen
DWR	California Department of Water Resources
DWSC	Deep Water Ship Channel
EC	electrical conductivity
EMP	Environmental Monitoring Program
FERC	Federal Energy Regulatory Commission
IEP	Interagency Ecological Program
LSJR	Lower San Joaquin River
MAF	million acre-feet
mg/L	milligram(s) per liter
mmhos/cm	millimhos per centimeter
NDOI	Net Delta Outflow Index
NOAA Fisheries or NMFS	National Marine Fisheries Service
NPDES Permit	National Pollutant Discharge Elimination System Permit
OAL	California Office of Administrative Law
POD	Pelagic Organism Decline
ppt	parts per thousand
Regional Water Board	Regional Water Quality Control Board
ROD	Record of Decision
SDIP	South Delta Improvements Program
SDWA	South Delta Water Agency
SFSU	San Francisco State University
SJRMEP	San Joaquin River Monitoring and Evaluation Program
SLDMWA	San Luis Delta-Mendota Water Authority
SMCG	Suisun Marsh Charter Group
SMPA	Suisun Marsh Preservation Agreement

SMSCP	Suisun Marsh Salinity Control Project
SRCD	Suisun Resource Conservation District
STM Working Group	Stanislaus, Tuolumne and Merced Working Group
SWC	State Water Contractors
SWP	State Water Project
State Water Board	State Water Resources Control Board
TAF	thousand acre-feet
TMDL	Total Maximum Daily Load
UC DAVIS	University of California Davis
UDWA	Urban Drinking Water Agency
USBR	United States Bureau of Reclamation
USCOE	United States Army Corps of Engineers
USDOI	United States Department of the Interior
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WDR	Waste Discharge Requirements
WQCP	Water Quality Control Plan

References within the text use the above acronyms and abbreviations.

BAY-DELTA PLAN

Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary

Chapter I. Introduction

A. Background

The San Francisco Bay/Sacramento-San Joaquin River Delta Estuary (Bay-Delta Estuary or Estuary) (Figure 1) is important to the natural environment and economy of California. The watershed of the Bay-Delta Estuary provides drinking water to two-thirds of the State's population and water for a multitude of other urban uses, and it supplies some of the State's most productive agricultural areas, both inside and outside of the Estuary. The Bay-Delta Estuary itself is one of the largest ecosystems for fish and wildlife habitat and production in the United States. Historical and current human activities (e.g., water development, land use, wastewater discharges, introduced species, and harvesting), amplified by variations in natural conditions, have degraded the beneficial uses of the Bay-Delta Estuary, as evidenced by the declines in populations of many biological resources of the Estuary. Most recently, populations of Delta smelt and other pelagic organisms have exhibited significant declines, leading to investigations as to the possible causes of the degradation of the health of the Delta.

The State Water Resources Control Board (State Water Board) has previously adopted water quality control plans and policies to protect water quality and control the water resources that affect the beneficial uses of the Bay-Delta Estuary. These plans and policies were adopted consistent with section 13000 et seq. of the California Water Code and pursuant to the authority contained in section 13170. This Water Quality Control Plan covers the Bay-Delta Estuary and tributary watersheds (Bay-Delta Plan or Plan). The State Water Board periodically will review this plan pursuant to Water Code section 13240 to ensure that it provides reasonable protection for the designated beneficial uses.[1] The State Water Board's measures to implement this plan will consist of the regulation of existing water rights, regulatory measures to protect water quality, and recommendations to other entities. Current and previous versions of the Bay-Delta Plan[2] and supporting documents are available at:
http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/wq_control_plans/index.shtml
A summary description of the most recent updates to the Plan and issues of concern are provided in Section D: Key Issues and Plan Updates.

[1] The federal Clean Water Act, at section 303 (c), also requires a review of federal "standards," as defined in the Act, contained in state water quality control plans. (33 U.S.C. § 1313 (c).) The review under section 13240 ordinarily is combined with a review of any federal standards in a state water quality control plan.
[2] References herein to the 1995 Plan refer to the 1995 Bay-Delta Plan. References to the 2006 update refer to the update of the 2006 Bay-Delta Plan.

FIGURE 1
BAY-DELTA ESTUARY

B. Purpose and Application of the Water Quality Control Plan

A water quality control plan consists of: (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. This plan establishes water quality objectives for which implementation can be fully accomplished only if the State Water Board assigns some measure of responsibility to water rights holders and water users to mitigate for the effects on the designated beneficial uses of their diversions and use of water. Together, the beneficial uses and the water quality objectives established to reasonably protect the beneficial uses are called water quality standards under the terminology of the federal Clean Water Act.

This plan is complementary to the other water quality control plans adopted by the State and Regional Water Quality Control Boards (Regional Water Boards) and State policies for water quality control adopted by the State Water Board. This plan provides reasonable protection for the Estuary's beneficial uses that require control of salinity (caused by saltwater intrusion, municipal discharges, and agricultural drainage) and water project operations (flows and diversions). This plan protects the beneficial uses of the Bay-Delta Estuary and tributary watersheds. This plan supersedes the regional water quality control plans to the extent of any conflict between this plan and the regional water quality control plans. The other plans and policies establish water quality objectives and requirements for parameters such as toxic chemicals, bacterial contamination, and other parameters which have the potential to impair beneficial uses or cause nuisance.

Most of the objectives in this ongoing plan are being, and will continue to be, implemented by assigning responsibilities to water right holders because the parameters to be controlled are primarily impacted by flows and diversions. This plan, however, is not to be construed as establishing the responsibilities of water right holders. Nor is this plan to be construed as establishing the quantities of water that any particular water right holder or group of water right holders may be required to release or forego to meet the objectives in this plan. 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. If necessary after a water rights proceeding, this plan will be amended to reflect any changes that may be needed to ensure consistency between the plan and the water right decision.

C. Legal Authority

The State Water Board has prepared this Water Quality Control Plan under the Porter-Cologne Water Quality Control Act. The Regional Water Boards have primary responsibility for formulating and adopting water quality control plans for their respective regions (Wat. Code § 13240), but the State Water Board also is authorized, under Water Code section 13170, to adopt water quality control plans in

accordance with the provisions of section 13240 *et seq*[3]. When the State Water Board adopts a water quality control plan, it supersedes regional water quality control plans for the same waters to the extent of any conflict. (Wat. Code § 13170.)

This plan was informed by an environmental report prepared in compliance with Public Resources Code section 21080.5. The Secretary for Resources has certified the State Water Board's basin planning program as meeting the requirements of Public Resources Code section 21080.5. (Cal. Code Regs. tit. 14, § 15251(g).) Section 21080.5 authorizes state agencies acting under a certified program to assess the environmental effects of their actions within the decision-making document instead of in a separate environmental impact report or negative declaration.

1. Program of Implementation. A program of implementation for achieving water quality objectives shall include, but not be limited to: (1) a description of the nature of actions which are necessary to achieve the objectives, including recommendations for appropriate action by any entity, public or private; (2) a time schedule for the actions to be taken; and (3) a description of surveillance to be undertaken to determine compliance with the objectives. (Wat. Code, § 13242.)

2. U.S. Environmental Protection Agency Approval of This Plan. After adopting this Water Quality Control Plan, the State Water Board will submit this plan to the U.S. Environmental Protection Agency (USEPA) for approval under the federal Clean Water Act. (33 U.S.C. section 1251 et seq.) To the extent that this plan addresses matters outside the scope of the Clean Water Act, this plan will be provided to the USEPA for its consideration as a matter of State/federal comity. The State Water Board does not concede that it is required under the Clean Water Act to submit all parts of this plan to the USEPA. Assuming the USEPA has authority under the Clean Water Act to approve the objectives for flow and operations, the State Water Board believes that the USEPA could not adopt standards for these parameters under the Clean Water Act.[4] If the USEPA attempted to adopt such standards, it could fundamentally interfere with the State's water allocation authority under section 101(g) of the Clean Water Act.[5]

[3] The State Water Board also has authority to adopt State policy for water quality control under Water Code section 13140.
[4] The State Water Board reserves its arguments regarding the USEPA's authority to adopt standards for flow and operations, including standards for salinity intrusion. The State Water Board's legal comments regarding the USEPA's authority are set forth in the State Water Board's comments on the USEPA's January 6, 1994 draft standards, which were provided to the USEPA on March 11, 1994.
[5] The Supreme Court, in *PUD No. 1 of Jefferson County v. Washington Dep't of Ecology* (1994) 114 S.Ct. 1900, upheld a state's ability to impose an instream flow requirement under Clean Water Act section 401 to protect fish habitat which had been designated as a beneficial use in a water quality standard under Clean Water Act section 303. In reaching this result, the Supreme Court rejected arguments based on Clean Water Act section 101(g) that water quantities could not be regulated under the Clean Water Act. The Supreme Court pointed out that insufficient flows can cause water quality violations, and that reduced habitat caused by low flows may constitute pollution. The Court's narrow interpretation of section 101(g) allows regulation of water users by a state to prevent their having an adverse effect on water quality, but does not go so far as to allow a fundamental interference by the USEPA with a state's water allocation authority.

D. Key Issues and Plan Updates

This Plan is periodically updated. The most recent update of the Plan was completed in 2018, at which time the following elements were updated:

- San Joaquin River flow objectives to protect fish and wildlife beneficial uses and southern Delta salinity objective to protect agricultural beneficial uses;
- Programs of implementation to achieve and determine compliance with the above objectives; and
- Monitoring and special studies to fill information needs and inform future updates to the objectives.

This 2018 update of the San Joaquin River flow objectives implements the Delta Stewardship Council's Delta Plan recommendation for the State Water Board to adopt, and as soon as reasonably possible, implement flow objectives for high-priority tributaries in the Delta watershed that are necessary to achieve the coequal goals.[6]

The 2018 amendments to this Plan primarily address portions of the Plan concerning the San Joaquin River flow objectives and southern Delta salinity objective. In addition, updates without regulatory effect were made to descriptions of non-State Water Board programs related to salinity, key Bay-Delta issues and the State Water Board's planning efforts. Not all elements of the Bay-Delta Plan were updated in 2018. Some of the information in the Plan may therefore be out of date. This information will be updated as part of the State Water Board's process of reviewing and updating other elements of the Plan, including water quality objectives and programs of implementation for:

- Delta outflows
- Sacramento and other tributary inflows other than San Joaquin River
- Interior Delta flows
- Suisun Marsh and Suisun Bay salinity

This review will continue to address two key issues identified in the 2006 update of the Plan: ecosystem regime shift and climate change.

The State Water Board will conduct these planning activities with the support of the Delta Stewardship Council's Delta Science Program and the Independent Science Board to assure that Plan updates are based on the best available science. The State Water Board recognizes that planning for and management of the Delta's multiple uses, resources, and ecosystem should occur in cooperation with elected

[6] The 2009 Delta Reform Act declared that State policy for the Delta must serve two "coequal goals": providing a more reliable water supply for California, and protecting, restoring, and enhancing the Delta ecosystem; and to do so in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place.

officials, government agencies, stakeholders, academia, and affected Delta and California communities.

There was a rapid decline in the populations of numerous pelagic fishes in the Sacramento-San Joaquin Delta Estuary and Suisun Bay starting in 2002. This decline became known as the Pelagic Organism Decline (POD), and was studied intensely by the Interagency Ecological Program (IEP) POD work team and numerous other researchers. The POD studies largely concluded that the decline resulted from multiple adverse conditions, with no single explanatory factor. Ongoing research is largely focused on the working hypothesis that the Bay-Delta has undergone an ecosystem regime shift from highly variable environmental conditions that favored native and other estuarine-dependent species to less variable conditions that favor invasive species. Work to better understand the influence that these and other factors have in relation to POD is ongoing.

A growing body of information suggests that climate change could result in: (1) sea level rise that would adversely impact levees, water quality, and conveyance of water supplies through the Delta; (2) decreased snowmelt in the Sierra Nevada that would reduce effectiveness of existing water storage facilities; (3) increased rainfall that could exacerbate flooding; and (4) adverse biological effects from changes in flow and water quality. Water quality control planning must begin to address these possible effects. Future State Water Board activities therefore should be responsive to the impacts of climate change and provide timely response and guidance to water resources agencies, consistent with the Water Quality Control Plan, as they submit plans and requests to process applications for water conveyance facilities and flow control structures.

Chapter II. Beneficial Uses

A water quality control plan must establish beneficial uses. (Wat. Code § 13050(j).) Beneficial uses serve as a basis for establishing water quality objectives. The beneficial uses to be protected were established in the 1978 Delta Plan and the 1991 Bay-Delta Plan. These uses are carried over in this plan from earlier plans, including the 1995 Plan. The fish and wildlife beneficial uses designated in the "Water Quality Control Plan for the Sacramento River Basin and San Joaquin River Basin" for the Stanislaus River, Tuolumne River, Merced River, and the San Joaquin River from the mouth of the Merced River to Vernalis remain in effect and this plan includes measures to protect those uses. The beneficial uses protected by this plan are presented below.

Municipal and Domestic Supply (MUN) – Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.

Industrial Service Supply (IND) – Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining cooling water supply, hydraulic conveyance, gravel washing, fire protection, and oil well repressurization.

Industrial Process Supply (PRO) – Uses of water for industrial activities that depend primarily on water quality.

Agricultural Supply (AGR) – Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

Ground Water Recharge (GWR) – Uses of water for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.

Navigation (NAV) – Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

Water Contact Recreation (REC-1) – Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.

Non-Contact Water Recreation (REC-2) – Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion is reasonably possible. These include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Shellfish Harvesting (SHELL) – Uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial or sports purposes.

Commercial and Sport Fishing (COMM) – Uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

Warm Freshwater Habitat (WARM) – Uses of water that support warm water ecosystems including, but not limited to, preservation of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Cold Freshwater Habitat (COLD) – Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancements of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Migration of Aquatic Organisms (MIGR) – Uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.

Spawning, Reproduction, and/or Early Development (SPWN) – Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

Estuarine Habitat (EST) – Uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).

Wildlife Habitat (WILD) – Uses of water that support estuarine ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

Rare, Threatened, or Endangered Species (RARE) – Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under State or federal law as being rare, threatened, or endangered.

Chapter III. Water Quality Objectives

A water quality control plan must contain such water quality objectives as are needed to ensure the reasonable protection of beneficial uses and the prevention of nuisance. (Wat. Code, § 13241.) The State Water Board must consider, in establishing water quality objectives:

- The past, present, and probable future beneficial uses of water;
- The environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto;
- The water quality conditions that could reasonably be achieved through the coordinated control of all factors that affect water quality in the area;
- Economic considerations;
- The need for developing housing within the region;
- The need to develop and use recycled water. (Wat. Code, § 13241.)

Flow and water project operations are within the scope of objectives that can be adopted in a water quality control plan under the Porter-Cologne Water Quality Control Act.

This chapter establishes water quality objectives which, in conjunction with the water quality objectives for the Bay-Delta Estuary watershed that are included in other State Water Board adopted water quality control plans and in water quality control plans for the Central Valley and San Francisco Bay Basins, when implemented, will: (1) provide for reasonable protection of municipal, industrial, and agricultural beneficial uses;
(2) provide reasonable protection of fish and wildlife beneficial uses at a level which stabilizes or enhances the conditions of aquatic resources; and (3) prevent nuisance. These water quality objectives are established to attain the highest quality of water that is reasonable, considering all the demands being made on waters in the Estuary watershed.

The water quality objectives in this plan apply to waters of the San Francisco Bay system and the legal Sacramento-San Joaquin Delta and tributary watersheds, as specified in the objectives. Unless otherwise indicated, water quality objectives cited for a general area, such as for the southern Delta, are applicable for all locations in that general area and compliance locations will be used to determine compliance with the cited objectives. Tables 1, 2, and 3 contain the water quality objectives for the protection of municipal and industrial, agricultural, and fish and wildlife beneficial uses, respectively.

A. Water Quality Objectives for Municipal and Industrial Beneficial Uses

The water quality objectives in Table 1 provide reasonable protection of the beneficial uses MUN, IND, and PRO, from the effects of salinity intrusion. These

municipal and industrial objectives also provide protection for the beneficial uses of REC-1, REC-2, and GWR.

B. Water Quality Objectives for Agricultural Beneficial Uses

The water quality objectives in Table 2 provide reasonable protection of the beneficial use AGR, from the effects of salinity intrusion and agricultural drainage in the western, interior, and southern Delta.

C. Water Quality Objectives for Fish and Wildlife Beneficial Uses

The water quality objectives in Table 3 provide reasonable protection of fish and wildlife beneficial uses in the Bay-Delta Estuary including EST, COLD, WARM, MIGR, SPWN, WILD, and RARE. They also provide reasonable protection of fish and wildlife beneficial uses designated in the "Water Quality Control Plan for the Sacramento River Basin and San Joaquin River Basin" for the Stanislaus River, Tuolumne River, Merced River, and the San Joaquin River from the mouth of the Merced River to Vernalis, as well as those presumed to exist under the Clean Water Act.[7] Protection of these fish and wildlife beneficial uses also provides protection for the beneficial uses of SHELL, COMM, and NAV. The parameters to be regulated under Table 3 are dissolved oxygen, salinity (expressed as electrical conductivity), Delta outflow, river flows, export limits, and Delta Cross Channel gate operation. Information available in 1995 indicated that, unlike water quality objectives for parameters such as dissolved oxygen, temperature, and toxic chemicals, which have threshold levels beyond which adverse impacts to the beneficial uses occur, there were no defined threshold conditions that could be used to set objectives for flows and project operations. Instead, available information indicated that a continuum of protection 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. Therefore, these objectives were set based on a subjective determination of the reasonable needs of all the consumptive and nonconsumptive demands on the waters of the Estuary.

[7] See 40 C.F.R. § 131.10(j).

