

Master Response 2.1

Amendments to the Water Quality Control Plan

Overview

Amendments to the *Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta Estuary* (Bay-Delta Plan) are an essential part of a comprehensive statewide effort to protect, restore, and enhance the aquatic ecosystem in the San Francisco Bay/Sacramento–San Joaquin Delta Estuary (Bay-Delta) and its surrounding watershed while continuing to provide a reliable water supply for communities and agriculture. The Bay-Delta watershed provides unparalleled economic and ecological water resources that supply drinking water to two-thirds of California’s population, fresh water for the nation’s most productive and diverse agricultural lands, and is one of the largest estuarine ecosystems for fish and wildlife habitat on the west coast of the United States. Critically poor aquatic ecosystem conditions in the Bay-Delta watershed have resulted in sharp declines in commercial, recreational, and forage fisheries and have contracted the estuarine food web. State and federal resource agencies and other watershed partners are working to address multiple stressors that contribute to poor aquatic ecosystem conditions and periodically disrupt water supply reliability for communities and agriculture.

The State Water Resources Control Board (State Water Board) recirculated a draft Substitute Environmental Document (SED) in support of changes to Bay-Delta plan amendments on September 15, 2016. A draft SED was previously circulated to the public in 2012. The SED contains information supporting the plan amendments, which include modifications to the southern Sacramento–San Joaquin Delta (Delta) water quality objectives for salinity and new and modified flow requirements for in the Lower San Joaquin River (LSJR) and its major eastside tributaries, the Stanislaus, Tuolumne, and Merced Rivers (LSJR flow objectives). The southern Delta water quality (SDWQ) objectives reflect updated scientific information about salt levels that reasonably protect water quality for agriculture in the southern Delta. The LSJR flow objectives recognize that freshwater flows are a principal factor controlling the quantity and quality of aquatic habitat for resident and migratory fish populations in the Bay-Delta watershed. The new and modified flow requirements for the LSJR and its major tributaries increase February–June river flows to reasonably protect fish and wildlife beneficial uses.

The LSJR flow objectives are one of the primary actions needed to achieve the broad statewide goal of protecting, restoring, and enhancing the aquatic ecosystem in the Bay-Delta and LSJR Watershed and the State Water Board’s responsibility to reasonably protect beneficial uses in the Bay-Delta watershed. The health of the aquatic ecosystem in the Bay-Delta and tributary watersheds has declined substantially since flow objectives for the Bay-Delta were last significantly revised in the 1995 Bay-Delta Plan. Salmon and steelhead that spawn and rear in LSJR tributaries and migrate through the Delta to the Pacific Ocean have steeply declined and remain at historically low abundance levels. Scientific studies show that freshwater flow in rivers is a principal factor in the survival of migratory fish like salmon and other resident fish species in the Bay-Delta Estuary. Reduced flow is recognized as a primary driver of the decline of riverine ecosystem conditions and fish species abundance and distribution. Nearly every feature of habitat that affects native fish and wildlife is, to some extent, determined by flow (e.g., temperature, water chemistry, physical habitat complexity). The 2013 Delta Plan states that “Without adequate water flow (the right mix of timing

and amount), we cannot expect fisheries to recover, no matter how well we deal with the range of other stressors.” The 2013 Delta Plan also highlights the need to “act now.” “While all parties agree the status quo is not acceptable, failure to take action only prolongs a worsening status quo,” (Delta Stewardship Council 2013:16).

The LSJR flow objectives increase required river flows upstream of the Delta to support the migratory and spawning habitat of native, commercial, and recreational fish populations. Specifically, the proposed LSJR flow objectives require 40 percent of unimpaired flow (on a 7-day running average) within an adaptive implementation range of 30–50 percent to be provided on each of the Stanislaus, Tuolumne, and Merced Rivers from February through June. The amendments are based on a percent of unimpaired flow approach, which generally mimics the natural hydrologic variability of river flows that support native fish such as salmon and steelhead. The unimpaired flow requirement defines a volume of water, or water budget, which can be used to establish flow schedules that target specific biological and ecosystem functions. Adaptive implementation of the percent of the unimpaired flow requirement enables the magnitude and timing of flows to be adjusted, within 30–50 percent unimpaired flow, when changes result in better protection of fishery resources than following the unimpaired flow value on a 7-day running average.

The SED shows that the LSJR flow plan amendments can substantially improve aquatic conditions for fish and wildlife beneficial uses while moderating negative economic effects. The SED shows an average increase of 17 percent more instream flow and a 14-19 percent increased frequency of attaining temperature targets in April and May than the baseline condition while average annual water supply is decreased by 14 percent with an average economic production loss of 2.6 percent relative to the baseline condition. Adaptive implementation may optimize flows to achieve the objectives while allowing for consideration of other beneficial uses, provided that intended benefits to fish and wildlife are not diminished. The plan amendments also include recommendations for non-flow measures that are complementary to the flow objectives. Non-flow measures could improve habitat conditions for fish and wildlife and may support a change in the required percent of unimpaired flow, within the prescribed range, or other adaptive adjustments that may collectively reduce the water supply and economic effects resulting from implementing the plan amendments.

The proposed SDWQ objective modifies the existing salinity water quality objectives in the southern Delta. Southern Delta salinity water quality objectives were established in the 1978 *Water Quality Control Plan for the Delta and Suisun Marsh*. The southern Delta salinity water quality objectives apply at four southern Delta locations to protect agriculture. Analysis of southern Delta water quality and crop salinity requirements shows that existing salinity conditions in the southern Delta are suitable for all crops and that the existing April–August salinity objective is lower than what is needed to reasonably protect agriculture (Appendix C, *Technical Report on the Scientific Basis for Alternative San Joaquin River Flow and Southern Delta Salinity Objectives*).

The proposed SDWQ objective increases the southern Delta salinity objective to reflect the current condition, which is sufficient to protect agriculture. The current salinity objectives are 0.7 deciSiemens per meter (dS/m) April–August and 1.0 dS/m September–March. The State Water Board proposes to amend the current southern Delta salinity objectives to a year-round objective of 1.0 dS/m. The program of implementation explains that the U.S. Bureau of Reclamation (USBR) shall continue to comply with the current Vernalis salinity requirements in its water rights to implement the SDWQ objectives. The proposed SDWQ objective specifies channel segments as compliance locations.

The LSJR flow objectives and SDWQ objective are complementary. Increased flows under the LSJR flow alternatives would have the incidental benefit of providing a low-salinity irrigation water supply to flush salts early in the irrigation season, and thus provide better salinity conditions during spring germination of crops, which is generally the most salt-sensitive time (*Executive Summary*, Section ES6.1, *Southern Delta Water Quality Alternatives*, and Chapter 18, *Summary of Impacts and Comparison of Alternatives*, Table 18-4). The complementary nature of both objectives (i.e., salinity and flow) allows the plan amendments to provide a comprehensive means to put the state's water resources to beneficial use (including for fish and wildlife and agriculture) (*Executive Summary*, Section ES4, *Purpose, Need, and Goals*) to the fullest extent possible.

The LSJR plan amendments are the focus of this master response, which addresses comments regarding the LSJR project description, the geographic scope of the revised Bay-Delta Plan, LSJR flow requirements, LSJR program of implementation (including biological goals and the Stanislaus, Tuolumne, and Merced (STM) Working Group), justification for the LSJR and SDWQ plan amendments, modifications to the plan amendments, and modifications to the plan amendments requested by commenters. Master Response 2.2, *Adaptive Implementation*, focuses specifically on adaptive methods and other portions of the LSJR program of implementation. Master Response 3.3, *Southern Delta Water Quality*, responds to comments regarding the SDWQ plan amendments and SDWQ alternatives.

The State Water Board considered all comments, criticisms, and suggestions in determining whether and how to modify the plan amendments. The 2016 plan amendments are the product of a lengthy development process, which began with the Notice of the Preparation issued in 2009. Substantial changes were made to the SED in response to the large number of oral and written public comments received on the 2012 Draft SED (*Executive Summary* 2016 Recirculated SED). Other changes to the 2016 Recirculated SED were made to incorporate information from the recent drought and to recognize the 2014 state policy for sustainable groundwater management (Wat. Code, § 113) and passage of the Sustainable Groundwater Management Act (SGMA)(Wat. Code, § 10720 et seq.). *Executive Summary, Areas of Known Controversy*, summarizes the concerns raised in the 2012 Draft SED and describes the subsequent revisions made in the Recirculated SED.

Clarifying modifications were made to the plan amendments, after consideration of all comments received on the 2016 Recirculated SED. The modifications, however, also reflect public input and additional development throughout this water quality planning process, including substantial modifications from the 2012 Draft SED to the 2016 Recirculated SED proposal. Table 2.1-1 contains a summary of all the modifications to Appendix K. These changes were made in response to comments and to clarify flow and salinity requirements. Minor editorial changes and corrections were also made where necessary.

The key issue with the LSJR plan amendments is disagreement over the quantity of water that should be used for the reasonable protection of fish and wildlife beneficial uses and the water supply cost. Some commenters suggested that more flow is needed while other commenters suggested that other "non-flow" measures could replace or reduce the need for flow. Other commenters suggested different flow-based regimes. Many of the suggested modifications to the 2016 plan amendments, however, fall within the rubric of the plan amendments, which offer flexibility in managing flows to best achieve the water quality objectives. For example, some commenters suggested that the LSJR plan amendments should adopt a functional flow versus unimpaired flow approach. The LSJR flow objectives are based on a percent of unimpaired flow approach at each tributary, which generally mimics the natural hydrologic variability of river flows

that support native fish. The percent unimpaired flow requirement defines a volume of water, or water budget, which can be used to establish functional flow schedules that target specific biological and ecosystem functions. The flexible properties of the adaptive implementation framework are intended to provide maximum operational and implementation flexibility while still achieving program goals of reasonable fish and wildlife protection. Responses to these comments are provided in this master response or the master responses referenced herein.

Table 2.1-1. Summary of Modifications to Plan Amendments and Appendix K Changes

Item	Page(s)	General Description of Text Change
Clarifying text modifications	1, 4, 6, 7, 8, 13, 29, 30, 35, 45, 50, 62	Non-substantive changes to improve the clarity, update, and correct text in the document.
Beneficial Uses introduction text	10	Clarifies that beneficial uses in the Water Quality Control Plan for the Sacramento and San Joaquin River Basins remain in effect and the Bay-Delta Plan includes measures to protect those uses.
Tributary Watersheds	12 and 13	Clarifies the geographic scope of the plan amendments and the beneficial uses protected by the water quality objectives in Table 3.
Southern Delta Salinity Objective	15, Table 2	Corrects transposed references to Old and Middle Rivers consistent with the description of the river compliance segments in the SED.
LSJR flow objectives	18, Table 3	Modifies the objective to include the starting 40 percent of unimpaired flow from the program of implementation. The adaptive range of 30–50 percent on each of the Stanislaus, Tuolumne, and Merced Rivers remains unchanged.
LSJR flow objectives	18, Table 3	Revises the base flow requirement at Vernalis for improved clarity. Adds station number C10 to the station number column.
LSJR flow objectives	18, Table 3	Adds text to ensure that the February–June flow objectives do not have unintended impacts on fish and wildlife at other times of the year, consistent with the program of implementation.
LSJR flow objectives	20, Table 3 footnote	Provides information on determining unimpaired flow compliance and clarifies that the total volume of water provided by percent of unimpaired flow may be managed using different averaging periods through the program of implementation.
Implementation Measures within State Water Board Authority	26	Clarifies implementation measures within the State Water Board’s authority.

Item	Page(s)	General Description of Text Change
Implementation of February–June LSJR flow objectives	28	Adds the word “significant” because it had been inadvertently omitted.
Implementation of February–June LSJR flow objectives	29	Clarifies implementation measures within the State Water Board’s authority.
Adaptive Methods for February–June Flows	30	Clarifies roles of Executive Director and State Water Board in approving adaptive adjustments.
Adaptive Methods for February–June Flows	31	Responds to commenters’ concerns regarding water supply reliability.
Biological Goals	33	Adds consultation with Delta Science Program on biological goals. Identifies temperature targets as a reasonable contribution to biological goals. Modifies organization of text and adds concepts to inform the development of biological goals.
Unimpaired flow compliance	34	Clarifies that specific measures to achieve the flow objectives and to monitor and evaluate compliance can improve over time and be modified subject to approval.
Annual Adaptive Operations Plan	34	Allows a multi-year operations plan to be submitted.
San Joaquin River Monitoring and Evaluation Program (SJRMEP)	35	Clarifies general categories of State Water Board actions to require monitoring, evaluation, and reporting.
Periodic review of SJRMEP	36	A sentence was added stating State Water Board will request the Delta Science Program to conduct a periodic review of SJRMEP.
Annual Reporting	36	Commits to reviewing annual reports in public meetings.
Southern Delta Salinity Objectives	41	Clarifies actions to achieve the Delta salinity objective
State Regulatory Actions	42–44	Adds background context and information regarding implementation of the SDWQ objectives. Clarifies language regarding USBR’s and the California Department of Water Resources’ (DWR’s) obligations to implement the SDWQ objective. Explains that the use of compliance locations and gage stations is not a limitation on the applicability of the salinity water quality objective, which applies throughout the southern Delta.

Item	Page(s)	General Description of Text Change
Comprehensive Operations Plan	44	Amends date of October 31 to February 1 each year as the date when the Comprehensive Operations Plan (COP) is required to be submitted to the Executive Director for approval. Requires DWR and USBR to consult with Contra Costa Water District, in addition to other stakeholders, in developing the Comprehensive Operations Plan to address operational impacts on interior southern Delta salinity levels.
Publicly Owned Treatment Works	46–49	Explains the responsibility of publicly owned treatment works (POTWs) to implement the SDWQ objectives and provides direction to the Central Valley Regional Water Quality Control Board (Central Valley Regional Water Board) to regulate in-Delta discharges of salts by POTWs and other dischargers.

LSJR = Lower San Joaquin River
SED = Substitute Environmental Document
SDWQ = southern Delta water quality

The comments addressed by this master response are often related to subjects addressed in other master responses. Accordingly, this master response references related master responses, as appropriate, where recurring comments and common themes overlap with other subject matter areas. Please see Master Response 1.2, *Water Quality Control Planning Process*, which addresses general comments regarding the peer review process for the plan amendments, additional Bay-Delta Plan updates, adequacy of legal and regulatory compliance, implementation, consideration of beneficial uses through the water quality control planning process, and the water rights priority process. Please see Master Response 2.4, *Alternatives to the Water Quality Control Plan Amendments*, regarding comments related to the purposes and goals of the plan amendments, the reasonable range of alternatives evaluated in the SED, the overall approach to selecting the feasible alternatives evaluated, and the feasibility of commenter-suggested plans and proposals.

Please see Master Response 3.1, *Fish Protection*, for responses to comments regarding the protection of fish, potential environmental impacts on aquatic biological resources, and measurable benefits to aquatic resources from the LSJR plan amendments. Please see Master Response 3.2, *Surface Water Analyses and Modeling*, regarding methods and data used in hydrologic modeling to evaluate changes in streamflow and water supply. Please see Master Response 5.2, *Incorporation of Non-Flow Measures*, for responses to comments regarding non-flow measures; their role in the overall ecosystem health of the tributaries; and how they relate to the LSJR plan amendments.

This master response includes for ease of reference a table of contents on the following page to help guide readers to specific subject areas. The table of contents is based on the recurring and common themes found in the comments that were received. It is provided to help guide readers in finding where the topics of their concern are addressed.

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Project Description

Multiple comments were received describing concerns about the project description and the adequacy of the California Environmental Quality Act (CEQA) analysis in the SED. Some commenters suggested that the project description is incorrect, vague, too narrow, incomplete, uncertain, unclear, and difficult to find in the SED. Multiple commenters asserted that the declared deficiencies in the project description result in an incomplete and inadequate environmental analysis that does not consider a reasonable range of alternatives and mitigation measures and does not sufficiently analyze the impacts of the project on the environment.

Clarity of Project Description: The SED provides a clear, accurate, and finite project description to adequately analyze and disclose environmental impacts in Chapters 3 through 23, contrary to commenters' claims. Lead agencies are required to provide a project description in sufficient detail to allow for a meaningful analysis and a comparison of conditions under alternatives with the project to a baseline without the project. An accurate and "finite project description is indispensable to an informative, legally adequate" environmental document (*County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185, 192). Without an accurate project description on which to base the SED's analysis, the goals of CEQA to further public disclosure and informed decision making are stymied. (See, e.g., *San Joaquin Raptor/Wildlife Rescue Ctr. V. County of Stanislaus* (1994), 27 Cal.App.4th 713, 730.)

The plan amendments are the project. "Project" means the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment, according to State CEQA Guidelines, section 15378. The project is to amend the Bay-Delta Plan by adopting:

- New water quality flow objectives on the LSJR and its three eastside tributaries for the protection of fish and wildlife beneficial uses.
- Revised water quality objectives for the protection of agricultural beneficial uses in the southern Delta.
- A program of implementation to achieve these objectives.
- Monitoring and special studies necessary to fill information needs and determine the effectiveness of, and compliance with, the new objectives.

Chapter 1, *Introduction*, provides the basic project description and refers to Appendix K, *Revised Water Quality Control Plan*, which contains the entirety of the proposed amendments to the Bay-Delta Plan, and Chapter 3, *Alternatives Description*, for details of the plan amendments. The *Executive Summary* also provides a summary of the plan amendments.

For purposes of this master response, briefly, the plan amendments include:

- **New Flow Objectives on the LSJR:** The new LSJR flow objectives include a narrative flow objective and a numeric flow objective during the February–June time period.
 - **LSJR Narrative Flow Objective:** "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 (SJR) 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.”

- **Numeric Vernalis Base Flow:** 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 cubic feet per second (cfs) with an allowed adaptive implementation range between 800–1,200 cfs, inclusive.
- **Numeric LSJR Flow Objective:** LSJR Alternative 3—evaluates 40 percent of unimpaired flow within an adaptive implementation range of 30–50 percent of unimpaired flow in the program of implementation.
- **Revised Water Quality Objective for the Southern Delta:** The SDWQ objective modifies the existing salinity objectives for the reasonable protection of southern Delta agricultural beneficial uses and a program of implementation to achieve the objectives. It includes: SDWQ Alternative 2—1.0 dS/m as a maximum 30-day running average of mean daily electrical conductivity (EC) for all months in the southern Delta. Compliance locations are the LSJR between Vernalis and Brandt Bridge, Middle River from Old River to Victoria Canal, and Old River/Grant Line Canal from the Head of Old River to West Canal.

Flow Objectives and Non-Flow Actions: Multiple commenters suggested that the LSJR flow objectives are incorrectly or too narrowly defined because they address flow in isolation or instead of other water quality and habitat metrics such as floodplain and stream channel habitat restoration, predator suppression, or hatchery management. Commenters asserted that flow requirements are the wrong solution for improving conditions for fish populations in the LSJR Watershed and should be replaced by non-flow actions. Commenters also asserted that the purportedly narrow or incorrect definition of the project eliminates alternatives that may have fewer adverse impacts on water supply from consideration and invalidates the environmental analysis.

The State Water Board’s exercise of its water quality authority in this water quality control plan proceeding focuses on the activities and factors that may affect the quality of the waters of the state. (Wat. Code, § 13000.) The Porter-Cologne Water Quality Control Act (Wat. Code, § 13000 et seq.; Porter Cologne Act) establishes State Water Board authority, responsibility, and discretion to define a project in accordance with statutory mandates and propose water quality objectives to reasonably protect beneficial uses. Accordingly, the plan amendments focus on the activities and factors that may affect the quality of the waters of the state. (Wat. Code, §§ 13240, 13050, subd. (i) and (j).) The phrase “quality of the waters” refers to “chemical, physical, biological, bacteriological, radiological, and other properties and characteristics of water which affect its use.” (Wat. Code, § 13050, subd. (g).) “Water quality objectives” refers to the “water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or prevention of nuisance within a specific area.” (*Id.*, § 13050, subd. (h).) Flow and the functions it provides are physical attributes of water quality and are critical in protecting fish and wildlife beneficial uses. Thus, the proposal for water quality objectives based on flow is consistent with science that supports increasing flows to protect fish populations and is consistent with the State Water Board’s mandate to protect the quality of the waters of the state and establish water quality objectives to reasonably

protect the beneficial uses of those waters. (Wat. Code, §§ 13240, 13241, 13000-13002, 13050, subd. (g)-(j).)

Water quality objectives based on flow are needed to reasonably protect fish and wildlife beneficial uses in the LSJR (*Executive Summary* and Appendix C, *Technical Report on the Scientific Basis for Alternative San Joaquin River Flow and Southern Delta Salinity Objectives*). Improving flow conditions in the LSJR Watershed is a critical step toward improving commercial, recreational, and forage fisheries in the LSJR and Bay-Delta Ecosystem. Water quality objectives state the desired condition of water bodies including the chemical, physical, biological, and other characteristics of water that affect its use. River flow is a physical characteristic of water and is an appropriate basis for establishing water quality objectives in the Bay-Delta Plan.

Many non-flow actions such as stream channel, floodplain, and riparian habitat restoration, predator suppression, and hatchery management projects are not themselves characteristics of water and are not an appropriate basis for water quality objectives in the Bay-Delta Plan. Non-flow measures, which in most cases depend on sufficient flow for successful implementation, cannot substitute for, or be prioritized over, flow as the primary element of the LSJR water quality objectives. Therefore, non-flow measures are not feasible alternatives to the LSJR plan amendments in this proceeding (please see Master Response 2.4, *Alternatives to the Water Quality Control Plan Amendments*, for more information regarding the range of alternatives considered and Master Response 5.2, *Incorporation of Non-Flow Measures*).

The State Water Board recognizes that flow and non-flow actions are essential to protecting fish and wildlife beneficial uses and to comprehensively address Delta aquatic ecosystem needs as a whole (see the State Water Board *Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem* report [2010 Delta Flow Criteria Report][State Water Board 2010] and Appendix K). The LSJR flow objectives provide the flow action that will complement and enhance the benefits of non-flow actions taken by watershed partners. The program of implementation for the LSJR plan amendments recommends and encourages the development of non-flow measures to assist in further improving protections for fish and wildlife beneficial uses. For example, the program of implementation recommends other agencies implement non-flow actions that are complementary to the LSJR plan amendments. (See Chapter 3, *Alternatives Description*, and Appendix K, *Revised Water Quality Control Plan*.)

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. In addition, the program of implementation's framework for adaptive implementation of the flow objectives is structured such that non-flow actions can inform adjustments to the percent of unimpaired flow within the prescribed range if certain criteria are met. In other words, it allows for consideration of the benefits associated with non-flow measures in adjusting the percent of unimpaired flows (see Chapter 3, *Alternatives Description*). For more information on non-flow actions, please see Master Response 5.2, *Incorporation of Non-Flow Measures*.

