

Appendix K

Revised Water Quality Control Plan

Draft Lower San Joaquin River Fish and Wildlife Flow Objectives
and Program of Implementation

Draft Lower San Joaquin River (LSJR) Fish and Wildlife Flow Objectives

TABLE 3 WATER QUALITY OBJECTIVES FOR FISH AND WILDLIFE BENEFICIAL USES						
RIVER FLOWS						
COMPLIANCE LOCATION	STATION	PARAMETER	DESCRIPTION	WATER YEAR	TIME	VALUE
<i>Inflows from the LSJR at Airport Way Bridge, Vernalis to the Delta</i>	<i>C-10</i>	<i>Flow Rate</i>	<i>Narrative</i>	<i>All</i>	<i>February through June</i>	<i>Maintain flow conditions from the San Joaquin River Watershed to the Delta at Vernalis, together with other reasonably controllable measures in the San Joaquin River Watershed, sufficient to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta. Flow conditions that reasonably contribute toward maintaining viable native migratory San Joaquin River fish populations include, but may not be limited to, flows that 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 abundance, spatial extent or distribution, genetic and life history diversity, migratory pathways, and productivity.</i>
<i>Inflows from the Tuolumne River to the LSJR</i>	<i>TBD</i>					
<i>Inflows from the Merced River to the LSJR</i>	<i>TBD</i>					
<i>Inflows from the Stanislaus River to the LSJR</i>	<i>TBD</i>					
<i>LSJR at Airport Way Bridge, Vernalis</i>	<i>C-10</i>	<i>Flow Rate</i>	<i>Minimum Average Monthly Flow Rate (cfs)</i>	<i>All</i>	<i>Oct</i>	<i>1,000¹</i>

¹ Plus up to an additional 28 thousand acre-feet (TAF) pulse/attraction flow shall be provided during all water year types. The amount of additional water will be limited to that amount necessary to provide a monthly average flow of 2,000 cfs. The additional 28 TAF is not required in a critical year following a critical year. The pulse flow will be scheduled in consultation with the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and the Department of Fish and Game (DFG).

Draft Lower San Joaquin River Fish and Wildlife Flow Objectives Program of Implementation

Delete existing text in Chapter IV. Program of Implementation, A. Implementation Measures within State Water Board Authority, 3. River Flows: San Joaquin River at Airport Way Bridge, Vernalis, and add the following new text to Section B. Measures Requiring a Combination of State Water Board Authorities and Actions by Other Entities:

Consistent with the Porter-Cologne Water Quality Control Act, Water Quality Control Plans shall include a description of the nature of actions which are necessary to achieve the objectives, including actions by the State Water Resources Control Board (State Water Board) and recommendations for appropriate actions by any other entity, public or private. In addition, a description of surveillance to be undertaken to determine compliance with the objectives is required. This Program of Implementation for the Lower San Joaquin River (LSJR) flow objectives describes the flow actions that the State Water Board will take to implement the narrative objective and the monitoring, special studies, and reporting requirements that the State Water Board will implement to determine compliance. Actions by the State Water Board alone will, however, be insufficient to fully implement the narrative objective's goal of protecting native LSJR fish populations. Actions outside of LSJR flows and the State Water Board's direct regulatory authority must also be part of the comprehensive approach to protect fish and wildlife beneficial uses in the LSJR and San Francisco Bay-Sacramento/San Joaquin Delta Estuary (Bay-Delta). Further, the need for, and effectiveness of, flow and other water quality objectives included in the Water Quality Control Plan for the Bay-Delta (Bay-Delta Plan) to protect fish and wildlife beneficial uses is intricately linked to the successful implementation of these other actions. Other actions, such as habitat restoration, are needed in combination with flow to protect fish and wildlife beneficial uses. At the same time, successful implementation of habitat restoration actions may reduce the need for flows or other actions required by the State Water Board. Accordingly, actions that need to be implemented by other entities are also included in this program of implementation.

State Water Board Actions

The State Water Board will require implementation of the narrative LSJR objective described in Table 3 of the Bay-Delta Plan through water rights actions, Federal Energy Regulatory Commission (FERC) hydropower licensing processes, other water quality actions, or actions by other entities. The implementation framework described below provides for adaptive management of flows informed by required monitoring, special studies, and reporting. The purpose of this program of implementation, in part, is to achieve the narrative LSJR flow objective by providing more natural flow conditions, including more flow of a more natural spatial and temporal pattern; providing for adaptive management in order to respond to changing information on flow needs and to minimize water supply costs; and allowing for and encouraging coordination and integration of existing and future regulatory processes. To allow for refinement of implementation measures and coordination with ongoing FERC proceedings in the LSJR watershed, implementation of the narrative flow objective may be phased in order to achieve full compliance with the narrative objective by no later than 2020.

Although the lowest downstream compliance location for the LSJR narrative flow objective is at Vernalis, the objective is intended to protect migratory fish in a larger area, including areas upstream and within the Delta where fish that migrate to or from the LSJR watershed depend on adequate flows from the LSJR and its tributaries. To assure that flows required to meet the LSJR narrative flow objective are not rediverted for other purposes, the State Water Board may take water right and other actions to assure that the flows are used for their intended purpose.