Table 1
Water Quality Objectives For Municipal and Industrial Beneficial Uses

COMPLIANCE LOCATIONS	INTERAGENCY STATION NUMBER (RKI [1])	PARAMETER	DESCRIPTION (UNIT)	WATER YEAR TYPE [2]	TIME PERIOD	VALUE
Contra Costa Canal at Pumping Plant #1 **-or-** *San Joaquin River at Antioch Water Works Intake*	*C-5 (CHCCC06)* *D12 (near) (RSAN007)*	*Chloride (Cl-)*	*Maximum mean daily 150 mg/L Cl- for at least the number of days shown during the calendar year. Must be provided in intervals of not less than two weeks duration. (Percentage of calendar year shown in parenthesis)*	*W* *AN* *BN* *D* *C*		*No. of days each calendar year ≤150 mg/L Cl-* *240 (66%)* *190 (52%)* *175 (48%)* *165 (45%)* *155 (42%)*
Contra Costa Canal at Pumping Plant #1 **-and-** *West Canal at mouth of Clifton Court Forebay* **-and-** *Delta-Mendota Canal at Tracy Pumping Plant* **-and-** *Barker Slough at North Bay Aqueduct Intake* **-and-** *Cache Slough at City of Vallejo Intake [3]*	*C-5 (CHCCC06)* *C-9 (CHWST0)* *DMC-1 CHDMC004* *--- (SLSAR3)* *C-19 (SLCCH16)*	*Chloride (Cl-)*	*Maximum mean daily (mg/L)*	*All*	*Oct-Sep*	*250*

Table 1 Footnotes:

[1] River Kilometer Index station number.

[2] The Sacramento Valley 40-30-30 water year hydrologic classification index (see Figure 2) applies for determinations of water year type.

[3] Cache Slough objective to be effective only when water is being diverted from this location.

Table 2
Water Quality Objectives For Agricultural Beneficial Uses

COMPLIANCE LOCATIONS	INTERAGENCY STATION NUMBER (RKI [1])	PARAMETER	DESCRIPTION (UNIT) [2]	WATER YEAR TYPE [3]	TIME PERIOD	VALUE
WESTERN DELTA						
Sacramento River at Emmaton	*D-22 (RSAC092)*	*Electrical Conductivity (EC)*	*Maximum 14-day running average of mean daily EC (mmhos/cm)*		*0.45 EC April 1 to date shown*	*EC from date shown to Aug 15 [4]*
				W	*Aug 15*	*----*
				AN	*Jul 1*	*0.63*
				BN	*Jun 20*	*1.14*
				D	*Jun 15*	*1.67*
				C	*----*	*2.78*
San Joaquin River at Jersey Point	*D-15 (RSAN018)*	*Electrical Conductivity (EC)*	*Maximum 14-day running average of mean daily EC (mmhos/cm)*		*0.45 EC April 1 to date shown*	*EC from date shown to Aug 15 [4]*
				W	*Aug 15*	*----*
				AN	*Aug 15*	*----*
				BN	*Jun 20*	*0.74*
				D	*Jun 15*	*1.35*
				C	*----*	*2.20*
INTERIOR DELTA						
South Fork Mokelumne River at Terminous	*C-13 (RSMKL08)*	*Electrical Conductivity (EC)*	*Maximum 14-day running average of mean daily EC (mmhos/cm)*		*0.45 EC April 1 to date shown*	*EC from date shown to Aug 15 [4]*
				W	*Aug 15*	*----*
				AN	*Aug 15*	*----*
				BN	*Aug 15*	*----*
				D	*Aug 15*	*----*
				C	*----*	*0.54*
San Joaquin River at San Andreas Landing	*C-4 (RSAN032)*	*Electrical Conductivity (EC)*	*Maximum 14-day running average of mean daily EC (mmhos/cm)*		*0.45 EC April 1 to date shown*	*EC from date shown to Aug 15 [4]*
				W	*Aug 15*	*----*
				AN	*Aug 15*	*----*
				BN	*Aug 15*	*----*
				D	*Jun 25*	*0.58*
				C	*----*	*0.87*
SOUTHERN DELTA						
San Joaquin River at Airport Way Bridge, Vernalis ***-and-*** *San Joaquin River from Vernalis to Brandt Bridge* ***-and-*** *Middle River from Old River to Victoria Canal* ***-and-*** *Old River/Grant Line Canal from Head of Old River to West Canal*	*C-10 [5] (RSAN112)* *C-6 [5] (RSAN073)* *C-8 [5] (ROLD69)* *P-12 [5] (ROLD59)*	*Electrical Conductivity (EC)*	*Maximum 30-day running average of mean daily EC (dS/m/m [6])*	*All*	*Year-round*	*1.0*
EXPORT AREA						
West Canal at mouth of Clifton Court Forebay ***-and-*** *Delta-Mendota Canal at Tracy Pumping Plant*	*C-9 (CHWST0)* *DMC-1 (CHDMC004)*	*Electrical Conductivity (EC)*	*Maximum monthly average of mean daily EC (mmhos/cm)*	*All*	*Oct-Sep*	*1.0*

Table 2 Footnotes:

[1] River Kilometer Index station number.

[2] Determination of compliance with an objective expressed as a running average begins on the last day of the averaging period. The averaging period commences with the first day of the time period for the applicable objective. If the objective is not met on the last day of the averaging period, all days in the averaging period are considered out of compliance.

[3] The Sacramento Valley 40-30-30 water year hydrologic classification index (see Figure 2) applies for determinations of water year type.

[4] When no date is shown, EC limit continues from April 1.

[5] The salinity objective is subject to the Variance Policy, Salinity Variance Program and Salinity Exception Program adopted in Central Valley Regional Water Board Resolution No. R5-2014-0074, as may be amended.

[6] 1 mmhos/cm = 1 dS/m. The International System of Units for EC is dS/m. As other portions of Table 2 are updated in future amendments to the Bay-Delta Plan, the units of measurement for EC will be updated to the international system.

Table 3
WATER QUALITY OBJECTIVES FOR FISH AND WILDLIFE BENEFICIAL USES

COMPLIANCE LOCATIONS	INTERAGENCY STATION NUMBER (RKI [1])	PARAMETER	DESCRIPTION (UNIT) [2]	WATER YEAR TYPE [3]	TIME PERIOD	VALUE
DISSOLVED OXYGEN						
San Joaquin River between Turner Cut & Stockton	*(RSAN050-RSAN061)*	*Dissolved Oxygen (DO)*	*Minimum DO (mg/L)*	*All*	*Sep-Nov*	*6.0*
SALMON PROTECTION						
			narrative	*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.*		
SAN JOAQUIN RIVER SALINITY						
San Joaquin River at and between Jersey Point and Prisoners Point [4]	*D-15 (RSAN018)* ***-and-*** *D-29 (RSAN038)*	*Electrical Conductivity (EC)*	*Maximum 14-day running average of mean daily EC(mmhos/cm)*	*W,AN,BN, D*	*Apr-May*	*0.44 [5]*
EASTERN SUISUN MARSH SALINITY[6]						
Sacramento River at Collinsville ***-and-*** *Montezuma Slough at National Steel* ***-and-*** *Montezuma Slough near Beldon Landing*	*C-2 (RSAC081)* *S-64 (SLMZU25)* *S-49 (SLMZU11)*	*Electrical Conductivity (EC)*	*Maximum monthly average of both daily high tide EC values (mmhos/cm), or demonstrate that equivalent or better protection will be provided at the location*	*All*	*Oct* *Nov-Dec* *Jan* *Feb-Mar* *Apr-May*	*19.0* *15.5* *12.5* *8.0* *11.0*
WESTERN SUISUN MARSH SALINITY[6]						
Chadbourne Slough at Sunrise Duck Club ***-and-*** *Suisun Slough, 300 feet south of Volanti Slough* ***-and-*** *Cordelia Slough at Ibis Club* ***-and-*** *Goodyear Slough at Morrow Island Clubhouse* ***-and-*** *Water supply intakes for waterfowl management areas on Van Sickle and Chipps islands*	*S-21 (SLCBN1)* *S-42 (SLSUS12)* *S-97 (SLCRD06)* *S-35 (SLGYR03)* *No locations specified*	*Electrical Conductivity (EC)*	*Maximum monthly average of both daily high tide EC values (mmhos/cm), or demonstrate that equivalent or better protection will be provided at the location*	*All but deficiency period* *Deficiency period [7]*	*Oct* *Nov* *Dec* *Jan* *Feb-Mar* *Apr-May* *Oct* *Nov* *Dec-Mar* *Apr* *May*	*19.0* *16.5* *15.5* *12.5* *8.0* *11.0* *19.0* *16.5* *15.6* *14.0* *12.5*
BRACKISH TIDAL MARSHES OF SUISUN BAY						
			narrative	*Water quality conditions sufficient to support a natural gradient in species composition and wildlife habitat characteristic of a brackish marsh throughout all elevations of the tidal marshes bordering Suisun Bay shall be maintained. Water quality conditions shall be maintained so that none of the following occurs: (a) loss of diversity; (b) conversion of brackish marsh to salt marsh; (c) for animals, decreased population abundance of those species vulnerable to increased mortality and loss of habitat from increased water salinity; or (d) for plants, significant reduction in stature or percent cover from increased water or soil salinity or other water quality parameters.*		

Table 3 (continued)
WATER QUALITY OBJECTIVES FOR FISH AND WILDLIFE BENEFICIAL USES

COMPLIANCE LOCATIONS	INTERAGENCY STATION NUMBER (RKI [1])	PARAMETER	DESCRIPTION (UNIT) [2]	WATER YEAR TYPE [3]	TIME PERIOD	VALUE
DELTA OUTFLOW						
		Net Delta Outflow Index (NDOI) [8]	*Minimum monthly average [9] NDOI(cfs)*	*All*	*Jan*	*4,500 [10]*
				All	*Feb-Jun*	*[11]*
				W,AN	*Jul*	*8,000*
				BN		*6,500*
				D		*5,000*
				C		*4,000*
				W,AN,BN	*Aug*	*4,000*
				D		*3,500*
				C		*3,000*
				All	*Sep*	*3,000*
				W,AN,BN,D	*Oct*	*4,000*
				C		*3,000*
				W,AN,BN,D	*Nov-Dec*	*4,500*
				C		*3,500*
RIVER FLOWS						
Sacramento River at Rio Vista	*D-24 (RSAC101)*	*Flow rate*	*Minimum monthly average [12] flow rate (cfs)*	*All*	*Sep*	*3,000*
				W,AN,BN,D	*Oct*	*4,000*
				C		*3,000*
				W,AN,BN,D	*Nov-Dec*	*4,500*
				C		*3,500*
LOWER SAN JOAQUIN RIVER FLOWS						
San Joaquin River at Airport Way Bridge, Vernalis	*C-10 (RSAN112)*	*Flow rate*	*Minimum monthly average flow rate (cfs)*	*All*	*Oct*	*1,000 [13]*
San Joaquin River at Airport Way Bridge, Vernalis	*C-10*	*Flow Rate*	*Narrative & Minimum 7-day running average flow rate (cfs) for February through June*	*Maintain inflow conditions from the San Joaquin River watershed to the Delta at Vernalis sufficient to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta. Inflow conditions that reasonably contribute toward maintaining viable native migratory San Joaquin River fish populations include, but may not be limited to, flows that more closely mimic the natural hydrographic conditions to which native fish species are adapted, including the relative magnitude, duration, timing, and spatial extent of flows as they would naturally occur. Indicators of viability include population abundance, spatial extent, distribution, structure, genetic and life history diversity, and productivity.*		
Stanislaus River at Koetitz	*DWR Gage KOT*					
Tuolumne River at Modesto	*USGS Gage 1129000*					
Merced River near Stevenson	*DWR Gage MST*			*Maintain 40% of unimpaired flow, with an allowed adaptive range between 30% - 50%, inclusive, from each of the Stanislaus, Tuolumne, and Merced Rivers from February through June.* [*14*]		
	C-10			*At all times during February through June, the flow at Vernalis, as provided by the percent of unimpaired flow objective, shall be no lower than the base flow value of 1,000 cfs with an allowed adaptive management range between 800 – 1,200 cfs, inclusive.*		
				Flows provided to meet these numeric objectives shall be managed in a manner to avoid causing significant adverse impacts to fish and wildlife beneficial uses at other times of the year.		

EXPORT LIMITS						
		Combined export rate [15]	*Maximum 3-day running average (cfs)*	*All*	*Apr 15-May 15 [16]*	*[17]*
				All	*Feb-Jun*	*35% Delta inflow [20]*
			Maximum percent of Delta inflow diverted [18] [19]	*All*	*Jul-Jan*	*65% Delta inflow*
DELTA CROSS CHANNEL GATES CLOSURE						
Delta Cross Channel at Walnut Grove	—	*Closure of gates*	*Closed gates*	*All*	*Nov-Jan*	*[21]*
					Feb-May 20	*----*
					May 21-Jun 15	*[22]*

Table 3 Footnotes:

[1] River Kilometer Index station number.

[2] Determination of compliance with an objective expressed as a running average begins on the last day of the averaging period. The averaging period commences with the first day of the time period of the applicable objective. If the objective is not met on the last day of the averaging period, all days in the averaging period are considered out of compliance.

[3] The Sacramento Valley 40-30-30 Water Year Hydrologic Classification Index (see Figure 2) applies unless otherwise specified.

[4] Compliance will be determined at Jersey Point (station D15) and Prisoners Point (station D29).

[5] This standard does not apply in May when the best available May estimate of the Sacramento River Index for the water year is less than 8.1 MAF at the 90% exceedance level. [Note: The Sacramento River Index refers to the sum of the unimpaired runoff in the water year as published in the California Department of Water Resources' (DWR) Bulletin 120 for the following locations: Sacramento River above Bend Bridge, near Red Bluff; Feather River, total unimpaired inflow to Oroville Reservoir; Yuba River at Smartville; and American River, total unimpaired inflow to Folsom Reservoir.]

[6] An exceedance of any of these objectives at a time when it is established through certification by the entity operating the Suisun Marsh Salinity Control Gates that the Gates are being operated to the maximum extent shall not be considered a violation of the objective.

[7] A deficiency period is: (1) the second consecutive dry water year following a critical year; (2) a dry water year following a year in which the Sacramento River Index (described in footnote 5) was less than 11.35; or (3) a critical water year following a dry or critical water year. The determination of a deficiency period is made using the prior year's final Water Year Type determination and a forecast of the current year's Water Year Type; and remains in effect until a subsequent water year is other than a Dry or Critical water year as announced on May 31 by DWR and U.S. Bureau of Reclamation (USBR) as the final water year determination.

[8] Net Delta Outflow Index (NDOI) is defined in Figure 4.

[9] For the May-January objectives, if the value is less than or equal to 5,000 cfs, the 7-day running average shall not be less than 1,000 cfs below the value; if the value is greater than 5,000 cfs, the 7-day running average shall not be less than 80% of the value.

[10] The objective is increased to 6,000 cfs if the best available estimate of the Eight River Index for December is greater than 800 TAF. [Note: The Eight River Index refers to the sum of the unimpaired runoff as published in the DWR Bulletin 120 for the following locations: Sacramento River flow at Bend Bridge, near Red Bluff; Feather River, total inflow to Oroville Reservoir; Yuba River flow at Smartville; American River, total inflow to Folsom Reservoir; Stanislaus River, total inflow to New Melones Reservoir; Tuolumne River, total inflow to Don Pedro Reservoir; Merced River, total inflow to Exchequer Reservoir; and San Joaquin River, total inflow to Millerton Lake.]

[11] The minimum daily Delta outflow shall be 7,100 cfs for this period, calculated as a 3-day running average. This requirement is also met if either the daily average or 14-day running average EC at the confluence of the Sacramento and the San Joaquin rivers is less than or equal to 2.64 mmhos/cm (Collinsville station C2). If the best available estimate of the Eight River Index (described in footnote 10) for January is more than 900 TAF, the daily average or 14-day running average EC at station C2 shall be less than or equal to 2.64 mmhos/cm for at least one day between February 1 and February 14; however, if the best available estimate of the Eight River Index for January is between 650 TAF and 900 TAF, the Executive Director of the State Water Board shall decide whether this requirement applies. If the best available estimate of the Eight River Index for February is less than 500 TAF, the standard may be further relaxed in March upon the request of the DWR and the USBR, subject to the approval of the Executive Director of the State Water Board. The standard does not apply in May and June if the best available May estimate of the Sacramento River Index (described in footnote 5) for the water year is less than 8.1 MAF at the 90% exceedance level. Under this circumstance, a minimum

14-day running average flow of 4,000 cfs is required in May and June. Additional Delta outflow objectives are contained in Table 4.

[12] The 7-day running average shall not be less than 1,000 cfs below the monthly objective.

[13] Plus up to an additional 28 TAF pulse/attraction flow during all water year types. The amount of additional water will be limited to that amount necessary to achieve a monthly average flow of 2,000 cfs. The additional 28 TAF pulse flow is not required in a critical year following a critical year. The pulse flow will be scheduled in consultation with the USFWS, the NOAA Fisheries and the DFW.

[14] Unimpaired flow represents the natural water production of a river basin, unaltered by upstream diversions, storage, or by export or import of water to or from other watersheds. Compliance with the percent of unimpaired flow from February through June in each river is determined by dividing the 7-day average observed flow at the compliance stations by the 7-day average calculated Full-Natural-Flow (FNF) at the FNF stations. Refinements to methods and measurements used to estimate FNF can be used for compliance if refinements improve accuracy and precision of FNF estimates. The total volume of water established by the percent of unimpaired flow requirement may be managed using an averaging period consistent with approved adaptive methods outlined in the program of implementation.

[15] Combined export rate for this objective is defined as the Clifton Court Forebay inflow rate (minus actual Byron-Bethany Irrigation District diversions from Clifton Court Forebay) and the export rate of the Tracy pumping plant.

[16] This time period may be varied based on real-time monitoring. The DWR and the USBR, in consultation with the USFWS, the NOAA Fisheries and the DFW, will determine the time period for this 31-day export limit. Consultation with the CALFED Operations Group established under the Framework Agreement will satisfy the consultation requirement.

[17] Maximum export rate is 1,500 cfs or 100% of the 3-day running average of San Joaquin River flow at Vernalis, whichever is greater. Variations to this maximum export rate may be authorized if agreed to by the USFWS, the NOAA Fisheries and the DFW. This flexibility is intended to result in no net water supply cost annually within the limits of the water quality and operational requirements of this plan. Variations may result from recommendations of agencies for protection of fish resources, including actions taken pursuant to the State and federal Endangered Species Act. Any variations will be effective immediately upon notice to the Executive Director of the State Water Board. If the Executive Director does not object to the variations within 10 days, the variations will remain in effect. The Executive Director of the State Water Board is also authorized to grant short-term exemptions to export limits for the purpose of facilitating a study of the feasibility of recirculating export water into the San Joaquin River to meet flow objectives.