Flow Objectives and Reasonable Use: The LSJR flow objectives will substantially improve aquatic conditions for fish and wildlife beneficial uses and prevent the deterioration of water quality that impairs beneficial uses. Some commenters asserted that the LSJR flow objectives alone will not reasonably protect fish and wildlife beneficial uses, or that the benefits of the proposed project are not great enough or certain enough to justify the volume of water involved; thus, the commenters

asserted, the LSJR plan amendments will result in a waste and unreasonable use of water. The SED describes substantial benefits to fish habitat that result from the LSJR plan amendments alone, without complementary non-flow actions (*Executive Summary*, Chapter 7, *Aquatic Biological Resources*, Chapter 19, *Analyses of Benefits to Native Fish Populations from Increased Flow between February 1 and June 30*, and Master Response 3.1, *Fish Protection*). Establishing flow requirements to support aquatic ecosystem conditions or prevent deterioration of water quality for the protection of fish and wildlife beneficial uses does not constitute a waste and unreasonable use of water (see Master Response 1.2, *Water Quality Control Planning Process*).

LSJR Alternatives and SDWQ Alternatives: Proposing water quality objectives based on flow does not constrain alternatives, eliminate alternatives with fewer water supply and economic impacts, or in any way invalidate the SED analysis. The LSJR plan amendments focus on flow because that is the water quality characteristic that is within the State Water Board’s regulatory authority and responsibility to address under the Porter-Cologne Act, as discussed above, and because increased flows improve river conditions and other instream habitat elements for fish. Nearly every feature of habitat that affects native fish and wildlife is, to some extent, determined by flow (e.g., temperature, water chemistry, physical habitat complexity). These habitat features, in turn, affect risk of disease, risk of predation, reproductive success, growth, smoltification, migration, feeding behavior, and other physiological, behavioral, and ecological factors that determine the viability of native fish.

CEQA requires an environmental document such as the SED to describe a range of reasonable alternatives to a project that “would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives.” (Cal. Code Regs., tit. 14, § 15126.6, subd. (a); Cal. Code Regs., tit. 23, § 3777, subd. (b).) An SED need not consider every conceivable alternative to a project, but instead, it “must consider a reasonable range of potentially feasible alternatives that will foster informed decision making and public participation.” (State CEQA Guidelines § 15126.6, subd. (a).) An SED is not required to consider alternatives that are infeasible. (*Ibid.*)

Focusing on flows as the water quality parameter to address through the LSJR plan amendments does not eliminate from consideration alternatives that may have less impacts on the *environment* (not economic impacts as some commenters suggested). The following illustrates this point. The LSJR flow alternatives span a range between 20 and 60 percent of unimpaired flow. This range was selected to capture a range of potential flow alternatives that the State Water Board may adopt and implement, thus allowing an examination of alternatives that would feasibly obtain most of the goals of the LSJR plan amendments while avoiding or substantially lessening any significant impacts on the environment. As described in Chapter 3, *Alternatives Description*, the alternative with the lowest flow, LSJR Alternative 2 was selected to bracket the low end of flows under current conditions because it potentially could have fewer impacts on the environment (e.g., groundwater, agricultural, recreational, and other resources) than higher flows. Flows in the Stanislaus, Tuolumne, and Merced Rivers and the SJR at Vernalis had median values of 40, 21, 26, and 29 percent of February–June unimpaired flow respectively, for water years 1986–2009, indicating that impacts associated with the lesser amount of unimpaired flow from LSJR Alternative 2 are less than other alternatives. (See Chapter 18, *Summary of Impacts and Comparison of Alternatives*, for a comparison of the impacts from the LSJR alternatives.) This alternative demonstrates that focusing on flows does not foreclose alternatives that may substantially reduce or avoid significant environmental impacts.

The SED evaluates four alternatives for consideration as LSJR flow objectives. LSJR Alternative 1 is the No Project Alternative, which would not amend the Bay-Delta Plan. LSJR Alternatives 2, 3, and 4

include amendments to the Bay-Delta Plan composed of the same narrative flow objective and base flow objective on the LSJR at Vernalis, varying numeric flow objectives for the eastside tributaries, and the same program of implementation.

- LSJR Alternative 2—evaluates 20 percent of unimpaired flow within an adaptive implementation range of 20–30 percent of unimpaired flow in the program of implementation.
- LSJR Alternative 3, the plan amendment,—evaluates 20 percent of unimpaired flow within an adaptive implementation range of 20–30 percent of unimpaired flow in the program of implementation.
- LSJR Alternative 4—evaluates 60 percent of unimpaired flow within an adaptive implementation range of 50–60 percent of unimpaired flow in the program of implementation.

The SED evaluates SDWQ Alternative 1 (No Project Alternative) and two other SDWQ alternatives (SDWQ Alternatives 2 and 3). SDWQ Alternatives 2 and 3 have different numeric objectives and the same program of implementation and they have the same compliance locations (LSJR between Vernalis and Brandt Bridge, Old River from Middle River to Victoria Canal, and Old River/Grant Line Canal from the Head of Old River to West Canal).

- SDWQ Alternative 2, the plan amendment,—1.0 dS/m as a maximum 30-day running average of mean daily EC for all months in the southern Delta.
- SDWQ Alternative 3—1.4 dS/m as a maximum 30-day running average of mean daily EC for all months in the southern Delta.

Program of Implementation and Monitoring and Special Studies: The plan amendments include a program of implementation that describes the nature of actions needed to implement the new LSJR flow objectives and modified SDWQ salinity objectives, including implementation measures within the State Water Board’s authority and recommendations to other agencies. The plan amendments clarify that 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, including the adoption of regulations.

The program of implementation for the LSJR flow objectives includes, among other things, a description of adaptive implementation methods, recommendations for non-flow measures, and requirements for special studies, reporting, and monitoring. Adaptive implementation allows the unimpaired flow objective to be implemented in a way that can provide more functionally useful flows and to respond to more quickly to changing conditions. Adaptive implementation is inherently part of the project. Please refer to SED Chapter 3, *Alternatives Description*, and Master Response 2.2, *Adaptive Implementation*, for additional details on adaptive implementation.

The program of implementation for the SDWQ salinity objectives requires USBR to continue complying with the terms of its water rights that require implementation of EC levels of 0.7 dS/m at Vernalis for April–August and 1.0 dS/m for September–March as a maximum 30-day running average. In addition, it requires DWR and USBR to continue to implement the interior southern Delta objective, and to develop a Comprehensive Operations Plan (COP) that addresses the impacts of their operations on interior southern Delta salinity levels. The agencies must also prepare a long-term monitoring and reporting plan to determine compliance with the SDWQ objectives and to inform the COP. The program of implementation explains that the SDWQ objective also will be

implemented through the LSJR flow objectives, as well as actions by the Central Valley Regional Water Board.

Multiple commenters equated the program of implementation in the Bay-Delta Plan with the assignment of responsibility for implementation of the Bay-Delta Plan water quality objectives in a future proceeding. For example, a commenter stated that the SED presents an inconsistent characterization of the project because the SED indicates “implementation” is part of the project, but the SED also indicates that implementation will occur in a separate phase. The program of implementation in the Bay-Delta Plan, however, is distinct from implementation actions in future water quality and water rights proceedings.

The “program of implementation” is an element of the Bay-Delta Plan, required by the Porter-Cologne Act, which establishes a framework for achieving Bay-Delta Plan objectives. (Wat. Code, § 13050, subd. (j)(3).) The program of implementation must include “[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.” (Wat. Code, §13242.) The program of implementation accordingly describes such actions. To ensure, however, that these actions will take place, the State Water Board will impose enforceable requirements on entities to achieve the water quality objectives through water right and water quality actions (see Chapter 3, *Alternatives Description*, and Appendix K, *Revised Water Quality Control Plan*). These actions will occur pursuant to and after adoption of Bay-Delta Plan amendments. Please refer to Master Response 1.2, *Water Quality Control Planning Process*, for additional discussion regarding the distinction between the program of implementation and future water right or water quality proceedings.

Plan Area and Extended Plan Area

Commenters questioned the plan area, extended plan area and geographic scope of the plan amendments. The plan area of the SED includes areas where the Bay-Delta Plan amendments apply to protect beneficial uses of water. The plan area is defined in Chapter 1, *Introduction*, Section 1.2, *Plan Area*. A map of the plan area is provided in *Executive Summary*, Figure ES-2. The specified area of the revised Bay-Delta Plan is stated in Appendix K, *Revised Water Quality Control Plan*, page 1, as “This Water Quality Control Plan covers the Bay-Delta Estuary and tributary watersheds (Bay-Delta Plan or Plan).” As set forth in Chapter 1, the plan amendments could directly affect portions of the SJR Basin and Delta that drain into, divert water from, or otherwise obtain beneficial use from the following water bodies:

- Stanislaus River Watershed, from and including New Melones Reservoir to the confluence of the LSJR.
- Tuolumne River Watershed, from and including New Don Pedro Reservoir to the confluence of the LSJR.
- Merced River Watershed, from and including Lake McClure to the confluence with the LSJR.
- Mainstem of the LSJR, between its confluence with the Merced River downstream to Vernalis.
- Areas that receive a portion of their water supply from, and that are contiguous with, the above areas.

- The southern Delta, including the SJR from Vernalis to Brandt Bridge, Middle River from Old River to Victoria Canal, and Old River/Grant Line Canal from the Head of Old River to West Canal.¹

The plan amendments have the potential to affect water supply, rivers and surrounding watersheds, and the greater watershed above the rim dams, because as stated in Chapter 1, the State Water Board will evaluate, in a subsequent water right proceeding, whether to impose responsibility on surface water users who divert surface water from above the dams. The SED defines the extended plan area to include the Stanislaus, Tuolumne, and Merced Watersheds above the rim dams to capture potential effects on those areas in analyses in the SED.

Finally, as stated in Chapter 1, the plan amendments also have the potential to affect areas outside of the plan area or extended plan area that obtain beneficial use from the Stanislaus, Tuolumne, and Merced Rivers and the LSJR downstream of the Merced River but are not contiguous with the plan area or extended plan area. These areas are included in the areas of potential effects for some of the resources evaluated, as appropriate, throughout the SED and include the City and County of San Francisco, which diverts water from the Tuolumne River, and any other area served by water delivered from the plan area or extended plan area.

Multiple comments were made regarding the geographic scope of the revised Bay-Delta Plan and the plan amendments. The range of comments span from suggesting the plan amendments exceed the geographical jurisdiction of the 2006 Bay-Delta Plan to suggesting that the plan amendments should expand the geographical scope of the revised Bay-Delta Plan. Several commenters stated that the plan amendments violate the Porter-Cologne Act by proposing to regulate waters and beneficial uses outside the geographical boundaries of the 2006 Bay-Delta Plan. Some commenters asserted that the SED violates California's water rights priority system by limiting the scope of the plan area. Multiple commenters asserted that the specified area of the Bay-Delta Plan cannot exceed the legal boundaries of the Sacramento-San Joaquin Delta. Several comments suggest that the Bay-Delta Plan amendments should expand the geographical scope of the Bay-Delta Plan to include flow objectives for the Upper SJR and identify implementation measures in the Upper SJR Watershed.

Authority to Define Geographic Scope of Bay-Delta Plan

The State Water Board's authority and responsibility to protect the state's water quality is established under the Porter-Cologne Act and extends to the "waters of the state," without geographic limitation. The State Water Board's regulatory authority is not limited by the legal boundaries of the lands constituting the Sacramento-San Joaquin Delta in Water Code section 12220. Section 12220 was enacted in 1959 as part of the Delta Protection Act (Wat. Code, §§ 12200-12220) when the State Water Project was authorized. (*United States v. State Water Resources Control Bd.* (1986) 182 Cal.App.3d 82, 139.) The Delta Protection Act recognizes the unique water problems in the Delta, particularly salinity intrusion, and requires the project, in coordination with the operation of the federal Central Valley Project, to control salinity within the Delta and provide an adequate water supply for users of water within the Delta. (*Ibid.*; Wat. Code, § 12202.) The Delta

¹ Table 2's salinity objectives in Appendix K, which unintentionally transposed Old River and Middle River when referring to Middle River from Old River to Victoria Canal, have been corrected in Appendix K. This error affected maps of the plan area in Figures ES-2, 2-1a, 2-1b, 2-3, 9-1, G.3-1, which have also been corrected. The analysis in the SED did not include this error. The description of the southern Delta has also been clarified in Chapter 3, Section 3.4.

Protection Act neither limits nor modifies the State Water Board's responsibilities under the Porter-Cologne. The fact that the Legislature fixed the legal boundaries of the Delta region in connection with the authorization of the State Water Project is irrelevant to the exercise of the State Water Board's authority over water quality under the Porter-Cologne Act.

The Legislature combined the water rights, water quality, and drinking water functions of the state government within the State Water Board to provide for coordinated consideration of water rights, water quality, and safe and reliable drinking water. (Wat. Code, § 174.) The State Water Board performs dual functions in both ensuring water quality and allocating water rights for the "waters of the state." (*United States v. State Water Resources Control Board* (1986) 182 Cal.App.3d 82, 110-12; see also *Nat'l Audubon Soc'y v. Superior Court* (1983) 33 Cal.3d 419, 444 [the State Water Board is charged with "comprehensive planning and allocation of waters"].) In implementing its water quality responsibilities under the Porter-Cologne Act, the State Water Board's "legislated mission is to protect the 'quality of all the waters of the state ... for use and enjoyment by the people of the state.'" (*United States v. State Water Res. Control Bd.*, *supra*, 182 Cal.App.3d at p. 116, quoting Wat. Code, § 13000 [emphasis added].) The Porter-Cologne Act defines "waters of the state" to mean "any surface water or groundwater, including saline waters, within the boundaries of the state." (Wat. Code, § 13050, subd. (e).)

The State Water Board is empowered to formulate water quality control plans that supersede conflicting regional water quality control plans. (Wat. Code, § 13170.) Water quality control plans consist of "a designation or establishment for the waters within a specified area of all of the following: (1) Beneficial uses to be protected; (2) Water quality objectives; and (3) A program of implementation needed for achieving water quality objectives." (Wat. Code, § 13050, subd. (j).) The State Water Board's authority to adopt water quality control plans for waters of the state is not limited by geographic or hydrologic boundaries. (*Ibid.*; Wat. Code, § 13170.) Only the regional water quality control boards' water quality control plans are geographically limited since their plans must be for all areas within their regions. (Wat. Code, § 13240.) In contrast, the boundaries of State Water Board water quality control plans, like the Bay-Delta Plan, are not predetermined by law, nor does Water Code section 12220, which defines the lands of the Delta, limit the State Water Board's plenary authority to regulate the state's waters as it sees fit.

For similar reasons, the State Water Board's previous policy decisions regarding the geographic scope of the Bay-Delta Plan are not binding on the State Water Board. As discussed above, neither the Porter-Cologne Act nor Water Code section 12220 limit the geographic scope of the State Water Board's regulation of the state's waters. The State Water Board has historically developed the water quality control plan for the Bay-Delta for two key reasons. First, the Sacramento-San Joaquin Delta and San Francisco Bay Estuary fall within the boundaries of two regional water quality control boards. The State Water Board's development and adoption of the plan ensures a coordinated approach across regional water quality control board boundaries. Second, 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. The State Water Board's decision to expand the geographic scope of the Bay-Delta Plan to the LSJR and the three eastside tributaries to help protect fish and wildlife beneficial uses is supported by scientific information and is consistent with a more comprehensive approach to ecosystem health in the Bay-Delta watershed.

Identification of the plan area and extended plan area in the SED or the geographic scope of the Bay-Delta plan does not violate the California water rights priority system, as asserted by at least one

commenter. The State Water Board's evaluation and adoption of the plan amendments, by themselves, do not impose requirements on any water right holders to comply with the plan amendments that are enforceable by the State Water Board. Instead, the State Water Board will allocate responsibility to water right holders to implement the water quality objectives by imposing enforceable conditions in future proceedings, for example, through proceedings resulting in a water right decision or order amending specific water rights or by regulation. Water right proceedings to implement the plan amendments would generally follow the water rights priority system and applicable law. The proposed amendments to the Bay-Delta Plan have not yet been implemented by a water right decision amending specific water rights or by regulation. Please refer to Master Response 1.2, *Water Quality Control Planning Process*, for additional information regarding implementation through water rights proceedings and water rights priority.

Tributary Watersheds

It is well within the State Water Board's broad powers and responsibilities to establish water quality objectives for areas upstream of the Bay-Delta in the Bay-Delta Plan in order to reasonably protect beneficial uses. The fish and wildlife beneficial uses of the three salmon-bearing tributaries of the LSJR, the Stanislaus, Tuolumne, and Merced Rivers, have been adversely affected by insufficient flows. Sufficient inflow conditions for these waters during the February–June period, an important period for several critical life stages of salmon, is necessary to protect native migratory fish migrating through these upstream rivers and the Bay-Delta. The Bay-Delta is not an isolated water body. The quality of upstream tributaries affects the quality of Bay-Delta waters and native migratory fish populations migrate through both the Bay-Delta and its upstream tributaries. It is, therefore, necessary to address the quality of those upstream waters, as well as the Bay-Delta, in order to reasonably protect fish and wildlife beneficial uses.

Diversions of water within and upstream of the Bay-Delta are key drivers of water quality in the Bay-Delta, and the State Water Board is well within its authority to protect Bay-Delta water quality by addressing upstream flow. (See *State Water Res. Control Bd. Cases, supra*, 136 Cal.App.4th at pp. 701–02 [“a flow objective sets the amount of water that must be flowing in a watercourse at a given time for ‘the reasonable protection of beneficial uses of [the] water,’” citing Wat. Code, § 13050, subd. (h)].) “Obviously, meeting [a flow] objective may be achieved, among other ways, by reducing the amount of water that upstream water right holders divert from the watercourse or by increasing the amount of water released into the watercourse.” (*Ibid.*)

The 2006 Bay-Delta Plan, in conjunction with other water quality control plans, protect beneficial uses to be served by the waters of the Bay-Delta. The plan amendments expand the geographic scope of the 2006 Bay-Delta Plan to include the tributary watersheds of the Bay-Delta. The tributary watersheds include the LSJR and its three eastside tributaries. The LSJR is the portion of the San Joaquin River between its confluence with the Merced River and downstream to Vernalis. The three LSJR eastside tributaries include the Stanislaus, Tuolumne, and Merced Rivers. Thus, the plan amendments recognize the importance of the LSJR Watershed to the protection of the Delta aquatic ecosystem.

The expansion of the geographic boundaries is also consistent with past State Water Board actions. The State Water Board adopted the 1978 *Delta Water Quality Control Plan* and identified the specified area as the Sacramento–San Joaquin Delta and Suisun Marsh. The State Water Board revised the 1978 plan in 1991 to create the *Bay-Delta Water Quality Control Plan* (1991 Bay-Delta Plan) and expanded the specified area to include the San Francisco Bay and the Sacramento–San

Joaquin Delta Estuary, which comprises San Francisco Bay, San Pablo Bay, and Suisun Bay, Suisun Marsh, and the Sacramento–San Joaquin Delta (see the *Executive Summary* and Figure 3-1 in the 1991 Bay-Delta Plan). Updates were made to the *Bay-Delta Water Quality Control Plan* in 1995 and 2006, but they did not include modifications to the specified area of the Bay-Delta Plan.

Some commenters asserted that the Central Valley Regional Water Board should be establishing the flow objectives in its basin plans because the Central Valley Regional Water Board’s jurisdiction already encompasses the tributaries. As explained above, the State Water Board holds dual responsibilities of allocating surface water rights and protecting water quality. The regional water quality control boards do not have the authority to allocate surface water rights. Because diversions of water within and upstream of the Bay-Delta are a driver of water quality, implementation of the Bay-Delta Plan relies on the State Water Board’s combined water right and water quality authorities, including implementation primarily through water rights actions that regulate water diversions and use. The regional water boards do not have these water right authorities and it would not be effective for them to include in their water quality control plans requirements that they could not implement. Further, as explained above, the State Water Board is the appropriate state agency to develop a comprehensive and coordinated approach to the water supply and water quality challenges involving diversions of water within and upstream of the Bay-Delta.

Lower and Upper San Joaquin River Watershed

The LSJR plan amendments focus on rivers in the SJR Watershed with salmon runs that provide the majority of average unimpaired flow to the Delta from the SJR Watershed. The plan amendments are proposed to better provide reasonable protection for fish and wildlife beneficial use than the existing flow objectives on the SJR at Vernalis alone. Chapter 3, *Alternatives Description*, explains that selection of a flow alternative that includes the Stanislaus, Tuolumne, and Merced Rivers supports goals 1 and 2 because these rivers provide habitat for a variety of critical salmon life history stages. The purpose of the LSJR plan amendments is to establish flow objectives and a program of implementation for the LSJR, including the three eastside, salmon-bearing tributaries. The LSJR plan amendments apply to the entire migration pathway of salmon from the rim dams on the three salmon-bearing tributaries of the SJR to the SJR near Vernalis.

Some commenters asserted that the LSJR flow objectives disregard 40 percent of the watershed by excluding the Upper SJR main stem, tributaries to the Upper SJR, and the westside tributaries of the SJR. Commenters further asserted that proposing flow objectives on the LSJR, Stanislaus, Tuolumne, and Merced Rivers is inconsistent with the 2010 Delta Flow Criteria Report because it recommends 60 percent of unimpaired flow as San Joaquin inflow from the whole SJR Watershed, not just the lower east side of the watershed. The primary biological goal used to guide the development of the SJR inflow recommendation in the 2010 Delta Flow Criteria Report (see page 43) is “provide sufficient flow in the San Joaquin River to transport salmon smolts through the Delta during spring in order to contribute to attainment of the State Water Board’s salmon protection water quality objective” (State Water Board 2010). Therefore, the LSJR plan amendments focus on the river segments in the SJR Watershed that support salmon and provide the greatest combined source of flow to the Delta.

The LSJR, Stanislaus, Tuolumne, and Merced Rivers (eastside tributaries) are the appropriate waters to include in flow objectives because they support existing salmon runs and supply more than 60 percent of the average unimpaired flow available in the SJR Watershed (see Table 2.1-2). The SJR westside tributaries do not support salmon populations and supply less than 1 percent of the

available average unimpaired flow to the watershed (see Table 2.1-2). Please refer to Chapter 3, *Alternatives Description*.

The Upper SJR is not included in the LSJR plan amendments because it does not currently support salmon runs and an independent effort, the San Joaquin River Restoration Program (SJRRP), is intended to provide flows needed to restore and maintain fish populations in “good condition” on the Upper SJR. The Upper SJR is the portion of the SJR from the confluence of the Merced River upstream to Friant Dam. The Upper SJR provides a little less than 30 percent of the available unimpaired flow to the SJR Watershed. The plan amendments recommend that stakeholders evaluate 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 SJR’s confluence with the Merced River in future Bay-Delta Plan updates. Please refer to Master Response 1.1, *General Comments*, Chapter 3, and Appendix K, *Revised Water Quality Control Plan*, for additional information about the Upper SJR and SJRRP.