Draft Lower San Joaquin River Fish and Wildlife Flow Objectives and Program of Implementation

In addition, the State Water Board may take actions to assure that provision of flows to meet the narrative LSJR flow objective does not result in redirected impacts to groundwater resources. During the implementation proceeding for the narrative LSJR flow objective, the State Water Board may establish requirements, including minimum reservoir carryover storage or other requirements, to assure that provision of flows to meet the narrative flow objective does not have adverse impacts on cold water pool levels and related fisheries impacts.

It is the State Water Board's intention that an agency's implementation of the narrative LSJR flow objective, including implementation through flow requirements imposed in a FERC process, will serve to meet any responsibility to contribute to the LSJR inflow component of the Delta outflow objective in this plan that would be otherwise imposed on that agency. The State Water Board, however, may further consider and reallocate responsibility for implementing the Delta outflow objective in any subsequent proceeding, including a water right proceeding.

February through June Flows Requirements

The State Water Board has determined that more flow of a more natural pattern is needed from February through June from the LSJR watershed to Vernalis to achieve the narrative LSJR flow objective. Specifically, more flow is needed from the existing salmon and steelhead bearing tributaries in the LSJR watershed down to Vernalis in order to provide for connectivity with the Delta and more closely mimic the natural hydrographic conditions to which native migratory fish are adapted. Salmon bearing tributaries to the San Joaquin River currently include the Merced, Tuolumne, and Stanislaus Rivers.¹

Thus, the State Water Board has determined that 35 percent of unimpaired flow is required from February through June from each of the Merced, Tuolumne, and Stanislaus Rivers on a 14-day running average, unless otherwise approved by the State Water Board through the adaptive management framework described below. This flow is in addition to flows in the LSJR from sources other than the Merced, Tuolumne, and Stanislaus Rivers. The 35 percent of unimpaired flow requirement would not apply when such flows would exceed levels that would cause or contribute to flooding or other related public safety concerns as determined through consultation with federal, state, and local agencies and other appropriate interests with expertise in flood management.

In addition, the State Water Board has determined that base flows of 1,000 cfs on a 14-day running average are required at Vernalis on the LSJR at all times during the February through June period. If the base flows at Vernalis are reduced below 1,000 cfs, then water needed to achieve the base flows should be provided on a basis relative to the average February through June unimpaired flow contributions from each of the Merced, Tuolumne, and Stanislaus Rivers until the base flows reach 1,000 cfs at Vernalis. Specifically, the Merced shall provide 24 percent, the Tuolumne 47 percent, and the Stanislaus 29 percent of the flow needed to achieve

¹ Currently, the San Joaquin River (SJR) does not support salmon runs upstream of the Merced River confluence (upper SJR). However, pursuant to the San Joaquin River Restoration Program (SJRRP), spring-run Chinook salmon are planned to be reintroduced to the upper SJR no later than December 31, 2012. Flows needed to support this reintroduction are being determined and provided through the SJRRP. During the next review of the Bay-Delta Plan, the State Water Board will consider information made available through the SJRRP process, and any other pertinent sources of information, in evaluating the need for any additional flows from the upper SJR to contribute to protection of fish and wildlife beneficial uses in the SJR.

Draft Lower San Joaquin River Fish and Wildlife Flow Objectives and Program of Implementation

a base flow of 1,000 cfs at Vernalis unless otherwise approved through the Implementation Plan or adaptive management processes described below.

Implementation of February Through June Flow Requirements

Implementation of the February through June LSJR flow requirements will require the development of specific measures to achieve, monitor, and evaluate compliance with the February through June flow requirements, including compliance with the percent unimpaired flow and base flow requirements. Accordingly, State Water Board staff will convene an Implementation Workgroup consisting of persons with expertise in fisheries management, unimpaired flows, and operations on the LSJR, Merced, Tuolumne, and Stanislaus Rivers to develop recommendations for such measures that will best achieve the February through June flow requirements while minimizing water supply costs. The recommendations shall be included in an Implementation Plan that shall be submitted to the Executive Director of the State Water Board for approval within 180 days from the date of the Office of Administrative Law's (OAL) approval of this amendment to the Bay-Delta Plan. The Implementation Plan will then be considered in State Water Board water right proceedings, FERC licensing proceedings, or other implementation actions to achieve the February through June flows.

Annual Adaptive Management of February through June Flow Requirements

The February through June percent of unimpaired flow requirement described above may be adaptively managed on an annual basis in order to achieve the narrative LSJR flow objective and minimize water supply impacts, as described below. Any adaptive management of flows must not result in flows of less than 25 percent of unimpaired flow from each of the Merced, Tuolumne, and Stanislaus Rivers over the entire February through June period.² Specifically, instantaneous flows and monthly, daily, and 14-day running average flows may be changed over the particular averaging period on each tributary as long as average flows over the entire five-month period are no less than 25 percent of unimpaired flow on each tributary. This flow is in addition to flows in the LSJR from sources other than the Merced, Tuolumne, and Stanislaus Rivers. At all times, base flows must be met. The adaptive management of flows does not have to rely on the unimpaired flow percentage method, but instead can use pulse flows or other management approaches, as long as the requisite unimpaired flow percentage for the entire February through June period is met.