[18] Percent of Delta inflow diverted is defined in Figure 4. For the calculation of maximum percent Delta inflow diverted, the export rate is a 3-day running average and the Delta inflow is a 14-day running average, except when the Central Valley Project or the State Water Project (SWP) is making storage withdrawals for export, in which case both the export rate and the Delta inflow are 3-day running averages.

[19] The percent Delta inflow diverted values can be varied either up or down. Variations are authorized subject to the process described in footnote 17.

[20] If the best available estimate of the Eight River Index (described in footnote 10) for January is less than or equal to 1.0 MAF, the export limit for February is 45% of Delta inflow. If the best available estimate of the Eight River Index for January is greater than 1.5 MAF, the February export limit is 35% of Delta inflow. If the best available estimate of the Eight River Index for January is between 1.0 MAF and 1.5 MAF, the DWR and the USBR will set the export limit for February within the range of 35% to 45%, after consultation with the USFWS, the NOAA Fisheries and the DFW. Consultation with the CALFED Operations Group established under the Framework Agreement will satisfy the consultation requirement.

[21] For the November-January period, close Delta Cross Channel gates for a total of up to 45 days. The USBR will determine the timing and duration of the gate closure after consultation with the USFWS, the NOAA Fisheries and the DFW. Consultation with the CALFED Operations Group established under the Framework Agreement will satisfy the consultation requirement.

[22] For the May 21-June 15 period, close the Delta Cross Channel gates for a total of 14 days. The USBR will determine the timing and duration of the gate closure after consultation with the USFWS, the NOAA Fisheries and the DFW. Consultation with the CALFED Operations Group established under the Framework Agreement will satisfy the consultation requirement. Gate closures shall be based on the need for the protection of fish. The process for approval of variations shall be similar to that described in footnote 17.

FIGURE 2

Sacramento Valley Water Year Hydrologic Classification

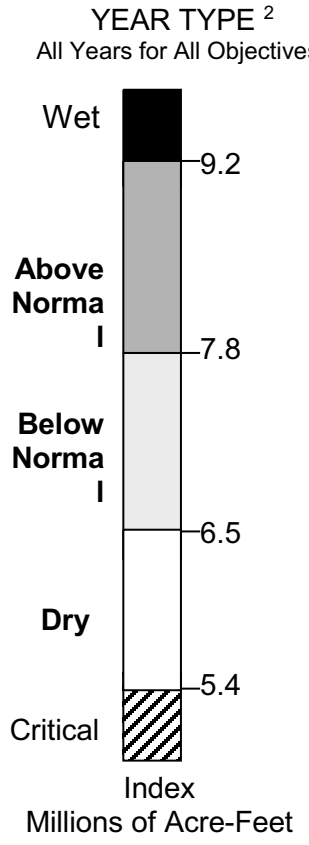
Year classification shall be determined by computation of the following equation:

INDEX = 0.4 * X + 0.3 * Y + 0.3 * Z

Where:
- X = Current year's April – July Sacramento Valley unimpaired runoff
- Y = Current October – March Sacramento Valley unimpaired runoff
- Z = Previous year's index[1]

The Sacramento Valley unimpaired runoff for the current water year (October 1 of the preceding calendar year through September 30 of the current calendar year), as published in California Department of Water Resources Bulletin 120, is a forecast of the sum of the following locations: Sacramento River above Bend Bridge, near Red Bluff; Feather River, total inflow to Oroville Reservoir; Yuba River at Smartville; American River, total inflow to Folsom Reservoir. Preliminary determinations of year classification shall be made in February, March, and April with final determination in May. These preliminary determinations shall be based on hydrologic conditions to date plus forecasts of future runoff assuming normal precipitation for the remainder of the water year.

Classification	Index Millions of Acre-Feet (MAF)
Wet……	Equal to or greater than 9.2
Above Normal…..	Greater than 7.8 and less than 9.2
Below Normal…..	Equal to or less than 7.8 and greater than 6.5
Dry…….....	Equal to or less than 6.5 and greater than 5.4
Critical……..…	Equal to or less than 5.4



1 A cap of 10.0 MAF is put on the previous year's index (Z) to account for required flood control reservoir releases during wet years.

2 The year type for the preceding water year will remain in effect until the initial forecast of unimpaired runoff for the current water year is available. The San Joaquin Valley Water Year Hydrologic Classification may be used to inform adaptive implementation of the LSJR flow objectives.

FIGURE 3

San Joaquin Valley Water Year Hydrologic Classification

Year classification shall be determined by computation of the following equation:

INDEX = 0.6 * X + 0.2 * Y + 0.2 * Z

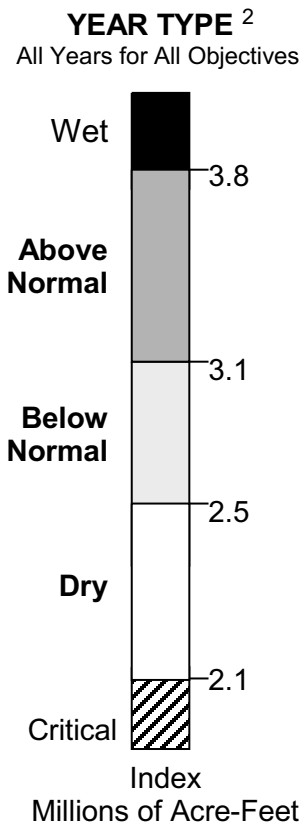
Where: X = Current year's April – July San Joaquin Valley unimpaired runoff

Y = Current October – March San Joaquin Valley unimpaired runoff

Z = Previous year's index[1]

The San Joaquin Valley unimpaired runoff for the current water year (October 1 of the preceding calendar year through September 30 of the current calendar year), as published in California Department of Water Resources Bulletin 120, is a forecast of the sum of the following locations: Stanislaus River, total flow to New Melones Reservoir; Tuolumne River, total inflow to Don Pedro Reservoir; Merced River, total flow to Exchequer Reservoir; San Joaquin River, total inflow to Millerton Lake. Preliminary determinations of year classification shall be made in February, March, and April with final determination in May. These preliminary determinations shall be based on hydrologic conditions to date plus forecasts of future runoff assuming normal precipitation for the remainder of the water year.

Classification	Index Millions of Acre-Feet (MAF)
Wet…….	Equal to or greater than 3.8
Above Normal…..	Greater than 3.1 and less than 3.8
Below Normal…..	Equal to or less than 3.1 and greater than 2.5
Dry…….	Equal to or less than 2.5 and greater than 2.1
Critical……..	Equal to or less than 2.1



1 A cap of 4.5 MAF is put on the previous year's index (Z) to account for required flood control reservoir releases during wet years.

2 The year type for the preceding water year will remain in effect until the initial forecast of unimpaired runoff for the current water year is available. The San Joaquin Valley Water Year Hydrologic Classification may be used to inform adaptive implementation of the LSJR flow objectives.

FIGURE 4

NDOI and PERCENT INFLOW DIVERTED[1]

The NDOI and the percent inflow diverted, as described in this figure, shall be computed daily by the DWR and the USBR using the following formulas (all flows are in cfs):

NDOI = DELTA INFLOW - NET DELTA CONSUMPTIVE USE - DELTA EXPORTS

PERCENT INFLOW DIVERTED = (CCF + TPP) ÷ DELTA INFLOW

where *DELTA INFLOW = SAC + SRTP + YOLO + EAST + MISC + SJR*

SAC = Sacramento River at Freeport mean daily flow for the previous day; the 25-hour tidal cycle measurements from 12:00 midnight to 1:00 a.m. may be used instead.

SRTP = Sacramento Regional Treatment Plant average daily discharge for the previous week.

YOLO = Yolo Bypass mean daily flow for the previous day, which is equal to the flows from the Sacramento Weir, Fremont Weir, Cache Creek at Rumsey, and the South Fork of Putah Creek.

EAST = Eastside Streams mean daily flow for the previous day from the Mokelumne River at Woodbridge, Cosumnes River at Michigan Bar, and Calaveras River at Bellota.

MISC = Combined mean daily flow for the previous day of Bear Creek, Dry Creek, Stockton Diverting Canal, French Camp Slough, Marsh Creek, and Morrison Creek.

SJR = San Joaquin River flow at Vernalis, mean daily flow for the previous day.

where *NET DELTA CONSUMPTIVE USE = GDEPL - PREC*

GDEPL = Delta gross channel depletion for the previous day based on water year type using the DWR's latest Delta land use study.[2]

PREC = Real-time Delta precipitation runoff for the previous day estimated from stations within the Delta.

and where *DELTA EXPORTS*[3] *= CCF + TPP + CCC + NBA*

CCF = Clifton Court Forebay inflow for the current day.[4]

TPP = Tracy Pumping Plant pumping for the current day.

CCC = Contra Costa Canal pumping for the current day.

NBA = North Bay Aqueduct pumping for the current day.

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1 Not all of the Delta tributary streams are gaged and telemetered. When appropriate, other methods of estimating stream flows, such as correlations with precipitation or runoff from nearby streams, may be used instead.

2 If up to date channel depletion estimates are available they shall be used. If these estimates are not available, DAYFLOW channel depletion estimates shall be used.

3 The term "Delta Exports" is used only to calculate the NDOI. It is not intended to distinguish among the listed diversions with respect to eligibility for protection under the area of origin provisions of the California Water Code.

4 Actual Byron-Bethany Irrigation District withdrawals from Clifton Court Forebay shall be subtracted from Clifton Court Forebay inflow. (Byron-Bethany Irrigation District water use is incorporated into the GDEPL term.)

Table 4. Number of Days When Maximum Daily Average Electrical Conductivity of 2.64 mmhos/cm Must Be Maintained at Specified Location

Number of Days When Maximum Daily Average Electrical Conductivity of 2.64 mmhos/cm Must Be Maintained at Specified Location [a]																	
PMI[b] (TAF)	Chipps Island (Chipps Island Station D10)					PMI[b] (TAF)	Port Chicago (Port Chicago Station C14) [d]					PMI[b] (TAF)	Port Chicago (Port Chicago Station C14)[d]				
	FEB	MAR	APR	MAY	JUN		FEB	MAR	APR	MAY	JUN		FEB	MAR	APR	MAY	JUN
≤ 500	0	0	0	0	0	**0**	0	0	0	0	0	**5250**	27	29	25	26	6
750	0	0	0	0	0	**250**	1	0	0	0	0	**5500**	27	29	26	28	9
1000	28[c]	12	2	0	0	**500**	4	1	0	0	0	**5750**	27	29	27	28	13
1250	28	31	6	0	0	**750**	8	2	0	0	0	**6000**	27	29	27	29	16
1500	28	31	13	0	0	**1000**	12	4	0	0	0	**6250**	27	30	27	29	19
1750	28	31	20	0	0	**1250**	15	6	1	0	0	**6500**	27	30	28	30	22
2000	28	31	25	1	0	**1500**	18	9	1	0	0	**6750**	27	30	28	30	24
2250	28	31	27	3	0	**1750**	20	12	2	0	0	**7000**	27	30	28	30	26
2500	28	31	29	11	1	**2000**	21	15	4	0	0	**7250**	27	30	28	30	27
2750	28	31	29	20	2	**2250**	22	17	5	1	0	**7500**	27	30	29	30	28
3000	28	31	30	27	4	**2500**	23	19	8	1	0	**7750**	27	30	29	31	28
3250	28	31	30	29	8	**2750**	24	21	10	2	0	**8000**	27	30	29	31	29
3500	28	31	30	30	13	**3000**	25	23	12	4	0	**8250**	28	30	29	31	29
3750	28	31	30	31	18	**3250**	25	24	14	6	0	**8500**	28	30	29	31	29
4000	28	31	30	31	23	**3500**	25	25	16	9	0	**8750**	28	30	29	31	30
4250	28	31	30	31	25	**3750**	26	26	18	12	0	**9000**	28	30	29	31	30
4500	28	31	30	31	27	**4000**	26	27	20	15	0	**9250**	28	30	29	31	30
4750	28	31	30	31	28	**4250**	26	27	21	18	1	**9500**	28	31	29	31	30
5000	28	31	30	31	29	**4500**	26	28	23	21	2	**9750**	28	31	29	31	30
5250	28	31	30	31	29	**4750**	27	28	24	23	3	**10000**	28	31	30	31	30
≤ 5500	28	31	30	31	30	**5000**	27	28	25	25	4	**>10000**	28	31	30	31	30

[a] The requirement for number of days the maximum daily average EC (EC) of 2.64 mmhos per centimeter (mmhos/cm) must be maintained at Chipps Island and Port Chicago can also be met with maximum 14-day running average EC of 2.64 mmhos/cm, or 3-day running average NDOIs of 11,400 cfs and 29,200 cfs, respectively. 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. The number of days for values of the PMI between those specified in this table shall be determined by linear interpolation.

[b] PMI is the best available estimate of the previous month's Eight River Index. (Refer to Footnote 10 for Table 3 for a description of the Eight River Index.)

[c] When the PMI is between 800 TAF and 1000 TAF, the number of days the maximum daily average EC of 2.64 mmhos/cm (or maximum 14-day running average EC of 2.64 mmhos/cm, or 3-day running average NDOI of 11,400 cfs) must be maintained at Chipps Island in February is determined by linear interpolation between 0 and 28 days.

[d] This standard applies only in months when the average EC at Port Chicago during the 14 days immediately prior to the first day of the month is less than or equal to 2.64 mmhos/cm.

Chapter IV. Program of Implementation

The Porter-Cologne Water Quality Control Act states that a water quality control plan consists of a designation or establishment of beneficial uses to be protected, water quality objectives, and program of implementation needed for achieving water quality objectives. (Wat. Code, § 13050(j).) The implementation program shall include, but not be limited to:

1. A description of the nature of actions which are necessary to achieve the objectives, including recommendations for appropriate action by any entity, public or private;
2. A time schedule for the actions to be taken; and
3. A description of surveillance to be undertaken to determine compliance with the objectives. (Wat. Code, § 13242.)

This program of implementation for the Water Quality Control Plan for the Bay Delta Estuary consists of five general components: (1) implementation 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; and (5) other studies that are being conducted by other entities but may provide information relevant to future proceedings. The specific actions identified within these components include time schedules for implementation, if appropriate. No time schedule is included for actions that have already been implemented.

The State Water Board will exercise its quasi-legislative or adjudicative powers involving water rights and water quality to require implementation of the water quality objectives. Water quality actions include water quality certifications, regulations, waste discharge requirements, and water quality permitting. In the future, the State Water Board may amend this program of implementation, take action in a water right proceeding or proceedings to change the water right responsibilities of water right holders to implement these objectives, or take other actions that implement the objectives.

A. Implementation Measures within State Water Board Authority

Under its water rights and water quality authority, the State Water Board will take actions to require implementation of the objectives in this Plan. The State Water Board may implement the objectives by conducting water right proceedings, which may include adopting regulations, conducting adjudicative proceedings, or both, that take into consideration the requirements of the Public Trust Doctrine and the California Constitution, article X, section 2. The State Water Board will also continue, as necessary and appropriate, to use its Clean Water Act section 401 water quality certification authority to implement objectives in this Plan, and may take other actions under its water quality authority to implement objectives in this Plan. The following water quality objectives are currently, or may in the future be,

primarily implemented using water rights authority, but may also be implemented through water quality actions:

1. Delta Outflow
2. River Flows: Sacramento River at Rio Vista
3. River Flows: Lower San Joaquin River
4. Export Limits
5. Delta Cross Channel Gates Operation
6. Salinity

The State Water Board may require compliance with these objectives in stages or may shift responsibility for meeting an objective among water right holders and other entities based on evidence it receives in a water right proceeding or in a water quality proceeding.

1. Delta Outflow Objective
The Delta Outflow Objective is to be implemented through water right actions. It requires a minimum amount of outflow, measured in cubic feet per second (cfs) as defined in footnote 11 of Table 3. The permits and license of the DWR and the USBR are conditioned to establish responsibilities to ensure that the Delta Outflow Objective is met on an interim basis until the State Water Board adopts a water right decision or order that assigns permanent responsibility for meeting the Delta Outflow Objective. This water right decision or order would follow a water right proceeding after a request for such a proceeding by the DWR or USBR.

2. River Flows: Sacramento River at Rio Vista
This objective is to be implemented through water right actions. The permits and license of the DWR and the USBR are conditioned to establish responsibilities to ensure that the flow objectives at Rio Vista on the Sacramento River are met on an interim basis until the State Water Board adopts a decision that assigns permanent responsibility for meeting the Sacramento River at Rio Vista flow objectives. This water right decision would follow a water right proceeding after a request for such a proceeding by the DWR or USBR.

3. River Flows: Lower San Joaquin River at Airport Way Bridge, Vernalis
The Lower San Joaquin River (LSJR) water quality objectives for the reasonable protection of fish and wildlife beneficial uses, referred to as the LSJR flow objectives, include all of the LSJR flow objectives for February through June, the LSJR base flow objective for February through June at Vernalis, and the October pulse flow objective, as set forth in Table 3.

This program of implementation focuses on flow-related actions on the Stanislaus, Tuolumne, and Merced Rivers (collectively, “LSJR Tributaries”) that are necessary to achieve the LSJR flow objectives. The State Water Board also recognizes that Recommended Actions, including non-flow measures, such as habitat restoration, must also be part of efforts to comprehensively address Delta aquatic ecosystem

needs as a whole. The State Water Board encourages voluntary agreements that will assist in implementing the LSJR flow objectives, and will consider such agreements as part of its proceedings to implement this Plan, consistent with its obligations under applicable law.