Table 2.1-2. San Joaquin Valley Unimpaired Total Outflow

Watershed Unit	Average Unimpaired Flow (TAF)	Percent of Total
UF 16 Stanislaus River	1121	18
UF 17 San Joaquin Valley Floor	184	3
UF 18 Tuolumne River	1850	30
UF 19 Merced River	956	15
UF 20 Chowchilla River	70	1
UF 21 Fresno River	88	1
UF 22 Upper San Joaquin River	1727	28
UF 23 Tulare Lake Basin Overflow	174	3
UF 24 SJV West Side Minor Streams	7	0
TOTAL	6177	100

Source: DWR 2007 California Central Valley Unimpaired Flow Data Fourth Edition.

Flow for 1921–2003 was computed as the sum of UF 16 through UF 24.

SJV = San Joaquin Valley

TAF = thousand acre-feet

UF = unimpaired flow subbasin

LSJR Flow Requirements

Description of LSJR Flow Objectives

Some commenters asserted that the narrative flow objective is vague and uncertain and as a result, the regulated community cannot determine, with any certainty, how to comply with the objective. The State Water Board, together with the regional water quality control boards, adopt water quality standards pursuant to the federal Clean Water Act (CWA) and state Porter-Cologne Act. Under the federal CWA, water quality standards (WQS) consist of identification of beneficial uses of water, criteria to protect those uses, and antidegradation requirements. Water quality criteria can be narrative or numeric, or both. (40 CFR § 131.11(b).) (Please refer to Master Response 1.2, *Water Quality Control Planning Process*, for a discussion of the Porter-Cologne Act and CWA, and the use of

a narrative objective as an appropriate means of protecting the beneficial uses.) The terms of the narrative objective establish the desired biological conditions in the LSJR and the three eastside tributaries for the numeric flow objective to achieve. This is especially important for implementation of the numeric objective because it requires flows to be managed in a manner necessary to achieve the narrative objective.

The LSJR narrative flow objective is an expression of desired flow and biological conditions in the LSJR and three eastside tributaries.

- **LSJR Narrative Flow Objective:** “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. Flows provided to meet the flow objectives shall be managed in a manner to avoid causing significant adverse impacts to fish and wildlife beneficial uses.”

The LSJR narrative objective is similar in its level of specificity to other narrative flow objectives that have been adopted nationwide. Kentucky, Missouri, New Hampshire, New York, Rhode Island, Tennessee, Vermont, and Virginia have all adopted narrative flow criteria for the protection of aquatic life. Many narrative criteria are general in nature. Narrative criteria are written in various ways but they commonly address two general components: (1) a description of the resource to be protected and/or a resource protection goal, and (2) one or more statements describing the hydrologic condition needed to be maintained to achieve the protection goal. For example, Missouri adopted, and U.S. Environmental Protection Agency (USEPA) approved, the following narrative criteria: “Waters shall be free from physical, chemical, or hydrological changes that would impair the natural biological community” (USEPA and USGS 2016).

The narrative objective meets the standards of Government Code section 11349.1 subdivision (a) and is neither unclear nor vague. The terms in the LSJR narrative objective are specific with precise scientific and dictionary definitions and the overall statement of desired conditions is not vague. The LSJR narrative flow objective identifies the desired flow condition by establishing that flows need to be sufficient for supporting and maintaining the natural production of viable native SJR Watershed fish populations migrating through the Delta. The phrase “support and maintain” means that there must be enough flow to provide, and continue providing, a basis for the existence of fish populations. Merriam-Webster Dictionary definition 3(b) states the meaning of the word “support” is “to provide a basis for the existence or subsistence of” something (Merriam-Webster Dictionary Online 2018).

The term “natural production” is unambiguous; it refers to fish spawned and reared in nature as opposed to spawned and reared in a fish hatchery. The term “natural production” is commonly used with respect to salmonids (“natural production during the baseline period [is] that portion of production not produced in hatcheries” and “production [is] the number of fish that recruit to adulthood...” [USFWS 1995].)

The narrative flow objective provides examples of indicators of fish population viability, which include population abundance, spatial extent, distribution, structure, genetic and life history

diversity, and productivity. The narrative flow objective also provides examples of flows that contribute to maintaining viable, native migratory SJR fish populations. These types of flows include flows that more closely mimic the natural hydrographic conditions than existing flows on the eastside tributaries and LSJR. Flows that more closely mimic the natural hydrograph from February through June provide a flow pattern and volume more similar to conditions to which native fish species are adapted than the flow pattern and volume provided by existing flow conditions.

Several commenters expressed concern that the narrative LSJR flow objective would not be enforceable due to what the commenters assert are vague terms and lack of clarity in the LSJR plan amendments. Adoption of the narrative objective does not impose enforceable requirements on any entities. Rather, the State Water Board will have to implement the LSJR flow objectives, pursuant to the program of implementation, through water right and water quality actions (see Chapter 3, *Alternatives Description*, and Appendix K, *Revised Water Quality Control Plan*) that will include imposing enforceable requirements based on flows needed to achieve the narrative and numeric objectives.

The narrative and numeric LSJR flow objectives and program of implementation work together to achieve the goal of reasonably protecting fish and wildlife beneficial uses in the LSJR. The numeric LSJR flow objective is expressed as an unimpaired flow value within an allowed adaptive range. The unimpaired flow value and range are not vague; they are precise, numeric values that are not subject to a variation of interpretation. The numeric flow objectives are designed to provide flow conditions that will attain the narrative flow objective. The LSJR plan amendments establish numeric flow objectives based on a percent of unimpaired flow because this method reflects the features of the natural hydrograph, including frequency, timing, duration, and magnitude of flow. The percent of unimpaired flow provides a block of water that is large enough and that can be shaped and shifted to provide functional flows needed to achieve fish and wildlife goals.

- **LSJR Flow Objective:** A minimum percent of unimpaired flow of 40 percent with an allowed adaptive implementation range of 30–50 percent inclusive, from each of the Stanislaus, Tuolumne, and Merced Rivers, shall be maintained from February through June.

Unimpaired flow is the flow that would accumulate in surface waters in response to rainfall and snowmelt, and flow downstream if there were no reservoirs or diversions to change the quantity, timing, and magnitude of flows. Unimpaired flow differs from natural flow because unimpaired flow is the flow that occurs at a specific location in the watershed under the current configuration of channels, levees, floodplain, wetlands, deforestation, and urbanization. Unimpaired flow is reflective of the frequency, timing, magnitude and duration of natural flows to which fish and wildlife have adapted. Unimpaired flow estimated at higher points in the watershed is an adequate approximation of full natural flow because the ground surface in these areas has less urban and agricultural development than lower lying areas in the watershed.

The LSJR plan amendments include a fixed, numeric base flow requirement at Vernalis to provide reasonable protection for fish and wildlife beneficial uses when percent of unimpaired flow from the LSJR tributaries is critically low. The base flow objective is not vague. It is a precise, numeric value that is not subject to wide ranging interpretation.

- **Vernalis Base Flow:** 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 implementation range of 800–1,200 cfs, inclusive.

The base flow requirement establishes minimum flow conditions that must be maintained in the event that the percent of unimpaired flow from the LSJR tributaries results in flows less than 1,000 cfs in the LSJR at Vernalis (minimum 7-day running average). The base flow requirement is expressed as a range so that base flow can also be adaptively managed to maximize the beneficial use of water during critically dry years. The program of implementation allocates proportional responsibility for meeting the base flow requirements when the percent of unimpaired flow is insufficient for providing 1,000 cfs at Vernalis. The Stanislaus River shall provide 29 percent, the Tuolumne River 47 percent, and the Merced River 24 percent of the additional total flow needed to achieve and maintain the required base flow at Vernalis. Modeling results summarized in Chapter 5, *Surface Hydrology and Water Quality*, indicate that the percent of unimpaired flow requirement provides flows greater than 1,000 cfs in the LSJR at Vernalis in more than 99 percent of months evaluated (see Table 5-18 Number and Percent of Months Affected by February–June Minimum Vernalis Flow Requirements Based on the 82 Years Simulated by the WSE Model) and that the base flow requirement is rarely activated. This base flow requirement provides a minimum numeric flow value to reasonably protect fish and wildlife beneficial uses.

Additional Future LSJR Flows: Commenters expressed concern that the State Water Board may immediately, upon adoption of the LSJR plan amendments, consider additional flow requirements from the LSJR Watershed to meet new Delta outflow requirements. As stated in Appendix K, *Revised Water Quality Control Plan*, it is the State Water Board’s intention that an entity’s implementation of the LSJR flow objectives will meet any responsibility to contribute to the LSJR inflow component of the Delta outflow objective in the Bay-Delta Plan. The State Water Board, however, may further consider and reallocate responsibility for implementing the Delta outflow objective in any subsequent water right or water quality proceeding.

LSJR Flow Objectives for Three Tributaries

Some commenters objected to proposing the same flow objectives for the Stanislaus, Tuolumne, and Merced Rivers. Commenters described the proposed flow objectives as a “one-size-fits-all” approach. Commenters asserted that flow objectives and the SED analysis should be based on and tailored to high-resolution, individual, characteristics of each river.

The LSJR flow objectives are proposed for the Stanislaus, Tuolumne, and Merced Rivers because they support salmon populations and provide the majority of average unimpaired flow to the Delta from the SJR Watershed. These are the principal elements of the proposed narrative LSJR flow objective and project goals 1 and 2 (see *Executive Summary*). Similarly, the primary biological goal used to guide the development of the SJR inflow recommendation in the 2010 Delta Flow Criteria Report (see page 43) is “provide sufficient flow in the San Joaquin River to transport salmon smolts through the Delta during spring in order to contribute to attainment of the State Water Board’s salmon protection water quality objective.” Therefore, the LSJR plan amendments focus on flow in the Stanislaus, Tuolumne, and Merced Rivers because these rivers support salmon populations, provide the greatest combined source of flow to the Delta from the SJR Watershed, and provide spatial diversity.

Contrary to the concerns stated in comments, it is appropriate to propose the same flow requirements for the Stanislaus, Tuolumne, and Merced Rivers. The Stanislaus, Tuolumne, and Merced Rivers are similar in many elemental stream classification characteristics. Chapter 2, *Water Resources*, provides descriptions of each tributary and the surrounding watershed. Summary characteristics of the tributaries and their watershed are provided in Table 2-1, Summary of

Watershed and Reservoir Characteristics in San Joaquin River Basin. Classifying streams into groups for setting flow objectives is supported by USEPA, USGS, and the emerging California Environmental Flows Framework being developed by the University of California, Davis (USEPA and USGS 2016; Yarnell 2017).

Flow requirements are needed on all three tributaries to protect fish and wildlife beneficial uses and improve resiliency of Central Valley salmonid populations. The tributaries support salmonid populations and are the greatest combined source of freshwater flow for cold water habitat needed by native resident and migratory fish species. The proposed flow objectives increase spatial and temporal access to food and cold water habitat for juvenile fall-run Chinook salmon and steelhead in the Stanislaus, Tuolumne, and Merced Rivers. These benefits are expected to improve abundance, productivity, diversity, and spatial structure of the SJR Basin and Central Valley populations. Improving and maintaining these important population attributes should help buffer SJR Basin and Central Valley salmon and steelhead populations from catastrophic events and conditions in the future (see Appendix C, Chapter 3, *Scientific Basis for Developing Alternative San Joaquin River Flow Objectives*).

Flow requirements on the three eastside tributaries that mimic natural hydrographic conditions, including instream temperature and floodplain access, are expected to provide juvenile salmonids with greater quality and quantity of habitat and food resources that are necessary for required growth, development, and survival. Extending spatial, temporal, and nutritional opportunities available to juvenile fall-run Chinook salmon and steelhead in the Stanislaus, Tuolumne, and Merced Rivers is expected to improve abundance, productivity, diversity, and spatial structure of the SJR Basin and Central Valley populations (see Appendix C, Chapter 3).

The proposed objectives are designed with flexibility, allowing implementation to be tailored to each tributary. The proportional feature of the proposed flow objectives (percent) adjusts the flow requirements to the size of each watershed and its associated unimpaired flow. The proposed percent of unimpaired flow objectives establishes a block of water (40 percent of unimpaired flow) that can be adjusted within an approved range (30–50 percent of unimpaired flow) and can be shaped and shifted in time to provide functionally useful flows tailored to each river and its physical, biological, and chemical characteristics and seasonal conditions.

The SED provides an appropriate level of analysis using details from each of the tributaries and their surrounding watersheds. The Water Supply Effects (WSE) model, temperature model, and floodplain inundation analysis evaluate effects of the proposed action using information specific to each river. Please refer to Chapters 7, *Aquatic Biological Resources*; 11, *Agricultural Resources*; 13, *Service Providers*; and 19, *Analyses of Benefits to Native Fish Populations from Increased Flow between February 1 and June 30*; Appendix F.1, *Hydrologic and Water Quality Modeling*; and Master Responses 3.1, *Fish Protection*; and 3.2, *Surface Water Analyses and Modeling*, for additional information regarding the WSE model, temperature model, and floodplain inundation analysis and inputs to these tools that are specific to each tributary.

Commenters also questioned the need for coordinated implementation of the LSJR flow objectives on all three tributaries through the STM Working Group. Coordinating implementation of the flow requirements on the tributaries is imperative for optimizing the fish habitat benefits of shaping and shifting flows through adaptive implementation. Examples of groups using coordinated management to make flow releases in the San Joaquin River include the Stanislaus Operations Group (SOG) and the Vernalis Adaptive Management Plan (VAMP).

SOG currently coordinates flows among the three tributaries because they make recommendations for implementation of Stanislaus River actions in the National Marine Fisheries Service (NMFS) BiOp. SOG considers expected flows from the Merced and Tuolumne Rivers when providing advice on BiOp implementation regarding spring and fall pulse flows on the Stanislaus River (for example, see the 2011 and 2017 SOG Annual Reports [SOG 2011, 2017]). Also, signatories to the San Joaquin River Agreement released flows in a coordinated fashion to meet flow requirements under the VAMP for the period 2000–2012. These examples illustrate that coordinating spring and fall pulse flows among the three tributaries optimizes flows that promote survival of out-migrating juveniles in the spring and enhance fall adult attraction flows in the mainstem of the lower San Joaquin River and within the Delta. Isolated implementation of flow requirements would provide fewer fish benefits with the same volume of water than coordinated implementation because timing flows from the tributaries would not occur.

Similarly, coordinated monitoring, assessment, and science among the three tributaries is essential for successful adaptive implementation, evaluating effectiveness of flow objectives, efficiently using resources, and advancing methods for optimizing water use to support fisheries, wildlife, agriculture, industry, and communities. Isolated implementation is likely to continue flow management inefficiencies such as a patchwork of monitoring requirements, disaggregated monitoring data with limited accessibility, and disconnected special studies and investigative science. Coordinated implementation of objectives has the greatest chance of success when stakeholders are engaged in developing management options that directly address their concerns and needs and collectively invest in monitoring, assessment, and science so that all participants can benefit from access to data, advancements in knowledge, and attainment of the flow objectives.

Unimpaired Flow and Functional Flows

The percent unimpaired flow objective is compatible with and facilitates functional flows that improve fish and wildlife beneficial use protection. Multiple commenters suggested that the State Water Board should identify flows to achieve specific fish and wildlife functions instead of expressing the flow objective as a percent of unimpaired flow. The LSJR flow objective is expressed as a percent of unimpaired flow because this approach defines a volume of water that reflects the natural hydrograph and the water volume can be shaped within the February–June time period to provide flow schedules that could have greater benefits for fish and wildlife beneficial uses than prescribed, fixed monthly flow schedules. Functional flows are designed to achieve a specific ecological or biological function, such as increased habitat, floodplain activation, improved temperature profiles, or a migration cue. The unimpaired flow requirement defines a volume of water, or water budget, with flexibility to shape and shift the water volume and provide flows to achieve a specific ecological function.

The unimpaired flow objective defines the water budget and allows the frequency, timing, magnitude, and duration of flows to be shaped and shifted in time to enhance the biological benefits. The unimpaired flow objective is intended to be implemented in a way that achieves the greatest biological benefits for the volume of water provided by the unimpaired flow objective. Adaptive implementation of the water budget provided by the percent of unimpaired flow objective has the potential to achieve greater biological benefits with the same volume of water if the flows are shaped and/or shifted to achieve specific ecological functional improvements. Each of the three tributaries may be managed differently, with respect to the percent of unimpaired flow and the specific adaptive implementation, so long as the flows remain within the adaptive range and

adaptive implementation among the three rivers is coordinated. Please refer to Master Response 2.2, *Adaptive Implementation*, Master Response 3.1, *Fish Protection*, *Executive Summary*, and Chapter 3, *Alternatives Description*, for additional information.

Multiple commenters recommended shorter or longer averaging periods than the 7-day averaging period for the unimpaired flow objective. Shorter averaging periods generally benefit fish because the flows more closely track the hydrograph and weather conditions that improve habitat and provide behavioral cues to fish. Longer averaging periods are generally preferred for operational flexibility and feasibility. Adaptive implementation allows for shaping flows over a specified period of time as long as the volume of water shaped in adaptive implementation is the same as the volume of water required by the percent of unimpaired flow objective on a 7-day running average. In the absence of adaptive implementation, the 7-day averaging period strikes a balance between the fish benefits of a shorter averaging period and the operational benefits of a longer averaging period. Please refer to Master Response 2.2, *Adaptive Implementation*, for additional discussion regarding flow objective averaging period.

February through June Time Period

The LSJR narrative and numeric flow objectives apply in the February–June time period because target fish species need in-stream habitat conditions to support early, sensitive life stages. Multiple commenters suggested that the objectives should apply in all months in order to achieve the narrative flow objective and the existing salmon protection objective. Chapter 3, *Alternatives Description*, explains that the February–June time period captures the majority of water that could be used to reasonably protect fish and wildlife in the LSJR year-round. Adaptive implementation allows a portion of the 30–50 percent of unimpaired flow to be shifted into the July–January time period to prevent elevated temperature conditions that could cause poor or lethal instream habitat conditions. In addition, consistent with the program of implementation, the narrative objective requires flows to be managed in a manner that avoids causing significant adverse impacts to fish at other times of the year.

The February–June flow objectives combined with the narrative objective and adaptive implementation are designed to provide a similar level of protection as year-round flow schedules while providing flexibility needed to achieve the greatest biological benefit with the block of water provided by the percent of unimpaired flow objective. Table 3-1 in Chapter 3 shows that approximately 80 percent of the annual volume of unimpaired flow occurs in February–June (based on 1984–2009 unimpaired flow data from Appendix C, *Technical Report on the Scientific Basis for Alternative San Joaquin River Flow and Southern Delta Salinity Objectives*). This means that the proposed LSJR unimpaired flow objective (LSJR Alternative 3) directs up to 40 percent of mean annual flows toward the protection of fish and wildlife (50 percent multiplied by 80 percent). The adaptive element of the LSJR flow objective allows up to 25 percent of the February–June flows to be shifted to time periods after June to minimize adverse effects on fisheries, including instream temperature conditions that would otherwise occur due to implementation of the February–June flow requirements.

Please refer to Chapter 19, *Analyses of Benefits to Native Fish Populations from Increased Flow Between February 1 and June 30*, and Master Response 3.1, *Fish Protection*, for additional information about the benefits of June flows to fall-run Chinook salmon and Central Valley steelhead. Please refer to Master Response 2.4, *Alternatives to the Water Quality Control Plan Amendments*, regarding the exclusion of June flows from consideration in the plan amendments.

Migratory Corridors

Flow connectivity is important for providing migratory corridors and habitat continuity for fish and wildlife in the Bay-Delta Estuary Watershed. Multiple commenters expressed concern that the flows provided by the LSJR flow objectives will not be protected to provide habitat improvements to salmonids in the LSJR and the Delta. Multiple commenters suggested that the LSJR flow requirements include a percent of unimpaired flow objective on the LSJR at Vernalis in addition to the Vernalis base flow objective and percent of unimpaired flow objectives on the three tributaries. Commenters asserted that the percent of unimpaired flow objective at Vernalis is necessary to protect flows provided by the tributaries from diversion while they are in the LSJR between the Merced River confluence and Vernalis. Multiple commenters expressed concern that the increased flows at Vernalis will be diverted and not be available in the Delta to provide migratory corridors that reach Chipps Island.

Migratory pathways for LSJR salmonids will be protected in at least two ways. First, the program of implementation states that the State Water Board will exercise its water right and water quality authority to ensure that flows required to meet the LSJR flow objectives are used for their intended purpose and not diverted for other purposes. This primary focus of this statement is to prevent unauthorized diversions on the LSJR and the Stanislaus, Tuolumne, and Merced Rivers. It commits the State Water Board to ensuring the LSJR flow objectives are used for their intended purpose and are not diverted for other uses. Accordingly, actions will be taken by the State Water Board to prohibit diversion of the Stanislaus, Tuolumne, and Merced flows that are bypassed for the purpose of meeting the LSJR flow objectives.

Information from a network of flow gages will support the State Water Board's efforts to ensure that the tributary flow requirements are used for their intended purposes and are not diverted for other uses. The Stanislaus, Tuolumne, and Merced Rivers contribute most of the flow in the LSJR. Flow gages are installed on each tributary upstream of the confluence with the LSJR. A flow gage is installed on the LSJR immediately upstream of the Merced River. Flow gages are installed on the LSJR downstream of the confluences of the Merced River, the Tuolumne River, and the Stanislaus River (LSJR at Vernalis). Flow gages are installed on key westside tributaries. This network of flow gages provides sufficient information to determine whether flows are increasing or decreasing in each of the reaches of the LSJR from the Merced River confluence to Vernalis.

Second, flow increases in the LSJR at Vernalis provided by the LSJR flow objectives are high enough to improve migratory corridors through the Delta. Modeling shows that increased LSJR flows will contribute to Delta outflow, meaning the increased LSJR flows will protect migratory LSJR fish in a larger area. The SED acknowledges that a relatively small amount of LSJR flows will be exported, but also explains that increased LSJR flows will contribute more to Delta outflow (see Appendix F.1, *Hydrologic and Water Quality Modeling*, section describing potential changes in Delta exports and outflow). Flow shaping and shifting can also improve migratory pathways for out-migrating juveniles and returning adults and minimize adverse temperature conditions during other months of the year for fish that remain in the tributaries. Thus, benefits to migratory pathways will be achieved through the adoption and implementation of the LSJR flow objectives.

Commenters expressed concerns about future actions that could potentially limit these benefits or allow increased LSJR flows to be exported. The program of implementation states, "the flow 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.” This provision is based on the foundational science that informs establishment of the LSJR flow objectives and recognizes that flow connectivity is important for providing migratory corridors and habitat continuity for fish and wildlife in the larger watershed. To the extent commenters were referring to future Bay-Delta Plan amendments, it is not the intent of the State Water Board to act at cross purposes with the proposed LSJR flow objectives or create inconsistencies within the Bay-Delta Plan, including the statement that the LSJR flow objectives are intended to protect migratory LSJR fish in a larger area. Moreover, future amendments of the Bay-Delta Plan must be consistent with other parts of the plan. (40 C.F.R. § 130.6, subd. (e); see also Gov. Code, § 11349.1, subd. (a).)

