Master Response 2.4
Alternatives to the Water Quality Control Plan Amendments

Overview

This master response addresses comments regarding alternatives to the plan amendments, with a primary focus on specific plans and proposals suggested by commenters. As explained in this master response and in the substitute environmental document (SED), as required by the California Environmental Quality Act (CEQA), the State Water Resources Control Board (State Water Board) appropriately selected and defined a reasonable range of potentially feasible alternatives to evaluate in the SED.

The comments received illustrate the complexities of selecting a reasonable range of potentially feasible alternatives in this water quality control planning process. CEQA requires a lead agency to consider and analyze feasible project alternatives that would avoid or substantially lessen a project's significant environmental impacts. (Pub. Resources Code, §§ 21002, 21002.1, subd. (a).) State CEQA Guidelines section 15126.6 provides guidance for a lead agency's consideration and discussion of the alternatives to a proposed project. The lead agency is responsible for selecting a range of reasonable alternatives to the 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 for evaluating the comparative merits of the alternatives. (Cal. Code Regs., tit. 14, 15126.6, subds. (a), (c); see Cal. Code Regs., tit. 23, 3777, subd. (b) [requiring discussion of alternatives in the State Water Board SED].) CEQA does not require a set number of alternatives. Moreover, the lead agency is not required to consider every conceivable alternative or alternatives that are infeasible. *Feasible* is defined as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors." (Pub. Resources Code, § 21061.1.) The range of alternatives is governed by the "rule of reason," which requires analysis only of those alternatives necessary to permit a reasoned choice. (Cal. Code Regs., tit. 14, 15126.6, subd. (f).) Of those alternatives, the lead agency need only examine in detail the ones that could feasibly attain most of the basic project objectives.

Please refer to Chapter 3, *Alternatives Description,* for a description of the alternatives to the plan amendments, the No Project Alternative (which is further evaluated in Chapter 15, *No Project Alternative: LSJR Alternative 1 and SDWQ Alternative 1*), and the alternatives considered but eliminated from further consideration. Chapter 18, *Summary of Impacts and Comparison of Alternatives,* compares the Lower San Joaquin River (LSJR) and southern Delta water quality (SDWQ) alternatives evaluated in the SED and summarizes their environmental impacts. Appendix K, *Revised Water Quality Control Plan,* contains the official language of the plan amendments.

As described in Chapter 3, the State Water Board is considering amendments to the 2006 *Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta* Estuary (Bay-Delta Plan) that include establishing water quality objectives to reasonably protect beneficial uses of water. Chapter 3 describes the specific purposes and goals of the plan amendments, including establishing (i) flow water quality objectives during the February–June period for the reasonable

protection of fish and wildlife beneficial uses in the LSJR Watershed, and (ii) SDWQ objectives for the reasonable protection of southern Delta agricultural beneficial uses. The SED appropriately describes and considers the purposes and objectives of the plan amendments, the ability of alternatives to reduce or avoid significant environmental impacts, and feasibility in selecting a range of reasonable alternatives. In doing so, the SED describes the attributes of the flow and salinity water quality objectives that can be used to assess the potential for alternatives to achieve the purposes and goals while reducing or avoiding significant environmental effects. For example, as discussed in Chapter 3, the SED identifies attributes of alternatives to the LSJR flow objectives to be considered, including geography, method, season and averaging period, and magnitude. In addition, other considerations, such as non-flow measures and adaptive implementation, inform the analysis of the LSJR alternatives. The SED identifies different attributes of alternatives to the SDWQ objectives, such as seasonal and averaging period, geographic scope, and the level of protection. Chapter 3, Section 3.3.9, *LSJR Alternatives Considered but Eliminated from Further Evaluation*, and Section 3.4.6, *SDWQ Alternatives Considered but Eliminated from Further Evaluation*, describe alternatives that were eliminated from further consideration. These alternatives were initially evaluated but not considered in further detail in the SED because of the inability to meet most of the underlying fundamental purposes and goals of the plan amendments, infeasibility, and inability to avoid significant effects on the environment.