Implementation of February through June LSJR Flow Objectives

By 2022, the State Water Board will fully implement the February through June LSJR flow objectives through water right actions or water quality actions, such as Federal Energy Regulatory Commission (FERC) hydropower licensing processes.[8]

The State Water Board will exercise its water right and water quality authority to help ensure that the flows required to meet the LSJR flow objectives are used for their intended purpose and are not diverted for other purposes. In order to help ensure that actions taken in response to implementation of the LSJR flow objectives do not result in unreasonable redirected impacts to groundwater resources, the State Water Board will take actions as necessary pursuant to its authorities, including its authorities to prevent the waste, unreasonable use, unreasonable method of use, and unreasonable method of diversion of water (Cal. Const., art. X, § 2; Wat. Code, §§ 100, 275) and to enforce the Sustainable Groundwater Management Act (SGMA) (Wat. Code, § 10720 et seq.).

When implementing the LSJR flow objectives through water right actions or water quality actions, the State Water Board will require the development and implementation of minimum reservoir carryover storage targets or other requirements to help ensure that providing flows to meet the flow objectives will not have significant adverse temperature or other impacts on fish and wildlife or, if feasible, on other beneficial uses. The State Water Board will also take actions as necessary to ensure that implementation of the flow objectives does not impact supplies of water for minimum health and safety needs, particularly during drought periods. Actions may include, but are not limited to, assistance with funding and development of water conservation efforts and regional water supply reliability projects and regulation of public drinking water systems and water rights.

Although the lowest downstream compliance location for the LSJR flow objectives is at Vernalis, the objectives are intended to protect migratory LSJR fish in a larger area, including within the Delta, where fish that migrate to or from the LSJR watershed depend on adequate flows from the LSJR and its salmon-bearing tributaries.

It is the State Water Board's intention that an entity's implementation of the LSJR flow objectives, including implementation through flow requirements imposed in a FERC process, will meet any responsibility to contribute to the LSJR inflow component of the Delta outflow objective in this Plan. The State Water Board,

[8] To refine the implementation actions and provide for coordination with ongoing FERC proceedings in the LSJR watershed, the February through June LSJR flow objective may be phased in over time, but must be fully implemented by 2022.

however, may further consider and reallocate responsibility for implementing the Delta outflow objective in any subsequent proceeding, including a water right proceeding.

Flow Requirements for February through June

The LSJR flow objectives for February through June shall be implemented by requiring 40 percent of unimpaired flow, based on a minimum 7-day running average, from each of the Stanislaus, Tuolumne, and Merced Rivers. This required percentage of unimpaired flow, however, may be adjusted within the range allowed by the LSJR flow objectives through adaptive methods detailed below. The required percentage of unimpaired flow does not apply to an individual tributary during periods when flows from that tributary could cause or contribute to flooding or other related public safety concerns, as determined by the State Water Board or Executive Director through consultation with federal, state, and local agencies and other persons or entities with expertise in flood management.

In addition, the LSJR base flow objective for February through June shall be implemented by requiring a minimum base flow of 1,000 cfs, based on a minimum 7-day running average, at Vernalis at all times. This minimum base flow, however, may be adjusted within the range allowed by the LSJR base flow objective through adaptive methods detailed below. When the percentage of unimpaired flow requirement is insufficient to meet the minimum base flow requirement, the Stanislaus River shall provide 29 percent, the Tuolumne River 47 percent and the Merced River 24 percent of the additional total outflow needed to achieve and maintain the required base flow at Vernalis.

The Executive Director may approve changes to the compliance locations and gage station numbers set forth in Table 3 if information shows that another location and gage station more accurately represent the flows of the LSJR tributary at its confluence with the LSJR.

Adaptive Methods for February through June Flows

Adjustments to the February through June unimpaired flow requirements allowed by the LSJR flow objectives should be implemented in a coordinated and adaptive manner, taking into account current information. Specifically, FERC licensing proceedings on the Merced and Tuolumne Rivers, other scientific review processes initiated to develop potential management strategies on a tributary basis, and the establishment of the San Joaquin River Monitoring and Evaluation Program (SJRMEP) described below are expected to yield additional scientific information that will inform future management of flows for the protection of fish and wildlife beneficial uses.

Adaptive implementation could also optimize flows to achieve the objectives while allowing for consideration of other beneficial uses, provided that these other considerations do not reduce intended benefits to fish and wildlife.

The State Water Board may approve adaptive adjustments to the flow requirements as set forth in (a) – (d) below on an annual or long-term basis if information produced through the monitoring and review processes described in this program of implementation, or other best available scientific information, indicates that the change for the period at issue will satisfy the following criteria for adaptive adjustments: (1) it will be sufficient to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta; and (2) it will meet any existing biological goals approved by the State Water Board. The Executive Director may approve adaptive adjustments that satisfy the criteria above and as provided below:

a) The required percent of unimpaired flow may be adjusted to any value between 30 percent and 50 percent, inclusive. The Executive Director may approve changes within this range on an annual basis if all members of the Stanislaus, Tuolumne, and Merced Working Group (STM Working Group), described below, agree to the changes.

b) The required percent of unimpaired flow for February through June may be managed as a total volume of water and released on an adaptive schedule during that period where scientific information indicates a flow pattern different from that which would occur by tracking the unimpaired flow percentage would better protect fish and wildlife beneficial uses. The total volume of water must be at least equal to the volume of water that would be released by tracking the unimpaired flow percentage from February through June. The Executive Director may approve such changes on an annual basis if the change is recommended by one or more members of the STM Working Group.

c) The release of a portion of the February through June unimpaired flow may be delayed until after June to prevent adverse effects to fisheries, including temperature, that would otherwise result from implementation of the February through June flow requirements. The ability to delay release of flow until after June is only allowed when the unimpaired flow requirement is greater than 30 percent. If the requirement is greater than 30 percent but less than 40 percent under (a) above, the amount of flow that may be released after June is limited to the portion of the unimpaired flow requirement over 30 percent. (For example, if the flow requirement is 35 percent, 5 percent may be released after June.) If the requirement is 40 percent or greater under (a) above, then 25 percent of the total volume of the flow requirement may be released after June. (For example, if the requirement is 50 percent, at least 37.5 percent unimpaired flow must be released in February through June and up to 12.5 percent unimpaired flow may be released after June.) The

Executive Director may approve changes on an annual basis if the change is recommended by one or more members of the STM Working Group.

d) The required base flow for February through June may be adjusted to any value between 800 and 1,200 cfs, inclusive. The Executive Director may approve changes within this range on an annual basis if all members of the STM Working Group agree to the changes.

Any of the adjustments in (a)-(d) above may be made independently of each other or combined. The adjustments in (a), (b), and (c) may also be made independently on each of the Stanislaus, Tuolumne, and Merced Rivers, so long as the flows are coordinated to achieve beneficial results in the LSJR related to the protection of fish and wildlife beneficial uses. Experiments may also be conducted within the adaptive adjustments in (a)-(d), subject to the approvals provided therein, in order to improve scientific understanding of needed measures for the protection of fish and wildlife beneficial uses, such as the optimal timing of required flows. Any experiment shall be coordinated with the SJRMEP and identify the scientific uncertainties to be addressed and the actions that will be taken to reduce those uncertainties, including monitoring and evaluation.

Stanislaus, Tuolumne and Merced Working Group

The State Water Board will establish a STM Working Group to assist with the implementation, monitoring and effectiveness assessment of the February through June LSJR flow requirements. Specifically, the State Water Board will seek recommendations from the STM Working Group on biological goals; procedures for implementing the adaptive methods described above; annual adaptive operations plans; and the SJRMEP, including special studies and reporting requirements. Each of these activities is described in more detail below.

The State Water Board will seek participation in the STM Working Group by the following entities who have expertise in LSJR, Stanislaus, Tuolumne, and Merced Rivers fisheries management, hydrology, operations, and monitoring and assessment needs: the DFW; NMFS; USFWS; and water diverters and users on the Stanislaus, Tuolumne, and Merced Rivers. The STM Working Group will also include State Water Board staff and may include any other persons or entities the Executive Director determines to have appropriate expertise, including non-governmental organizations. To the extent practicable, the Executive Director will strive to achieve a membership of the STM Working Group that is a balance of interests such that no one interest constitutes a majority of the group. Subgroups of the STM Working Group may be formed as appropriate and State Water Board staff may also initiate activities in coordination with members of the STM Working Group.

The STM Working Group provides recommendations to the State Water Board, but has no control over diversions of water or water project operations. Persons assigned responsibility for implementing the February through June LSJR flow

objectives maintain responsibility for the diversion or use of water or water project operations necessary to implement the water quality objectives.

Biological Goals

Biological goals will be used to inform the adaptive methods, evaluate the effectiveness of this program of implementation, the SJRMEP, and future changes to the Bay-Delta Plan. The State Water Board will seek recommendations on the biological goals from the STM Working Group, State Water Board staff, and other interested persons, in consultation with the Delta Science Program. The State Water Board will consider approval of the biological goals within 180 days from the date of the Office of Administrative Law's (OAL) approval of this amendment to the Bay-Delta Plan and may modify them based on new information developed through the monitoring and evaluation activities described below or other pertinent sources of scientific information. Biological goals will specifically be developed for LSJR salmonids, as salmonids are among the fish species most sensitive to LSJR flow modifications. The State Water Board may seek recommendations on biological goals for other LSJR species as appropriate.

Biological goals for salmonids will specifically be developed for:

- abundance
- productivity as measured by population growth rate
- genetic and life history diversity
- population spatial extent, distribution, and structure

Reasonable contributions to these biological goals may include meeting temperature targets and other measures of quality and quantity of spawning, rearing, and migration habitat, fry production, and juvenile outmigrant survival to the confluence of each tributary to the LSJR.

The salmonid biological goals for this program of implementation will be specific to the LSJR and its tributaries and will contribute to meeting the overall goals for each population, including the salmon doubling objective established in state and federal law. Biological goals should be specific, measurable, achievable, result-focused, and include a time frame for when they will be achieved. Biological goals for salmonid populations will be consistent with best available scientific information, including information regarding viable salmonid populations, recovery plans for listed salmonids, or other appropriate information.

Unimpaired Flow Compliance

Implementation of the unimpaired flow requirement for February through June will require the development of information and specific measures to achieve the flow objectives and to monitor and evaluate compliance. The STM Working Group, or

State Water Board staff as necessary, will, in consultation with the Delta Science Program, develop and recommend such proposed measures. The State Water Board or Executive Director will consider approving the measures within 180 days from the date of OAL's approval of this amendment to the Bay-Delta Plan. The approved measures will inform State Water Board water right proceedings, FERC licensing proceedings, or other implementation actions to achieve the February through June flows. As information and methods improve, specific measures to achieve the flow objectives and to monitor and evaluate compliance may be modified and submitted for approval.

Procedures for Implementation of Adaptive Methods

The STM Working Group, or State Water Board staff as necessary, will, in consultation with the Delta Science Program, develop proposed procedures for allowing the adaptive adjustments to the February through June flow requirements discussed above. The State Water Board or Executive Director will consider approving procedures for allowing those adaptive adjustments within one year following the date of OAL's approval of this amendment to the Bay-Delta Plan.

Annual Adaptive Operations Plan

The State Water Board will assign responsibility for submitting and implementing approved annual plans for adaptive implementation actions (annual adaptive operations plans) when it implements the LSJR flow objectives in water right or water quality actions. Proposed annual adaptive operations plans will be required for the coming season by January 10 of each year and must be approved by the State Water Board or Executive Director. Proposed annual adaptive operations plans must be subject to review by the STM Working Group prior to submission to the State Water Board. The State Water Board or Executive Director will consider the recommendations of the STM Working Group when acting on annual adaptive operations plans, along with the requirements and procedures for adaptive implementation and other relevant information. The State Water Board recognizes that an annual operations plan is based on a forecast from the best available information and may not accurately reflect actual conditions that occur during the February through June period. Accordingly, the State Water Board will consider this factor and whether the hydrologic condition could have been planned for in evaluating deviations from approved operations plans. An annual operations plan shall include actions and operations that consider and will work under a reasonable range of hydrological conditions. It shall also identify how unimpaired flows are calculated and adjustments to be made as updated information becomes available, such as DWR's Bulletin 120.[9] An annual operations plan shall be informed by the review activities described below and may be modified with the approval of the State

[9] Bulletin 120 is a publication issued four times a year, in the second week of February, March, April, and May by the California Department of Water Resources. It contains forecasts of the volume of seasonal runoff from the state's major watersheds, and summaries of precipitation, snowpack, reservoir storage, and runoff in various regions of the State.

Water Board or Executive Director. A multi-year operations plan meeting these requirements may be submitted at any time.

Implementation of October Pulse Flow Objective

The October pulse flow objective is currently implemented through water right actions. The State Water Board will reevaluate the assignment of responsibility for meeting the October pulse flow objective during a water right proceeding, FERC licensing proceeding, or other proceeding.

Through water right, FERC licensing, or other processes, the State Water Board will require monitoring and special studies to determine what, if any, changes should be made to the October pulse flow objective and its implementation. The State Water Board may require such monitoring and special studies to be part of the SJRMEP. The State Water Board will evaluate the need to modify the October pulse flow objective in a future update of the Bay-Delta Plan based on information developed through these processes.

State of Emergency

At its discretion, or at the request of any affected responsible agency or person, the State Water Board may authorize a temporary change in the implementation of the LSJR flow objectives in a water right proceeding if the State Water Board determines that either (i) there is an emergency as defined in the California Environmental Quality Act (Pub. Resources Code, § 21060.3) or (ii) the Governor of the State of California has declared an emergency pursuant to the California Emergency Services Act (Gov. Code, § 8550 et seq.) and LSJR flow requirements affect or are affected by the conditions of such emergency. Before authorizing any temporary change, the State Water Board must find that measures will be taken to reasonably protect the fish and wildlife beneficial use in light of the circumstances of the emergency.

San Joaquin River Monitoring and Evaluation Program

In order to determine compliance with the LSJR flow objectives, inform adaptive implementation, investigate the technical factors involved in water quality control, and potential needed future changes to the LSJR flow objectives, including flows for other times of the year, a comprehensive monitoring, special studies, evaluation, and reporting program is necessary. The State Water Board will require annual and comprehensive monitoring, evaluation, and reporting through water rights and water quality actions. Pursuant to its authorities, including Water Code section 13165, comprehensive monitoring will be required to address both the individual and cumulative impacts of diversions and discharges to fish and wildlife beneficial uses. The following requirements, at a minimum, shall be imposed:

1) Monitoring, special studies, and evaluations of the effects of flow and other factors on the viability of native LSJR watershed fish populations throughout the year, including assessment of abundance, spatial extent (or distribution), diversity (both genetic and life history), and productivity.
2) Consideration of recommendations from entities with relevant Central Valley monitoring plans to improve standardization of methods, including the quantification of bias and precision of population estimates.
3) Regular external scientific review of monitoring, evaluation, and reporting.

Monitoring should be integrated and coordinated with new and ongoing monitoring and special studies programs in the LSJR, including pursuant to federal biological opinion requirements, FERC licensing proceedings for the Tuolumne and Merced Rivers, Central Valley Regional Water Board requirements, and the Delta Science Program. At least every five years, the State Water Board will request the Delta Science Program to conduct a review of the San Joaquin River Monitoring and Evaluation Program.

Annual reporting

To inform the next year's operations and other activities, the State Water Board will require preparation and submittal of an annual report to the State Water Board by December 31 of each year. The annual report shall describe implementation of flows, including any flow shifting done pursuant to the annual adaptive operations plan, monitoring and special studies activities, and implementation of other measures to protect fish and wildlife during the previous water year, including the actions by other entities identified in this program of implementation. The annual report shall also identify any deviations from the annual adaptive operations plan and describe future special studies. The State Water Board will hold public meetings to receive and discuss the annual report.

Comprehensive Reporting

Additionally, every three to five years following implementation of this update to the Bay-Delta Plan, the State Water Board will require preparation and submittal of a comprehensive report that, in addition to the requirements of annual reporting, reviews the progress toward meeting the biological goals and identifies any recommended changes to the implementation of the flow objectives. The comprehensive report and any recommendations shall be peer-reviewed by an appropriate independent science panel, which will make its own conclusions and recommendations. The State Water Board will hold public meetings to consider the comprehensive report, technical information, and conclusions or recommendations developed through the peer review process. This information will be used to inform

potential adaptive changes to the implementation of the flow objectives and, as appropriate, future potential changes to the Bay-Delta Plan.

In order to leverage expertise and limited resources (financial and otherwise), parties are encouraged to work collaboratively in one or more groups and in consultation with the STM Working Group, USBR and DWR, in meeting the above monitoring and reporting requirements. The State Water Board may streamline monitoring and reporting obligations of parties working collaboratively with each other, the STM Working Group, USBR, DWR, the Delta Science Program or other appropriate parties.

Voluntary Agreements

The State Water Board recognizes that voluntary agreements can help inform and expedite implementation of the water quality objectives and can provide durable solutions in the Delta watershed.

Subject to acceptance by the State Water Board, a voluntary agreement may serve as an implementation mechanism for the LSJR flow objectives for the LSJR Tributaries as a whole, an individual tributary, or some combination thereof. Voluntary agreements may include commitments to meet the flow requirements and to undertake non-flow actions. If the voluntary agreements include non-flow actions recommended in this Plan or by DFW, the non-flow measures may support a change in the required percent of unimpaired flow, within the range prescribed by the flow objectives, or other adaptive adjustments otherwise allowed in this program of implementation. Any such changes must be supported by DFW and satisfy the criteria for adaptive adjustments contained within this program of implementation. At a minimum, to be considered by the State Water Board, voluntary agreements must include provisions for transparency and accountability, monitoring and reporting, and for planning, adaptive adjustments, and periodic evaluation, that are comparable to similar elements contained in the program of implementation for the LSJR flow objectives.

The State Water Board encourages parties to present any executed voluntary agreement to the State Water Board for its review as soon as feasible to improve conditions in the watershed.

4. Export Limits

These objectives are to be implemented through water right actions. The water right permits and licenses of the DWR and the USBR are conditioned upon meeting the objectives for export pumping.

5. Delta Cross Channel Gates Operation

This objective is to be implemented through water right actions. The USBR, as the owner and operator of the Gates, is solely responsible under its water right permits and licenses for implementing the Delta Cross Channel Gates Closure objectives.