For example, in a separate proceeding referred to as the Sacramento/Delta watershed proceeding, the State Water Board is reviewing and considering updates to other parts of the Bay-Delta Plan, such as Delta outflows, export restrictions, and other water quality objectives for different geographic areas of the Delta and its tributaries (State Water Board 2017a). That effort cannot presume the adoption of the plan amendments and is independent of the plan amendments. Nothing in that effort, however, suggests that there will be inconsistencies with the plan amendments; rather, that effort will likely be complementary. For example, it includes a draft “inflow-based Delta outflow” approach to updating the Delta outflow objective that acknowledges that inflows produce the volume and pattern of Delta outflows needed to provide effective migratory corridors. Limits on diversions at the south Delta export facilities will also be reviewed and revised as necessary to promote improvement in fish and wildlife beneficial use protection. Accordingly, the benefits of the plan amendments will not be diminished.

Some comments noted that the words “migratory pathways” were included in the 2012 proposed narrative flow objective but removed from the 2016 narrative objective. The terms “migratory pathways” were not used in the 2016 narrative objective because the concept of migratory pathways is encompassed by the narrative objective by identifying “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.”

Salmon Doubling and Salmon Protection Objective

Some commenters observed that the LSJR plan amendments do not address the salmon protection objective (commonly referred to as the salmon doubling objective) and requested clarification regarding the relationship between the salmon doubling objective and the LSJR plan amendments. The 2006 Bay-Delta Plan includes the salmon protection objective, which requires water quality conditions coupled with watershed actions to achieve a doubling of the natural production of Chinook salmon from the average production of 1967–1991, consistent with the provisions of state and federal law. As previously mentioned, the term “natural production” refers to the number of returning adult salmon that are not of hatchery origin. To achieve doubling, the federal Anadromous Fish Restoration Program (AFRP) identified quantitative natural production targets as abundance estimates for fall-run Chinook salmon on each of the LSJR tributaries. The LSJR plan amendments neither modify the salmon protection objective nor the program of implementation expressly addressing the objective.

The LSJR plan amendments are focused on supporting and maintaining viable native SJR fish populations migrating through the Delta. Indicators of viability include not only population abundance, but also spatial extent, distribution, structure, genetic and life history diversity, and productivity. In contrast, the salmon protection objective is expressed in terms of abundance,

consistent with the targets identified by AFRP. The narrative and numeric LSJR flow objective, when implemented, would benefit early life stages of fish populations and lead to progress toward achieving the natural production targets identified by AFRP for the Stanislaus, Tuolumne, and Merced Rivers. Biological goals can be developed that connect juvenile survival targets and other viability parameters to natural production targets for returning adults. Additional details are provided below in the section providing responses to comments on biological goals.

Some commenters asserted that the LSJR flow objectives are not sufficient for attaining the salmon protection objective and AFRP doubling goals for the Stanislaus, Tuolumne, and Merced Rivers. Other comments recommend adopting a percent of unimpaired flow range and starting flow value sufficient to achieve salmon doubling.

The LSJR plan amendments, Alternative 3 in the SED, establishes a flow range and starting flow value consistent with achieving salmon doubling and the salmon protection objective. Chapter 3, *Alternatives Description*, explains that California Department of Fish and Wildlife (CDFW) and the U.S. Department of Interior (DOI) have established independent recommendations for SJR flows at Vernalis needed to achieve salmon doubling. Comparison of the proposed LSJR flow objectives with the CDFW and DOI recommended doubling flows shows that the proposed LSJR flow objectives are generally similar and encompass the recommended doubling flows with the exception of critically dry years and the DOI flow recommendations.

The Bay-Delta Plan recognizes that the salmon protection objective will require actions not just by the State Water Board, but other entities as well. The program of implementation for the objective is located in Chapter IV, *Program of Implementation*, Section B, *Measures Requiring a Combination of State Water Board Authorities and Actions by Other Agencies* (Appendix K, *Revised Water Quality Control Plan*). It states that the salmon protection objective is to be implemented through numeric flow-dependent objectives and non-flow actions. The exact combination of flow (magnitude, timing, duration, and variability) values, locations, and extent of non-flow measures necessary to achieve doubling is currently not known; however, the SED analysis shows that LSJR plan amendments will make measurable progress toward meeting the salmon protection objective.

Even though the proposed LSJR flow objective is generally lower at Vernalis than the April and May flows AFRP recommend, the SED analysis shows substantial improvement in stream flow and instream habitat (temperature) on the three eastside tributaries and in the LSJR relative to baseline conditions (Chapter 19, *Analyses of Benefits to Native Fish Populations from Increased Flow between February 1 and June 30; Executive Summary*; Appendix F.1, *Hydrologic and Water Quality Modeling*). The numeric February–June LSJR flow objective works together with the narrative objective. The numeric objective provides flows that more closely mimic natural hydrograph conditions, but flows can also be shaped if information supports that shaping the flows better achieves the narrative goal of supporting SJR Watershed fish populations migrating through the Delta.

The temperature and flow benefits described in the SED indicate that the LSJR plan amendments can result in measurable progress toward attaining the salmon protection objective. Investments in non-flow restoration actions (also recommended by AFRP to achieve doubling) will further improve benefits provided by the LSJR plan amendments. The San Joaquin River Monitoring and Evaluation Program (SJRMEP) is expected to produce data that advances knowledge regarding the management of flows to protect fish and wildlife beneficial uses. Data and knowledge produced by the SJRMEP will be used to inform adaptive implementation, including shaping flows and shifting the percent of unimpaired flow within the approved range, inform non-flow and restoration actions, evaluate

attainment of the LSJR flow objectives, and inform potential future changes to the Bay-Delta Plan (see Appendix K, Part IV, *San Joaquin Monitoring and Evaluation Program*). The effort will also inform attainment of the salmon protection objective. The combination of all these elements provides substantial improvement to salmonid habitat, measurable progress toward attaining the salmon doubling objective, scientific advancement of knowledge regarding measures needed to achieve salmon doubling, and the platform to modify flows if it is determined that they are insufficient for protecting the beneficial use.

Calculating Unimpaired Flow and Percent Unimpaired Flow

Unimpaired flow is defined as the water production of a river basin, unaltered by upstream diversions, storage, or by export or import of water to or from other watersheds. It differs from natural flow because unimpaired flow is the flow that occurs at a specific location under the current configuration of channels, levees, floodplains, wetlands, deforestation, and urbanization. Although that distinction is meaningful for valley floor areas that have experienced drastic hydrologic modification, upstream of the major reservoirs, the difference between natural and unimpaired flow is not considered to be significant.

The percents of unimpaired flow for the LSJR alternatives evaluated in the SED were calculated using monthly unimpaired flows for water years 1922–2003 available from the California Department of Water Resources (DWR 2007) as estimates of unimpaired flows upstream of the major reservoirs. Appendix F.1, *Hydrologic and Water Quality Modeling*, explains that the February–June minimum instream flow requirement was calculated as a percentage of that month’s unimpaired flow, for each month in the February–June time period, for purpose of comparing alternatives. For example, the unimpaired flow volume in the Stanislaus River in February 2003 was 55 TAF. An unimpaired flow of 40 percent would be 22 TAF (a monthly average of 396 cfs) for the month of February. Each month is calculated individually. Higher flows such as flood spills would meet the requirement during the month of the spills, but the surplus would not apply to successive months that would still need to meet the minimum flow.

Unimpaired flow is currently estimated by DWR and reported at three locations on the Stanislaus, Tuolumne, and Merced Rivers: Goodwin Dam (California Data Exchange Center [CDEC] station GDW, La Grange Dam [CDEC station TLG], and Merced Falls [CDEC station MRC]). DWR’s Full Natural Flow (FNF) metric is functionally equivalent to unimpaired flow at these particular locations. The percent of unimpaired flow required by the flow objective determines the size of the block of water or the water budget. This is calculated as 40 percent of the estimated FNF or unimpaired flow at the GDW, TLG, MRC stations. Compliance with the percent of unimpaired flow objective is determined at the downstream compliance points on each river near the confluence with the LSJR. These locations are Stanislaus River at Koetitz (DWR gage KOT), Tuolumne River at Modesto (USGS gage 1129000), and Merced River near Stevenson (DWR gage MST). 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 (Appendix K, Table 3) by the 7-day average calculated Full Natural Flow at the FNF stations.

Unimpaired flow is estimated on a daily and monthly time steps; however, the daily unimpaired flows are not always available for short-term decision-making or reliable for 7-day average calculations. The unimpaired flow estimates rely on variable and limited data that do not necessarily reflect actual unimpaired flow on a specific day. For example, changes in reservoir volume are used to estimate unimpaired flow. Reservoir volume or storage is often measured by recording changes

in water surface elevation. Water surface elevation can be affected by strong winds pushing water higher or lower at the location of the gage, causing volume and unimpaired flow to be over- or underestimated for that day. This type of variability evens out over longer averaging periods and daily divergences from actual unimpaired flow eventually sum to zero over time.

The program of implementation recognizes the need and benefit of refining existing methods for measuring flow variables and estimating unimpaired flow on a time step that is consistent with the averaging period for the LSJR numeric flow objective. This includes refinements to methods and measurements used to estimate FNF. Please see Master Response 2.2, *Adaptive Implementation*, for additional discussion on unimpaired flow compliance. The program of implementation requires the STM Working Group or State Water Board staff as necessary to work with the Delta Science Program to develop and recommend specific actions to monitor and evaluate compliance with the unimpaired flow objective. The State Water Board or Executive Director will consider approving the measures within 180 days from the date of Office of Administrative Law's (OAL's) approval of this amendment to the Bay-Delta Plan.

Emergency Provision

A number of comments were received regarding the state of emergency provision in the context of drought and in the context of CEQA. Commenters expressed concern about the emergency provision providing sufficient protection for water supply and fish and wildlife beneficial uses. Commenters expressed multiple views regarding changing the LSJR flow requirements for percent of unimpaired flow during drought. Some comments requested that the State Water Board maintain the percent of unimpaired flow during a drought to protect fish and wildlife beneficial uses instead of accommodating other beneficial uses, such as water supply for municipal and agricultural beneficial uses. Other comments requested that the State Water Board reduce the required percent of unimpaired flow to better protect water supply beneficial uses during a drought.

Commenters also requested that the State Water Board be more specific and precise about what exactly would occur regarding planning for drought conditions and implementation during drought conditions with the LSJR plan amendments. Commenters expressed concern that the State Water Board did not propose and analyze a plan for extended drought conditions under CEQA or otherwise evaluate the emergency provision under CEQA. Some comments expressed concern that the emergency provision for implementing the flow objectives relies on decisions made pursuant to the California Emergency Services Act which does not include criteria or guidance for identifying measures to "reasonably protect the fish and wildlife beneficial use."

In response to comments, the emergency provision set forth in Appendix K of the Recirculated SED, is revised in the Final SED so that it no longer applies to emergencies declared by local governing bodies pursuant to the California Emergency Services Act. (Gov. Code, § 8550 et seq.) The revised emergency provision states:

"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.”

The program of implementation does not contain the text of emergency definitions it references, but they are provided in this response to comments for convenience and clarity. “Emergency” means a sudden, unexpected occurrence, involving a clear and imminent danger, demanding immediate action to prevent or mitigate loss of, or damage to, life, health, property, or essential public services. (Pub. Res. Code, § 21060.3.) “Emergency” includes such occurrences as fire, flood, earthquake, or other soil or geologic movements, as well as such occurrences as riot, accident, or sabotage (*Ibid.*).

California Emergency Services Act, Government Code section 8558 characterizes “state of emergency” as follows:

“State of emergency” means the duly proclaimed existence of conditions of disaster or of extreme peril to the safety of persons and property within the state caused by such conditions as air pollution, fire, flood, storm, epidemic, riot, drought, sudden and severe energy shortage, plant or animal infestation or disease, the Governor’s warning of an earthquake or volcanic prediction, or an earthquake, or other conditions, other than conditions resulting from a labor controversy or conditions causing a “state of war emergency,” which, by reason of their magnitude, are or are likely to be beyond the control of the services, personnel, equipment, and facilities of any single county, city and county, or city and require the combined forces of a mutual aid region or regions to combat, or with respect to regulated energy utilities, a sudden and severe energy shortage requires extraordinary measures beyond the authority vested in the California Public Utilities Commission.

The revised emergency provision is now operative only if either the State Water Board determines an emergency under CEQA or the Governor declares an emergency under the California Emergency Services Act. Notably, the Governor’s power to declare an emergency is not limited to statewide emergencies but encompasses emergencies that are regional or local in nature. For example, on October 9, 2017, following the Cherokee, LaPorte, Sulphur, Potter, Cascade and Canyon fires, the Governor declared a state of emergency for 5 of California’s 58 counties: Butte, Lake, Mendocino, Nevada, and Orange (Office of Governor Edmund G. Brown Jr. 2017). This modification addresses certain concerns about the potentially broad use of the provision, recognizes the existing power of the Governor to address emergencies that are also local or regional in nature, and ensures that the emergency provision will be implemented only in situations involving state oversight, thus eliminating potential conflicts between state and local police powers.

The emergency provision has not been further modified in response to comments for several reasons. First, the emergency provision is sufficiently rigorous in terms of what qualifies as an emergency and is based on established state law. Second, the wide variety of emergencies that may occur are not predictable and the State Water Board needs the ability to act quickly under an array of emergency circumstances. As such, it is not desirable to further define, and perhaps inadvertently too narrowly limit, the circumstances in which the State Water Board may authorize a temporary change in the implementation of the LSJR flow objectives in a water right proceeding. Third, with respect to drought conditions, most are not declared emergencies and are accommodated through the adaptive implementation methods for the LSJR flow objectives, as explained below. Finally, the emergency provision is drafted so that it cannot be used to routinely relax implementation of flow requirements, but is reserved for true emergencies.

The emergency provision retains the requirement for the State Water Board to find that measures will be taken to reasonably protect fish and wildlife beneficial uses in light of the circumstances of

the emergency prior to authorizing any temporary change in the implementation of the LSJR flow objectives. Commenters wanted predetermined, default measures to reasonably protect fish and wildlife beneficial uses; however, that is difficult because the circumstances of emergencies will vary greatly. Predetermined measures may not be appropriate or tailored to the unique circumstances of the emergency.

Environmental impacts potentially resulting from implementation of the emergency provision are too speculative for evaluation. By its very definition under CEQA, an emergency is a sudden or unexpected occurrence. The California Emergency Services Act includes within a “state of emergency” the existence of conditions of disaster or of extreme peril to the safety of persons and property within the state that are caused by unpredictable circumstances or circumstances of such magnitude that extraordinary measures are required. The occurrences or conditions that could constitute an emergency, and their location, extent, duration, severity, and resulting effects are all unknown. As such, the temporary change to implementation of the flow objectives that the State Water Board could authorize in response to the emergency is similarly unknown and cannot be analyzed without engaging in sheer speculation based on “what-if” scenarios that may not occur. No meaningful public disclosure of environmental impacts occurs when an agency engages in such speculation.

Commenters characterized the emergency provision as a waiver or change of the flow water quality objective. It is neither. Rather, the provision allows temporary changes to water right implementation requirements under state law. For example, Water Code section 1435 provides that a permittee or licensee who has an urgent need to change the point of diversion, place of use, or purpose of use from that specified in the permit or license may petition for a conditional temporary change order. “Urgent need” is defined as “the existence of circumstances from which the [State Water Board] may in its judgment conclude that the proposed temporary change is necessary to further the constitutional policy that the water resources of the state be put to beneficial use to the fullest extent of which they are capable and that waste of water be prevented . . .” (Wat. Code, § 1435, subd. (c).) Temporary urgency change orders are temporary and expire automatically 180 days after issuance, unless they are revoked or an earlier expiration date is specified. (*Id.*, § 1440.) The State Water Board may renew temporary urgency change orders for a period not to exceed 180 days. (*Id.*, § 1441.)

Commenters stated that droughts are part of the natural conditions in California and, therefore, should not qualify as emergencies. As explained above, the revised emergency provision limits the use of the emergency provision, including for droughts. Under the definition of emergencies under CEQA and the Emergency Services Act, effectively, the only drought that would qualify under the emergency provision for a temporary change to implementing the flow objectives is a Governor-declared drought emergency that, due to its magnitude, requires the combined forces of the state.

Droughts, as commenters stated, are a natural part of California. Most drought years and sequences will not result in declaration of a state of emergency. The LSJR plan amendments anticipate and account for drought conditions through routine implementation of the flow objectives. First, the LSJR plan amendments are designed to adjust to dry water years and droughts because they use a proportional metric, percent of unimpaired flow, which automatically adjusts the volume of water required to meet the objective to the amount of water available in the system. For example, 40 percent of unimpaired flow results in a low flow value during dry years because total unimpaired flow is low. Likewise, 40 percent of unimpaired flow is a high flow value during wet years because total unimpaired flow is high.

Second, the adaptive implementation feature of the LSJR plan amendments can be used to address drought conditions that have not been declared emergencies by the Governor. The adaptive implementation range allows the State Water Board, or Executive Director with STM consensus, to implement any value of percent of unimpaired flow in the adopted range of 30–50 percent in response to changing hydrology conditions such as single or multiple drought years if the narrative water quality objective and any biological goals are met. These adjustments can be made without a formal declaration of a state of emergency and without a petition to the State Water Board for approval of temporary urgency changes.

Finally, the program of implementation requires planning for a reasonable range of hydrological conditions, including dry years. The STM Working Group (or a subset of the group) must submit annual operations plans for the coming year that include “actions and operations that consider and will work under a reasonable range of hydrological conditions,” (Appendix K, section *Annual Adaptive Operations Plan*). Thus, while the annual operations plan may not address emergency situations, which are sudden or unexpected, it should address more frequent variable conditions consistent with the wide variability that characterizes California hydrology and precipitation patterns. Multi-year operations plans may be proposed and should also include actions and operations that consider and will work under a reasonable range of hydrological conditions. This, too, should address the more frequent variable conditions of California’s hydrology and precipitation patterns.

Some commenters asserted that the SED analysis does not provide any information on which to base conclusions related to drought conditions and should identify and evaluate a drought emergency scenario to estimate and disclose impacts on water supply and fish and wildlife beneficial uses during a drought. The SED hydrology analysis evaluates drought conditions for a range of LSJR flow alternatives and discloses impacts accordingly. Each of the LSJR flow alternatives is evaluated along a cumulative distribution of annual hydrology conditions that range from the driest years represented by the 10th percentile condition (and minimum flow) and increase by 10 percent intervals to maximum flow levels represented by the 90th percentile condition (and maximum flow) in the 82-year modeling evaluation period. The SED discloses impacts on river flows, diversions for water supply, reservoir storage, and river temperature in Chapter 5, *Surface Hydrology and Water Quality*, on aquatic resources in Chapter 7, *Aquatic Biological Resources*, and on fish benefits in Chapter 19, *Analyses of Benefits to Native Fish Populations from Increased Flow between February 1 and June 30*. Other resource impacts from LSJR Alternative 2 are estimated and disclosed in the remaining SED chapters. Impact estimates are disclosed for the driest 10 percent of years (10th percentile condition) in the 82-year record to the wettest 10 percent of years (90th percentile condition) in the 82-year record.

The SED does not specify a “drought scenario” but it evaluates a lower flow alternative, LSJR Alternative 2, 20 percent of unimpaired flow in an adaptive range of 20–30 percent, and estimates impacts along a continuum of dry to wet water years (cumulative distribution of water years) as it does for each LSJR alternative. The lower flow LSJR Alternative 2 is not a designated “drought scenario”; however, it estimates and discloses impacts on resources at a lower level of flow requirement during the driest 10 percent of years in the 82-year record. This provides a proximate “drought scenario” that estimates impacts that could occur if the State Water Board responded to a formally declared state of emergency by relaxing flow requirements to approximately 20 percent of unimpaired flow. The lowest flow required by LSJR flow objectives is the Vernalis base flow of 800 cfs. Only two of the years evaluated in the 82-year period, or 0.5 percent of the years, resulted in flows at Vernalis less than 800 cfs from February through June (Table 5-18). Flows greater than

1,000 cfs (monthly average) at Vernalis are expected in the driest 10 percent of years evaluated in LSJR Alternative 2 for each month in the February–June time period. This shows that the SED evaluates a broad range of hydrologic conditions for each LSJR flow objective, including very dry conditions that could be interpreted as a drought scenario.

The preceding paragraph is not intended to suggest that the State Water Board would approve changes to the implementation requirements consistent with the flows evaluated for LSJR Alternative 2. Rather, LSJR Alternative 2 discloses the reasonably foreseeable potential impacts that could result from low flows in dry conditions. As noted above, even in emergency situations, the State Water Board must find that measures will be taken to reasonably protect the fish and wildlife beneficial uses in light of the circumstances of the emergency.

A commenter stated that the SED overestimated water supply impacts (and therefore agricultural and economic impacts) because it did not consider the likely effects on water supply from waiving flow requirements during future droughts under the emergency provision. As explained above, most droughts would not be considered emergencies, but would be addressed through adaptive implementation, which has been evaluated in the SED. Temporary changes under the emergency provision would be limited. Furthermore, as explained above, the environmental impacts potentially resulting from implementation of the emergency provision are too speculative for evaluation.

LSJR Flow Program of Implementation

This section provides additional context for and description of the provisions in the program of implementation for LSJR flows. This master response addresses comments regarding the program of implementation broadly, while Master Response 2.2, *Adaptive Implementation*, addresses comments that are specific to adaptive implementation, one of the features of the program of implementation. Responses to comments regarding adaptive implementation in combination with the STM Working Group, biological goals, information needs, and monitoring are addressed in Master Response 2.2. This section addresses many of the same program of implementation elements (e.g., STM Working Group, biological goals, monitoring); however, this section provides responses to comments that were broader than comments focusing on adaptive implementation methods.

Multiple commenters asserted that the program of implementation is too vague and requested more detail and/or clarity regarding certain elements of the program of implementation. The purpose of this section is to address these and other comments regarding the program of implementation for the LSJR flow objectives, including adaptive methods, carryover storage, minimum health and safety requirements, the STM Working Group, biological goals, and the SJRMEP.

The program of implementation provides for the flexible management of water subject to specified criteria. Affording such flexibility does not equate to being vague. The program of implementation is written with an appropriate level of detail to guide implementation actions that are designed to collectively attain the LSJR flow objectives. The program of implementation is a framework that provides maximum operational and implementation flexibility for achieving the best biological outcomes with the block of water provided by the LSJR percent of unimpaired flow objectives. It provides for flows to be implemented in a coordinated and adaptive manner, using current information. It also allows flows to be optimized to achieve the objectives while allowing for consideration of other beneficial uses, such as agricultural and municipal water supply, provided these other considerations do not reduce intended benefits to fish and wildlife.