The State Water Board or other responsible entity will establish a Coordinated Operations Group (COG), which will be comprised of the Department of Fish and Game (DFG); National Marine Fisheries Service (NMFS); United State Fish and Wildlife Service (USFWS); representatives of water users on the Merced, Tuolumne, and Stanislaus Rivers; and any other representatives deemed appropriate by the Executive Director. In order to inform implementation actions, State Water Board staff will work with the COG and interested persons to develop procedures for an adaptive management process, to be submitted for approval by the Executive Director within one year following the date of OAL's approval of this amendment to the Bay-Delta Plan. The procedures shall allow the COG or its members to propose annual adaptive management of flows during the February through June period by preparing a proposed adaptive management plan, subject to approval by the Executive Director. Any member of the COG may submit a proposed adaptive management plan to modify the timing of flows during the February through June time frame in order to better protect fishery resources in the LSJR, Stanislaus, Merced, and Tuolumne Rivers. Any adaptive management plan that

² Flows may exceed 35 percent of unimpaired flow from each of the tributaries, but the annual adaptive management does not require such flows.

Draft Lower San Joaquin River Fish and Wildlife Flow Objectives and Program of Implementation

would modify the total quantity of flow over the entire February through June period must be agreed to by all members of the COG prior to submitting it to the Executive Director. Other interested persons may provide information to inform the COG process and the Executive Director's consideration of any adaptive management plan.

The State Water Board recognizes that an adaptive management plan may not be able to accurately forecast conditions that may actually occur during the February through June period. Accordingly, as long as the approved adaptive management plan is designed to achieve the applicable unimpaired flow range described above, compliance with the plan will be deemed compliance with those flows.

Long-term Adaptive Management of February through June Flow Requirements

Based on future monitoring and evaluation of flow information developed for the LSJR, Merced, Tuolumne, and Stanislaus Rivers, the State Water Board may allow modifications to the numeric requirements in this program of implementation that will achieve the narrative LSJR flow objective. For example, FERC licensing proceedings on the Merced and Tuolumne Rivers are expected to yield specific information on in-stream flow needs for those tributaries. To obtain similar information for the Stanislaus River, the State Water Board will require the development of any additional information needed to inform specific instream flow needs on the Stanislaus River. The State Water Board expects this information to inform specific measures that may be used to adaptively implement the narrative LSJR flow objective.

Specifically, the State Water Board may use subsequently developed information to approve modifications to the required base flow, percentage of unimpaired flows, and upper end of flows at which a percentage of unimpaired flows are no longer required. The required percentage of unimpaired flow may range between 25 and 45 percent of unimpaired flow from any one tributary over the entire February through June period and the base flows at Vernalis may range from 800 to 1200 cfs. The State Water Board may authorize these modifications at its own discretion. In addition, the Executive Director of the State Water Board may approve a request made by the COG for such modifications. Any modification to the February through June flow requirements do not have to rely on the unimpaired flow percentage method, but instead can use other management approaches (such as requiring specific flow levels to support identified ecosystem functions achieved at those levels), as long as the total quantity of water that would be provided over the entire February through June period is between 25 percent and 45 percent of unimpaired flow.

October Flow Requirements

The State Water Board will reevaluate the assignment of responsibility for meeting the October pulse flow requirement during a water right proceeding, FERC licensing proceeding, or other proceeding, in order to optimize protection for fish and wildlife beneficial uses and minimize impacts to water supplies.

The State Water Board will require monitoring and special studies (discussed below) during the water rights and FERC processes to determine what, if any, changes should be made to the October pulse flow requirement and its implementation to achieve the narrative LSJR flow objective. Based on the analyses of fall flow needs, the State Water Board will evaluate the need to modify the October pulse flow requirements in the next update of the Bay-Delta Plan.

Flow Requirements at Other Times of Year (July through September and November through January)

The State Water Board has not established flow requirements for the July through September and November through January time frames that are necessary to implement the narrative LSJR flow objective. The State Water Board will require monitoring and special studies (discussed below) during the water rights and FERC processes to be conducted to determine what, if any, flow requirements should be established for these time frames to achieve the narrative LSJR flow objective. Results from the monitoring and special studies program shall be used to inform the FERC proceedings on the Merced and Tuolumne Rivers and to inform potential changes to the LSJR flow objectives and program of implementation, and other changes to the Bay-Delta Plan.

Variance for 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 variance to the implementation of the narrative LSJR flow objective or October flow objective 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 or a local governing body has declared a state or local emergency pursuant to the California Emergency Services Act (Gov. Code, § 8550 et seq.). Before authorizing any temporary variance, the State Water Board must find that measures will be taken to reasonably protect the beneficial use in light of the circumstances of the emergency.

Other State Water Board Activities

In addition to the actions listed above, the State Water Board is currently in the process of conducting a comprehensive review and update of the remainder of the Bay-Delta Plan focused on needed changes to protect fish and wildlife beneficial uses not addressed by the current amendment to establish revised LSJR flows. Specifically, the comprehensive review and update to the Bay-Delta Plan will address inflows from other tributaries to the Bay-Delta, Delta outflows, Old and Middle River flows, and State Water Project (SWP) and Central Valley Project (CVP) operational constraints. In conjunction with the updates to the Bay-Delta Plan, the State Water Board will undertake proceedings to implement changes to the Bay-Delta Plan through water right or other measures. In addition to the updates to the Bay-Delta Plan and its implementation, the State Water Board is also in the process of establishing and implementing flow requirements for priority Delta tributaries. As discussed above, hydropower projects on the Merced and Tuolumne Rivers are also currently in the FERC relicensing process. Pursuant to its Clean Water Act section 401 approval authority, the State Water Board will assure that renewed licenses are appropriately conditioned to ensure compliance with the LSJR flow objectives and other applicable water quality requirements. It is expected that all of the actions listed above will contribute to the protection of fish and wildlife beneficial uses in the Bay-Delta Estuary.