6. Salinity Control

Salinity objectives are implemented through a mix of water right actions (flow) and salinity control measures depending on the location and beneficial use affected. Salinity objectives and their implementation fall into the following broad categories:

i. Municipal and Industrial Uses: These objectives are to be implemented through a combination of water right actions and other actions, depending on the location at which the objective applies. The water right permits and licenses of the DWR and the USBR currently are conditioned upon implementation of chloride objectives to protect municipal and industrial uses. The salinity objectives at Contra Costa Water District's Pumping Plant No. 1 on Rock Slough, however, are being implemented in part through flows provided by the DWR and the USBR on Old River at the head of Rock Slough and in part through infrastructure improvements that reduce water quality degradation caused by localized drainage into Rock Slough.

ii. Fish and Wildlife in Suisun Marsh: These objectives are to be implemented through water right actions because the salinity levels are determined by flows and control structure operations. The water right permits and licenses of the DWR and the USBR currently are conditioned upon implementation of the numeric salinity objectives for Suisun Marsh at stations S-21, and S-42 (Figure 5). Due to evidence showing a potential for the objectives at stations S-97 and S-35 to cause harm to the beneficial uses they are intended to protect, the State Water Board in Decision 1641 (D-1641) did not require that DWR and USBR attain the objectives at stations S-97 and S-35. Implementation of the salinity objectives at these two stations is discussed in section B.5.

iii. Fish and Wildlife in the San Joaquin River: These objectives are to be implemented through water right actions. The water right permits and licenses of the DWR and the USBR currently are conditioned upon implementation of the San Joaquin River salinity objective to protect fish and wildlife uses.

iv. Agriculture in the Western Delta, Interior Delta, and Export Area: These objectives are to be implemented through water right actions. The water right permits and licenses of the DWR and the USBR currently are conditioned upon implementation of the Western Delta, Interior Delta, and Export Area salinity objectives to protect agricultural uses.

v. Agriculture in the Southern Delta: The water rights of the DWR and the USBR are conditioned upon implementation of the southern Delta salinity objectives to protect agricultural beneficial uses. Implementation of salinity objectives in the southern Delta requires a mix of salt load control and flow related measures. It is therefore discussed in section B of the Program of

Implementation: 'Measures Requiring a Combination of State Water Board Authorities and Actions by Other Agencies.'

B. Measures Requiring a Combination of State Water Board Authorities and Actions by Other Agencies

Implementation of the following water quality objectives will require water rights and water quality measures by the State Water Board, in concert with actions taken by other agencies:

Implementation of these objectives can be accomplished through a combination of the following: dilution flows, regulation of water diversions, pollutant discharge controls, best management practices to control the amount of waste produced, and improvements in water circulation. In addition to describing the actions taken, or to be taken, by the State Water Board, this section describes the actions taken, and that should be taken, by other agencies to implement these objectives. The State Water Board will use its authority, as needed and appropriate, under section 13165 of the California Water Code to require that studies are conducted.

1. Southern Delta Agricultural Salinity Objectives

The program of implementation for the southern Delta salinity objective describes the actions necessary to achieve the objective and the monitoring, special studies, and reporting requirements that the State Water Board will require to evaluate compliance with the objective and to obtain additional information to inform implementation of the objective and understanding of salinity conditions in the southern Delta. The southern Delta salinity objective will be achieved primarily through water right and water quality control actions that affect flow. Regulation of municipal and other discharges will also be required.

State Regulatory Actions

i. San Joaquin River at Airport Way Near Vernalis: In D-1641 the State Water Board concluded that USBR, through its activities associated with operating the CVP in the San Joaquin River basin, has caused reduced water quality of the San Joaquin River at Vernalis. For the San Joaquin River at Airport Way near Vernalis, D-1641 imposes conditions on USBR's water rights requiring implementation of EC levels of 0.7 mmhos/cm from April through August and 1.0 mmhos/cm from September through March (units of mmhos/cm are equal to units of dS/m). As part of implementing the salinity water quality objective for the interior southern Delta, USBR shall be required to continue to comply with these salinity levels, as a condition of its water rights. Implementation of the southern Delta salinity objective at Vernalis may be modified by the State Water Board in a future Bay-Delta Plan update and a subsequent water right proceeding, if necessary, after

adoption of a Total Maximum Daily Load (TMDL) or other salinity management plan by the State Water Board or Central Valley Regional Water Quality Control Board (Central Valley Regional Water Board) that identifies more appropriate salinity management measures.

ii. Interior Southern Delta Compliance Locations: In D-1641 the State Water Board concluded that DWR and USBR are partially responsible for salinity problems in the southern Delta due to hydrologic changes caused by export pumping. D-1641 imposes conditions on DWR's and USBR's water rights requiring implementation of EC levels of 0.7 mmhos/cm from April through August and 1.0 mmhos/cm from September through March at the three compliance stations in the interior southern Delta (Interagency Stations No. C-6, C-8, and P-12). As part of implementing the salinity water quality objective for the interior southern Delta, the State Water Board will amend DWR's and USBR's water rights to continue to require implementation of the interior southern Delta salinity water quality objectives consistent with this plan. The State Water Board may also consider the responsibility of others for implementing the interior southern Delta salinity objective based on implementation or completion of the Comprehensive Operations Plan, Monitoring Special Study, modeling, or Monitoring and Reporting Plan described below, or development of other information.

The interior southern Delta salinity compliance locations are comprised of three river segments rather than three specific point locations so that compliance with the southern Delta salinity objective can be better determined in a Delta environment subject to alternating tidal flows. DWR's and USBR's water rights shall be conditioned to require development of information that will be used to determine the appropriate locations and methods to assess attainment of the salinity objective in the interior southern Delta, including through the Comprehensive Operations Plan, Monitoring Special Study, Modeling, and Monitoring and Reporting Plan described below. Prior to State Water Board approval of the Monitoring and Reporting Plan, compliance with the salinity objective for the interior southern Delta will be assessed at stations C-6, C-8, and P-12, which USBR and DWR shall be required to continue to operate as a condition of their water rights. Chapter III of this plan provides the general rule that unless otherwise provided, water quality objectives cited for a general area are applicable for all locations in that general area. Consistent with this, the use of compliance locations and gage stations to determine compliance by DWR and USBR shall not be interpreted as a limitation on the applicability of the southern Delta salinity objective, which applies throughout the southern Delta.

iii. Comprehensive Operations Plan: The State Water Board will continue to require DWR and USBR to address the impacts of their operations on interior southern Delta salinity levels. Specifically, the State Water Board will require the development and implementation of a Comprehensive Operations Plan (COP). The COP must:

- describe the actions that will fully address the impacts of SWP and CVP export operations on water levels and flow conditions that may affect salinity conditions in the southern Delta, including the availability of assimilative capacity for local sources of salinity;
- include detailed information regarding the configuration and operations of any facilities relied upon in the plan; and
- identify specific performance goals (i.e., water levels, flows, or other similar measures) for these facilities.

Monitoring requirements needed to measure compliance with the specific performance goals in the COP must be included in the Monitoring and Reporting Plan, discussed below. DWR and USBR shall be required to consult with the South Delta Water Agency (SDWA), Contra Costa Water District (CCWD), State Water Board staff, other state and federal resource agencies, and local stakeholders to develop the COP, and will be required to hold periodic coordination meetings, no less than quarterly, throughout implementation of the plan.

DWR and USBR shall submit the COP to the Executive Director for approval within six months from the date of the OAL's approval of this amendment to the Bay-Delta Plan. The Executive Director will act on the COP after providing notice and opportunity for comment. Once approved, the COP shall be reviewed annually, and updated as needed, with a corresponding report submitted by February 1 each year to the Executive Director for approval. The State Water Board will require compliance with this measure pursuant to its Porter-Cologne Water Quality Control Act authority to require technical and monitoring requirements, or as a requirement of a water right order.

iv. Special Studies, Modeling and Monitoring and Reporting: To implement and determine compliance with the salinity objective in these river segments, and to inform the COP, the State Water Board will require DWR and USBR to complete the following activities. The State Water Board will require compliance with these activities pursuant to its Porter-Cologne Water Quality Control Act authority to require technical and monitoring requirements, or as a requirement of a water right order:

a. Monitoring Special Study: Prior to development of the long-term Monitoring and Reporting Plan, described below, DWR and USBR shall work with State Water Board staff and solicit stakeholder input to develop and implement a special study to characterize the spatial and temporal distribution and associated dynamics of water level, flow, and salinity conditions in the southern Delta waterways. The study shall identify the extent of low or null flow conditions and any associated concentration of local salt discharges. The State Water Board will request local agricultural water users and municipal dischargers to provide data regarding local diversions and return flows or discharges. DWR and USBR shall submit a plan for this special study to the Executive Director for approval within six months from the date of OAL's approval of this amendment to the Bay-Delta Plan. Once approved, the monitoring contained in this plan shall be conducted until superseded by the long-term Monitoring and Reporting Plan, described below, is approved.

b. Modeling: DWR and USBR shall provide modeling and other technical assistance necessary to prepare and update the COP, and otherwise assist in implementing the southern Delta agricultural salinity objective. DWR and USBR will be required to continue to provide this assistance as required by State Water Board Order WR 2010-0002, which modifies paragraph A.3 of Order WR 2006-0006.

c. Monitoring and Reporting Plan: DWR and USBR shall develop long-term monitoring protocols to measure compliance with the performance goals of the COP, and to assess attainment of the salinity objective in the interior southern Delta. These monitoring and reporting protocols shall be based on the information obtained in the Monitoring Special Study, and shall include specific compliance monitoring locations in, or monitoring protocols for, the three river segments that comprise the interior southern delta salinity compliance locations. The Executive Director may approve changes to the gage stations at which compliance is determined, except monitoring station C-10, in Table 2, if information shows that other gage stations more accurately represent salinity conditions in the interior southern Delta.

The Monitoring and Reporting Plan will be required to be integrated and coordinated with existing monitoring and special studies programs in the Delta. DWR and USBR shall submit the Monitoring and Reporting Plan to the Executive Director for

approval within 18 months from the date of OAL's approval of this amendment to the Bay-Delta Plan.

v. DWR's and USBR's water rights shall be conditioned to require continued operations of the agricultural barriers at Grant Line Canal, Middle River, and Old River at Tracy, or other reasonable measures, to address the impacts of SWP and CVP export operations on water levels and flow conditions that might affect southern Delta salinity conditions, including the assimilative capacity for local sources of salinity in the southern Delta. The water right conditions shall require any necessary modifications to the design and operations of the barriers or other measures as determined by the COP.

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

vii. Salinity problems in the southern Delta primarily result from low flows, tidal action, diversions by the CVP, SWP and local water users, agricultural return flows, poor circulation, and channel capacity. As early as the 1991 Bay-Delta Plan, the State Water Board recognized the need to meet the salinity objectives largely through regulation of water flow. This Bay-Delta Plan continues Revised Decision 1641's obligations on the CVP and SWP to meet the salinity water quality objectives. Overall, discharges from publicly owned treatment works (POTWs) in the southern Delta have only a small effect on southern Delta salinity. Studies show the de minimis influence of POTW discharges on downstream ambient EC levels, both in low and high CVP and SWP export scenarios. The extent to which a POTW can meet salinity water quality objectives in the southern Delta is in part controlled by factors beyond its control, namely flows and circulation patterns, which are largely controlled by tidal action and water diversions. POTW discharges also reflect the EC levels of their source water, which is high in the southern Delta. POTWs are subject to the Clean Water Act and must control their salt discharges. It is reasonable to view the extent to which they must control their discharges in light of the constraints they face, the de minimis effect of their discharge on water quality related to salinity, and this implementation program's focus on water levels and flows to achieve the salinity water quality objectives. Desalination through reverse-osmosis processes can reduce salinity in POTW effluent, but is energy intensive, may be cost-prohibitive to construct and operate,

and may also create brine waste disposal issues in an area that is already challenged by high salts. The State Water Board, therefore, finds that reverse-osmosis treatment for POTW wastewater discharges into the southern Delta is currently not a feasible technology for the purpose of controlling salinity in the southern Delta.

The Central Valley Regional Water Board shall regulate in-Delta discharges of salts by agricultural, municipal POTW, and other dischargers consistent with applicable state and federal law, including, but not limited to, establishing water-quality based effluent limitations and compliance monitoring and reporting requirements, where they are applicable, as part of the reissuance of National Pollutant Discharge Elimination System (NPDES) permits under the Clean Water Act and the regulations thereunder. In most, if not all, cases, it may be infeasible for POTWs discharging to the southern Delta to comply with traditional numeric water-quality based effluent limitations for salts in NPDES permits where they are applicable. In cases where it is infeasible, the Central Valley Regional Water Board shall include in NPDES permits the following types of enforceable effluent limitations:

(a) A performance-based effluent limitation derived using, at a minimum, the past three years of effluent data and one that considers the potential for drought conditions, changing water sources, and water conservation.
(b) Best management practices, including but not limited to: (A) an industrial pretreatment program, implemented through local ordinances, that minimizes salinity inputs from all industrial sources of salinity within the POTW's collection system; (B) source control measures, such as reducing salinity concentrations in source water supplies; (C) actions to limit or ban the use of residential self-generating water softeners or imposing salt efficiency standards on such water softeners; (D) a salinity education and outreach program; and (E) ongoing participation in the Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS).

In addition, where it is infeasible for POTWs discharging to the southern Delta to comply with traditional numeric water-quality based effluent limitations for salts, the Central Valley Regional Water Board shall require POTWs to submit the following information, which shall be submitted with a POTW's application for a renewal of its NPDES permit, except for (e) and (f), which shall be submitted in annual reports:

(a) An evaluation of whether technological or economic changes have made previously deemed infeasible upgrades to control salinity in the POTW's effluent feasible.
(b) A survey of industrial sources of salinity regulated by the industrial pretreatment program, along with all annual reports submitted pursuant to that program documenting the implementation of salinity management strategies at the industrial facility within the collection system area.
(c) Documentation of source control measures taken. If alternative lower-salinity source water supplies were available but not utilized, a justification for not using such supplies shall be provided.
(d) An evaluation of the efficacy of actions taken to limit or ban the use of residential self-generating water softeners or to impose efficiency standards on water softeners within the POTW's collection system area. This evaluation shall include the estimated number of such water softeners in the POTW's collection system area. If a ban against the use of self-generating water softeners is not instituted, a justification why a ban is not feasible.
(e) Materials developed and disseminated in support of the salinity education and outreach program.
(f) Documented proof of participation in CV-SALTS.

Where it is or becomes feasible for a POTW to comply with numeric water quality based effluent limitations for salts, the Central Valley Regional Water Board shall require them in the applicable NPDES permit. In such cases, POTW compliance actions could include, among other things, source control, such as reducing salinity concentrations in source water supplies; pretreatment programs, such as reducing water softener use among water users; and desalination. If the Central Valley Regional Water Board determines it is feasible for a POTW to comply with numeric water quality based effluent limitations for salts, it may grant compliance schedules for new compliance actions to comply with numeric limitations consistent with the State Water Board's Compliance Schedule Policy, Resolution No. 2008-0025. A feasibility determination would result in the first instance of a legally binding numeric permit limitation for the POTW to implement the salinity water quality objective for the southern Delta set forth in Table 2 and shall be regarded as a "newly interpreted water quality objective" under the State Water Board Compliance Schedule Policy, Resolution No. 2008-0025, at the time of the NPDES permitting action implementing the feasibility determination. Where appropriate, the Central Valley Regional Water Board may also grant variances in accordance with applicable state and federal law.

viii. The Central Valley Regional Water Board shall implement the TMDL for the San Joaquin River at Vernalis, develop a salinity control program for areas upstream of Vernalis, and implement the control program to reduce salinity and other pollutants reaching the southern Delta.

Central Valley Regional Water Board Actions

The Central Valley Regional Water Board is undertaking the following efforts, which will assist in implementing the southern Delta salinity objective:

i. Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS): CV-SALTS is a stakeholder-led effort initiated by the State Water Board and the Central Valley Regional Water Board in 2006 to develop comprehensive long-term measures to address salinity and nitrate problems in California's Central Valley, including formulation of a basin plan amendment and implementation actions. The State Water Board may consider modifications to the southern Delta salinity objective and program of implementation in a future Bay-Delta Plan update, as well as requirements imposed through water right actions, based on information and recommendations generated from the CV-SALTS initiative.

ii. San Joaquin River at Vernalis Salt and Boron TMDL: The Central Valley Regional Water Board is implementing the salinity and boron TMDL at Vernalis. Actions described in the program of implementation for the TMDL include execution of a Management Agency Agreement with USBR addressing salt imported into the San Joaquin River basin via the Delta-Mendota Canal, development of new numeric salinity objectives, and establishment of the Real Time Management Program for the control of salinity discharges to the San Joaquin River.

iii. Upstream of Vernalis San Joaquin River Salinity Objectives: CV-SALTS established a subcommittee that developed a proposal for, and the Central Valley Regional Water Board approved, a basin plan amendment to the Water Quality Control Plan for the Sacramento River Basin and San Joaquin River Basin to establish numerical salinity objectives and a program of implementation for the Lower San Joaquin River upstream of Vernalis. Those objectives are not affected by the Bay-Delta Plan.

iv. Irrigated Lands Regulatory Program: Under the Irrigated Lands Regulatory Program, the Central Valley Regional Water Board issues waste discharge requirements (WDRs) to coalition groups and individual dischargers requiring surface water quality monitoring and the preparation and implementation of management plans to address identified water quality problems, including those associated with salinity. The most recent WDRs require third parties to

develop regional water quality management plans for areas where irrigated agriculture is contributing to water quality problems. It requires growers to implement practices consistent with those plans to address the identified problems.

v. Variances from Surface Water Quality Standards for Point Source Dischargers, Variance Program for Salinity, and Exception from Implementation of Water Quality Objectives for Salinity: The Central Valley Regional Water Board adopted Resolution R5-2014-0074 to amend water quality control plans for the Sacramento River and San Joaquin River basins and the Tulare Lake basin to add policies for *Variances from Surface Water Quality Standards for Point Source Dischargers (Variance Policy)*, a *Variance Program for Salinity (Salinity Variance Program)* and an *Exception from Implementation of Water Quality Objectives for Salinity (Salinity Exception Program)*. The amendments were approved by the State Water Board on March 17, 2015, (Resolution No. 2015-0010), by OAL on June 19, 2015, and by USEPA on July 8, 2016.