The program of implementation provides a flexible framework with three absolute and overarching requirements: (1) to maintain flows in the LSJR equal to the total volume of water represented by the required percent of unimpaired flow within the allowed adaptive range of 30–50 percent of unimpaired flow; (2) to be sufficient to support and maintain the natural production of viable native SJR Watershed fish populations migrating through the Delta (sometimes referred to as “attaining the narrative objective”); and (3) to meet any existing biological goals approved by the State Water Board. Adaptive adjustments must be supported by best available scientific information. The program of implementation intentionally avoids prescribing specific actions such as flow schedules during specific calendar dates. This structure allows a working group of informed professionals with local expertise to identify flow schedules intended to achieve biological goals more efficiently and effectively than rigid tracking of the seasonal hydrograph at 40 percent unimpaired flow, or some other percent unimpaired flow value.

The approach in the program of implementation allows informed professionals to shape flows to improve habitat and subsequently increase the fish and wildlife benefits that can be achieved with the same volume of water. This approach avoids highly prescriptive implementation actions that may not adjust to seasonal precipitation efficiently or employ current information. Providing this flexibility allows for maximum fish and wildlife improvement with a block of water, and clear criteria for adaptively implementing flows are provided.

Full Implementation: The program of implementation commits the State Water Board to fully implement the LSJR flow objectives by 2022. The State Water Board will take actions to require implementation of the LSJR flow objectives through water right or water quality actions. Water right proceedings may include adopting regulations, conducting adjudicative proceedings, or both. Water quality actions include water quality certifications, regulations, and waste discharge requirements. Implementation of the LSJR plan amendments may be phased over time to allow coordination with ongoing FERC proceedings and refine implementation actions.

Protection of LSJR Flows and Groundwater: The State Water Board will use water right and water quality authority to ensure LSJR flows provided by the flow objectives remain in river channels to protect fish and wildlife beneficial uses and to protect groundwater resources from unreasonable impacts that may result from water supply adaptations. The program of implementation recognizes the need to prevent other parties from diverting flows bypassed by responsible parties to fulfill the LSJR flow objectives. The State Water Board will use regulatory tools to ensure that bypassed flows remain within river channels supporting fish and wildlife beneficial uses and are not diverted by other parties.

Similarly, the State Water Board recognizes the need to help ensure that implementation of the LSJR objectives does not result in unreasonable redirected impacts on groundwater resources if water users choose to pump more groundwater in response to reduced surface water supplies. At this time, local agencies are vested with the mandatory duty to achieve sustainable groundwater management under Sustainable Groundwater Management Act (Wat. Code, § 10720 et seq.; SGMA); however, the State Water Board has oversight and enforcement authority. Accordingly, the program of implementation states the State Water Board will take action as necessary to enforce SGMA. In addition, the State Water Board will take actions as necessary under its authority to prevent the waste, unreasonable use, unreasonable method of use, and unreasonable method of diversion of water to help avoid unreasonable redirected impacts on groundwater resources. (Cal. Const., art. X, § 2; Wat. Code, §§ 100, 275.)

Reservoir Carryover Storage: The program of implementation expressly requires the development of minimum reservoir carryover storage targets or other requirements to help ensure that the implementation of the flow objectives will not have significant adverse temperature or other effects on fish and wildlife. The response of water users to increased flow requirements could be reservoir operations that result in low reservoir storage. Reservoir storage below certain levels can have adverse temperature or other effects on fish and wildlife that can prevent attainment of the narrative LSJR flow objective. Minimum reservoir carryover storage targets or other requirements are a necessary element of successful implementation of the LSJR flow objectives because they will help to avoid adverse impacts by requiring water to be stored in the reservoir (or other requirements) so that it is available for flow releases that provide habitat conditions (e.g., cool water temperatures and higher velocities) that promote survival of salmonids, depress habitat use by introduced predators, and contribute to attaining the narrative LSJR flow objective. Specific carryover storage targets and other requirements are not established in this proceeding to encourage site-specific solutions and avoid constraining future implementation options. Carryover storage targets will be established in future proceedings based on project-specific information that considers local conditions. Water users may modify reservoir operations to achieve the numeric and narrative objectives within the LSJR flow objective program of implementation framework.

It was necessary to use reasonable assumptions regarding carryover storage to model potential environmental effects at a programmatic level because project-specific values for carryover storage requirements are not yet established. The WSE model incorporates carryover storage guidelines and other reservoir operation parameters to represent reasonable methods of re-operating reservoirs to meet LSJR flow objectives, minimize redirected impacts on temperature, and maximize water deliveries to customers. The carryover storage guidelines employed in modeling alternatives were found to reduce the occurrence of higher river temperatures that would otherwise result from generally lower reservoir levels, due to diminished cold pool in the absence of such guidelines. The WSE model assumptions, therefore, are a credible representation of how the LSJR plan amendments could be implemented for purposes of evaluating environmental impacts. Using reasonable numeric assumptions for one purpose (modeling) does not create specific numeric regulatory carryover storage requirements. As stated above, specific regulatory requirements for carryover storage would need to be determined in a future, project-level proceeding, rather than the programmatic evaluation in the SED.

Please see Master Response 3.2, *Surface Water Analyses and Modeling*, for more information regarding carryover storage as it relates to how the effects of the proposed project were modeled.

Minimum Health and Safety: The program of implementation provides that the State Water Board will take actions as necessary to ensure that the LSJR flow objectives do not impact water supplies for minimum health and safety needs, particularly during droughts. This provision furthers the state's Human Right to Water policy, which declares that every human being has the right safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes. (Wat. Code, § 106.3). Please see Master Response 2.7, *Disadvantaged Communities*, for responses to comments regarding the human right to water and Water Code section 106.3. Actions that the State Water Board may take 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.

Adaptive Methods for February–June Flows

Multiple comments were received regarding adaptive methods in the program of implementation for the LSJR flow objectives. Master Response 2.2, *Adaptive Implementation*, addresses comments regarding adaptive methods for February–June flows, STM Working Group structure and governance, monitoring and assessment, products, plans, and process, non-flow measures, and information needs. Master Response 2.2 also provides examples of adaptive implementation that illustrate how flows can be adjusted within the approved range, shaped, and shifted to protect fish and wildlife beneficial uses.

STM Working Group

The purpose of this section is to provide more clarity on the STM Working Group and respond to comments that describe concerns about the role, membership, and structure of the STM Working Group. Master Response 2.2, *Adaptive Implementation*, also responds to comments on the STM Working Group, with a focus on responding to comments that address STM Working Group composition and governance with respect to adaptive methods.

The program of implementation intentionally provides a general description of the STM Working Group in the Bay-Delta Plan. This allows the State Water Board to establish the STM Working Group and allows it to grow and evolve over time in response to changing demands within a process that does not require time-consuming amendments to the Bay-Delta Plan. This approach avoids overly prescriptive directives in the Bay-Delta Plan for STM Working Group establishment, membership, development, and process.

Establishment, Membership, and Structure

The State Water Board will establish the STM Working Group and request participation from organizations with expertise in LSJR, Stanislaus, Tuolumne, and Merced River fisheries management, hydrology, operations, monitoring, and assessment. These organizations include CDFW, DWR, NMFS, USFWS, and water operators and districts on the LSJR, Stanislaus, Tuolumne, and Merced Rivers. The STM Working Group will include State Water Board staff and may also include other persons or entities the Executive Director determines to have corresponding levels of expertise. Examples of organizations that may have required levels of expertise and experience include, but are not limited to, the Delta Science Program, USEPA, university and private-sector scientists, Resource Conservation Districts, San Francisco Estuary Partnership, and non-governmental organizations. The State Water Board encourages all of its resource partners to participate and make recommendations to successfully implement the LSJR flow objectives; however, participation in the STM Working Group is voluntary.

The governance structure and decision-making processes of the STM Working Group will be established by its members. Existing water operations and fishery management teams and long-term monitoring programs such as the Stanislaus Operations Group (SOG), Delta Operations for Salmon and Sturgeon (DOSS), Smelt Working Group (SWG), Water Operations Management Team (WOMT), and Interagency Ecological Program (IEP) can be used as examples to inform the STM Working Group structural framework. Subgroups of the STM Working Group may be formed as appropriate. State Water Board staff will establish the governance structure of the STM Working Group if invited organizations decline to participate. State Water Board staff may also initiate and coordinate implementation activities with the STM Working Group.

Some commenters recommended that the STM Working Group and State Water Board be evaluated at a regular interval of time to assess effectiveness, measure progress toward attaining the LSJR flow objectives, and assure that implementation is proceeding consistent with the program of implementation. The program of implementation proposes establishment of the SJRMEP as a comprehensive monitoring, special studies, evaluation, and reporting program to determine compliance with the LSJR flow objectives, adaptive implementation, investigation of technical factors involved in water quality control, and to evaluate potential needed future changes to the LSJR flow objectives. A regular evaluation of the SJRMEP would include an evaluation of the effectiveness of the program of implementation, which includes the STM Working Group. The following language has been added to the program of implementation in the section addressing the SJRMEP to promote transparency, accountability, and efficacy:

“At least every five years, the State Water Board will request the Delta Science Program to conduct periodic reviews of the San Joaquin River Monitoring and Evaluation Program.”

Role of STM Working Group

The role of STM Working Group is advisory. The STM Working Group will provide advice needed to successfully implement the LSJR flow objectives. Implementation of the LSJR plan amendments has the greatest chance of success when stakeholders, such as the entities in the STM Working Group, are engaged in developing management options that implement the LSJR flow objectives in a manner that optimizes flows, while allowing for consideration of other beneficial uses as long as the intended benefits to fish and wildlife are not reduced. The STM Working Group provides a means of engaging stakeholders on local issues and needs. The STM Working Group may establish subgroups as appropriate.

The STM Working Group, including any subgroups, will submit Annual Adaptive Operations Plans that propose adaptive implementation actions for the approaching season. The LSJR flow objective requires 40 percent of unimpaired flow, with an allowed adaptive range of 30–50 percent, inclusive, to be maintained February–June in each of the Stanislaus, Tuolumne, and Merced Rivers. A simple annual operations plan could propose flows that track the 40 percent unimpaired flow pattern February–June (see Master Response 2.2, *Adaptive Implementation*, for additional examples of operations plans). Operation plans can be adjusted subject to State Water Board or Executive Director approval as more information about seasonal water supply becomes available. State Water Board staff will develop the Annual Adaptive Operations Plan if stakeholders invited to join the STM Working Group decline to participate in the STM Working Group.

Annual Adaptive Operations Plans may propose functional flow schedules that allocate the total volume of water, provided by the percent unimpaired flow objective from February through June, to achieve the best biological outcomes with the available water. The total volume of water provided by the percent unimpaired flow objective on a minimum 7-day running average from February through June defines a block of water, or a water budget. The STM Working Group can identify and recommend functional flow schedules and operations that achieve the best biological outcomes given the available water budget.

The State Water Board will request the STM Working Group provide recommendations on biological goals for the tributaries and LSJR, adaptive methods, information and specific measures to achieve the flow objectives and to monitor and evaluate compliance with the new flow objectives, and adaptive operations for implementing flow objectives. The State Water Board may request

additional recommendations from the STM Working Group, including any subgroups, as the implementation process evolves with changing water years and watershed stressors.

Biological Goals

Multiple public comments were received regarding biological goals. Commenters supported the use of biological goals in adaptive implementation and multiple commenters suggested that the program of implementation should provide more detail about the development and use of biological goals. Some comments suggested specific biological goals and methods for using biological goals to adaptively implement the LSJR flow objectives. Other commenters requested more time to develop the goals and provided information to use for developing biological goals. Some commenters requested clarification regarding the relationship between biological goals, the narrative flow objective, and the salmon protection (doubling) objective.

The State Water Board will work with watershed partners to develop biological goals and will request review by and recommendations from the STM Working Group. The program of implementation recognizes the need to develop biological goals promptly and provides a description of types of biological goals needed to guide adaptive implementation, evaluate the effectiveness of the LSJR flow objectives, and inform future changes to the Bay-Delta Plan. Ideally, such goals would already be available to inform adaptive implementation; however, adaptive implementation can proceed as biological goals are being developed, as explained in Master Response 2.2, *Adaptive Implementation*.

The State Water Board has provided time to develop biological goals with watershed partners. The program of implementation provides 180 days from the date of the OAL's approval of the amendment to the Bay-Delta Plan. The short timeline provides incentive for watershed partners to work together to develop basic biological goals to be used in adaptive implementation. Methods for using biological goals and other information to support adaptive implementation decisions will be determined by the State Water Board, working with the STM Working Group and the Delta Science Program. Biological goals must be consistent with best available scientific information and may be modified based on new knowledge discovered by investigative science or new information developed through monitoring and evaluation activities from monitoring programs such as the SJRMEP.

The program of implementation requires developing biological goals for the following LSJR salmonid population viability parameters:

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

Developing goals for habitat elements such as stream temperature targets and other measures of quality and quantity of spawning, rearing, and migration habitat are reasonable contributions to biological goals. Similarly, metrics such as fry production and juvenile survival to the confluence of each tributary to the LSJR are identified as potential metrics for establishing biological goals. Biological goals for other LSJR species may be developed as appropriate; however, the initial focus is on biological goals for salmonids.

Biological goals should measure progress toward achieving the LSJR narrative flow objective and measure contribution toward meeting salmon doubling requirements established in state and federal law. Several commenters requested clarification regarding the biological goals and the salmon doubling objective. The federal Central Valley Project Improvement Act and the Bay-Delta Plan require flow and water quality conditions coupled with watershed actions to achieve a doubling of the natural production of Chinook salmon from the average production of 1967–1991. The federal Anadromous Fish Restoration Program (AFRP) identified quantitative natural production targets for fall-run Chinook salmon on each of the LSJR tributaries. Natural production refers to the number of returning adult salmon that are born instream, not in a hatchery. The natural production targets for each of the LSJR tributaries are: Stanislaus River—22,000 returning adults; Tuolumne River—38,000 returning adults; and the Merced River—18,000 returning adults.

The LSJR plan amendments are focused on supporting and maintaining the natural production of viable native fish population while the salmon protection objective is focused on improving abundance of returning adults. The LSJR narrative flow objective is expressed in terms of population viability indicators including abundance, spatial extent, and distribution, structure, genetic and life history diversity. These are comprehensive population metrics that lead to population resiliency while addressing abundance alone can leave populations vulnerable. For example, a population with high abundance but small spatial extent and/or narrow genetic diversity is vulnerable to catastrophic events in the small spatial extent they occupy or genetic diseases even though abundance is high.

Biological goals can be developed that connect juvenile survival targets and other viability parameters to natural production targets for returning adults. A collaborative effort between state, federal, and non-governmental organization watershed scientists called the Science Evaluation Process has conducted this exercise for fall-run Chinook salmon on the Stanislaus River associated with three different population targets (rebuilding, resiliency, and sustainability). One of the salmonid biological goals developed for this effort identifies juvenile survival targets necessary to achieve the AFRP natural production target for the Stanislaus River. The Science Evaluation Process work can be used as an example to inform biological goals for the LSJR flow objectives along with other relevant and timely efforts such as the Central Valley Flood Protection Plan and Conservation Strategy, the NMFS Recovery Plan for Central Valley Chinook Salmon and Steelhead, and efforts to refine temperature targets that promote survival for salmon and steelhead.

San Joaquin River Monitoring and Evaluation Program

The SJRMEP is necessary to determine compliance with the flow objectives, inform adaptive implementation, investigate technical factors involved in water quality control, and inform potential future changes to the LSJR plan amendments. Multiple commenters agreed with the need for the SJRMEP and requested additional details to be added to the LSJR plan amendments. Commenters requested details such as specific monitoring requirements and special studies, a description of methods for creating a regional monitoring program, identifying responsible parties for performing monitoring activities including data collection, data management, evaluation of monitoring data, and creating and submitting annual and comprehensive reports.

The language in the program of implementation requiring the establishment of the SJRMEP is purposely broad to provide the necessary time and flexibility needed to establish an effective and efficient regional monitoring program. Multiple comments expressed concerns that the program of implementation does not identify responsible parties for producing annual and comprehensive

reports that are required in the LSJR plan amendments. The State Water Board will require annual and comprehensive monitoring, evaluation, and reporting through water rights and water quality actions. Specific responsibility for these various monitoring and assessment elements, including annual and comprehensive reports, will be assigned when the State Water Board assigns responsibility for the LSJR plan amendments in future proceedings.

To leverage expertise and limited resources, parties are encouraged, but not required, to work collaboratively with each other, the STM Working Group, USBR, DWR, the Delta Science Program, or other appropriate parties. Commenters observed that a successful regional monitoring program relies on a collaborative effort to identify key management questions and to design a monitoring network that produces data used to answer these questions. Some commenters suggested producing a regional monitoring framework or a monitoring and assessment plan to be included in the Final SED and program of implementation.

Launching a new regional monitoring program is a significant effort. The program of implementation appropriately states the need, requirement, and regulatory tools that can be used to create the SJRMEP. The details regarding monitoring framework, design, and governance structure of a regional monitoring program are more effective and efficient when collaboratively identified by the State Water Board and watershed partners. The Delta Independent Science Board is currently reviewing the Monitoring Enterprise in the Sacramento–San Joaquin Delta and the results of this review should inform the creation of the SJRMEP. The State Water Board intends to work with its agency and watershed partners, including the STM Working Group, to build a regional monitoring template that can be used to guide the creation of a regional SJRMEP.

Multiple commenters expressed concerns that inserting monitoring requirements as conditions in permits and certifications may create a fragmented network of individual monitoring requirements that is not capable of producing the data needed for adaptive implementation, assessing biological goals, and evaluation of LSJR flow requirements on a regional scale. The State Water Board will not only require annual reporting, but comprehensive reporting that, in addition to the requirements of annual reporting, reviews the progress toward meeting biological goals and recommends changes to implementation of the flow objectives. The comprehensive report and any recommendations will be required to be peer-reviewed. Individual monitoring should not preclude responsible entities from satisfying requirements for comprehensive reporting. The State Water Board does, however, encourage parties to work collaboratively in one or more groups and in consultation with the STM Working Group, USBR, and DWR to leverage expertise and limited resources.

Several commenters suggested periodic reviews of the SJRMEP. Some suggested that there should be oversight and review of this monitoring, in addition to State Water Board oversight. Oversight and review of this monitoring is important. 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. In addition, the following language has been added to the program of implementation. “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.”

Integration of Non-Flow Measures

The State Water Board recognizes the importance of implementing non-flow measures to support and maintain the different habitat needs of fish and wildlife. For this reason, the State Water Board

recommends and incorporates a range of non-flow actions complementary to the flow objectives for the reasonable protection of fish and wildlife in Appendix K, *Revised Water Quality Control Plan*. The State Water Board recognizes the recommended non-flow actions should be part of the overall effort to comprehensively address Delta aquatic ecosystem needs, and tributary ecosystem needs, as a whole, and can be used to inform adaptive implementation decisions under the LSJR plan amendments (see Chapter 3, *Alternatives Description*, and Appendix K). However, non-flow measures alone will not be sufficient to “support and maintain the natural production of viable native San Joaquin River Watershed fish populations migrating through the Delta”; therefore, water quality objectives based on flow are needed (Appendix C, *Technical Report on the Scientific Basis for Alternative San Joaquin River Flow and Southern Delta Salinity Objectives*, Sections 3.1, *Introduction*, and 3.7, *Importance of Flow Regime*).

Non-flow measures, which in most cases depend on sufficient flow for successful implementation, cannot substitute or be prioritized over the need for flow requirements and therefore cannot be considered alternatives to the LSJR plan amendments (please see Master Response 2.4, *Alternatives to the Water Quality Control Plan Amendments*, for more information regarding the range of alternatives considered). Please refer to Master Response 5.2, *Incorporation of Non-Flow Measures*, for more information regarding non-flow measures; their role in the overall health of the tributaries’ ecosystem; and how they relate to the LSJR plan amendments described in Chapter 3, *Alternatives Description*, and Appendix K, *Revised Water Quality Control Plan*. For response to comments related to how much non-flow actions could be used to substitute for flow, please see Master Response 2.2, *Adaptive Implementation*.

Voluntary Agreements

The State Water Board recognizes that voluntary agreements can help inform and expedite implementation of flow objectives and provide durable solutions in the Delta watershed. Accordingly, the State Water Board encourages stakeholders to work together to reach voluntary agreements, which could include a mix of flow and non-flow measures, which may serve as an implementation mechanism for the LSJR flow objectives. Please refer to Master Response 1.1, *General Comments*, for more information regarding voluntary agreements.

Executive Director Authority

Multiple commenters asserted that too much authority is delegated to the Executive Director to make decisions about the LSJR flow objective adaptive adjustments. Other commenters asserted that the State Water Board cannot delegate authority to its Executive Director and staff.

Water Code section 7 authorizes the State Water Board to delegate authority to the Executive Director and its staff. In State Water Board Resolution No. 2012-0061 (State Water Board 2012), the State Water Board delegated to the Executive Director the authority to conduct and supervise the State Water Board’s activities. These activities include “implementing the State Water Board’s policies and regulations.” (State Water Board Resolution No. 2012-0061, ¶ 2.) The delegation expressly precludes the Executive Director from taking certain actions, including “[a]dopting or approving water quality control plans or plan amendments.” (*Id.*, ¶ 3.3.) Although the Executive Director is instructed to bring certain matters to the attention of the State Water Board, such as highly controversial matters and matters involving significant policy questions, this instruction does not restrict the Executive Director’s authority. (*Id.*, ¶ 12.) The authority the State Water Board

delegates to the Executive Director under the plan amendments is within the scope of the State Water Board's delegation.

The LSJR plan amendments delegate authority to take actions related to implementation of the water quality objectives and performance of monitoring and special studies to the Executive Director. With respect to the LSJR flow objectives, as described in Appendix K, *Revised Water Quality Control Plan*, this authority includes approval of the following: (1) changes to compliance locations and gage station numbers; (2) adaptive adjustments to the flow requirements; (3) procedures for implementation of adaptive methods; and (4) annual adaptive operations plans. The Executive Director is also delegated authority to approve plans in connection with implementation and monitoring associated with the SDWQ objectives. The Executive Director is not delegated authority to adopt or amend the Bay-Delta Plan. The program of implementation delegates management of implementation activities, not fundamental policy determinations regarding the establishment of the water quality objectives, to the Executive Director.

Thus, the State Water Board Executive Director has broad delegated authority to act on behalf of the State Water Board, which will facilitate implementation. The delegation provides the ability to act much more quickly in response to rapidly changing hydrology circumstances, which is desirable when managing river flows in real time under hydrologic conditions that change monthly, seasonally, and yearly. The State Water Board, however, retains the authority and ability to make implementation decisions at any time.