The State Water Board reviewed all comments related to the LSJR and SDWQ alternatives and developed this master response to address recurring comments and common themes on alternatives or commenter suggested plans and proposals. This master response addresses 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. In some cases, it was unclear whether commenters were proposing plans or proposals that can be considered alternatives as defined by CEQA because these commenters did not explain how a plan or proposal would avoid or substantially lessen the plan amendments' significant environmental impacts as set forth in State CEQA Guidelines section 15126.6. (See also Cal. Code Regs., tit. 14, § 15204, subd. (a) ["Comments are most helpful when they suggest additional specific alternatives or mitigation measures that would provide better ways to avoid or mitigate the significant environmental effects."].) Nonetheless, this master response addresses commenter-suggested plans and proposals even though certain plans and proposals do not necessarily meet the purposes of the alternatives analysis required under CEQA. This master response includes, but is not limited to, the following common topics of concern to commenters.

- The adequacy of the reasonable range of feasible alternatives.
- The focus of the planning efforts.
- The feasibility of commenter-suggested plans and proposals to achieve the reasonable protection of the fish and wildlife beneficial uses, including: alternative flow regimes, non-flow measures, Merced Irrigation District (Merced ID) Salmon, Agriculture, Flows & Environment (S.A.F.E) Plan, San Francisco Public Utilities Commission (SFPUC) Alternative, and plans addressing the Upper San Joaquin River and other parts of the watershed.
- The feasibility of commenter-suggested plans and proposals to achieve the reasonable protection of the southern Delta agricultural beneficial uses, including changes to the numeric SDWQ objective and actions outside the plan area or by taken by other entities.

This master response includes for ease of reference a table of contents on the following page to help guide readers to specific subject areas and find where the topics of their concern are addressed.

Additional information in response to more general comments on alternatives can be found in Master Response 1.1, *General Comments*, which also includes information regarding the programmatic nature of the analysis of the plan amendments and responses to general commenter-suggested plans and proposals and comments in support of (or opposition to) commenter-suggested plans and proposals. Master Response 2.5, *Baseline and No Project*, addresses comments on the No Project Alternative (LSJR Alternative 1 and SDWQ Alternative 1) described in Chapter 15. Comments specific to the water quality control planning process are addressed in Master Response 1.2, *Water Quality Control Planning Process*. Comments specific to the justification for the plan amendments, including comments regarding the justification of SDWQ Alternative 2 and the recommended selection and approval of that alternative over SDWQ Alternative 3, and suggested modifications to the plan amendments made by commenters are addressed in Master Response 2.1, *Amendments to the Water Quality Control Plan*. Master Response 3.1, *Fish Protection,* describes how unimpaired flows would achieve the goals of the plan amendments and addresses non-flow stressors, such as predation. Master Response 5.2, *Incorporation of Non-Flow Measures*, discusses the role of non-flow measures and their relationship to the plan amendments.

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CEQA Requirements for the Discussion of Alternatives

As described in Chapter 3, *Alternatives Description*, the SED identifies a range of alternatives that could feasibly attain most of the basic objectives of the plan amendments but would avoid or substantially lessen any of the significant environmental effects, taking into account economic, social, and technological factors. This section discusses CEQA's requirement to identify and discuss feasible alternatives to a project that will reduce or avoid the project's significant environmental impacts. It describes the development of a reasonable range of feasible alternatives in this water quality control planning process for the LSJR objectives and the SDWQ objectives, and why certain alternatives were eliminated from further analysis. Chapter 18, *Summary of Impacts and Comparison of Alternatives*, compares the types of potential impacts under the different LSJR and SDWQ alternatives and identifies the environmentally superior alternative.