- The *Variance Policy* will allow the Central Valley Regional Water Board the authority to grant short-term exceptions from meeting water quality based effluent limitations to dischargers subject to NPDES permits. The policy will only apply to non-priority pollutants, which includes salinity.
- The *Salinity Variance Program* will allow the Central Valley Regional Water Board the authority to grant multiple discharger variances from meeting water quality based effluent limitations for salinity constituents to publicly owned treatment works. A multiple discharger variance provides a streamlined approval procedure in which an individual discharger variance application, which is consistent with the multiple discharger variance, does not require separate review and approval from the USEPA once the multiple discharger variance is approved by USEPA.
- The *Salinity Exception Program* establishes procedures for dischargers that are subject to WDRs and conditional waivers to obtain a short-term exception from meeting effluent or groundwater limitations for salinity constituents.

The above programs will support the development and initial implementation of the comprehensive salt and nitrate management plans in the Central Valley by requiring dischargers to participate in the CV-SALTS effort.

State Funding of Programs

i. The State Water Board has various financial assistance programs under which it can contribute funding for programs that will help meet the salinity objectives or to improving understanding about salinity conditions in the southern Delta (primarily the San Joaquin River upstream of Vernalis). To date, it has funded tens of millions of dollars worth of projects and studies for such programs. The State Water Board provides funds through the State Revolving Fund Loan Program, the Agricultural Drainage Loan Program, the Agricultural Drainage Management Loan Program, Proposition 13, 40, and 50 grant funding through the Nonpoint Source Pollution Control Programs and Watershed Protection Programs.

Current Projects and Actions by Other Agencies

The following projects may assist in meeting the southern Delta salinity objectives by reducing high salinity drainage to the San Joaquin River; improving circulation in the southern Delta; and supplementing flows through recirculation. All or a portion of these projects are being funded through the above referenced programs. Each of these projects, described below, should be pursued by the identified agencies. If successful, these projects and the actions they contain could make additional regulatory measures by the State Water Board and the Central Valley Regional Water Board unnecessary.

i. Grasslands Bypass Project: The Grasslands Bypass Project manages discharges of agricultural drainage water from 97,000 acres in the Grasslands Watershed. The purpose of the project is to prevent discharges of water containing high levels of selenium to wildlife refuges and wetlands in the San Joaquin Valley. Recent monitoring data shows that from 1995-2015 the discharge of salts was reduced by 83% compared to pre-project conditions through various management measures including sump management, recycled tail and tile water programs, on-farm tile and tail water management, and various source control measures. The Grassland Areas farmers, USBR, the Central Valley Regional Water Board, and other agencies should continue to evaluate the various management measures in the Grasslands Bypass Project and should continue to implement those measures that are effective in reducing salinity and selenium discharges to the San Joaquin River to meet the goal of zero discharges to the San Joaquin River from the Grasslands area by 2019.

ii. West Side Regional Drainage Plan: The West Side Regional Drainage Plan evolved from the Grasslands Bypass Project as a long-term solution to eliminate discharges to the San Joaquin River of drainage water from irrigated agriculture containing high amounts of selenium, salt and other constituents. The plan uses the following practices:

a) Reduction of drainage volumes by using source control/efficient water management techniques such as replacing furrow irrigation with micro-irrigation technology and lining unlined delivery canals;
b) Recirculation of tailwater on primary irrigation lands;
c) Collection and reuse of tile drainage water on halophytic croplands to concentrate drainage;
d) Installation and pumping of groundwater wells in strategic locations to eliminate groundwater infiltration into tile drains; and
e) Treatment and disposal of remaining drainage water through reverse osmosis, evaporation and disposal or reuse of salts.

When fully implemented, the parties implementing the plan expect to assure achievement of the salinity objectives at Vernalis and reduce the frequency of exceedances of the salinity objectives at Brandt Bridge by 71 percent over a 73-year hydrology. Stakeholder parties to the Westside Regional Drainage Plan should continue work to implement the various practices discussed above to achieve the goal of zero discharges to the San Joaquin River from the Grasslands area by 2019.

iii. San Luis Unit Feature Reevaluation Project: USBR evaluated seven alternatives as part of the San Luis Unit Feature Reevaluation Project to provide drainage service to the San Luis Unit of the CVP. This project would reduce discharges to the San Joaquin River and sustain long-term agricultural production on drainage-impacted lands. The alternatives considered included: on-farm, in-district drainage reduction actions; federal facilities to collect and convey drain water to regional reuse facilities; and some level of land retirement. Additional options considered included options for in-valley disposal of drain water, ocean disposal, and Delta disposal. USBR's preferred alternative is an in-valley/land retirement alternative that involves treatment of drain water through reverse osmosis and selenium biotreatment before disposal in evaporation basins. USBR expects implementation to help reduce saline discharges to the lower San Joaquin River. A desalination demonstration project is currently being implemented as part of this effort.

iv. Central Valley Project Improvement Act (CVPIA) Land Retirement Program: USBR and Westland's Water District are implementing land retirement projects under the CVPIA Land Retirement Program and under settlement agreements in drainage-impacted areas of the San Luis Unit of the Joaquin Valley.

v. San Joaquin River Real-time Salinity Management Program: The San Joaquin River Real-time Salinity Management Program is a partnership effort between agricultural dischargers within the Lower San Joaquin River Basin, DWR, USBR, USFWS and United States Geological Survey (USGS) that uses telemetered stream stage and salinity data and computer models to simulate and forecast water quality conditions along the lower San Joaquin

River. The main objective of the project is to control and time the releases of wetland and agricultural drainage to coincide with periods when dilution flow is sufficient to meet the Vernalis salinity objectives. The Central Valley Regional Water Board adopted a resolution in 2014 approving the proposed framework to establish the program (R5-2014-0151). The framework document describes completed pilot studies that establish the feasibility of the program and describes the steps to be taken to implement the program.

vi. South Delta Improvements Program: DWR and USBR propose to construct permanent tidal gates in the southern Delta as part of the South Delta Improvements Program (SDIP) to replace the temporary barriers that are currently constructed on an annual basis. DWR and USBR expect that the gates project will assist in achieving the salinity objectives at the two Old River compliance measurement locations by improving water circulation in the southern Delta. Due to concern regarding the impact the gates project may have on migratory fish, additional studies are being conducted prior to the re-initiation of consultation for Endangered Species Act permits required for this project. Consequently, implementation of this project has been postponed indefinitely.

2. San Joaquin River Dissolved Oxygen Objective

D-1641 directs the Central Valley Regional Water Board to establish a TMDL to address the dissolved oxygen (DO) impairment in the San Joaquin River. In November of 2005, the State Water Board approved an Amendment to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins. The amendment, approved by the Office of Administrative Law in August 2006, consists of a Control Program for Factors Contributing to the DO impairment in the Stockton Deep Water Ship Channel (DWSC) and other actions to implement DO objectives in the DWSC portion of the San Joaquin River. The DO basin plan amendment includes implementation measures and a timeline for implementation for both the 1995 Plan DO objective and the DO objective in the Water Quality Control Plan for the Sacramento River Basin and the San Joaquin River Basin.

The Central Valley Regional Water Board should continue to implement the recently adopted DO TMDL. Further, the United States Army Corps of Engineers (USCOE) and other agencies and parties that contribute to the DO impairment should complete the measures recommended by the Central Valley Regional Water Board in the basin plan amendment. In addition, the responsible entities should complete their investigations into the feasibility of operating an aeration facility in the Stockton DWSC to assist in achieving the objectives. If the pilot project and other information demonstrates that permanent installation and operation of aeration devices is feasible and would not have immitigable adverse impacts on fish, wildlife, water quality and other resources, DWR, CALFED, and the other implementing agencies should pursue operation of such a facility with operating assistance from the State Water Contractors (SWC), the Port of Stockton, San Luis Delta-Mendota Water

Authority (SLDMWA), the San Joaquin River Group Authority ~~(SJRGA)~~, and other appropriate agencies.

DWR and USBR should continue to expeditiously pursue installation of a permanent operable gate (barrier) at the head of Old River or equivalent measures to assist in achieving the DO objective.

3. Narrative Objective for Salmon Protection

D-1641 assigned responsibility to the USBR and DWR to comply with the river flow and operational objectives for fish and wildlife. These objectives help protect salmon migration through the Bay-Delta Estuary. D-1641 did not require separate actions to implement the narrative objective for salmon because the State Water Board expects that implementation of the numeric flow-dependent objectives and other non-flow measures will implement this objective.

The narrative objective for salmon protection in the Delta is consistent with the anadromous fish doubling goals of the CVPIA. Under the Anadromous Fish Restoration Program (AFRP), State, federal and local entities are continuing to implement programs within and outside the Delta geared towards achieving the CVPIA anadromous fish doubling goals.

The State Water Board intends to invite DFG, NOAA Fisheries, and other agencies monitoring the progress of the salmon doubling effort to present to the Board the results from ongoing studies, fishery improvement programs, and any recommendations for a specific numeric objective at subsequent workshops every two years starting from the date of the adoption of this Plan. The State Water Board will consider monitoring results when determining whether numeric objectives either should replace or augment the narrative objective. The Board may use the information it receives to modify the objective in future proceedings.

Actions by parties other than the State Water Board are required to implement the narrative objective for salmon protection if implementation of the flow-dependent objectives does not achieve the objective. Other agencies are implementing the following actions. These actions not only benefit the salmonids while they are in the Estuary, but also help improve habitat for other species.

i. Through the CVPIA, Section 3406 (b) 21, Anadromous Fish Screen Program, the USBR, USFWS, and other participating agencies should continue to work towards the implementation of new screening facilities on diversions in the Bay-Delta Estuary to reduce losses of fish in all life stages to unscreened water diversions. In evaluating Delta diversions, these agencies should:

ii. (1) decide where screens are needed; (2) consider whether diversion points should be relocated or consolidated; and (3) provide their recommendations on changes in points of diversion to the State Water Board for consideration in a water rights proceeding.

iii. The DWR and the USBR, in consultation with the DFG, USFWS, and NOAA Fisheries, should continue to evaluate and implement all feasible measures and programs to reduce entrainment and mortality of fish salvaged at the Skinner Fish Protection Facility (Banks Pumping Plant) and the Tracy Fish Collection Facility (Tracy Pumping Plant). These measures should include: (1) monitoring entrainment on a real-time basis to identify periods of peak susceptibility of various species; (2) coordinating operations of the two diversions, including interchangeable pumping, to reduce combined losses; (3) increasing screening efficiency; (4) improving fish salvage and handling; and (5) controlling predators at the SWP and CVP intakes.

4. Narrative Objective for Brackish Tidal Marshes of Suisun Bay

In the 1995 Plan, the State Water Board recommended that DWR convene a Suisun Marsh Ecological Work group (SEW) consisting of representatives from various State, federal and private agencies and other interested parties. The SEW was assigned eight tasks, one of which was to determine a numeric objective to replace the narrative objective for tidal brackish marshes of Suisun Bay. However, the SEW was unable to determine a single numeric objective for the tidal marshes. In 2001 the Suisun Marsh Charter Group (SMCG[10]) was formed to develop a plan to balance the competing needs in Suisun Marsh. The SMCG is currently preparing a Programmatic Environmental Impact Statement/Environmental Impact Report (PEIS/EIR) for the Habitat Management, Preservation, and Restoration Plan for the Suisun Marsh (Suisun Marsh Plan). In the preparation of the Suisun Marsh Plan, the principal Suisun Marsh agencies are evaluating Plan alternatives with a tidal wetland habitat restoration component ranging from 3,000 to 36,000 acres.

State Water Board staff will use the results of the final PEIS/EIR and the resulting Suisun Marsh Plan during the next Water Quality Control Plan update to determine whether and how to convert the narrative objective to a numeric objective for the Brackish Tidal Marshes.

5. Numeric Objectives for Suisun Marsh

State Water Board staff will use the results of the final PEIS/EIR and the resulting Suisun Marsh Plan currently being prepared by the Suisun Marsh Charter Group (SMCG), to determine in a future plan amendment whether the objectives at stations S-97 and S-35 should be amended or deleted. The objectives at stations S-97 and S-35 may be amended and/or implemented in stages, as appropriate, and shall be implemented no later than either January 1, 2015, or an earlier date, if a further review of these objectives does not determine that they are not needed.

The objectives for water supply intakes for waterfowl management areas on Van Sickle and Chipps islands, which have no locations specified, may be amended and/or implemented in stages, and shall be implemented no later than January 1, 2015 if a further review of these objectives does not determine that they are not

[10] The SMCG Principle Agencies include Suisun Resource Conservation District, DFG, DWR, USBR, CBDA, NMFS and USFWS.

needed. Other measures to control Suisun Marsh soil and channel water salinities are discussed in section C9.

C. Recommendations to Other Agencies

Consistent with the Porter-Cologne Water Quality Control Act, this Water Quality Control Plan identifies control actions recommended for implementation by agencies other than the State Water Board. Actions are recommended both for the attainment of water quality objectives and to obtain additional information on the effects of flow and water quality on beneficial uses.

Numerous actions can be taken, in addition to establishing and implementing water quality objectives for the Bay-Delta Estuary, to improve fish and wildlife beneficial uses in the Estuary. These actions involve improvements to habitat conditions both inside and outside of the Estuary, many of which are under the authorities of other agencies, as well as studies needed to better understand the effects of flow and water quality on beneficial uses.

There is an ongoing effort by State agencies, the federal government, and agricultural, urban, and environmental interests to identify, fund, and implement, as warranted, measures to address the broader non-flow-related range of factors potentially affecting water quality and habitat in the Bay-Delta Estuary. Potential measures under consideration by these entities include those that would be implemented outside of the Estuary itself. These efforts, in connection with the other measures to implement the objectives in this plan, are among the ongoing programs to provide better protection for the beneficial uses that depend on the Bay-Delta Estuary.

The State Water Board will use its authority, as needed and appropriate, under section 13165 of the California Water Code to require that the following actions and studies be conducted.

1. Review and modify, if necessary, existing commercial and sport fishing regulations

Current levels of sport and commercial fishing may be contributing to reduced fish populations in the Bay-Delta Estuary. Since the implementation of the 1995 Plan, the Fish and Game Commission was granted authority over all state managed bottom trawl fisheries not managed under a federal fishery management plan or state fishery management plan. (Fish & Game Code, § 8841.) This authority ensures the sustainable management of resources, protects the health of ecosystems, and assists in the orderly transition to sustainable gear types when bottom trawling is incompatible with these goals.

The DFG, California Fish and Game Commission, Pacific Fisheries Management Council, and NOAA Fisheries should take the following actions within their respective authorities: (1) develop and implement a fisheries management program

to provide short-term protection for aquatic species of concern through seasonal and area closures, gear restrictions to reduce capture and mortality of sub-legal fish, and other appropriate means; and (2) review immediately, and then at least every two years, and modify, if necessary, existing harvest regulations to ensure that they adequately protect aquatic species.

2. Reduce illegal harvesting

Illegal harvesting has a certain but un-quantified impact on fisheries of the Bay-Delta Estuary. The DWR and the DFG should expand the current illegal harvest enforcement program. Additionally, the DFG should continue to develop and implement educational programs to curb poaching of fishery resources.

3. Reduce the impacts of introduced species on native species in the Estuary

The intentional and accidental introduction of non-native species has caused major changes in the composition of aquatic resources in the Bay-Delta Estuary; however, the exact impacts of existing introduced species on native species in the Estuary are not clear. The impact of introduced species is being investigated as a potential cause of the POD. The results of the ongoing POD studies may provide insight into the reasons for the decline, and provide the scientific basis for actions that can be taken to reverse the trend.

Until the results from the POD studies are made available, other programs are being implemented by other agencies to lessen the propagation of invasive species. The National Invasive Species Act of 1996 established various programs intended to decrease the propagation of invasive species into waters of the U.S. and to prevent the spread of aquatic nuisance species. These programs include the Ballast Water Management Demonstration Program and the Aquatic Nuisance Species Program and allows for State Invasive Species Management Plans to be created independent of federal action. Under the National invasive Species Act of 1996, the DFG, USFWS, and NOAA Fisheries should continue to pursue programs to determine the impacts of introduced species, including striped bass, on the native aquatic resources of the Estuary, and the potential benefits of control measures. The DFG should also continue its efforts under the Fish and Game Code sections 6430-6439, enacted in 1992, concerning introduced species. Additionally, the California Fish and Game Commission should deny all requests for the introduction of new aquatic species into the watershed of the Bay-Delta Estuary unless it finds, based on strong, reliable evidence, that an introduction will not have deleterious effects on native species.

4. Improve hatchery programs for species of concern

Existing fish hatcheries are operated in order to provide mitigation for the loss of stream spawning and rearing habitat due to the construction of large dams. As noted by NOAA Fisheries in the Biological Opinion on the Long-Term Central Valley Project and State Water Project Operations Criteria and Plan (OCAP), the viability of natural fish populations has been compromised due to the operation of hatcheries, as the hatchery fish are not isolated from the natural systems. Hatchery fish, while

increasing the abundance of fish numbers, often result in increased harvesting pressure on natural fish stocks. Additionally the hybridization between hatchery and natural fish stocks has caused deterioration of the natural population.

To assist in the management of natural fish stocks, Congress has mandated that all federal and federally funded salmon and steelhead hatcheries implement a marking program on the fish they release to visually distinguish between hatchery and natural stock. DFG, NOAA Fisheries, and USFWS should continue to: (1) carefully examine and periodically re-examine the role and contribution of existing hatchery production for various fish species (e.g., chinook salmon, steelhead trout), including a consideration of the need for genetic diversity and maintaining the integrity of different salmon runs and (2) evaluate strategies for improving the survival of hatchery fish, before and after release, including diet and pre-release conditioning, selection of the life stage and size of fish to be released, timing releases relative to the presence or absence of other species, and using multiple release locations.

5. Expand the gravel replacement and maintenance programs for salmonid spawning habitat

The presence of dams on the major tributaries of the Delta blocks the movement of gravel eroding from upstream areas and causes fine sediments to infiltrate the remaining gravels. Reduction in the riverbed gravels required for salmonid spawning limits the success of chinook salmon and steelhead trout reproduction in the watershed of the Bay-Delta Estuary.