Southern Delta Salinity Water Quality Objective and Program of Implementation

The State Water Board is proposing to amend the southern Delta water quality objectives for salinity by increasing the April–August salinity objective, as measured by electrical conductivity (EC), from 0.7 dS/m EC to 1.0 dS/m EC. This action effectively eliminates the seasonal distinction of the existing objectives, which requires 0.7 dS/m EC from April through August and 1.0 dS/m from September through March. The amendment is being proposed to reflect updated scientific knowledge regarding salt levels that reasonably protect crops and agricultural beneficial uses. Analysis of southern Delta water quality and crop salinity requirements show that existing salinity conditions in the overall southern Delta are suitable for all agricultural crops and the existing 0.7 dS/m April–August objective is lower than is needed to reasonably protect the agricultural beneficial uses. Under the SDWQ plan amendments, the interior southern Delta salinity compliance locations comprise three river segments rather than three specific point locations so that compliance with the SDWQ objective can be better determined in a Delta environment that is subject to alternating tidal flows.

The SED evaluates SDWQ Alternative 1 (No Project Alternative) and two other SDWQ alternatives (SDWQ Alternatives 2 and 3). SDWQ Alternatives 2 and 3 are composed of a numeric objective and an associated program of implementation. SDWQ Alternatives 2 and 3 have different numeric objectives and the same program of implementation.

- **SDWQ Alternative 1 (The No Project Alternative)** — 0.7 dS/m as a maximum 30-day running average of mean daily EC from April through August and 1.0 dS/m as a maximum 30-day running average of mean daily EC from September through March in the southern Delta. The three compliance locations are San Joaquin River at Airport Way Bridge, and at Brandt Bridge, Old River near Middle River, and at Tracy Road Bridge.

- **SDWQ Alternative 2** — 1.0 dS/m as a maximum 30-day running average of mean daily EC for all months in the SJR in the southern Delta. The compliance locations would change to be river segments between Vernalis and Brandt Bridge, Middle River from Old River to Victoria Canal, and Old River/Grant Line Canal from the Head of Old River to West Canal.
- **SDWA Alternative 3** — 1.4 dS/m as a maximum 30-day running average of mean daily EC for all months in the southern Delta. The compliance locations would change to be river segments between Vernalis and Brandt Bridge, Middle River from Old River to Victoria Canal, and Old River/Grant Line Canal from the Head of Old River to West Canal.

Salinity levels in the southern Delta are affected primarily by low flows, tidal action, diversions by the state and federal water projects and local water users, agricultural return flows, poor circulation and channel capacity (Chapter 5, *Surface Hydrology and Water Quality*, and State Water Board Decision 1641 [D-1641] [revised March 15, 2000]). Point sources of salt in the southern Delta have a small overall salinity effect on the waterways in the southern Delta. Accordingly, as set forth in Chapter 3, *Alternatives Description*, the State Water Board identifies a numeric range of alternatives that would be met through flow as the means of protecting agricultural beneficial uses.

The program of implementation for the revised SDWQ objective is in Appendix K, *Revised Water Quality Control Plan*. It identifies the actions needed to achieve the SDWQ objectives and the monitoring, special studies, and reporting requirements that the State Water Board will require to evaluate compliance with the objective and to obtain information to inform implementation and advance knowledge and understanding of factors that drive salinity conditions in the southern Delta. Implementation actions include requiring USBR to continue to comply with the 0.7 dS/m salinity level for the SJR at Vernalis as a condition of its water rights, among other requirements. In addition, the program of implementation states the SDWQ objective will be implemented through the LSJR flow objectives. Increased flows under the flow objectives will also have the incidental benefit of providing a low salinity irrigation water supply to flush salts early in the irrigation season, and provide better salinity conditions during spring germination of crops, which is generally the most salt sensitive time. The complementary nature of both objectives (i.e., salinity and flow) allows the plan amendments for both salinity and flow to provide a comprehensive solution for the reasonable protection of beneficial uses. Regulation of municipal and other discharges will also be required, though these actions have a de minimis impact on salinity conditions. As explained in Chapter 23, *Antidegradation Analysis*, overall, salinity in the southern Delta would not only be maintained with the proposed plan amendments, but would generally improve during the irrigation season.

Many comments were received regarding the SDWQ plan amendments. Please refer to Master Response 3.3, *Southern Delta Water Quality*, for more information on the justification for updating the southern Delta salinity objective including its scientific basis, responsibilities of USBR and DWR, measuring compliance, barriers, and issues related to water quality. For responses to comments regarding the SDWQ plan amendments as it relates to municipal dischargers, please see Master Response 3.6, *Service Providers*.

Justification for Plan Amendments

The plan amendments are well supported by scientific information and legally grounded in the State Water Board's regulatory authority to protect the state's water quality. Bay-Delta watershed conditions have resulted in steep declines of commercial, recreational, and forage fisheries and

weakened the estuarine food web. Scientific analysis shows that flow modification is one of the primary stressors contributing to fish population declines and that higher and more variable inflows during the February–June timeframe are needed to support existing salmon and steelhead populations in the major SJR tributaries to the southern Delta at Vernalis. The abundance of resident and migratory fishes has remained at historically low levels for more than 15 years, which further suggests that existing flow conditions are one of the primary stressors precluding fish population recovery. In addition, 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–August salinity objective is actually lower than what is needed to reasonably protect agriculture.

Multiple commenters asserted that the SED did not provide a scientific or legal justification for the LSJR and/or SDWQ plan amendments. The *Executive Summary*, Chapter 3, *Alternatives Description*, and Chapter 18, *Summary of Impacts and Comparison of Alternatives* include the justification for recommending LSJR and SDWQ alternatives for adoption. Chapter 18 also compares the alternatives in relation to significant environmental impacts. The scientific basis for the plan amendments is in Appendix C, *Technical Report on the Scientific Basis for Alternative San Joaquin River Flow and Southern Delta Salinity Objectives*, of the SED. This section of the master response further elaborates on the justification for the plan amendments in response to the comments received.

The underlying fundamental purpose and goal of the plan amendments is twofold.

- To establish flow water quality objectives during the February–June time period and a program of implementation for the reasonable protection of fish and wildlife beneficial uses in the LSJR Watershed, including the three eastside, salmon-bearing tributaries.
- To establish SDWQ objectives for the reasonable protection of southern Delta agricultural beneficial uses and a program of implementation to achieve the objectives.

The plan amendments include the LSJR flow objectives and the SDWQ objectives and the program of implementation. The State Water Board considered a range of reasonable alternatives that would feasibly attain not only the fundamental purpose and goal of the plan amendments, but most of the goals of the plan amendments (see Chapter 3, *Alternatives Description*, Section 3.2, *Purposes and Goals*, and Master Response 2.4, *Water Quality Control Planning Process*) and would avoid or substantially lessen any of the significant environmental effects of the plan amendments. As explained previously, the SED evaluates four alternatives for LSJR flow requirements during the February–June timeframe and three alternatives for modifications to the SDWQ objectives. The justification for the LSJR and SDWQ plan amendments is discussed below.

Justification for LSJR Plan Amendments

Commenters asserted that justification for LSJR Alternative 3 is not included in the SED and/or is not sufficient. Chapter 18, *Summary of Impacts and Comparison of Alternatives*, supports and justifies recommending LSJR Alternative 3 with adaptive implementation as the LSJR alternative for adoption to the Bay-Delta Plan. Chapter 18 summarizes and compares the significance determinations of environmental impacts associated with each of the LSJR alternatives and considers the extent to which each LSJR alternative meets the project goals described in Chapter 3, *Alternatives Description* (Section 3.2, *Purposes and Goals*). All of the LSJR alternatives, with adaptive implementation, have significant environmental impacts and the SED evaluates those determinations in conjunction with the project goals. The SED further acknowledges the difficult

tradeoff between providing sufficient inflow to support and maintain the fish and wildlife beneficial uses while considering all of the demands being made of the water. The SED concludes that LSJR Alternative 3 with adaptive implementation more fully meets the project goals while moderating water supply effects relative to the other LSJR Alternatives.

LSJR Alternative 3 provides substantial improvement in fish and wildlife beneficial use protection while considering all of the demands being made and to be made on the waters in the LSJR and three eastside tributaries.

LSJR Alternative 3 provides instream flows that achieve the greatest temperature improvement for the least water supply cost and economic effect relative to the other alternatives. Water temperature is one of the most significant elements of habitat value for fall-run Chinook salmon. Myrick and Cech (2001) state that “water temperature is perhaps the physical factor with the greatest influence on Central Valley salmonids, short of a complete absence of water.” LSJR Alternative 3 (40 percent unimpaired flow) increases frequency of attaining April and May rearing temperature targets by 17 percent while LSJR Alternative 4 (60 percent unimpaired flow) increases frequency of attaining April and May temperature targets by 25 percent, an 8 percent greater frequency than LSJR Alternative 3 (see Table 2.1-3). LSJR Alternative 4 more than doubles the surface water supply impact to achieve the 8 percent incremental increase in frequency of achieving temperature targets. Similarly, LSJR Alternative 4 almost triples the agricultural production loss to achieve a 8 percent greater frequency of achieving temperature targets. LSJR Alternative 4 provides more than double the instream flow volume than LSJR Alternative 3 and therefore can achieve greater functions essential to native fish; however, the temperature and flow improvement provided by additional flows is achieved at a substantially larger water supply cost and agricultural production cost relative to LSJR Alternative 3.

Table 2.1-3 summarizes the magnitude of impacts on several resource and economic impact categories. LSJR Alternative 3 provides 10–20 percent more instream flow, 12–21 percent increased frequency of attaining temperature targets in April and May, 6–74 percent more acre-days of floodplain inundation than the baseline condition. The potential water supply effects from LSJR Alternative 3 range from a loss of 149–465 TAF in surface water supply per year, a 5–23 percent average annual reduction in surface water supply, and approximately \$69 million loss in total agricultural production (2.6 percent agricultural production decrease).

In sum, the scientific basis for the LSJR plan amendments is well documented in the SED. (See, e.g., Master Response 3.1, *Fish Protection*.) The SED also identifies the significant adverse environmental impacts and water supply effects resulting from the plan amendments. The SED provides information for the State Water Board’s consideration of the plan amendments consistent with applicable law.

Table 2.1-3. Comparison of Resource Effects for LSJR Alternatives 2–4 and Baseline

Resource Effect	Baseline	Alt 2 20% UF	Alt 3 40% UF	Alt 4 60% UF
		20–30% range	30–50% range	50–60% range
Average Annual Instream Flow (TAF)	1,742	+ 55 (3%) +55 to +174 +3% to +10%	+288 (17%) +174 to +485 +10% to +28%	+728 (42%) +485 to +728 +28% to +42%
Frequency of attaining temperature targets on tributaries, average April and May (rearing)	62%	+4% +3–12%	+17% +12–21%	+25% +21–25%
Total average annual floodplain inundation (acre*days)	39,292	0% 0–6%	+35% 6–74%	+74% 74–120%
Average Annual Surface Water Supply (TAF)	2,068	-65 (-3%) -65 to -149 -3% to -7%	-293 (-14%) -149 to -465 -7% to -23%	-689 (-33%) -465 to -689 -23% to -33%
Ground Water Pumping (TAF/year)	258	+21 (8%)	+104 (40%)	+216 (84%)
Total Economic Output related to Agricultural Production	2, 656	- \$18 million (-0.7%)	-\$69 million (-2.6%)	- \$190 million (-8%)

Alt = alternative
LSJR = Lower San Joaquin River
TAF = thousand acre-feet
UF = unimpaired flow

Some commenters asserted that the SED does not contain a scientific justification for the LSJR Vernalis base flow objective. The scientific justification for the Vernalis base flow objective is the same as the scientific justification for the LSJR percent of unimpaired flow alternatives, which demonstrates that flow is a major factor in fish survival. Chapters 7, Aquatic Biological Resources, and 19, *Analyses of Benefits to Native Fish Populations from Increased Flow between February 1 and June 30*, show that LSJR Alternative 3 provides flows in a quantity necessary to achieve functions essential to native fishes, such as increased instream flow, increased floodplain inundation, improved temperature conditions, improved migratory conditions, and other conditions that favor native fishes over nonnative fishes (Chapter 19, *Analyses of Benefits to Native Fish Populations from Increased Flow Between February 1 and June 30*, Tables 19-3 through 19-14 [temperature] and Tables 19-19 through 19-24 [floodplain]).

It is reasonable to establish a fixed monthly flow objective that is incrementally higher than the current flow objective for critically dry years as a base flow objective to complement a percent of unimpaired flow objective. The LSJR Vernalis base flow objective is an element of the plan amendments to protect fish and wildlife beneficial uses during critical dry periods when the LSJR percent of unimpaired flow objectives on the tributaries would result in very low flows on the LSJR at Vernalis. The proposed base flow objective of 1,000 cfs with an adaptive implementation range of 800–1,200 cfs, uses a fixed, monthly flow method instead of a percent of unimpaired flow method to provide a minimum flow level when the proportional nature of a percent of unimpaired flow objective would allow flows to fall below the minimum flow threshold needed to protect fish and

wildlife beneficial uses. The proposed base flow objective is higher than the current LSJR Vernalis spring flow objective for critical years. The current, critical-year spring flow objective requires 710 cfs as a monthly average at Vernalis when salinity at Chipps Island is greater than or equal to 2.64 millimhos per centimeter (mmhos/cm) at the water surface and 1,140 cfs monthly average when salinity at Chipps Island is less than 2.64 mmhos/cm at the water surface. The proposed base flow objective is incrementally higher than the existing critically dry year objective because the current objectives do not sufficiently protect fish and wildlife beneficial uses and the percent of unimpaired flow objectives on the tributaries provide flows that primarily exceed the base flow objective.

The science supporting the LSJR percent of unimpaired flow objectives also applies to establishment of the base flow objective, which requires a minimum level of flow to support fish and wildlife beneficial uses during critically dry periods. There are a small number of occurrences, in the 82-year hydrologic period, that result in the LSJR flow objectives providing flows at Vernalis that are lower than the base flow requirement. For LSJR Alternative 3, only 1 year in 82 resulted in flows at Vernalis that were less than 800 cfs, the lowest flow in the base flow range. The base flow requirement is slightly higher than the base flow requirements in the 2006 Bay-Delta Plan for the SJR at Vernalis and State Water Board Decision 1641, but is consistent with the concept of providing base flows during critically dry years.

Justification for SDWQ Plan Amendments

The proposal is for the State Water Board to adopt SDWQ Alternative 2 as part of the plan amendments because the SED shows it provides reasonable protection for agricultural beneficial uses and meets the project goals.

The SED evaluated three alternatives, briefly summarized here as follows:

- SDWQ Alternative 1, which is the No Project Alternative, would be a continuation of full compliance with the 2006 Bay-Delta Plan and the existing salinity objective in the plan (1.0 deciSiemens per meter [dS/m] September–March and 0.7 dS/m April–August in the southern Delta and at Vernalis). D-1641 imposes responsibility on DWR’s and USBR’s water rights to meet the objectives at the three compliance stations in the interior Delta and on USBR’s water right to meet the objective at Vernalis.
- SDWQ Alternative 2 would establish an annual 1.0 dS/m salinity objective for the southern Delta and a program of implementation that includes continued conditioning of USBR water rights to meet its current D-1641 salinity compliance requirement at Vernalis; allow for continued use of the temporary agricultural barriers or other reasonable measures to address salinity conditions; and establish various study, planning, and monitoring requirements.
- SDWQ Alternative 3 would establish an annual 1.4 dS/m salinity objective for the southern Delta and a program of implementation that includes continued conditioning of USBR water rights to meet its current D-1641 salinity compliance requirement at Vernalis; allow for continued use of the temporary agricultural barriers or other or other reasonable measures to address salinity conditions; and establish various study, planning, and monitoring requirements.

Details of these three SDWQ alternatives are provided in Chapter 3, *Alternatives Description*, and in Appendix K, *Revised Water Quality Control Plan*. In evaluating whether an alternative is feasible or infeasible, a lead agency may take into account a broad range of factors, including whether an alternative is inconsistent with agency goals or policies, meets the project objectives, and other

considerations. The purpose and goals of the SDWQ plan amendments (flow objectives and associated program of implementation) are outlined in Chapter 3, *Alternatives Description*. These goals are used in conjunction with the significance determinations to inform decision making.

Chapter 18, *Summary of Impacts and Comparison of Alternatives*, supports and justifies recommending SDWQ Alternative 2 as the SDWQ alternative for adoption to the Bay-Delta Plan. SDWQ Alternatives 2 and 3 have significant environmental impacts and the SED evaluates those determinations in conjunction with the project goals. The SED shows that SDWQ Alternative 2 fully meets goals 1–5 and provides reasonable protection of agricultural beneficial use. SDWQ Alternative 3 does not meet purpose and goals 1 and 4 as well as either SDWQ Alternative 2 or the No Project Alternative because it requires salinity in the southern Delta at a level that is less protective of agricultural beneficial uses. It also does not meet goal 2 because it does not take into consideration the water quality conditions that could reasonably be achieved through the coordinated control of all factors that affect water quality, as required under Water Code section 13241, because water quality better than the proposed salinity objective could be reasonably achieved. SDWQ Alternative 2 fully meets goals 1–5.

The No Project Alternative does not meet goal 3 because the existing salinity objective is lower than necessary to protect the most sensitive crops in the southern Delta. Although maintaining a salinity objective lower than is needed to protect agricultural beneficial uses would have no negative effect on agricultural beneficial uses in the southern Delta, the No Project Alternative would have other negative effects because it would be more difficult than necessary for those responsible to meet them. USBR controls salinity at Vernalis primarily by releasing dilution flows from New Melones reservoir on the Stanislaus River.

A lower salinity objective would require additional releases, reducing the amount of water available for other beneficial uses. In addition, the ability of DWR to control salinity concentrations in the southern Delta is limited, as it has no facilities on the SJR or its tributaries that can be used to release dilution flows, so most of the burden would fall on USBR. Source control programs for salt discharges upstream of Vernalis have improved water quality conditions in the SJR, but there is a limit to how much can be achieved through source reduction. The nature of salinity in the SJR and in the southern Delta is that water is diverted and consumptively used, leaving behind all the salts in the residual water, some of which returns back to the river, increasing the salt concentration.

The results of the No Project Alternative show the implications of maintaining the 0.7 dS/m salinity objective at the interior Delta stations. In the No Project Alternative, which represents compliance with the 2006 Bay-Delta Plan as implemented through D-1641, USBR is required to maintain the objective at each of the interior Delta stations by making releases from New Melones. The additional releases from the Stanislaus River further dilute the salt load at Vernalis and provide assimilative capacity to account for salt input between Vernalis and the interior Delta stations. On average, this requires about 60 TAF of additional releases from New Melones each year, primarily between June and August. In a few very dry years, the results indicate that the EC objectives are unachievable, even with increased releases from New Melones (see Table D-3 in Appendix D, *Evaluation of the No Project Alternative [LSJR Alternative 1 and SDWQ Alternative 1]*). Many of these releases would be in addition to the flow releases that are proposed in the SED to protect fish and wildlife during the February–June time period under the LSJR Alternatives. The best available science shows that it would be unreasonable to require these additional releases from New Melones in order to meet an overprotective salinity objective.

SDWQ Alternative 2 meets goals 1 and 3 because a key conclusion in Appendix E, *Salt Tolerance of Crops in the Southern Sacramento–San Joaquin Delta*, is that the water quality objective “could be increased as high as 0.9 to 1.1 dS/m and all of the crops normally grown in the South Delta would be protected.” It would also meet goal 5 through the monitoring and special studies required through the program of implementation. SDWQ Alternative 2 also considers all the demands on waters in the southern Delta, as evidenced by considering the water supply cost associated with not raising the salinity objective (see the above *No Project Alternative* discussion), consistent with goal 2. In so doing, the alternative also considers the factors to be considered in Water Code section 13241, which requires consideration of past, present, and future beneficial uses and economics, among other factors. Please also see Master Response 1.2, *Water Quality Control Planning Process*, and Master Response 3.6, *Service Providers*, on Water Code section 13241 factors. Finally, raising the water quality objective as proposed in SDWQ Alternative 2 will not cause water quality degradation related to salinity, consistent with goal 4, as explained in Chapter 23, *Antidegradation Analysis*.

Some commenters disagreed with the conclusion that SDWQ Alternative 2 would better meet goal 1 (provide salinity conditions that reasonably protect agricultural beneficial uses) than SDWQ Alternative 3. They pointed to Chapter 11, *Agricultural Resources*, which concludes that SDWQ Alternative 3 would not result in significant impacts related to the conversion of Designated Farmland to non-agricultural uses. However, as disclosed in Chapter 11, SDWQ Alternative 3 would result in a 5 percent yield reduction of dry beans under a scenario with minimum precipitation and a leaching fraction of 20 percent while SDWQ Alternative 2 would result in no yield reductions under the same scenario. Thus, SDWQ Alternative 2 better protects agricultural beneficial uses than SDWQ Alternative 3 and can also be reasonably achieved.

Commenters took issue with the recommendation of SDWQ Alternative 2 over SDWQ Alternative 3 because they asserted it will have more significant environmental and economic impacts since it may necessitate the construction of costly reverse-osmosis treatment (RO treatment) of effluent at wastewater treatment facilities that will have little effect on salinity conditions in the southern Delta. They asserted that the cost of such technology is not reasonable under Water Code section 13241, which is part of goal 2. The State Water Board has reconsidered the de minimis effect of wastewater on southern Delta salinity, the characteristics of the southern Delta related to salinity, the water quality conditions that could be reasonably achieved through the coordinated control of factors affecting water quality, including the fact that controlling flow always has been and continues to remain important for controlling salinity, and the costs associated with RO treatment, among other factors. Appendix K’s program of implementation for SDWQ Alternative 2 has been revised in response to comments to state that RO treatment of wastewater treatment facility effluent in the southern Delta is currently not a feasible technology for the purpose of controlling salinity in the southern Delta. Please see Appendix K, *Revised Water Quality Control Plan*, for the revised requirements related to wastewater treatment facilities. Unless RO treatment of effluent becomes feasible, significant environmental impacts associated with its construction and operation would not occur. Please see revisions to Chapters 13, *Service Providers*, 16, *Evaluation of Other Indirect and Additional Actions*, and 18, *Summary of Impacts and Comparison of Alternatives*, for more information.

Modifications to the Plan Amendments

Several modifications were made to the plan amendments to improve clarity and to respond to comments. There were also a small number of edits correcting errors in the plan amendments and other parts of the Bay-Delta Plan. Modifications to the plan amendments are summarized in this section. None of the modifications to the plan amendments make a substantive change to the plan amendments. A summary of recommended modifications to plan amendments that were not made and the reasons for not making comment-recommended modifications are also provided.

Modifications

Several small edits were made in Chapter I of the Bay-Delta Plan to improve clarity of text and correct errors. These types of changes include modifying word usage, removing or adding words, and reorganizing paragraph structure by moving sentences. Adding, changing, or removing words was done to improve clarity of concepts in paragraphs. Plan amendments are shown in the 2016 Recirculated SED's Appendix K, *Revised Water Quality Control Plan*, in underline or ~~strike-out~~. Modifications to the plan amendments made during the response to comments can be seen in double underline and ~~double strike-out~~ in the Final SED's Appendix K.