Actions by the Regional Water Quality Control Boards

The Central Valley Regional Water Quality Control Board (Central Valley Board) and San Francisco Bay Regional Water Quality Control Board (San Francisco Bay Board) (collectively Regional Water Boards) are undertaking various actions that will assist in achieving the narrative LSJR flow objective, including actions to monitor, study, and regulate water quality conditions in the LSJR and Bay-Delta watershed. The Regional Boards should continue to develop and implement their regional monitoring programs, Surface Water Ambient Monitoring Program activities, and other special studies and monitoring projects to fully understand the effects of water quality conditions in the LSJR and Bay-Delta on fish and wildlife beneficial uses.

Draft Lower San Joaquin River Fish and Wildlife Flow Objectives and Program of Implementation

Regional Water Board regulatory programs should continue to use this information to develop appropriate policies and regulatory requirements including: Clean Water Act section 303(d) impaired water bodies listings, Total Maximum Daily Loads, Waste Discharge Requirements, and National Pollution Discharge Elimination System permit requirements to protect native fish and wildlife in the LSJR and Bay-Delta. Specifically, water quality conditions should be evaluated and regulated from an ecosystem perspective and should address direct and indirect effects and synergistic effects of the following high priority water quality issues for the protection of fish and wildlife: nutrients, pesticides, temperatures, dissolved oxygen, cyanotoxins, endocrine disruptors, and other priority water quality issues.

[NOTE: THE FOLLOWING SECTION ON ACTIONS BY OTHER ENTITIES IS UNDER DEVELOPMENT. THE STATE WATER BOARD IS SPECIFICALLY REQUESTING COMMENTS ON THE ACTIONS THAT SHOULD BE INCLUDED IN THIS SECTION AND THE AGENCIES AND ENTITIES THAT SHOULD BE RESPONSIBLE FOR THEIR IMPLEMENTATION.]

Actions by Other Entities

Water quality and flow related actions alone, under the administration of the State and Regional Water Boards, will be inadequate to implement the narrative LSJR flow objective's goal of protecting native fish and wildlife in the LSJR and larger Bay-Delta watershed. Comprehensive planning and implementation activities must be taken that address the responsibilities of a broad group of entities outside of the State and Regional Water Boards to address the wide array of issues affecting the protection of fish and wildlife beneficial uses in the LSJR and Bay-Delta. As native anadromous fish inhabit and traverse a number of different environments, including riverine, delta, bay and ocean habitats, the actions described below involve activities within the LSJR watershed as well as activities in the Bay-Delta watershed and ocean environment. The State Water Board will use its authority, as needed and appropriate, to encourage and where appropriate, require that necessary actions by other entities are completed.

Major Planning and Restoration Activities

Several major planning and restoration activities are currently underway that are expected to greatly contribute to the protection of fish and wildlife in the Bay-Delta Watershed and LSJR when implemented. The State Water Board will work to assure that its Bay-Delta planning and implementation processes are coordinated and integrated with these other processes to protect fish and wildlife in the LSJR and Bay-Delta.

Delta Plan

As part of the 2009 Delta Reform Act (Act), the Delta Stewardship Council (Council) was formed with the responsibility for developing a Delta Plan to achieve the coequal goals established in the Act of a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. The Delta Plan lays out a number of regulatory policies and recommendations to others for actions that must be taken to achieve the coequal goals, including action by the State Water Board discussed above. When implemented, the Delta Plan is expected to achieve the following: improve California's water supply reliability, protect and enhance the Delta ecosystem, protect and enhance the Delta as a place, improve water quality, reduce risk related to flooding issues, and encourage and further the use of best available science. The State Water Board and Regional Water Boards are working to implement their associated activities described in the Delta Plan and will continue to work closely with the Council to implement measures identified in the Delta Plan.

Draft Lower San Joaquin River Fish and Wildlife Flow Objectives and Program of Implementation

Bay Delta Conservation Plan

The Bay Delta Conservation Plan (BDCP) is a 50-year plan being prepared by a group of local water agencies, environmental and conservation organizations, State and federal agencies, and other interest groups to address threatened and endangered species concerns in the Bay-Delta. Specifically, the BDCP is being developed in compliance with the Federal Endangered Species Act and the California Natural Communities Conservation Planning Act. When complete, the BDCP will provide the basis for the issuance of endangered species permits for the operation of the SWP and CVP. At the center of the BDCP is a long-term conservation strategy that sets forth actions needed to protect native fish species and other uses. It is expected that when approved and implemented, the BDCP will provide the foundation for many of the actions that are needed to protect fish and wildlife beneficial uses in the Bay-Delta, including habitat restoration activities and changes to the operations of the SWP and CVP. The State Water Board has water right and Clean Water Act section 401 water quality certification authority over the BDCP and will assure that any permits or approvals it issues related to BDCP are appropriately conditioned to assure the protection of fish and wildlife, including native LSJR fish and wildlife that may be affected by the project.