Reasonable Range of Feasible Alternatives

As discussed in the *Overview*, CEQA requires an analysis of reasonable alternatives to a project that would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen the significant adverse environmental impacts of the project. (Cal. Code Regs., tit. 23, § 3777, subd. (b)(3); see also Cal.Code Regs., tit. 14, § 15126.6, subd. (a) [establishing framework for alternatives analyses in environmental impact reports].) A lead agency need not consider every conceivable alternative or alternatives that are infeasible. Instead, the nature and scope of the alternatives analysis is governed by a "rule of reason," which requires the environmental document to set forth only those alternatives that would permit a "reasoned choice." (Cal. Code Regs., tit. 14, § 15126.6, subd. (f).) A project's objectives and purpose help the lead agency develop a reasonable range of feasible alternatives. "[A] lead agency may structure its EIR alternative analysis around a reasonable definition of underlying purpose and need not study alternatives that cannot achieve that basic goal." (*In re Bay-Delta Programmatic Environmental Impact Report Coordinated Proceedings* (2008) 43 Cal.4th 1143, 1166.] To avoid confusion with the term "objectives" as it is used in CEQA, and the term "objectives" as it is used in the water quality planning context (see, e.g., Wat. Code, §13050, subd. (h)), the SED refers to CEQA objectives as "purposes and goals" (Chapter 3, *Alternatives Description*, Section 3.2, *Purpose and Goals*). As described in Section 3.2, the underlying fundamental purpose and goal of the plan amendments is twofold.

1) To establish flow water quality objectives during the February–June 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.
2) To establish SDWQ objectives for the reasonable protection of southern Delta agricultural beneficial uses and a program of implementation to achieve the objectives.

In addition to the fundamental purpose and goal of the plan amendments, there are eight purposes and goals related to the LSJR flow objectives and the associated program of implementation. There are also five purposes and goals related to the SDWQ objectives and the associated program of implementation. For ease of reference, these purposes and goals are presented in the following two sections: *Feasibility of Commenter-Suggested Plans and Proposals for the Narrative and Numeric LSJR Flow Objectives* and *Feasibility of Commenter-Suggested Plans and Proposals for the SDWQ Objective*.

Some commenters remarked on economics as a factor to consider in identifying a range of reasonable alternatives to the plan amendments, with some appearing to suggest that the State Water Board is required to consider the less costly alternative, perhaps to the exclusion of other factors. It was appropriate, however, for the SED to evaluate a variety of factors in developing a reasonable range of alternatives, and not just primarily economic effects. Section 3.3, *Lower San Joaquin River (LSJR) Alternatives*, describes the alternative development process for the LSJR alternatives and Section 3.4, *Southern Delta Water Quality (SDWQ) Alternatives*, describes the process for developing the SDWQ alternatives. State CEQA Guidelines section 15126.6, subdivision (f) provides that "alternatives shall be limited to ones that would avoid or substantially lessen any of the significant effects of the project. Of those alternatives, the EIR need examine in detail only the ones that the lead agency determines could feasibly attain most of the basic objectives of the project." In addition to reducing significant effects, a primary consideration in developing the alternatives was whether and to what extent the alternatives met most of the purposes and goals of the plan amendments. For example, flows that are less than those that the LSJR alternatives considered would not meet the plan amendment's purpose and goals of protecting fish and wildlife beneficial uses. While economic considerations may inform the assessment of feasibility, economics are not the sole consideration in establishing a reasonable range of alternatives that can avoid or reduce significant environmental effects.

The State Water Board considered economics in the SED in accordance with applicable law. Pursuant to the Porter-Cologne Water Quality Control Act (Porter-Cologne Act, Wat. Code, § 13000 et seq.), the State Water Board must consider economics when establishing water quality objectives. (Wat. Code, § 13241, subd. (d).) Pursuant to CEQA, the State Water Board must consider economics when preparing an environmental analysis under Public Resources Code section 21159. The SED includes the appropriate consideration of economic issues and impacts in its evaluation of the LSJR and SDWQ alternatives in Chapter 20, *Economic Analyses*. Chapter 20 evaluates the direct and regional economic considerations associated with the different LSJR and SDWQ alternatives. A detailed analysis of agricultural economic effects of the plan amendments is provided in Appendix G, *Agricultural Economic Effects of the Lower San Joaquin River Flow Alternatives: Methodology and Modeling Results*. As described in Chapter 20, Section 20.3.5, *Effects on Fisheries and Associated Regional Economics*, the economic benefits associated with the LSJR alternatives also tend to increase as the percent of unimpaired flow increases. Also, please see Master Response 1.2, *Water Quality Control Planning Process*, regarding section Water Code 13241 factors, and Master Response 8.0, *Economic Analyses Framework and Assessment Tools,* for further discussion of the requirements of the State Water Board to consider economics in the water quality control planning process.