Small changes improving clarity and modernizing some Bay-Delta Plan text were made. These include things, such as text changes in Chapter I Section D, which previously stated the Water Quality Control Plan was updated in 2016. The update is occurring in 2018 and text was changed accordingly. Similarly, text in footnote 6, on page 6, was updated to discuss the Delta Reform Act.

The 2016 Recirculated SED's Appendix K modified the Bay-Delta Plan to state that it covers the Bay-Delta Estuary and tributary watersheds (see page 1). Corrections have been made where the 2016 Recirculated SED's Appendix K failed to make similar changes in a few places in the Bay-Delta Plan. In addition, in response to comments, clarifications were made that the designated fish and wildlife beneficial uses for the Stanislaus, Tuolumne, and Merced Rivers in the *Water Quality Control Plan for the Sacramento River Basin and San Joaquin River Basin* remain in effect and that the Bay-Delta Plan protects those uses. This is consistent with the Bay-Delta Plan's statement about the complementary relationship between water quality control plans.

Additional modifications to Appendix K are discussed below. Other master responses also discuss the modifications, where appropriate.

Table 2 Water Quality Objectives for Agricultural Beneficial Uses: The words "Old" and "Middle" were unintentionally transposed in the description of compliance locations for the southern Delta salinity objectives. The typographical error was fixed.

Table 3 Water Quality Objectives for Fish and Wildlife Beneficial Uses: Several changes were made to the LSJR flow objectives in Table 3 Water Quality Objectives for Fish and Wildlife Beneficial Uses (Table 3) of the Bay-Delta Plan. These changes were made for clarity and consistency and do not substantively change the LSJR flow objectives from the 2016 Recirculated SED. The LSJR unimpaired flow objective that applies to the tributaries was changed to state that 40 percent of unimpaired flow, within an allowed adaptive range of 30–50 percent, is required from each of the Stanislaus, Tuolumne, and Merced Rivers from February through June. Previously, the objective was stated in Table 3 as a requirement for 30–50 percent of unimpaired flow with 40 percent of

unimpaired flow as a starting point in the program of implementation. This change was made in response to comments to more clearly define the level of intended protection within the objective.

Changes were made to the SJR Vernalis base flow objective in response to comments. Multiple comments appeared to misunderstand the base flow objective as a flow value that could be met instead of the LSJR flow objectives on the tributaries. The base flow objective text was simplified to make it clearer that it must be met at all times during the February–June time period in addition to the LSJR percent of unimpaired flow objectives on the three eastside tributaries. The Vernalis base flow objective is in place to provide a minimal level of flow in the LSJR at Vernalis during the critically dry periods when the LSJR percent of unimpaired flow objective will not provide 800–1,200 cfs on the SJR at Vernalis.

The monitoring station number for SJR at Vernalis was added in the table in reference to the base flow objective. In response to comments, footnote 14 was updated to elaborate on the method to determine the LSJR percent of unimpaired flow objective on the three eastside tributaries.

Finally, consistent with the program of implementation, a sentence was added to the objective to clarify that flows provided to meet these 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. This change was made in response to comments stating concerns that the LSJR flow objective does not provide year-round protection for fish that are in the LSJR Watershed and tributary system, specifically in the months of July–January, which are not included in the LSJR flow objectives. Although the LSJR flow objective was not modified to be a year-round objective, this change helps ensure that implementation of the objectives will not inadvertently result in significant adverse conditions outside the February–June time period.

This change is consistent with language in the program of implementation, which states that the State Water Board will include minimum reservoir carryover storage targets or other requirements to help ensure that providing flows to meet the flow objectives will not have significant adverse temperature or other impacts on fish and wildlife beneficial uses. Therefore, this change helps to inform and clarify implementation of the LSJR flow objectives, but does not substantively change the LSJR plan amendments. The change reinforces the State Water Board’s intent to consider fish and wildlife beneficial uses year-round while focusing the water quality objectives on the season that is most important to early life stages of several fish species.

Implementation Measures within State Water Board Authority: Text was modified in the first paragraph of this section to clarify actions available to the State Water Board to implement the LSJR plan amendments.

LSJR Program of Implementation: Several modifications to the text in the program of implementation were made to improve clarity and respond to comments. The word “significant” was inadvertently omitted in the first sentence of the third paragraph under the heading “Implementation of February through June LSJR Flow Objectives.” The sentence, “The required percentage of unimpaired flow is in addition to flows in the LSJR from sources other than the LSJR Tributaries,” was removed because it is unnecessary and created confusion among commenters. The concept that flows would be protected, however, is already captured in the program of implementation’s statement:

“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.”

Adaptive Methods for February–June Flows: A small change was made to the section titled “Adaptive Methods for February through June Flows.” The words “establishment of the” was added in reference to the San Joaquin River Monitoring and Evaluation Program (SJRMEP) to make clear that the SJRMEP does not yet exist and needs to be created. Text changes were made to the third paragraph in this section. The word “set” was added to the first sentence because it appears it was missing from the Recirculated SED. In response to multiple comments regarding the respective roles of the Executive Director and the State Water Board in making adaptive adjustments to the flow requirements, the phrase regarding the Executive Director was removed from the first sentence of this section and addressed in a new sentence added to the end of the paragraph. This modification clarifies the roles of the Executive Director and the State Water Board in adaptive adjustments to the flow requirements. The following sentence, “If after June, the STM Working Group determines that conditions have changed such that water held for release after June should not be released by the fall of that year, the water may be held until the following year,” was removed in response to commenters’ concerns regarding water supply reliability.

Biological Goals: Organizational changes were made in this section as well as text modifications to respond to comments. A bulleted list of biological goals that need to be developed for salmonids is provided and takes the place of the list that was provided in sentence format in the Recirculated SED. The text states that biological goals may include temperature targets in response to multiple comments that suggested temperature targets to be part of or replace the LSJR flow objectives. While this action does not replace the LSJR flow objectives with temperature targets or require temperature targets, it identifies temperature targets as a measure of water quality and spawning, rearing, and migration habitat that is a reasonable contribution to biological goals. A sentence stating the State Water Board’s intent that biological goals should be specific, measurable, achievable, result-focused, and include a timeframe for when they will be achieved was added to ensure that biological goals presented to the State Water Board for approval will have these characteristics.

Unimpaired Flow Compliance: A sentence was added to this section that acknowledges that methods to comply with the percent of unimpaired flow objective may improve over time. The sentence is, “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.” This sentence reinforces footnote 14 to Table 3, which also acknowledges that refinements of methods and measurements to estimate Full Natural Flow may improve over time and be used.

Annual Adaptive Operations Plan: A sentence was added to this paragraph in response to comments that focused on drought management. The sentence added is, “A multi-year operations plan meeting these requirements may be submitted at any time.” This sentence acknowledges that the STM Working Group may choose to create and submit multi-year plans, that can include drought planning, but it does not require the STM Working Group to take this action. The STM Working Group, or members or subsets of the STM Working Group, may choose to create and submit a multi-year management plan for approval because it benefits water supply and in-river water needs in drought years. This has always been allowed, but the text change makes this more explicit.

San Joaquin River Monitoring and Evaluation Program (SJRMEP): The sentence structure of one sentence was modified for clarity. A sentence was added to the end of the last paragraph in this section.

“At least every five years, the State Water Board will request the Delta Science Program to conduct periodic reviews of the San Joaquin River Monitoring and Evaluation Plan.”

This change was made in response to comments that recommended a periodic review, within various suggested time periods, of the State Water Board, STM Working Group, and SJRMEP.

SDWQ Program of Implementation: Either in response to comments or to provide clarifications, several modifications were made to section 1, Southern Delta Salinity Objectives, in part B of the program of implementation that addresses implementation measures requiring a combination of State Water Board authorities and actions by other agencies. Changes were made to four subsections (i, ii, iii, and vii) under State Regulatory Actions on pages 42–47. The text changes in subsection i provides more background on USBR’s responsibility for reduced water quality on the SJR at Vernalis from operation of the Central Valley Project. Text modifications in section ii also provides more background on USBR’s and DWR’s responsibility for salinity problems in the southern Delta due to export pumping. It also states the State Water Board will amend USBR’s and DWR’s water rights to continue to require implementation of the interior SDWQ objective consistent with the Bay-Delta Plan. The previous language stated that USBR and DWR shall be required to comply with 1.0 dS/m as a condition of their water rights. The change was made to be clearer that the State Water Board will be amending their water rights consistent with the Bay-Delta Plan. Also included is text to make clear that the State Water Board may consider the responsibility of others for implementing the interior SDWQ objective based on implementation or completion of the COP, Monitoring Special Study, modeling, or Monitoring and Reporting Plan, or development of other information. In response to comments, text was added to subsection (ii) to clarify that the use of compliance locations is not a limitation on the applicability of the SDWQ objective, which applies throughout the southern Delta. Modified text in section iii changes the annual deadline for submitting the COP to the Executive Director for approval from October 31 to February 1 of each year. This change was made in response to comments from DWR. It also requires DWR and USBR to consult with Contra Costa Water District, among others, on the COP.

Modified text in section vii revises the program of implementation as it relates to wastewater treatment facilities, or publicly owned treatment works (POTWs), in response to comments. The new text acknowledges that the salinity objectives will primarily be met by flow requirements and that POTWs in the southern Delta have only a small effect on southern Delta salinity. POTWs are subject to the CWA and must control their salt discharges, but it is reasonable to view the extent to which salinity must be controlled in discharges in light of constraints they face, the de minimis effect of their discharge on salinity water quality, and the Bay-Delta Plan’s focus on flows to achieve salinity water quality objectives. The new text recognizes that reverse-osmosis treatment for POTW wastewater discharges in the southern Delta is currently not a feasible technology for the purposes of controlling salinity in the southern Delta. New text in section vii includes the types of enforceable effluent limitations and reporting obligations the Central Valley Regional Water Board must require of POTWs. For more information, see the above justification for the SDWQ Alternatives, Appendix K, *Revised Water Quality Control Plan*, and Master Response 3.6, *Service Providers*.

Suggested Modifications Not Made

Multiple commenters suggested modifications to the plan amendments. A summary of commonly recommended modifications is provided here with references to other parts of this master response that provide more details. Unique modification requests are addressed in unique responses or other master responses. Please see Master Response 2.4, *Alternatives to the Water Quality Control Plan Amendments*, which addresses commenter-suggested plans and proposals within the alternatives framework under CEQA.

Beneficial Uses: Some comments suggested that beneficial uses of the Bay-Delta Plan should be modified as part of the proposed action. Comments ranged from suggestions to remove the beneficial use for cold water habitat to adding several beneficial uses specifically for the Delta, LSJR, Stanislaus, Merced, and Tuolumne Rivers to the Bay-Delta Plan as part of the proposed revisions.

Suggestions to remove the cold water beneficial use designation (COLD) in the Bay-Delta Plan and conduct a use attainability analysis for the removal of COLD are fundamentally contrary to the CWA and its goals to restore and maintain the integrity of the nation's waters, including the goal to make waters fishable and swimmable. Instead of protecting existing beneficial uses, the suggestion is to eliminate uses where they have been adversely affected. The commenter argued that the criteria for de-designating a beneficial use are met, due to low flow conditions, human-caused conditions, hydrologic modifications, physical conditions, and widespread economic harm.

The CWA regulations generally prohibit the removal of an existing use. The regulations expressly provide that states may not remove designated uses if they are existing uses, unless a use requiring more stringent criteria is added. (40 CFR § 131.10(h)(1).) "Existing uses" are those are "those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards." (40 CFR § 131.3(e).) The regulations also require that existing instream uses and the level of water quality necessary to protect the existing uses be maintained and protected. (40 CFR § 131.12(a)(1).) The COLD beneficial use is an existing use that cannot be eliminated, but rather must be protected. Even if an existing beneficial use were to be severely impaired or functionally eliminated from waters, states are still required to establish water quality criteria to protect the use because it is considered an existing use under the CWA regulations. In addition, designated beneficial uses, such as the COLD beneficial use, are part of water quality standards whether or not they are being attained. (40 CFR § 131.3(f).) The suggestion for a use attainability analysis to remove a designated beneficial use is not applicable to existing uses. (40 CFR 131.11(g).)

Multiple commenters suggested adopting new beneficial uses for the Delta and LSJR and three eastside tributaries in the Bay-Delta Plan. One commenter suggested adding subsistence fishing, tribal, and cultural beneficial uses to the Bay-Delta Plan. In May 2017, the State Water Board adopted tribal tradition and culture (CUL), tribal subsistence fishing (T-SUB), and subsistence fishing (SUB) beneficial uses as part of amendments to the *Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (ISWEBE Plan, Part 2)(State Water Board 2017b). While these beneficial uses are important, designating them in the Bay-Delta Plan now is beyond the scope of the plan amendments and no modifications will be made. The

State Water Board will consider designating these uses in the Bay-Delta Plan as necessary and appropriate as part of its periodic review process.

Another commenter suggested that beneficial uses for the LSJR, Stanislaus, Tuolumne, and Merced Rivers must be designated within the Bay-Delta Plan to adopt water quality objectives for these waterways. The *Water Quality Control Plan for the Sacramento River Basin and the San Joaquin River Basin* designates fish and wildlife beneficial uses for the LSJR, Stanislaus, Tuolumne, and Merced Rivers. The designations remain in effect and the Bay-Delta Plan includes measures to protect them. This is consistent with the Bay-Delta Plan's recognition of the complementary nature of water quality control plans. Therefore, the suggested modifications are not made. The Bay-Delta Estuary is part of a larger, connected watershed. Reasonable protection of fish and wildlife beneficial uses for the Bay-Delta Estuary depends, in part, on protecting beneficial uses in the upstream watersheds.

Aquatic Habitat and Population Targets (Biological Goals) in Narrative or Numeric

Objective: Multiple commenters suggested modifying the narrative and/or numeric LSJR flow objectives to include quantitative and narrative aquatic habitat and population targets for salmon and/or steelhead. Examples of these types of comments include suggestions to include biological goals, such as the salmon doubling goal from Central Valley Project Improvement Act and the salmon protection objective in the narrative objective, and suggestions to add the term "variability" as a flow element in the narrative objective. Other examples include adding biological goals for spring-run Chinook, splittail, sturgeon, and steelhead.

It is not necessary to add quantitative population targets, such as the salmon doubling goal and narrative habitat goals, to the narrative or numeric objectives or the program of implementation. The 2006 Bay-Delta Plan includes the salmon protection objective, which requires water quality conditions coupled with watershed actions to achieve a doubling of the natural production of Chinook salmon from the average production of 1967–1991, consistent with the provisions of state and federal law. The plan amendments do not modify the salmon protection objective and it remains intact in the Bay-Delta Plan.

The LSJR plan amendments focus on supporting and maintaining viable native SJR fish populations migrating through the Delta. Indicators of viability include not only population abundance, but also spatial extent, distribution, structure, genetic and life history diversity, and productivity. In contrast, the salmon protection objective is expressed in terms of abundance, consistent with the targets identified by AFRP. The narrative and numeric LSJR flow objective, when implemented, would benefit early life stages of fish populations and lead to progress toward achieving the natural production targets identified by AFRP for the Stanislaus, Tuolumne, and Merced Rivers. Please refer to Master Response 3.1, *Fish Protection*, for additional information regarding biological goals.

The program of implementation's framework is intentionally broad to provide operational flexibility for achieving the best biological outcomes with the block of water provided by the LSJR flow objectives while allowing for consideration of other beneficial uses, such as water supply, provided these other considerations do not reduce intended benefits to fish and wildlife. Some comments recommended removing most or all flow shifting; however, flow shifting has

not been eliminated because it is an important element of the program of implementation for the reasons discussed previously in the description of the LSJR flow requirements.

The program of implementation does not prescribe specific implementation actions, such as flow schedules during specific calendar dates. Instead, the program of implementation establishes minimum requirements for using the block of water, provided by the LSJR flow objectives, to achieve the narrative flow objective, which will help achieve the salmon protection objective. Biological goals will be established by the State Water Board and used to support implementation of the LSJR flow objective. The existing framework in the program of implementation requires any existing biological goals to be met.

The program of implementation provides a framework that requires establishment of quantitative biological goals, inclusive of habitat metrics and targets, such as temperature targets. Biological goals for salmonids will be developed with watershed partners, reviewed by the STM Working Group, and subject to approval by the State Water Board. Suggestions regarding scientific resources to inform biological goals are consistent with the framework outlined in the program of implementation, but it is not necessary or useful to list specific scientific resources in the plan amendments.

The program of implementation recognizes that additional information will be needed to inform adaptive implementation, and that biological goals are particularly important. The following types of biological goals are specifically identified for LSJR salmonids: abundance, productivity as measured by population growth rate, genetic and life history diversity, and population spatial extent, distribution, and structure. Ideally, such goals would already be available; however, adaptive implementation can proceed as they are developed. It is not appropriate to add biological goals for fish species as quantitative or narrative targets to the objective. Information supporting these types of biological goals still needs to be developed.

It is not necessary to add the term “variability” to the narrative objective. The narrative objective requires 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.” Flow variability is a relevant and important flow element with respect to cold water habitat for migratory fishes. However, the description of flow elements provided in the narrative objective is broad enough to include flow variability and does not exclude flow variability. Flow variability may be directly addressed in the development of biological goals. The recommended change was not made to the LSJR flow objectives.

Please refer to Appendix K, *Revised Water Quality Control Plan*, Chapter IV, *Program of Implementation*, and the *Biological Goals* section of this master response and Master Response 2.2, *Adaptive Implementation*, for additional details. Quantitative population targets are adequately addressed by the proposed program of implementation and the existing Bay-Delta Plan. No changes regarding biological targets were made to the proposed LSJR narrative and numeric objectives.

Percent of Unimpaired Flow Too High or Too Low: Multiple commenters objected to identifying LSJR Alternative 3, which requires 40 percent unimpaired flows within an adaptive range of 30–50 percent, as the LSJR plan amendment. Commenters objected to the proposed unimpaired flow value

as too high for the benefits it would confer to fish and wildlife or too low to adequately protect fish and wildlife beneficial uses, especially in light of the recommendations from the State Water Board's 2010 Delta Flow Criteria Report. As stated above in the *Justification for Plan Amendments* section and in Chapter 18, *Summary of Impacts and Comparison of Alternatives*, LSJR Alternative 3, with adaptive implementation, more fully meets the purposes and goals of the LSJR plan amendments. LSJR Alternative 3 provides substantial improvement in fish and wildlife beneficial use protection while moderating adverse effects on surface water supply and maintaining protection of surface water supply for other beneficial uses. LSJR Alternative 3 provides instream flows that achieve the greatest temperature improvement important for cold water fishery habitat for the least water supply cost and economic effect relative to the other alternatives.

Some commenters recommended establishing an unimpaired flow range and starting percent that are high enough to achieve the salmon doubling goals. The LSJR flow objectives, Alternative 3 in the SED, establishes a flow range and starting flow value consistent with achieving salmon doubling and the salmon protection objective. Chapter 3, *Alternatives Description*, explains that CDFW and the U.S. Department of Interior (DOI) have established independent recommendations for SJR flows at Vernalis needed to achieve salmon doubling. Comparison of the LSJR flow objectives with the CDFW and DOI recommended doubling flows shows that the LSJR flow objectives are generally similar and encompass the recommended doubling flows with the exception of critically dry years and the DOI flow recommendations. Accordingly, no change was made to the LSJR flow objectives.

Some commenters made recommended changes to the definition and/or calculation of unimpaired flow. LSJR flow objectives in Table 3 were modified to include a quantitative description of compliance with the LSJR flow objectives in footnote 14. The additional text is copied below:

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 calculate FNF can be used for compliance if they improve accuracy and precision.

Other suggestions for modifying the description of percent unimpaired flow required for attainment of the objective were not accommodated because the added text is sufficient for describing the methods for determining compliance with the objective.

Percent of Unimpaired Flow at Vernalis: At least one comment suggested that the LSJR flow requirements include a percent of unimpaired flow objective on the LSJR at Vernalis in addition to the Vernalis base flow objective and percent of unimpaired flow objectives on the three tributaries. Commenters asserted that the percent of unimpaired flow objective at Vernalis is necessary to protect flows provided by the tributaries from diversion while they are in the LSJR between the Merced River confluence and Vernalis.

The program of implementation commits the State Water Board to exercising 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. The Stanislaus, Tuolumne, and Merced Rivers contribute most of the flow in the LSJR. Flow gages are installed on each tributary upstream of the confluence with the LSJR. A flow gage is installed on the LSJR immediately upstream of the Merced River. Flow gages are installed on the LSJR downstream of the confluences of the Merced River, the Tuolumne River, and the Stanislaus River (SJR at Vernalis). Flow gages are installed on key westside tributaries. This network of flow gages provides sufficient information to determine whether flows are increasing or

decreasing in each of the reaches of the LSJR from the Merced River confluence to Vernalis. This information is available to support the State Water Board in efforts to ensure that the tributary flow requirements are used for their intended purposes. Available river flow information combined with a commitment to prohibit diversion of the Stanislaus, Tuolumne, and Merced flows that are bypassed for the purpose of meeting the LSJR flow objectives will protect flows in the LSJR between Merced River confluence and Vernalis. Accordingly, no change was made to the proposed flow objective at Vernalis.

Year-round LSJR Flow Objectives: Multiple commenters recommended that the LSJR flow objectives should apply during all the months of the year. They stated the LSJR plan amendments do not provide year-round protection for fish that are in the LSJR Watershed and tributary system in the months of July–January. The reasons for recommending a seasonal plan amendment are summarized in this master response, in the section *February through June Time Period*. A modification to the LSJR flow objectives in Table 3 was made to address this recommendation. A sentence was added to the objective to clarify that flows provided to meet these 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. This change is consistent with the program of implementation, which states the State Water Board will include minimum reservoir carryover storage targets or other requirements in future proceedings that implement the LSJR flow objectives to help ensure that providing flows to meet the LSJR flow objectives will not have significant adverse temperature other impacts on fish and wildlife. In addition, the flow shifting element of adaptive implementation (item c) allows the release of a portion of the February–June flows to be delayed until after June to prevent adverse impacts to fisheries, including temperature impacts, which would otherwise result from implementation of the flows. The February–June flow objectives combined with adaptive implementation are designed to provide a reasonable level of protection while providing flexibility needed to achieve the greatest biological benefit with the block of water provided by the percent of unimpaired flow objective and reducing adverse impacts. Therefore, no change was made to the time period for the LSJR flow objectives.

Shorter or Longer Averaging Period for LSJR Flow Objectives: Multiple commenters recommended shorter or longer averaging periods than the 7-day averaging period for the unimpaired flow objective. Shorter averaging periods generally benefit fish because the flows more closely track the hydrograph and weather conditions which improve habitat and provide behavioral cues to fish. Longer averaging periods are generally preferred for operational flexibility and feasibility. Adaptive implementation allows for shaping flows over a specified period of time as long as the volume of water shaped in adaptive implementation is the same as the volume of water required by the percent of unimpaired flow objective on a 7-day running average. In the absence of adaptive implementation, the 7-day averaging period strikes a balance between the fish benefits of a shorter averaging period and the operational benefits of a longer averaging period. Therefore, no change in averaging period was made in the LSJR flow objectives.