San Joaquin River Restoration Program

The San Joaquin River Restoration Program (SJRRP) is a comprehensive long-term effort to restore flows to the upper SJR from Friant Dam to the confluence with the Merced River in order to restore a self-sustaining Chinook salmon fishery in the river while reducing or avoiding adverse water supply impacts from restoration flows. The SJRRP Plan covers 153 miles of the SJR from Friant Dam to the mouth of the Merced River and involves restoring flows to approximately 60 miles of dry river bed along with significant channel and fish passage improvements. Under the SJRRP, interim flows commenced in 2009 and full restoration flows are intended to begin no later than January of 2014, with salmon reintroduction starting by the end of 2012. The State Water Board will continue to coordinate adaptive management and future changes to the Bay-Delta Plan with the SJRRP to assure the protection of fish and wildlife in the SJR basin. Following full implementation of the SJRRP, the State Water Board will also evaluate whether additional changes should be made to flow and water right or other requirements to protect fish and wildlife in the SJR.

Develop and Implement a Comprehensive Habitat Restoration Effort in the LSJR Basin

Flow and flow related measures will not be adequate to fully protect and restore fish and wildlife beneficial uses in the LSJR. Suitable quantities and qualities of flow and habitat must be provided together to protect fish and wildlife. As discussed above, existing efforts are underway in the Bay-Delta and upstream SJR to address habitat issues in combination with flows, but these efforts do not extend into the LSJR, Merced, Tuolumne and Stanislaus Rivers. Similar efforts should be pursued on the LSJR to take actions to improve habitat conditions in the LSJR in coordination with implementation of the LSJR flow objectives and other local and regional habitat restoration efforts. Specifically, water users, government agencies, and others, should work together to develop and implement a comprehensive plan to address habitat impairments in the LSJR in coordination with other existing and planned efforts, including the SJRRP, BDCP, and the Delta Plan. Specific measures that should be pursued as part of that effort are discussed below.

Improve the Quantity, Quality, and Access to Suitable Riparian and Floodplain Habitat for the Benefit of Native Fish and Wildlife

The quality and quantity of accessible seasonal floodplain habitat in the LSJR has been heavily altered over the last century, reducing or eliminating much of the suitable historic habitat. Numerous studies over the past two decades have demonstrated that aquatic and terrestrial

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organisms and ecosystems benefit from inundation of and access to seasonal floodplains. Junvenile salmonids and other fish that rear in seasonal floodplain habitats have been shown to have improved growth and survival rates from improved foraging, spawning, and refuge conditions. Actions should be taken by local, State, and federal agencies and others in the LSJR and Merced, Tuolumne and Stanislaus Rivers to improve the quality, quantity, and access to floodplain habitat in the LSJR and its major salmon bearing tributaries.

Improve Riparian Habitat

Riparian habitat in the LSJR and Merced, Tuolumne, and Stanislaus Rivers has been degraded for over a hundred years by water supply, flood control, changes in land use, and resource extraction activities. In addition to improving seasonal floodplain habitat discussed above, riparian habitat below the floodplain should be restored to better protect fish and wildlife beneficial uses, including improvements to provide foraging, cover, and rearing habitat and to improve temperature conditions.

Maximize Gravel Replacement and Maintenance Programs for Salmonid Spawning and Rearing Habitat

Dams on the major tributaries of the Bay-Delta, including tributaries to the LSJR, block the movement of gravel eroding from upstream areas needed for salmonid spawning and rearing habitat. Recruitment of these critical habitat materials is practically lost without gravel replacement and maintenance programs. Dam operators, including those on the Merced, Tuolumne, and Stanislaus Rivers, should implement and improve on existing gravel augmentation programs in coordination with fisheries agencies and other restoration activities to maximize protection of native fish and wildlife.

Reduce Predator Habitat

Physical modifications to river channels, including scour pits, pilings and other structures in the LSJR, Merced, Tuolumne, and Stanislaus Rivers and the Bay-Delta provide habitat and refuge for predatory fish species and increased opportunities to prey upon native LSJR fish. Actions should be taken to identify and, where appropriate, modify these habitat structures to reduce the opportunity for predation on native LSJR fish and other Bay-Delta fish of concern.

Regulatory, Planning, and Implementation Activities of Other Agencies

Regulatory and planning activities of other local, State and federal agencies affect protection of fish and wildlife beneficial uses in the LSJR and Bay-Delta. The purpose and goals for these activities is often different than the narrative LSJR flow objective. Efforts to better coordinate and integrate these activities with activities to protect native LSJR and Bay-Delta fish and wildlife should be made, including the following:

Improve Hatchery Programs

Anadromous fish hatcheries on the Merced River and other tributaries to the Bay-Delta are operated to provide mitigation for the loss of stream spawning and rearing habitat due to the construction of dams. However, operations of these hatcheries also adversely affects the viability of natural fish populations due to increased harvesting pressure, increased competition, reduced genetic integrity due to hybridization, increased prevalence of disease, and other factors. The DFG, in coordination with other appropriate entities, should develop and implement improvements to its anadromous fish hatcheries through the Fish and Game Commission policy review process to address impacts from fish hatcheries on wild stocks.

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Reduce the Impacts of Introduced Species on Native Species in the Bay-Delta Estuary

Over time, the intentional and accidental introduction of non-native species has caused major changes in the composition of aquatic resources in the Bay-Delta Estuary. Actions are recommended for local, state and federal agencies to take corrective measures to reduce the impacts of introduced species and prevent the future introduction of non-natives species. Specifically, 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, on the native aquatic resources, and potential control measures. The DFG should also continue the efforts under Fish and Game Code section 6430-6439, concerning introduced species.