Under the AFRP, and other gravel replacement and maintenance programs, the DWR, the USBR, and other agencies that currently conduct gravel replacement and spawning habitat improvement programs on the Sacramento and San Joaquin River systems should continue and, where possible, increase their efforts in the reaches where salmonids are likely to spawn.

6. Evaluate alternative water conveyance and storage facilities of the SWP and CVP in the Delta

The current water diversion facilities of the CVP and the SWP in the southern Delta adversely impact fish populations. These facilities or alternative facilities are needed to meet water supply demands in areas south and west of the Delta. Various alternatives have been identified to minimize impacts to fish while meeting water supply demands. The proposed alternatives include construction of a water diversion intake on the Sacramento River equipped with state-of-the-art fish screens, isolated and through-Delta water conveyance facilities, and new water storage facilities within and south of the Delta. The DWR and USBR should continue their efforts to develop alternative water conveyance and storage facilities in the Delta, and should evaluate these alternatives and their feasibility and take action as necessary to minimize impacts to fish.

7. Develop an experimental study program on the effects of pulse flows on fish eggs and larvae in the Delta

The magnitude of freshwater outflow passing through the Delta affects the geographic distribution of many planktonic fish eggs and larvae. The egg and larval stages of many fish species occur in the Delta during a relatively short period of time in the spring (April-June). When there is high freshwater outflow, the planktonic eggs and larvae are moved downstream into Suisun Bay where they are less susceptible to entrainment at the SWP and CVP diversions and at other diversion points within the Delta. Absent high freshwater flows, pulse flows can be used to move the eggs and larvae downstream into Suisun Bay. To improve the efficiency of water used for this purpose, it would be helpful to experimentally quantify the magnitude and duration of pulse flows needed to move a substantial proportion of fish eggs and larvae into Suisun Bay.

DWR and USBR should conduct experiments to investigate and evaluate the biological benefits of pulse flows to move planktonic fish eggs and larvae into Suisun Bay. These experiments, which should be conducted as soon as feasible, should: (1) include flows from both the Sacramento and San Joaquin Rivers; (2) include real-time biological monitoring to determine the most favorable times for the pulse flows and the effects of the pulse flows on the eggs and larvae; (3) determine whether short-term pulse flows have a lasting benefit or whether, when outflows are reduced after a pulse flow, the larval fish are drawn back into interior Delta areas; and (4) take into account base flows and availability of water supplies. The experiments should be designed so that they can be used to refine potential pulse flow requirements in the future.

8. Implement actions needed to restore and preserve marsh, riparian, and upland habitat in the Delta

Most of the historical fish and wildlife habitat in the Delta has been eliminated or disturbed. In the Delta, less than 100,000 acres of the total 738,000 acres remains as marsh, riparian, and upland habitat. The remainder of the area is highly altered due to conversion to agricultural land, industrial and urban development, and actions for flood control and navigation, such as dredging channels and riprapping banks. Furthermore, many of the alterations that have already occurred require extensive ongoing maintenance, which also disrupts fish and wildlife habitat. Restoration of fish and wildlife habitat in the Delta would benefit many species of the Bay-Delta Estuary.

State and federal agencies should require, to the extent of their authorities, habitat restoration in the Delta as a condition of approving projects. For example, the Delta Protection Commission, in all of its actions under the Delta Protection Act of 1992 (Pub. Resources Code § 29700 *et seq*.) that provide for the coordination of local land use decisions in the Delta, should continue to implement and support programs such as the Delta Mercury TMDL Collaborative (AB 2901), the Lower Bypass Collaborative/Management Plan and the Delta-wide Conservation Easement Concept. The DFG, when it considers approving stream alterations, and the DFG,

USFWS, and NOAA Fisheries, when they consider projects that affect endangered species, should consider habitat requirements. The USCOE should consider habitat requirements in connection with applications for permits under Clean Water Act section 404. Within their authorities, these agencies should provide for: (1) levee setback requirements; (2) reductions in the depth of selected Delta channels, by using either dredge material from navigational channels or natural infill, to restore more productive shallows and shoals; (3) conversion of low-lying Delta islands to habitat areas; and (4) other habitat enhancement measures. The State Water Board will consider habitat requirements where needed to meet water quality standards under the Clean Water Act when approving section 401 certifications.

9. Suisun Marsh soil and channel water salinity objectives

In addition to the formation of the SEW discussed above, the 1995 Plan recommended three measures to be implemented to control Suisun Marsh soil and channel water salinities. The first measure, calling for continuation of the actions identified for implementation in the Suisun Marsh Preservation Agreement (SMPA), is included in the Revised Suisun Marsh Preservation Agreement executed on June 25, 2005. The Suisun Marsh Charter Group is evaluating two additional actions that may be added to the SMPA in a future amendment. The second measure, calling for a study to determine the relationship between channel water salinity and soil water salinity under alternative management practices, was completed in 2001 by DWR as part of the Comprehensive Review of Suisun Marsh Monitoring Data, 1985-1995. The third measure, requiring that DWR, USBR, DFG, and Suisun Resource Conservation District (SRCD), together with the property owners in Suisun Marsh, to employ a watermaster, has been accomplished through implementation of the Water Manager Program under the Revised SMPA.

In June of 2005, SRCD, DWR, USBR, and DFG signed the Revised SMPA. This agreement funded the Water Manager Program to help coordinate and improve water management practices on individual private managed wetlands throughout the Marsh. The duties of the Water Managers include:

- promote and encourage wetland management activities, including flooding, draining and circulation, so that they occur at the appropriate critical times of the year to produce desired wildlife habitats.

- provide technical support in the field to answer questions and educate landowners on beneficial management techniques.

- protect and enhance endangered species habitat, manage water application, and provide new scientific information pertaining to common management activities.

- supervise and coordinate the portable pump program to ensure proper maintenance and operation of the pumps.

- assist landowners in planning yearly maintenance and enhancement projects.

- additional activities may include assisting DFG on water management of State owned property, assisting in yearly salt marsh harvest mouse monitoring, California clapper rail surveys, and inspections of levees during storms to identify damages and assist in flood fight coordination.

10. San Joaquin River Non-Flow Actions

In addition to the recommendations in the preceding sections, the following recommendations apply specifically to the San Joaquin River. The recommendations are for non-flow actions that are complementary to the LSJR flow objectives for the protection of fish and wildlife. These recommended actions, together with the coordinated monitoring and adaptive implementation of the LSJR flow objectives, are expected to improve habitat conditions that benefit native fish and wildlife, or are expected to improve related science and management within the LSJR watershed.

Additionally, educational outreach programs should be developed and conducted with interested stakeholders or watershed groups to promote collaborative development, funding, and implementation of habitat enhancement and protection projects, and to promote resource stewardship among stakeholders. In many cases, the recommended actions will require authorizations by the appropriate agencies, which should consider this Plan when acting on them.

i. Restore, Enhance, and Protect Floodplain and Riparian Habitat: The USCOE, USBR, DFW, USFWS, FERC licensees, water districts, local landowners, and other appropriate entities should undertake, participate in, fund or authorize riparian and floodplain habitat corridor restoration, enhancement and protection actions along the LSJR and its tributaries, including but not limited to the following:

    a) Obtain easements or acquire land for riparian and floodplain habitat restoration.
    b) Reduce salmon stranding events in ponds, pits, and other unnatural features by physically modifying problem areas within river corridors.
    c) Facilitate the establishment and maintenance of self-sustaining native riparian and floodplain vegetation.
    d) Restore, enhance, and protect secondary/side-channel habitats to increase habitat diversity and function within the Stanislaus, Tuolumne, and Merced Rivers.
    e) Import silt or fine sediment onto floodplain restoration projects to improve soil moisture properties and encourage riparian vegetation success.
    f) Identify locations in the LSJR and its tributaries that are appropriate for levee modification (e.g. rip-rap removal and levee set back or removal) for the purpose of improving native fish and wildlife habitat.

ii. Reduce Vegetation Disturbing Activities in Floodplains and Floodways, Where Safe and Appropriate: The NMFS, DFW, USFWS, Central Valley Flood Protection Board, USACE, local landowners, county governments, local agricultural commissions and other land management agencies in the LSJR, Stanislaus, Tuolumne, and Merced River watersheds should reduce grazing, mowing, cutting, spraying, discing and other vegetation disturbing activities in floodplains and floodways, where safe and appropriate, to promote and restore these areas with riparian vegetation. Actions include but are not limited to the following:

    a) Develop grazing strategies that protect and improve streamside vegetation, and that minimize bank disturbance.
    b) Conduct outreach to inform landowners of state and federal laws and regulations that protect riparian, wetland, and Endangered Species Act (state and federal) protected vegetation.
    c) Review and potentially modify existing floodplain, floodway, and riparian vegetation management plans, or develop new ones using the best available science, to balance the needs of the ecosystem and the needs of public safety and other considerations.
    d) Compile data, conduct studies, and review literature to determine the influence that large trees and other vegetation types have on levee and floodway safety, and use this information to make science based management decisions.

iii. Provide and Maintain Coarse Sediment for Salmonid Spawning and Rearing: DWR, USBR, DFW, USFS, NMFS, FERC, FERC licensees and other entities performing or otherwise participating in habitat restoration, enhancement and protection projects should provide and maintain an adequate supply of coarse sediment for salmonid spawning and rearing habitat. In addition, entities that can control contributions of fine sediment in the Stanislaus, Tuolumne, and Merced River watersheds should reduce the input of fine sediment in spawning areas. These actions, include but are not limited to the following:

    a) Develop and maintain coarse sediment management plans for the major LSJR tributaries that consist of two temporal stages: (1) short-term restoration and gravel augmentation to re-build spawning habitat and to restore functional processes important to native fish and wildlife; and (2) long-term course sediment augmentation program to maintain the functioning of the restored habitat and to compensate for the blockage, by dams, of the natural gravel supply.
    b) Develop and implement erosion control measures including the construction of sediment retention basins within the Stanislaus, Tuolumne, and Merced River watersheds.
    c) Identify and remediate unpaved roads or other disturbed areas that may be contributing to fine sediment input.

iv. Enhance In-Channel Complexity: The DFW, USFWS, NMFS, FERC, FERC licensees, conservation groups, water districts and other appropriate entities

should enhance in-channel complexity within the LSJR tributaries by adding instream structures, including but not limited to the following:

a) Add boulders, large woody debris, or other structures where appropriate in river channels, taking human safety into consideration.
b) If large woody debris or coarse sediment is removed from upstream reservoirs, it should be transported downstream and placed into the Stanislaus, Tuolumne, and Merced Rivers due to that reservoir's contribution to deficits of large woody debris and coarse sediment supply in these rivers.

v. Improve Reservoir Operations and/or Physical Structures to Maintain Adequate Water Temperature Conditions: The USBR, NMFS, USFWS, DFW, FERC, FERC licensees, dam owners or operators, and others, should evaluate and implement temperature control solutions, including but not limited to the following:

a) Cold water pool management.
b) Installation or modification of selective withdrawal structures (e.g. temperature control curtains or shutters).

vi. Expand Fish Screening: The DFW, NMFS, USFWS, water districts, local landowners, and others should evaluate unscreened diversions on the Stanislaus, Tuolumne, and Merced Rivers and the LSJR for their potential to cause mortality to migrating salmonids and implement fish screening solutions where appropriate and effective.

vii. Improve Fish Passage Above Dams: The USBR, NMFS, USFWS, DFW, FERC, FERC licensees, dam owners or operators, and others, should evaluate and implement fish passage solutions to all human-made barriers which block native fishes from accessing important habitats, including but not limited to the following:

a) Near-term actions assessing habitat suitability upstream of dams, investigating fish passage options and developing plans for long-term reintroductions of salmonids upstream of existing dams.
b) Provide fish passage at existing dams which block or impede native fish movements.

viii. Improve Fish and Water Barrier Programs: The USBR, DWR, DFW, USFWS, and NMFS should develop and implement improvements to fish and water barrier programs within the Delta, including but not limited to the following:

a) Research, monitor, and report the effects of physical and non-physical barriers within the delta on water quality and fish.

b) Develop and evaluate physical and non-physical barrier designs to maximize their effectiveness in reducing adverse impacts on native fish and wildlife and their habitat.

ix. Reduce Predation and Competition by Non-Native Fish: The DFW, NMFW, USFWS, FERC, FERC licensees, local water districts, conservation groups, landowners, water users and other appropriate entities should reduce impacts that non-native predators and competitors have on native fish and modify habitats which currently favor non-native fish over native fish in the LSJR and its tributaries to favor native fish. Actions include but are not limited to the following:

a) Study and report the effects that predators and non-native fish have on native fish.
b) Identify gravel pits, scour pools, ponds, weirs, diversion dams, and other structures or areas that harbor significant numbers of non-native fish and predatory fish that may currently reduce native fish survival.
c) Modify priority structures and areas to reduce predation and non-native fish effects and to improve native fish success.
d) Evaluate and implement changes to fishing regulations to reduce the impact that non-native competitor and predator fish have on native fish.

x. Reduce Invasive Species: The NMFS, DFW, USFWS, USBR, United States Department of Agriculture, California Department of Food and Agriculture, the State Lands Commission, the California Fish and Game Commission, the California State Parks Division of Boating and Waterways, local agencies in LSJR Tributaries' watersheds, and other appropriate entities should reduce the impacts aquatic invasive species (plants and animals) have on native fish and wildlife of the Bay-Delta watershed. Actions include but are not limited to the following:

a) Fund and launch prevention, early detection, and rapid response actions, including efforts to coordinate various aquatic invasive species monitoring programs and expand monitoring of freshwater systems.
b) Evaluate and implement appropriate actions to minimize the effects of aquatic invasive species on native fishes in the Bay-Delta watershed.
c) Monitor and regulate the importation of aquatic invasive species to minimize the effects of such species on native fishes in the Bay-Delta watershed.
d) Conduct a statewide assessment of the risk from various aquatic invasive species vectors.
e) Support public education preventing the introduction of aquatic invasive species, including promoting the use of native and noninvasive alternatives.

11. San Joaquin River Restoration Program

The historic operation of the Friant Dam resulted in significant portions of the main stem of the San Joaquin River between Friant Dam and the confluence of the Merced River being dry. In 2006, in response to litigation over those impacts, the Department of Interior, the Natural Resources Defense Council, and the Friant Division long-term contractors reached a settlement to restore and maintain fish in "good condition" from below Friant Dam to the confluence of the Merced River, including naturally-reproducing and self-sustaining populations of salmon and other fish. In addition, the parties to the settlement agreed to reduce or avoid adverse water supply impacts to the Friant Division long-term contractors that could result from the implementation of interim and restoration flows. The settlement also acknowledged the potential for significant public benefits beyond its restoration and management goals including water quality benefits downstream of the Merced River.

The DFW, USBR, NMFS, and USFWS in coordination with the IEP, STM Working Group, and other interested parties should evaluate San Joaquin River Restoration Program flow contributions to flow and water quality requirements at Vernalis. The State Water Board may consider water quality objectives for the stream system above the San Joaquin River's confluence with the Merced River in future updates to this Plan.

D. Monitoring and Special Studies Program

This Plan requires, and the permits and license of the DWR and the USBR include conditions for, a monitoring program to provide baseline information and determine compliance with water quality objectives. This Plan also requires, and the permits of DWR and USBR include conditions for, special studies that will (1) evaluate the response of the aquatic habitat and organisms to the objectives; and (2) increase understanding of the large-scale characteristics and functions of the Estuary ecosystem to better predict system-wide responses to management options.

The monitoring and special studies program, also known as the Environmental Monitoring Program (EMP) is predicated on the ongoing monitoring efforts of the IEP. IEP member agencies include the State Water Board, DFG, USGS, NOAA Fisheries, USCOE, USEPA, DWR, and the USBR. The program is coordinated with the CBDA and UC Davis to minimize duplication and facilitate the exchange of data.

Table 4 of the 1995 Plan (now Table 5), established a preliminary compliance and baseline monitoring program. Condition 11 (e) on page 149 of D-1641 required the DWR and the USBR to complete an assessment of the EMP every three years to evaluate whether the goals of the monitoring program were being attained. This review was completed in 2003 and based on the conclusions of the review, several changes to the EMP were proposed that were considered to be functionally equivalent to the existing program. IEP participants developed a more appropriate compliance and baseline monitoring program. The new program contains

Geographic Information System (GIS) coordinates for each monitoring and baseline station. In addition the modifications will: 1) enhance continuous monitoring at key locations to better measure the temporal variability in the system; 2) enhance shallow water monitoring to better measure the spatial variability in the system; 3) reduce the tidal spring-neap bias that occurs in the current program; 4) improve the quality assurance and quality control of the program by providing continuous monitoring data that can be used as crosschecks against discrete or periodic sampling data; and 5) improve employee safety.

Prior to the release of the 1995 Plan, the IEP had been conducting a special studies program including the 20mm delta smelt survey and the juvenile salmon and delta fishes abundance and distribution sampling. These studies emphasize understanding the ecological responses of species of special concern to water project operations resulting from implementation of this Plan. Other ongoing studies, such as the Bay shrimp and crab abundance and distribution sampling, and the Bay salinity monitoring, enhance knowledge of how the Estuary responds to factors other than the operational impacts of water development facilities.

Since the release of the 1995 Plan, various State and federal agencies and interested parties developed a near-real-time monitoring program managed by the Water Operations Management Team (WOMT) to assist the CALFED Ops group acting pursuant to the Principles for Agreement. The State and federal agencies should continue to conduct a process like the CALFED Ops process to ensure that the SWP and CVP operations developed to comply with the Plan are as efficient as possible.