Elimination of Alternatives

CEQA requires identification of any alternatives that were considered by the lead agency but were rejected as infeasible during the scoping process with a brief explanation of the reasons underlying the lead agency's determination (Cal. Code Regs., tit. 14, § 15126.6, subd. (c).) Among the factors that may be used to eliminate alternatives from detailed consideration are: "(i) failure to meet most of the basic project objectives, (ii) infeasibility, or (iii) inability to avoid significant environmental impacts." (*Ibid*.)

Some commenters stated that the SED did not adequately explain why alternatives were deemed infeasible and eliminated from further consideration. As explained in the *Overview* of this master response and in Chapter 3, Section 3.3.1, *Attributes of LSJR Flow Objectives*, and Section 3.4.1,

Attributes of the SDWQ Objectives, the SED describes the attributes of alternatives that could feasibly attain most of the basic objectives of the plan amendments but would avoid or substantially lessen any of the significant environmental effects. In the SED, the State Water Board considers these attributes and eliminates potential alternative based on the consideration as described in Chapter 3. In addition to considering these attributes, in developing the range of alternatives evaluated in the SED, the State Water Board solicited and considered public input on related flow and salinity issues. The State Water Board considered the suggestions received from the public during the comment periods associated with the February 13, 2009 notice of preparation (NOP) and the April 1, 2011 revised NOP. It also considered flow recommendations received outside the scoping process and during the process of preparing the 2010 report, *Development of Flow Criteria for the Sacramento–San Joaquin Delta Ecosystem* (2010 Delta Flow Criteria Report) (State Water Board 2010). Appendix A, *NOP Scoping and Other Public Meetings*, summarizes the public involvement activities associated with the pre-scoping and scoping phases of the environmental review process for the amendments to the Bay-Delta Plan, as well as other public meetings associated with the planning process. Chapter 3, Section 3.3.9, *LSJR Alternatives Considered but Eliminated from Further Evaluation*, includes a discussion of potential LSJR alternatives that stakeholders proposed during scoping or related processes and that the State Water Board considered but eliminated from further evaluation. Some alternatives were rejected as infeasible and others were already effectively included within the alternatives analyzed in the SED. Chapter 3, Section 3.4.6, *SDWQ Alternatives Considered but Eliminated from Further Evaluation*, similarly addresses SDWQ alternatives.

Focus of Planning Efforts

The focus of the current effort by the State Water Board is to amend the existing Bay-Delta Plan to establish water quality objectives to reasonably protect the designated beneficial uses of fish and wildlife in the LSJR and its three eastside tributaries and salinity in the southern Delta. The establishment of the LSJR flow and SDWQ objectives and associated program of implementation is in keeping with the State Water Board's authority and responsibility under the Porter-Cologne Act to protect the quality of the waters of the state and the beneficial uses of those waters. (Wat. Code, §§ 13000-13001, 13241.) By their very definition, water quality objectives address 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).) *Water quality control* includes the regulation of any activity or factor that may affect water quality. (*Id*., subd. (i).) Thus, under the Porter-Cologne Act, the State Water Board and Regional Water Quality Control Boards regulate activities and factors that may affect the quality of the waters of the state, including through the establishment of water quality objectives. Please see Master Response 1.2, *Water Quality Control Planning Process,* for additional information regarding the State Water Board's authorities related to water quality. Master Response 2.1, *Amendments to the Water Quality Control Plan*, describes the project and the justification for the plan amendments.

The State Water Board's focus on water quality is reflected in the fundamental purpose and goal of the plan amendments that are the *project* under CEQA. As stated in State CEQA Guidelines section 15124, subdivision (b), a clearly written statement of objectives sought by the proposed project will help the lead agency to develop a reasonable range of alternatives to evaluate. The SED includes this statement in Chapter 3, Section 3.2, *Purposes and Goals*, which informs the development of a reasonable range of feasible alternatives. The consideration of an unimpaired flow objective, for example, is consistent with the purposes and goals for the flow objectives, and the best available

science, which provides that flow is necessary for the reasonable protection of fish and wildlife beneficial uses.