Review and Modify, if Necessary, Practices Promoting Non-Native Predators

The California Fish and Game Commission, DFG, NOAA Fisheries, and the USFWS and other responsible agencies should evaluate the appropriateness of existing practices designed to protect and promote non-native predatory fish species (including striped bass) to determine whether changes to those practices would benefit native LSJR and Bay-Delta fish species. Where appropriate, changes should be implemented to improve the protection of native species. Appropriate analysis and documentation of the decision-making process for fishing regulations, fish stocking programs and other decisions should be made available to the public and other decision makers and reviewed on a regular basis to incorporate evolving scientific information.

Review and Modify, if Necessary, Existing Commercial and Recreational Fishing Regulations for Salmon and Steelhead

The California Fish and Game Commission and Pacific Fisheries Management Council (PFMC) should continue the evaluation of Chinook salmon and Steelhead stocks and revise existing commercial and recreational fishing regulations to better protect and restore wild populations as necessary.

Reduce Illegal Harvesting

Illegal harvesting has a certain but un-quantified impact on fisheries that reside within the Bay-Delta Estuary and watershed. DFG and other appropriate agencies should take actions to reduce illegal harvesting of native LSJR and Bay-Delta fish species and should continue to develop and implement educational programs to discourage poaching of fishery resources.

Develop and Implement Improvements to Barrier Programs

Results from the Vernalis Adaptive Management Plan studies have shown that installation of a physical barrier at the Head of Old River during April and May helps to improve survival of outmigrating juvenile LSJR Chinook salmon. However, from 2009 to 2011, the physical barrier was prohibited due to endangered species concerns and a non-physical barrier was installed, yielding uncertain benefits. In 2012, it was agreed that a physical barrier could be installed as long as flows were below 6,000 cfs. The USFWS, NOAA Fisheries, DFG, DWR and USBR should work together to evaluate the potential impacts and benefits of installing physical or non-physical barriers at the Head of Old River and other locations in the Delta, and should implement appropriate changes to protect native fish and wildlife.

Evaluate Entrainment of Fish Species by the SWP and CVP in the Bay-Delta Estuary

The CVP and the SWP pumping facilities in the southern Delta entrain large numbers of fish from the LSJR and Bay-Delta Watershed every year. DWR and USBR should pursue efforts to address these effects on an interim and long-term basis, including measures being developed through the BDCP planning process.

Draft Lower San Joaquin River Fish and Wildlife Flow Objectives and Program of Implementation

Complete a Working Salmonid Life-Cycle model for the LSJR Basin

The DFG in coordination with other appropriate entities should complete the development of a salmonid life-cycle model for the LSJR basin that predicts population level responses to changes in ecological conditions with reasonable accuracy. The life-cycle model should address flow and non-flow related factors and should undergo regular updating with accompanying peer review. This model should be made available to decision makers and the public to inform adaptive management and other decision making.

Evaluate and Implement Improvements to the Flood Control Measures

The USACOE and other appropriate local and state flood control agencies should evaluate whether changes could be made to flood control requirements to improve the protection of native LSJR and Bay-Delta fish and wildlife while maintaining equivalent flood control infrastructure and practices. Specifically, reservoir storage requirements, levee setback criteria, levee vegetation limitations and other issues should be addressed to identify and implement improvements where appropriate.

New Special Studies, Monitoring, and Reporting Requirements

Add new section with the text below to the end of Chapter IV. Program of Implementation, Section D. Monitoring and Special Studies Program:

LSJR Fish and Wildlife Flow Objectives

In order to inform real time adaptive management and long-term management of flows on the LSJR for the protection of fish and wildlife beneficial uses, the State Water Board will require the development of a comprehensive monitoring, special studies, evaluation, and reporting program, referred to as the San Joaquin River Monitoring and Evaluation Program (SJRMEP). During the water right and FERC proceedings to implement the narrative LSJR flow objective, the State Water Board will establish responsibility for the development and implementation of the SJRMEP. The SJRMEP shall be developed with input from the COG and shall be subject to approval by the Executive Director of the State Water Board. The SJRMEP shall, at a minimum, include monitoring, special studies, and evaluations of flow related factors on the viability of native San Joaquin River watershed fish populations, including abundance, spatial extent (or distribution), diversity (both genetic and life history), and productivity. The SJRMEP shall include regular reporting and evaluation of monitoring and special studies data. Evaluations of monitoring and special studies data shall be subject to regular outside scientific review. The Executive Director may direct or approve changes to the SJRMEP based on monitoring and evaluation needs. The SJRMEP shall be integrated and coordinated with existing monitoring and special studies programs on the LSJR, including monitoring and special studies being conducted pursuant to federal biological opinion requirements and as part of the FERC licensing proceedings for the Merced and Tuolumne Rivers.

Specifically, the SJRMEP shall evaluate the effect of flow conditions at various times of year, including spring (February through June), fall (including October), summer, and winter months on the abundance, spatial extent, diversity, and productivity of native LSJR fish species in order to inform adaptive management and future changes to the LSJR flow objectives and their implementation. The SJRMEP shall be integrated with existing and new monitoring and science programs being developed by the Central Valley Regional Board and the Delta Science Program.