Changing Percent of Unimpaired Flow within the Adopted Range: Some commenters suggested that the State Water Board should use a biological goal in the LSJR flow objectives or the program of implementation to govern changes between the percent of unimpaired flow within the adopted range. This recommended modification is not made because the program of implementation establishes a framework for governing flow changes within the approved flow range, and there is insufficient information at this time to support a quantitative biological goal for inclusion in the proposed LSJR unimpaired flow objective. Moreover, the existing framework

in the program of implementation requires any existing biological goals to be met before a change in the percent of unimpaired flow can be approved.

Master Response 2.2, *Adaptive Implementation*, explains that the “variable quantity” element of adaptive implementation can be changed by the State Water Board on an annual or long-term basis or by the Executive Director on an annual basis as follows.

- 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 (STM) Working Group, described below, agree to the changes.

The variable quantity provision of adaptive implementation can be used to adjust the total quantity of water set aside for fish and wildlife protection to a specific value between 30 and 50 percent. This allows the percent of unimpaired flow to be increased if it is determined that an increase will be necessary to meet the narrative objective and any existing biological goals approved by the State Water Board. Alternately, it allows the percent of unimpaired flow to be decreased if the parties responsible for bypassing flow can demonstrate that, for example, a combination of flow and non-flow measures would meet the narrative objective and any existing biological goals approved by the State Water Board.

The program of implementation requires that adaptive adjustments meet two criteria:

- Sufficient to support and maintain the natural production of viable native SJR Watershed fish populations migrating through the Delta (the narrative objective).
- Meet any existing biological goals approved by the State Water Board.

There may be disagreements on the rationale for adaptive implementation, including changes in the percent of unimpaired flow required within the adaptive range. Where there is disagreement over a proposed single-year change to the percent of unimpaired flow within the adaptive range, the State Water Board must approve the change. The State Water Board must also approve any proposed multi-year change. This ensures that any contentious short-term changes and all long-term changes are presented to and approved by the State Water Board.

Some commenters recommended that the LSJR flow objective be modified to require the State Water Board to approve changes in percent of unimpaired flow within the approved range. The Executive Director may approve changes within the flow range on an annual basis if all members of the STM Working Group agree to the changes. There will likely be disagreements on the rationale upon which to base changes in the percent of unimpaired flow required within the adaptive range and likely it will be challenging to reach consensus. Accordingly, absent full agreement by the STM Working Group, the proposed adaptive implementation methods also allows the State Water Board to approve changes to the overall unimpaired flow percent (i.e., a change from 40 to 35 percent) and multi-year changes. If all members of the STM Working Group agree to a change, the change may be approved by the State Water Board Executive Director for only a single year. This means that changes to the percent of unimpaired flow within the adaptive range will require a vetting of the proposed change through a public process in all cases when there is lack of consensus and for all multi-year changes.

The recommended modification to require that the State Water Board approve all changes to the percent of unimpaired flow within the approved adaptive implementation range is, therefore, not necessary. It is appropriate to delegate authority to the Executive Director for approval of a change to the percent of unimpaired flow within the required range when all members of the STM Working Group agree to the change.

Reservoir Carryover Storage and Banking: Multiple commenters recommended that the State Water Board adopt narrative or numeric reservoir carryover storage objectives or targets while other commenters recommended removing reservoir carryover targets from the program of implementation. At least one comment recommended including minimum reservoir carryover storage targets in the program of implementation that are consistent with the targets used in the SED analysis and WSE model.

Reservoir carryover storage targets or other requirements are important to prevent impacts on fish and wildlife and help attain the narrative LSJR flow objective. Reservoir storage targets or other requirements are essential to the successful implementation of the LSJR flow objectives when significant adverse impacts would otherwise result from the flows. For example, cold water stored in the reservoir can be available for flow releases that provide habitat, conditions such as cool water temperatures and elevated water velocities, necessary to promote survival of salmonids, depress predator presence, and contribute to attaining the narrative LSJR flow objective.

Specific carryover storage targets and other requirements are not established in this proceeding because additional site-specific information must be developed. Establishing such requirements will avoid constraining future implementation and encourage site-specific solutions. Future proceedings will establish specific carryover storage targets and other requirements based on local conditions and project-specific information. Establishing numeric reservoir storage requirements in the Bay-Delta Plan would have the undesirable effect of limiting future options, potentially resulting in water supply costs higher than necessary to achieve program goals. Carryover storage is discussed extensively in Master Response 3.2, *Surface Water Analyses and Modeling*, as it relates to how the effects of the proposed project were modeled.

Multiple comments suggested amending the LSJR plan amendments to allow water banking during exceptionally wet years. The LSJR plan amendments do not preclude water banking options during surplus conditions to be evaluated as part of an annual or multi-year operations plan as long as the LSJR flow objectives are achieved and related requirements in the program of implementation are met. It is not necessary to modify the LSJR plan amendments for water banking in surplus conditions to be considered and implemented.

Excluding June from the LSJR Flow Objectives: Certain commenters suggested excluding the month of June from the LSJR flow objectives to lessen the effects on other beneficial uses, such as water supply for agricultural uses, and to avoid higher costs for agricultural users. The LSJR plan amendments provide for the reasonable protection of the designated beneficial use of fish and wildlife from February through June. As discussed in Master Response 3.1, *Fish Protection*, the State Water Board's scientific basis report (Appendix C, *Technical Report on the Scientific Basis for Alternative San Joaquin River Flow and Southern Delta Salinity Objectives*) and the 2010 Delta Flow Criteria Report (State Water Board 2010) both identified the February–June time period as being important and necessary for flow improvements to protect native fishes. The June period affords both temperature benefits and improved opportunities for protecting life stage diversity of emigrating salmonids. (See Master Response 3.1 for a discussion of seasonal flows from February

through June.) June is an important month for the lifecycle of salmon and other native fish species (see Master Response 3.1). An alternative that excludes June flows would not support the attribute of season and averaging period, which is discussed in Chapter 3, Section 3.3.1, *Attributes of LSJR Flow Objectives*. The recommended modification to the LSJR plan amendments is not made. Additional information is available in Master Response 2.4, *Alternatives to the Water Quality Control Plan Amendments*.

Including or Excluding Geographic Areas: Multiple comments suggested that the State Water Board should have expanded the geographic scope of the Bay-Delta Plan and included flow objectives for the Upper SJR in the plan amendments. The revised Bay-Delta Plan includes the tributary watersheds to the Bay-Delta Estuary. Tributary watersheds to the Bay-Delta Estuary include the Lower and Upper SJR.

The LSJR plan amendments do not include objectives for the Upper SJR at this time because the San Joaquin River Restoration Program (SJRRP) is intended to restore and maintain fish populations in “good conditions” on the Upper SJR. Currently, the Upper SJR does not support salmon runs. Flows needed to support the reintroduction of spring-run Chinook salmon are being determined and provided through the SJRRP. The State Water Board may consider water quality objectives for the stream system above the SJR’s confluence with the Merced River in future updates to the Bay-Delta Plan.

Other comments asserted that the State Water Board could not include the tributary watersheds to the San Francisco Bay Estuary and Sacramento–San Joaquin Delta Estuary (Bay-Delta Estuary). Please see the previous discussion of the State Water Board’s authority to define the geographic scope of the Bay-Delta Plan and information regarding the tributary watersheds and the Lower and Upper SJR. Please also see Master Response 2.4, *Alternatives to the Water Quality Control Plan Amendments*, for a discussion of the Upper SJR and other parts of the watershed. As explained in those sections and in other parts of the SED, the plan amendments appropriately focus the LSJR plan amendments on rivers in the SJR Watershed, with salmon runs, that provide the majority of average unimpaired flow to the Delta from the SJR Watershed. This action is within the authority of the State Water Board and no change has been made to the plan amendments.

Some comments suggested that the Central Valley Water Board should adopt the LSJR plan amendments instead of the State Water Board because the Central Valley Water Board’s Sacramento River Basin and San Joaquin River Basin Plan already includes the tributary watersheds. The State Water Board holds dual responsibilities of allocating surface water rights and protecting water quality. The regional water quality control boards (regional water boards) do not have the authority to allocate surface water rights. The State Water Board and regional water boards coordinate to ensure the highest reasonable quality of waters of the state through the administration of the Porter-Cologne Act and portions of the federal CWA. The regional water boards have primary responsibility for the formulation and adoption of water quality control plans for their respective regions and implement objectives through permits such as National Pollutant Discharge Elimination System (NPDES) permits, waste discharge requirements, and CWA water quality certifications. The State Water Board has authority to adopt statewide water quality control plans and adopts the *Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta Estuary Bay-Delta* (Bay-Delta Plan) in part because of its importance as a major source of water supply for the state and to ensure a coordinated approach across regional board boundaries. Much of the implementation for the Bay-Delta Plan relies upon the combined water rights and water quality

authorities of the State Water Board. Therefore, no change to the plan amendments has been made in response to this recommendation.

Some commenters requested that the LSJR plan amendments apply to diverters on the LSJR west side. The plan amendments do not directly impose responsibility on water users to achieve the LSJR flow objectives; instead implementation will take place in future proceedings. Further, to the extent the commenters are concerned about ensuring the flows are not diverted for other purposes, the program of implementation states that the State Water Board will exercise its water right and water quality authority to help ensure that the flows required to meet the LSJR flow objectives are used for their intended purpose and are not diverted for other purposes. This statement is a commitment to take actions that ensure the LSJR flows bypassed by a responsible entity are not diverted by others. This provision applies to all diverters on the LSJR and modifications to the LSJR plan amendments to expressly apply the provision to diverters on the LSJR west side are not necessary.

Protecting Flows in the Sacramento–San Joaquin Delta: Multiple commenters requested State Water Board actions or modifications to LSJR plan amendments to ensure that flows provided by the LSJR flow objectives will be protected in the Delta to provide habitat improvements and migratory corridors for salmonids. For example, multiple comments suggested modifying export restrictions to ensure LSJR flows will protect migratory pathways through the Delta.

Please see the section above on protecting migratory corridors (*Migratory Corridors* under *LSJR Flow Requirements*). As explained there, the plan amendments will protect and improve migratory corridors for LSJR salmonids. Accordingly, no further modifications to the plan amendments were made. In addition, please see the discussion on the Sacramento/Delta watershed proceeding to amend the Bay-Delta Plan. That proceeding will not diminish, but rather will likely be complementary to, these plan amendments.

Program of Implementation and Adaptive Implementation Framework: Commenters suggested that the program of implementation is too vague and requested more detail and/or clarity in describing certain elements of the program of implementation. Commenters requested additional details regarding establishment of a governance structure for the STM Working Group and requested regular reviews of the STM Working Group and SJRMEP. Some commenters recommended the State Water Board provide more specific criteria on how flows can be shaped and shifted through adaptive implementation in annual adaptive operations plans.

Some commenters provided detailed text changes to the program of implementation and adaptive implementation methods. The program of implementation's framework is intentionally broad to provide operational flexibility for achieving the best biological outcomes with the block of water provided by the LSJR flow objectives while allowing for consideration of other beneficial uses, provided that these other considerations do not reduce intended benefits to fish and wildlife. The program of implementation does not prescribe specific implementation actions, such as flow schedules during specific calendar dates. Instead, the program of implementation establishes minimum requirements for using the block of water, provided by the LSJR flow objectives, to achieve the narrative flow objective and the salmon protection objective. This approach avoids highly prescriptive implementation actions that may not efficiently adjust to seasonal precipitation and climate variability, or shape flows to improve habitat, and subsequently lose some of the fish and wildlife benefits that could be achieved with the same volume of water. The adaptive implementation framework is intended to provide maximum operational and implementation flexibility to optimize flows to achieve the flow objectives while allowing for considering other

beneficial uses, provided that these other considerations do not reduce intended benefits to fish and wildlife. The adaptive implementation framework has not been substantively changed though some text changes have been made for clarity.

Please refer to Master Response 2.2, *Adaptive Implementation*, for more detailed responses to comments regarding adaptive implementation methods.

STM Working Group: Multiple commenters requested the State Water Board add a governance structure to the STM Working Group in the program of implementation that outlines composition, roles, and decision-making procedures. These recommendations were made because commenters expressed concern with the potential lack of consensus of STM Working Group members on making changes. The program of implementation for LSJR flow objectives (Appendix K, *Revised Water Quality Control Plan*) explains that the STM Working Group will be composed of entities that have expertise in LSJR, Stanislaus, Tuolumne, and Merced Rivers fisheries management, hydrology, operations, and monitoring and assessment needs, including the CDFW, NMFS, USFWS, and water 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. The governance structure and decision-making processes of the STM Working Group will be established by its members. The program of implementation allows decisions to be made based on scientific information and expertise, but more quickly when there is consensus. This allows for important, short duration changes to be made when needed to best achieve program goals. The program of implementation has sufficient rigor governing adaptive implementation decisions in the absence of consensus; therefore, there is no need to establish a governance structure for the STM Working Group in the Bay-Delta Plan and no modifications to the LSJR plan amendments were made in response to these comments. Please also see Master Response 2.2, *Adaptive Implementation*, for further discussion on the STM Working Group.

Some commenters recommended that the STM Working Group and State Water Board be technically and scientifically evaluated at a regular time interval. A modification was made to the program of implementation that requires the State Water Board to request the Delta Science Program conduct periodic reviews of the SJRMEP.

“At least every five years, the State Water Board will request the Delta Science Program to conduct periodic reviews of the SJRMEP.”

The modification was made to SJRMEP, instead of directly to Table 3 or the STM Working Group section of the program of implementation because review of the SJRMEP includes the STM Working Group and State Water Board. The program of implementation states that the SJRMEP is needed to determine compliance with LSJR flow objectives, inform adaptive implementation, and inform potential future changes of the Bay-Delta Plan. A review of these activities necessarily includes a review of the STM Working Group and State Water Board because they are involved in implementing the LSJR flow objectives. Addressing a specific time period or regular time interval for SJRMEP reviews will occur during the development of the SJRMEP. Establishing the SJRMEP requires assigning specific responsibility for monitoring and assessment activities, which will be determined when the State Water Board assigns responsibility for the LSJR plan amendments in regulation, water rights permits and licenses, and/or water quality certifications. Adding recommended text regarding required reviews of the STM Working Group and State Water Board to the LSJR plan amendments is not necessary.

Biological Goals: Multiple commenters requested that the deadline for submitting biological goals to the Executive Director for approval to be extended from 180 days from the date of the OAL's approval of the amendments to the Bay-Delta Plan to some period of longer duration after OAL approval. The State Water Board recognizes that 180 days is an ambitious schedule. The short timeline provides incentive for interested parties to work together to develop the biological goals so that they can be used to guide adaptive implementation. The program of implementation allows biological goals to be modified and updated based on new information. The 180-day time period remains unchanged in the LSJR plan amendments.

Several commenters recommended specific biological targets as modifications to the LSJR flow objectives. Modifications were requested in Table 3 LSJR flow objectives, footnotes, and text in the program of implementation. These requests were not accommodated because adding the recommended level of specificity to the Bay-Delta Plan restricts flexibility needed to modify biological targets as measurement technology evolves and environmental conditions change. There is a process to develop biological goals outlined in the program of implementation in which these recommendations can be considered and evaluated for inclusion.

Other Types of Water Quality Objectives: Multiple commenters requested instream temperature or dissolved oxygen criteria to be identified as a biological goal or to be used in place of flow objectives in the LSJR plan amendments. Temperature targets are not required as biological goals but the section describing biological goals in the program of implementation identifies temperature targets as a measure of water quality and spawning, rearing, and migration habitat that is a reasonable contribution to biological goals. The State Water Board chose to regulate flow with the LSJR plan amendments because the best available science suggests that current flows are insufficient to protect fish and wildlife beneficial uses in the LSJR, flow is one driver of instream temperature profiles, flow affects dissolved oxygen levels, and flow regulation is uniquely within the State Water Board's authorities. Therefore, temperature and dissolved oxygen objectives were not added in place of the flow objectives in the LSJR plan amendments.

Emergency Provisions: Specific text changes to the State of Emergency section in the program of implementation were recommended; these recommended changes were considered, but the requested modifications to the emergency provision in the plan amendment for LSJR flows has not been modified for several reasons. First, the emergency provision is sufficiently rigorous in terms of what qualifies as an emergency and is based on established state law. Second, the wide variety of emergencies that may occur are not predictable and the State Water Board needs the ability to act quickly under an array of emergency circumstances. As such, it is not desirable to further define what the State Water Board must find in order to authorize a temporary change in the implementation of the LSJR flow objectives in a water right proceeding. Third, with respect to drought conditions, most are not declared emergencies and are accommodated through the adaptive implementation methods in the LSJR flow objectives, as explained below in the section *Dry Year Relief*. Finally, it is appropriate to include the emergency provision to account for emergencies that may occur and it is drafted so that it cannot be used routinely to relax implementation of the flow requirements.

San Joaquin River Monitoring and Evaluation Program (SJRMEP): Multiple comments suggested the SJRMEP is too vague, requested more detail, clarity, and/or certainty, and made specific text changes to sections describing the establishment, monitoring, and reporting elements of the SJRMEP. Several commenters recommended specific monitoring requirements as modifications to the LSJR flow objectives or in the program of implementation. These requests were not

accommodated because monitoring requirements will be determined when the State Water Board assigns responsibility for the LSJR plan amendments in water right and/or water quality actions. The description of the SJRMEP provides a framework and sufficient direction to establish the SJRMEP at the appropriate time. The text of this section remains primarily unchanged with the exception of requiring periodic reviews by Delta Science Program. Please refer to the *Modifications to the Plan Amendments* section above.

Unimpaired Flow Compliance: Multiple commenters requested more time to develop specific measures to monitor and evaluate compliance with the flow objectives. The program of implementation requires the STM Working Group, or State Water Board staff as necessary, in consultation with the Delta Science Program, to develop and recommend measures to monitor and evaluate compliance with the flow objectives within 180 days from the date of OAL's approval of the amendment to the Bay-Delta Plan. The 180 days allowed for development and Executive Director approval of measures to monitor and evaluate compliance with flow objectives is an ambitious timeframe. The information is a standardization of methods, and though adaptive implantation can proceed without them, refined methods may simplify, streamline, and standardize the processes used to identify flow targets and provide functional flows using the budget of water represented by the required percent of unimpaired flow. The relatively short timeframe is intended to encourage development of this information as soon as possible. The effort, however, will be made easier because much of the foundational information needed to calculate and use unimpaired flow is already available, as is the monitoring of flows near the confluence of each river (refer to Master Response 2.2, *Adaptive Implementation*, for further detail). Therefore, no change to the 180-day time period for identifying specific measures for monitoring and evaluating compliance with the LSJR is made to the LSJR plan amendments. Please see Master Response 2.2 for more discussion on unimpaired flow compliance.

Incorporation of Other Species: Some commenters suggested that the LSJR plan amendments should be modified to apply to other non-fish species to provide ecosystem benefits. The unimpaired flow approach is intended to capture the natural pattern of variability and retain the attributes of the natural flow regime to which native LSJR Basin fish and wildlife adapted and that is important to support key ecosystem processes. As described in Appendix C, *Technical Report on the Scientific Basis for Alternative San Joaquin River Flow and Southern Delta Salinity Objectives*, higher and more variable flows are anticipated to provide protection for fish, and improve a number of ecosystem attributes including, but not limited to: 1) native fish communities; 2) food web; 3) habitat; 4) geomorphic processes; 5) temperature; and 6) water quality. A discussion of the importance of a natural floodplain regimes in Chapter 19, *Analyses of Benefits to Native Fish Populations from Increased Flow between February 1 and June 30*, provides information regarding the importance of floodplains for the other species found in riverine ecosystems. The LSJR plan amendments are intended to protect fish and wildlife beneficial uses and the SED shows ecosystem improvements that will benefit multiple species of plants and animals that use these habitats. No change to the LSJR plan amendments is necessary in order to achieve broad ecosystem improvements that apply to multiple species of fish and wildlife.

Dry Year Relief: Some commenters suggested the LSJR plan amendments should be modified to provide dry year relief to beneficial uses such as agricultural and municipal water supply. The LSJR objectives and program of implementation already accounts for dry years and no change was made.

The LSJR plan amendments on the three eastside tributaries are designed to adjust to dry water years and droughts because they use a proportional metric, percent of unimpaired flow, that

automatically adjusts the volume of water required to meet the objective based on the amount of water available in the system. Forty percent, or some other percent in the range between 30 and 50 percent, of unimpaired flow results in a low flow value during dry years because total unimpaired flow is low. Likewise, forty percent of unimpaired flow is a high flow value during wet years because total unimpaired flow is high. In addition, the adaptive implementation range allows the State Water Board to implement a percent of unimpaired flow in the adaptive range of 30–50 percent in response to changing hydrology conditions, such as single or multiple drought years, provided the percent of unimpaired flows meets the narrative objective and any biological goals.

The adaptive implementation feature of the LSJR flow objectives may reduce the need for temporary urgency change petitions and orders. The State Water Board can adjust the percent of unimpaired flow value or the Executive Director can make adjustments in the percent of unimpaired flow value if there is full agreement on the STM Working Group and the narrative objective and any biological goals are met. The State Water Board's role in managing these conditions within the adaptive flow range is clear. These adjustments can be made without a formal declaration of a state of emergency and subsequent petitions to the State Water Board for temporary urgency change orders. Most drought years and sequences will not result in declaration of a state of emergency. Thus, the LSJR plan amendments anticipate and incorporate drought conditions into regular implementation of the flow objectives.

The emergency provision in the program of implementation allows any affected responsible agency or person, using the definitions of emergency provided above, to request a temporary change in implementation of the LSJR plan amendments if the LSJR flow objectives affect or are affected by the declared emergency. The emergency provision also states that the State Water Board must find that measures will be taken to reasonably protect fish and wildlife beneficial use in light of the emergency situation circumstances. Thus, in sudden or declared emergencies, there is a process by which the State Water Board may authorize a temporary change in the implementation of the LSJR flow objectives.

Elimination of October Pulse Flows: Some commenters suggested the LSJR plan amendments should be modified to eliminate the existing October pulse flow requirement. Modification of the October pulse flow requirement on the LSJR is not included in the LSJR plan amendments. However, please see Appendix K, *Revised Water Quality Control Program*, section *Program of Implementation, Implementation of October Pulse Flow Objective*. The program of implementation requires that the State Water Board, through water right, FERC licensing, or other processes, 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 reevaluate the implementation of the October pulse flow and flows during other times of the year after the monitoring and special studies have been conducted to determine if changes should be made to these flow requirements and their implementation to achieve the narrative SJR flow objective.

SDWQ Alternatives: Commenters' suggested modifications related to the SDWQ Alternatives are addressed in Master Responses 3.3, *Southern Delta Water Quality*, and 3.6, *Service Providers*. Suggested modifications are also addressed in unique responses to comments.

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