Table 5. Water Quality Compliance and Baseline Monitoring

Station Number[1]	Station Description[2]	Latitude[3]	Longitude[3]	Cont. Rec.[4]	Cont. Multi-para-meter[5]	Disc. Physical Chemical[6]	Disc. Phyto-plankton[7]	Discr. Zoo-plankton[8]	Discrete Benthos[9]
C2 ■	Sacramento River @ Collinsville	38.07395	-121.85010	*					
C3A ⏃	Sacramento River @ Hood	38.36772	-121.52051		*	*	*	*	
C4 ■	San Joaquin River @ San Andreas Ldg.	38.10319	-121.59128	*					
C5 ■	Contra Costa Canal @ Pumping #1	37.99520	-121.70244	*					
C6 ■	San Joaquin River @ Brandt Bridge site	37.86454	-121.32270	*					
C7 ⏃	San Joaquin River @ Mossdale Bridge	37.78604	-121.30666		*				
C8 ■	Old River near Middle River	37.82208	-121.37517	*					
C9 ●	West Canal at mouth of CCForebay Intake	37.8218	-121.55275						*
		37.83075	-121.55703		*	*	*	*	
C10 ●	San Joaquin River near Vernalis	37.67575	-121.26500						
		37.69734	-121.26472		*	*	*	*	
C13 ■	Mokelumne River @ Terminous	38.11691	-121.49888	*					
C14 ■	Sacramento River @ Port Chicago	38.05881	-122.02607	*					

Station Number[1]	Station Description[2]	Latitude[3]	Longitude[3]	Cont. Rec.[4]	Cont. Multi-para-meter[5]	Disc. Physical Chemical [6]	Disc. Phyto-plankton[7]	Discr. Zoo-plankton[8]	Discrete Benthos [9]
C19 ■	Cache Slough @ City of Vallejo Intake	38.29687	-121.74784	*					
D4 ⅄	Sacramento River above Point Sacramento	38.06214	-121.81792			*	*	*	*
D6 ⅄	Suisun Bay @ Bulls Head Pt. near Martinez	38.04427	-122.11764			*	*	*	*
D6A ⅄	Suisun Bay @ Martinez	38.02762	-122.14052		*				
D7 ⅄	Grizzly Bay @ Dolphin near Suisun Slough	38.11708	-122.03972	*		*	*	*	*
D8 ⅄	Suisun Bay off Middle Point near Nichols	38.05992	-121.98996			*	*	*	
D9 ⅄	Honker Bay near Wheeler Point	38.07245	-121.93923	*		*	*		
D10 ●	Sacramento River @ Chipps Island	38.04288	-121.92011		*	*			
		38.04631	-121.91829					*	
D11 ⅄	Sherman Island near Antioch	38.04228	-121.79951	*		*	*		
D12 ●	San Joaquin River @ Antioch Ship Canal	38.01770	-121.80273		*	*			
		38.02162	-121.80638					*	
D15 ■	San Joaquin River @ Jersey Point	38.05190	-121.68927	*					
D16 ⅄	San Joaquin River @ Twitchell Island	38.09690	-121.66912					*	*
D19 ⅄	Frank's Tract near Russo's Landing	38.04376	-121.61477	*		*	*	*	
D22 ●	Sacramento River @ Emmaton	38.08406	-121.73912	*					
		38.08453	-121.73914					*	
D24 ●	Sacramento River below Rio Vista Bridge	38.15891	-121.68721		*	*			
		38.15550	-121.68113						*
D26 ⅄	San Joaquin River @ Potato Point	38.07667	-121.56696			*	*	*	
D28A ⅄	Old River near Rancho Del Rio	37.97038	-121.57271			*	*	*	*
		37.96980	-121.57210	*					
D29 ■	San Joaquin River @ Prisoners Point	38.05793	-121.55736	*					
…….. ⅄		38.05793	-121.55736			*	*	*	
D41 ⅄	San Pablo Bay near Pinole Point	38.03016	122.37287			*	*	*	*
D41A ⅄	San Pablo Bay near mouth of Petaluma R.	38.08472	-122.39067			*	*	*	*
DMC1 ●	Delta-Mendota Canal at Tracy Pump. Plt.	37.78165	-121.59050		*				
P8 ⅄	San Joaquin River @ Buckley Cove	37.97815	-121.38242			*	*	*	*
P8A ⅄	San Joaquin River @ Rough and Ready Island	37.96277	-121.36587		*				
P12 ■	Old River @ Tracy Road Bridge	37.80493	-121.44929	*					
MD10 ⅄	Disappointment Slough near Bishop Cut	38.04229	-121.41935			*	*	*	
S21 ■	Chadbourne Slough @ Sunrise Duck Club	38.18476	-122.08315	*					
S35 ⅄	Goodyear Slough @Morrow Island Clubhouse	38.1181	-112.09580	*					
S42 ●	Suisun Slough 300' south of Volanti Slough	38.18053	-122.04696	*		*	*		
		38.18027	-122.04779					*	
S49 ■	Montezuma Slough near Beldon Landing	38.18686	-121.97080	*					

Station Number[1]	Station Description[2]	Latitude[3]	Longitude[3]	Cont. Rec.[4]	Cont. Multi-para-meter[5]	Disc. Physical Chemical [6]	Disc. Phyto-plankton[7]	Discr. Zoo-plankton[8]	Discrete Benthos [9]
S64 ■	Montezuma Slough @ National Steel	38.12223	-121.88800	*					
S97 ⅄	Cordelia Slough @ Ibis Club	38.15703	-122.11378	*					
NZ032 ⅄	Montezuma Slough, 2nd bend from mouth	38.16990	-122.02112					*	
SLBAR3 ■	Barker Sl. at No. Bay Aqueduct (SLBAR3)	38.27474	-121.79499	*					
--- ■	Sacramento R. (I St. Bridge to Freeport) (RSAC155)	38.589 to 38.45585	-121.504 to -121.50302	*					
--- ⅄	San Joaquin R. (Turner Cut to Stockton) (RSAN050-RSAN061)	37.99746 to 37.95242	-121.44435 to -121.31750	*					
--- ⅄	Water supply intakes for waterfowl management areas on Van Sickle Island and Chipps Island			*					

■Compliance monitoring station ⅄Baseline monitoring station ●Compliance and baseline monitoring station

Footnotes for Table 5

[1] *All stations with compliance monitoring component are identified by historical "interagency" station numbers as given in State Water Board D-1641 (2000) and Water Right Decision 1485 (1978). Modified station ID numbers (e.g. C3A) identify baseline stations near historical stations.*

[2] *All stations with a compliance monitoring component retain their historical "interagency" station descriptions as given in State Water Board D-1641 (2000) and D-1485 (1978). Baseline stations with modified station ID numbers (e.g. C3A) have modified station descriptions.*

[3] *Coordinates are geographic North American Datum 1983 and have been verified to be accurate for 1:24,000 scale mapping.*

[4] *Continuous recording (every 15 minutes) of water temperature, electrical conductivity (EC), and/or dissolved oxygen. For municipal and industrial intake chloride objectives, EC can be monitored and converted to chloride concentration.*

[5] *Continuous, multi-parameter monitoring (recording every 1 to 15 minutes with telemetry capabilities) includes the following variables: water temperature, EC, pH, dissolved oxygen, turbidity, chlorophyll a fluorescence, tidal elevation, and meteorological data (air temperature, wind speed and direction, solar radiation).*

[6] *Discrete physical/chemical monitoring is conducted on a year-round, near-monthly basis that alternates between spring and neap tides and includes the following variables: macronutrients (inorganic forms of nitrogen, phosphorus and silicon), total suspended solids, total dissolved solids, total particulate and dissolved organic nitrogen and carbon, chlorophyll a, pH, dissolved DO, EC (specific conductance), turbidity, secchi depth, and water temperature. In addition, on-board continuous recording is conducted intermittently for the following variables: water temperature, dissolved oxygen, electrical conductivity, turbidity, and chlorophyll a fluorescence.*

[7] *Discrete sampling for phytoplankton enumeration or algal pigment analysis is conducted on a year-round, near-monthly basis that alternates between spring and neap tides.*

[8] *Tow or pump sampling for zooplankton, mysids, and amphipods is conducted on a year-round, near-monthly basis that alternates between spring and neap tides.*

[9] *In water years 2004 and 2005, replicated benthos and sediment grab samples are taken quarterly (every three months) and during special studies; more frequent monitoring sampling resumes in water year 2006.*

E. Other Studies conducted by agencies that may provide information relevant to future proceedings

The following studies are currently in progress and are being completed by other agencies independent of State Water Board action. Upon completion, the State

Water Board may use the information provided by these studies to amend portions of this Plan.

1. Delta Cross Channel Gate

In the fall of 2000, the CALFED Bay Delta Program and the IEP began investigating the costs and benefits associated with re-operating the Delta Cross Channel (DCC) gate to address water quality and fisheries concerns. These studies have been delayed due to lack of funding and staffing problems. When completed, the Board expects the CALFED Bay Delta Program multidisciplinary studies to address the multi-purpose aspects of DCC gate operation (balancing the beneficial uses of fisheries, water quality, water supply and flood control), and provide evidence for future amendments to the DCC objective.

2. Potential New Municipal and Industrial Objectives

Further understanding of the chemical reactions which form disinfection by-products (DBPs) is required before water quality objectives for bromides and organic carbon can be set. However, USEPA may require compliance with new federal drinking water standards as soon as 2012. The preferred methods for developing this information are collaborative processes such as the CALFED Drinking Water Quality Program (DWQP), which includes the Central Valley Drinking Water Policy. DWR, CALFED, and the Central Valley Regional Water Board are planning to complete development of the Central Valley Drinking Water Policy by 2009. This work may include development of bromide objectives and other constituents for the Central Valley Drinking Water Policy. After the Drinking Water Policy is completed, the State Water Board may convene a workshop to receive comments as to whether there is a need for objectives in the Bay-Delta Plan for bromides and organic carbon.

3. Pelagic Organism Decline

The IEP formed a POD work team to evaluate the potential causes of the marked declines in numerous pelagic fishes in the Sacramento-San Joaquin Delta Estuary and Suisun Bay. This multi-agency effort has produced a work plan that provides an overview of the problem, and a description of the studies used to examine some of the suspected causes of the decline.

In order to better understand the results of the POD studies, the IEP has created a conceptual model of the decline. The model is based on three general factors that may be acting individually or in concert to lower pelagic productivity. The three main suspected factors are: toxins, invasive species and water project operations. The POD studies were designed to provide insight into the reasons for the decline and to set the scientific basis for future work, with the eventual goal of narrowing down the causes of the decline and determining what actions can be taken to reverse the trend. The proposed studies represent an interdisciplinary, multi-agency effort including staff from DFG, DWR, USBR, USEPA, USGS, CBDA, San Francisco State University and UC Davis. The proposed work falls into three general types: (1) an expansion of existing monitoring (five expanded surveys); (2) ongoing studies (19 studies); and (3) new studies (15 studies).

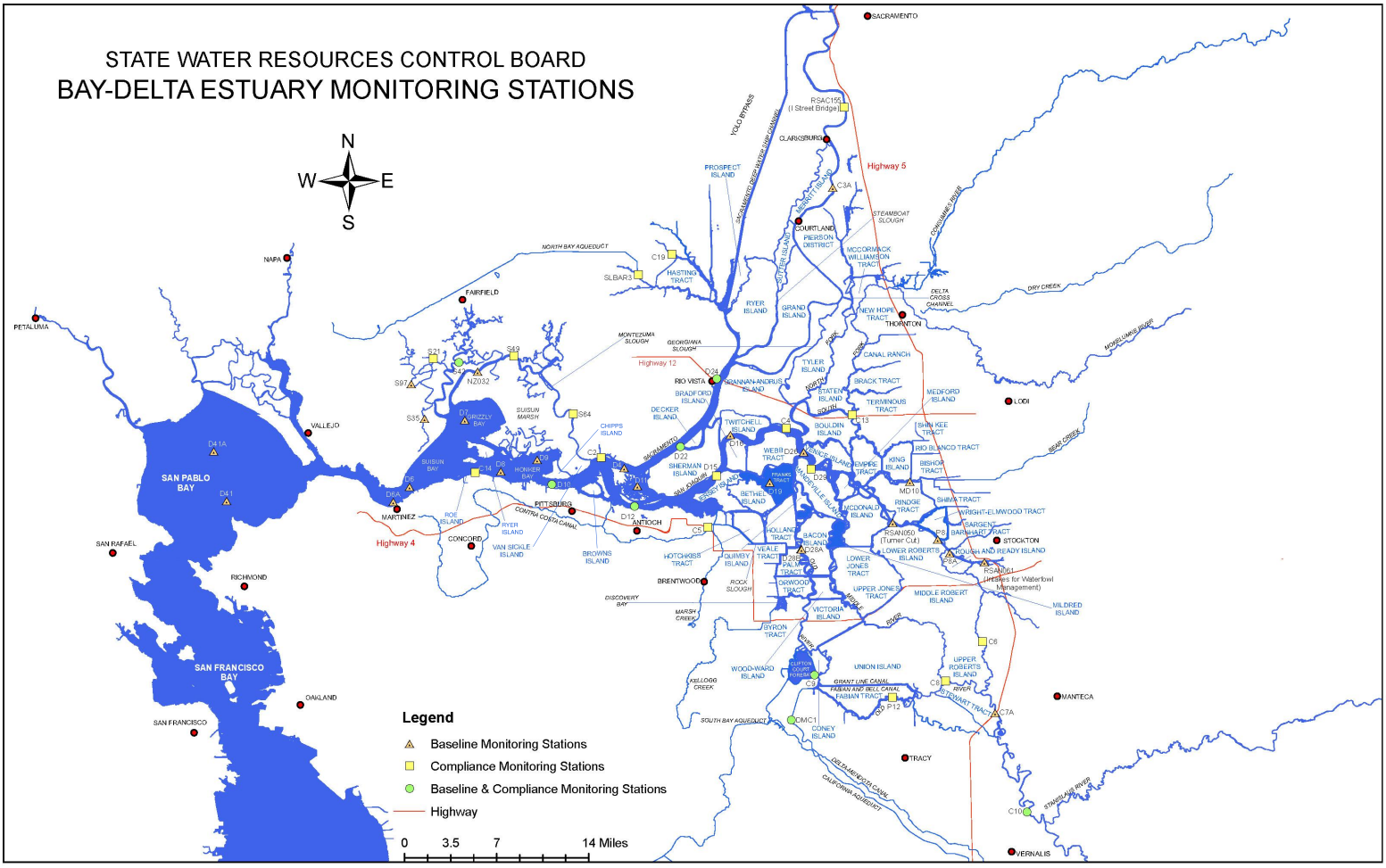
The program will be run by the existing IEP Pelagic Organisms Decline Project Work Team to develop, direct, review and analyze the results of the effort. The program will yield a range of products and deliverables including management briefs, publications and reports, web-based monitoring data, and presentations at conferences, workshops and meetings.

In February 2006, the CBDA provided an independent review of the initial results of the 2005 IEP POD Workplan and the 2005 IEP POD Synthesis Report entitled *Review Panel Report: San Francisco Estuary Sacramento-San Joaquin Delta Interagency Ecological Program on Pelagic Organism Decline*. The report provides perspectives on data synthesis presented and makes recommendations for improvements in analyzing, interpreting and defining appropriate context for future IEP POD-oriented investigations.

The expected completion date for the POD studies is 2007. Once the study results have been compiled; the State Water Board will ask the IEP to make a presentation of findings to the State Water Board at a subsequent workshop. Study results will be considered in the ongoing Plan review, and may be used to determine whether changes should be made to existing Water Quality Objectives, i.e. adding flexibility to the Delta Outflow Objective or the Delta Export Limits Objective. After the initial presentation to the State Water Board, the IEP shall give the State Water Board updates of current studies and new findings at subsequent workshops on an annual basis. The IEP presentations to the State Water Board shall continue until the next review of this Plan. The information collected by the State Water Board may be used to modify the water quality objectives in this Plan in the future.

4. Suisun Marsh

In 2001, the SMCG was formed to resolve issues of amending the SMPA, obtain a Regional General Permit, implement the Suisun Marsh Levee Program, and recover endangered species. The broader purpose of the SMCG is to develop and agree on a long-term implementation plan. The SMCG principal agencies are USFWS, USBR, DFG, DWR, Suisun Resource Conservation District, and NOAA Fisheries. The proposed Suisun Marsh Plan would be consistent with the goals and objectives of the Resources Agency's Bay-Delta Program, and would balance them with the SMPA, federal and State Endangered Species Acts and other management and restoration programs within the Suisun Marsh in a manner responsive to the concerns of all stakeholders and based upon voluntary participation of private landowners. In March 2006, the Plan was undergoing California Environmental Quality Act (CEQA)/National Environmental Policy Act review. The final CEQA document will be released in December 2008. The State Water Board will use the final Suisun Marsh Plan and the analysis in the final CEQA document in its next periodic review to determine what amendments, if any, to make to Suisun Marsh soil and channel water salinity objectives, and the narrative objective for brackish tidal marshes of Suisun Bay.


STATE WATER RESOURCES CONTROL BOARD
BAY-DELTA ESTUARY MONITORING STATIONS
N
W
E
S
Legend
Baseline Monitoring Stations
Compliance Monitoring Stations
Baseline & Compliance Monitoring Stations
Highway
0 3.5 7 14 Miles
SACRAMENTO
CLARKSBURG
Highway 5
COURTLAND
STEAMBOAT SLOUGH
CONSUMNES RIVER
DRY CREEK
MOKELUMNE RIVER
NAPA
FAIRFIELD
PETALUMA
VALLEJO
SAN PABLO BAY
SAN RAFAEL
RICHMOND
SAN FRANCISCO BAY
OAKLAND
SAN FRANCISCO
MARTINEZ
CONCORD
PITTSBURG
ANTIOCH
Highway 4
BRENTWOOD
Highway 12
RIO VISTA
THORNTON
LODI
STOCKTON
MANTECA
TRACY
VERNALIS
SOUTH BAY AQUEDUCT
DELTA-MENDOTA CANAL
CALIFORNIA AQUEDUCT
STANISLAUS RIVER
BEAR CREEK
MILDRED ISLAND
MIDDLE ROBERT ISLAND
UPPER JONES TRACT
LOWER JONES TRACT
VICTORIA ISLAND
UNION ISLAND
GRANT LINE CANAL
OLD RIVER
MIDDLE RIVER
FABIAN AND BELL CANAL
CONEY ISLAND
OMC1
RSAC155 (I Street Bridge)
RSAN050 (Turner Cut)
RSAN061 (Utilities for Waterfowl Management)