Draft Southern Delta Agricultural Water Quality Objectives and Program of Implementation

Draft Southern Delta Agricultural Water Quality Objectives

**TABLE 2
WATER QUALITY OBJECTIVES FOR AGRICULTURAL BENEFICIAL USES**

COMPLIANCE LOCATIONS	STATION	PARA-METER	DESCRIPTION	WATER YEAR	TIME	VALUE
SOUTHERN DELTA SALINITY						
San Joaquin River at Airport Way Bridge, Vernalis - and -	C-10 [5] (RSAN112)	Electrical Conductivity (EC)	Maximum 30-day running average of mean daily EC (dS/m)	All	All	1.0
San Joaquin River from Vernalis to Brandt Bridge - and -	C-6 [5] (RSAN073)					
Middle River from Old River to Victoria Canal - and -	C-8 [5] (ROLD69)					
Old River/Grant Line Canal from head of Old River to West Canal	P-12 [5] (ROLD59)					

[5] Monitoring for attainment of the numeric salinity objectives may be modified as part of the Monitoring and Reporting Protocol described in the implementation plan. Prior to establishing the Monitoring and Reporting Protocol, attainment of these numeric salinity objectives will be determined at the indicated locations.

Draft Southern Delta Agricultural Water Quality Objectives Program of Implementation

Replace entirely Chapter IV. Program of Implementation, B. Measures Requiring a Combination of State Water Board Authorities and Actions by Other Entities, 1. Southern Delta Agricultural Salinity Objectives with the following:

1. Southern Delta Agricultural Water Quality Objectives

Table 2 of the Bay-Delta Plan includes numeric salinity objectives that provide reasonable protection of agricultural beneficial uses of the southern Delta. These objectives supersede the southern Delta salinity objectives contained in the 2006 Water Quality Control Plan for the San Francisco Bay-Sacramento-San Joaquin Delta Estuary and the reference to these objectives in the Central Valley Regional Water Quality Control Board's (Central Valley Board) Water Quality Control Plan for the Sacramento and San Joaquin River Basins.

Salinity conditions in the southern Delta are affected by salt loading from the San Joaquin River as it enters the southern Delta at Vernalis and by local sources and evapo-concentration of salinity within the southern Delta. Salinity conditions are also affected by the capacity of the southern Delta water bodies to assimilate these salinity inputs. This assimilative capacity is potentially affected by hydrodynamic conditions such as water levels and the direction and magnitude of flow in the various channels of the southern Delta.

Existing salinity conditions in the southern Delta have been determined to be suitable for all agricultural crops, therefore individual elements of the program of implementation for these numeric salinity objectives are intended to either maintain, or improve upon existing conditions.

State Water Board Regulatory Actions

The southern Delta water quality objectives for protection of agricultural beneficial uses listed in Table 2 will be implemented as follows:

- i. In order to maintain current protective salinity levels in the southern Delta, USBR's water rights will continue to be conditioned to require compliance with a salinity level of 0.7 deciSiemens per meter (dS/m) from April through August and 1.0 dS/m from September through March in the San Joaquin River at the Airport Way Bridge near Vernalis¹. This water right responsibility may be modified after adoption of a TMDL or other salinity management plan by the State Water Board or Central Valley Board that identifies more appropriate salinity concentrations in the San Joaquin River at Vernalis. DWR and USBR's water rights will be conditioned to require the development and implementation of a Comprehensive Operations Plan to fully address the impacts of SWP and CVP export operations on water levels and flow conditions that might affect the assimilative capacity for local sources and evapo-concentration of salinity in the southern Delta. The plan shall include detailed information regarding the configuration and operations of any facilities relied upon in the plan, and shall identify specific performance goals (i.e. water levels, flows, etc.) for these facilities. Monitoring requirements needed to measure compliance with these specific performance goals in this plan should be included in the Monitoring and Reporting Protocol, discussed below. DWR and USBR will be required

¹ Water rights Decision 1641 includes 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.

to work together with the South Delta Water Agency (SDWA), State Water Board staff, other state and federal resource agencies, and local stakeholders to develop the plan, and will be required to hold periodic coordination meetings, no less than quarterly, throughout implementation of the plan.

The State Water Board requests DWR and USBR to submit the Comprehensive Operations Plan to the Executive Director for approval within six months from the date of the Office of Administrative Law's (OAL) approval of this amendment to the Bay-Delta Plan. Notwithstanding voluntary compliance with this measure, at a minimum, the State Water Board will require DWR and USBR to submit the plan within six months after the board has adopted a final order in a water right proceeding to require compliance with this measure. Once approved, the plan shall be reviewed annually, and updated as needed, with a corresponding report submitted by December 31 each year to the Executive Director for approval.

- ii. DWR and USBR's water rights will 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 the assimilative capacity for local sources and evapo-concentration of salinity in the southern Delta. This shall include modified design or operations as determined by the Comprehensive Operations Plan.
- iii. DWR and USBR's water rights will be conditioned to require completion of the Monitoring Special Study, Modeling Improvement Plan, and Monitoring and Reporting Protocol described in this Chapter, Section D. Monitoring and Special Studies Program, Part 2. Southern Delta Agricultural Water Quality Objectives.

The Monitoring and Reporting Protocol will provide the data necessary to assess attainment of the numeric salinity objectives for the southern Delta through the above program of implementation. Prior to establishing the Monitoring and Reporting Protocol, attainment of the numeric salinity objectives for the southern Delta will be assessed at stations C-10, C-6, C-8, and P-12, which USBR and DWR will be required to continue to operate.

- iv. In addition to the above requirements, implementation of revised San Joaquin River flow objectives will increase inflow of low salinity water into the southern Delta during February through June which will assist in achieving the southern Delta water quality objectives during that time.

State Water Board Funding of Programs

- i. State Water Board administered funding assistance for salinity-related projects will aid in implementing the Vernalis and interior southern Delta salinity objectives. Potential funding sources include the Clean Water State Revolving Fund Loan Program, the Agricultural Drainage Loan Program, the Agricultural Drainage Management Loan Program, and Federal Clean Water Act Section 319 Nonpoint Source Implementation Program.

To the extent necessary, the State Water Board may take other water right actions and water quality actions, in concert with actions by other entities, to implement the objectives.

Central Valley Board Regulatory Actions

The Central Valley Board is undertaking the following efforts, which will assist in implementing the Vernalis and interior southern Delta salinity objectives:

- 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 Board in 2006 to develop comprehensive long-term measures to address salinity and nitrate problems in California's Central Valley, including a basin plan amendment and implementation actions. The State Water Board may consider future modifications to the southern Delta salinity objectives and program of implementation based on information and recommendations generated from the CV-SALTS efforts.
- ii. Upstream of Vernalis San Joaquin River Salinity Objectives: CV-SALTS has established a subcommittee to develop a Basin Plan amendment containing numerical salinity objectives and a program of implementation for the Lower San Joaquin River upstream of Vernalis.
- iii. National Pollutant Discharge Elimination System (NPDES) Regulation: In coordination with the ongoing CV-SALTS process, the Central Valley Board regulates salt discharges upstream and within the southern Delta using its NPDES and other permitting authorities. The Central Valley Board, in coordination with various Central Valley stakeholders, is also developing an interim program to grant temporary exceptions from meeting water quality based effluent limits for salinity while CV-SALTS is in progress.
- iv. Irrigated Lands Regulatory Program: Under the Irrigated Lands Regulatory Program the Central Valley Board issues waste discharge requirements 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.
- v. San Joaquin River at Vernalis Salt and Boron Total Maximum Daily Load (TMDL): The Central Valley Board is implementing the salinity and boron TMDL at Vernalis. This effort includes a Management Agency Agreement with USBR addressing salt imported into the San Joaquin River basin via the Delta-Mendota Canal.

Actions by Other Entities

Other agencies are undertaking the following actions, which will assist in implementing the Vernalis and interior southern Delta salinity objectives:

- i. San Luis Unit Feature Re-evaluation Project: The purpose of the San Luis Unit Feature Re-evaluation Project, led by the USBR, is to provide agricultural drainage service to the San Luis Unit of the Central Valley Project, with the goal of providing a long-term sustainable salt and water balance for the associated irrigated lands. The project will consist of: drainage reduction measures, drainage water reuse facilities, treatment systems, evaporation ponds, and retirement of drainage impacted lands from irrigated agriculture in the San Luis Unit.
- ii. West Side Regional Drainage Plan: The West Side Regional Drainage Plan is an effort by local stakeholders in the western San Joaquin Valley, including the Grasslands Bypass Project, to meet Central Valley Board requirements to reduce salt and other contaminant loads to the San Joaquin River upstream of Vernalis. The projects implemented by this plan are coordinated with the USBR San Luis Unit Feature Re-evaluation project.

New Special Studies, Monitoring, and Reporting Requirements

Add new section with the text below to the end of Chapter IV. Program of Implementation, Section D. Monitoring and Special Studies Program:

2. Southern Delta Agricultural Water Quality Objectives

To assist in implementing the numeric salinity objectives in the southern Delta, the State Water Board will establish water right conditions, if not already established, to require the collection of information through the following monitoring and special studies programs in the southern Delta:

- i. Monitoring Special Study: DWR and USBR will be required to 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 extent of low or null flow conditions and any associated concentration of local salt discharges should be documented. The State Water Board will request local agricultural water users and municipal dischargers to provide data regarding local diversions and return flows or discharges.

The State Water Board requests DWR and USBR to 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. Notwithstanding voluntary compliance with this measure, at a minimum, the State Water Board will require DWR and USBR to submit the plan within six months after the board has adopted a final order in a water right proceeding to require compliance with this measure. Once approved, the monitoring contained in this plan shall be implemented until the Monitoring and Reporting Protocol (described below) is approved.

- ii. Modeling Improvement Plan: State Water Board Order WR 2010-0002, which modifies paragraph A.3 of Order WR 2006-0006, requires DWR and USBR to provide modeling and other technical assistance necessary to assist the State Water Board in reviewing and implementing the Bay-Delta Plan. DWR and USBR will continue to provide this assistance as required by the State Water Board's order.
- iii. Monitoring and Reporting Protocol: In coordination with State Water Board staff, DWR and USBR will be required to solicit stakeholder input to develop specific monitoring requirements to measure compliance with the specific performance goals of the Comprehensive Operations Plan. It will also provide the data necessary to assess attainment of the numeric salinity objectives for the southern Delta through the program of implementation. The Monitoring and Reporting Protocol will be required to be integrated and coordinated with existing monitoring and special studies programs in the Delta.

The State Water Board requests DWR and USBR to submit a plan for the Monitoring and Reporting Protocol to the Executive Director for approval within 18 months from the date of OAL's approval of this amendment to the Bay-Delta Plan. Notwithstanding voluntary compliance with this measure, at a minimum, the State Water Board will require DWR and USBR to submit the plan within 18 months after the board has adopted a final order in a water right proceeding to require compliance with this measure.