Some commenters criticized the range of LSJR alternatives evaluated in the SED that focused on flow. Some commenters stated that the State Water Board had decided to consider only those LSJR alternatives that met a predetermined set of conditions (e.g., a range of unimpaired flows, increased flows in the February–June time period, only flow-related alternatives instead of non-flow alternatives). Some commenters asserted that the range of LSJR alternatives was inadequate, arguing the range was too narrow because it consisted of only flow-related alternatives. The LSJR plan amendments focus on flow 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). Thus, flow and the functions it provides are critical in reasonably protecting fish and wildlife beneficial uses. As a physical attribute or characteristic related to the quality of water, flow is an appropriate means of protecting beneficial uses consistent with the Porter-Cologne Act and the State Water Board's authorities.

As discussed in Master Response 3.1, *Fish Protection*, flow is a key driver of the ecological health of riverine ecosystems (see also Chapter 19, *Analyses of Benefits to Native Fish Populations from Increased Flow between February 1 and June 30* and Appendix C, *Technical Report on the Scientific Basis for Alternative San Joaquin River Flow Objectives and Southern Delta Salinity Objectives*). Every watershed has a variable pattern of high flows and low flows. Species that depend on the LSJR Watershed have become adapted to these flows over many thousands of years. These species depend on the habitats these flows create and the signals they provide to, for example, migrate or spawn. Thus, flow is generally considered a "master variable" that limits the distribution and abundance of riverine species and regulates the ecological integrity of rivers (Poff et al. 1997; Resh et al. 1988; Power et al. 1995). The LSJR alternatives evaluated in the SED provide a broad range of potential flow functions associated with higher and more variable flows based on the unimpaired hydrograph (see Appendix C). The percent of unimpaired flow approach allows increased instream flows for the protection of fish and wildlife, captures the natural pattern of variability, and retains the attributes of the natural flow regime to which native LSJR Basin fish and wildlife adapted, all of which is important to support key ecosystem processes. As described in Master Response 3.1, a percent of unimpaired flow, when used with adaptive implementation as identified in the program of implementation for the plan amendments, would essentially provide functional flows. Functionally useful flows are designed to achieve a specific function, such as increased habitat, more optimal temperatures, or a migration cue (see Master Response 3.1). The analysis in the SED did not use unimpaired flow as a representation of natural conditions. Please see Master Response 2.1for information regarding unimpaired flow, functional flows, and salmon doubling, and Master Response 2.2, *Adaptive Implementation*, for information regarding functional flows. Please see Appendix C; Chapter 19, *Analyses of Benefits to Native Fish Populations from Increased Flow between February 1 and June 30*; and Master Response 3.1 regarding information about beneficial effects of unimpaired flow on salmon and habitat and the importance of the February–June flow regime.

Focusing on flows as the water quality parameter to address through the LSJR plan amendments does not eliminate from consideration alternatives that may substantially lessen or avoid significant impacts to the environment. Chapter 3, Section 3.3.1, *Attributes of LSJR Flow Objectives,* describes the attributes used to evaluate the reasonableness and feasibility of alternatives for the flow objectives. These attributes, which included geography, method, season and averaging period, and magnitude,

were selected because they inform the feasibility of the LSJR alternatives in attaining most of the project's basic objectives and the ability of the alternatives to avoid or substantially lessen any of the significant environmental effects. In addition to the No Project Alternative, the SED considers three LSJR alternatives that meet all or most of the purposes and goals as described in Chapter 3. LSJR Alternatives 2, 3, and 4 evaluated in the SED consist of flow objectives that evaluate ranges of unimpaired flows for the February–June time period.

As demonstrated in the selection of the SDWQ alternatives, salinity is also an important water quality constituent or characteristic to be considered when reasonably protecting agricultural beneficial uses. As discussed in Chapter 3, Section 3.4.1, *Attributes of the SDWQ Objectives*, several attributes guide the development and selection of the alternatives evaluated in the SED. These attributes include magnitude/level of protection, seasonality and averaging period, geographic scope, and other measures, such as improved circulation. The attributes informed the feasibility of the salinity alternatives in the SED and the ability of alternatives to avoid or substantially lessen any of the significant effects of the plan amendments. In addition to the No Project Alternative, as described in Chapter 3, the SED evaluates two SDWQ alternatives (SDWA Alternative 2 and 3).

The State Water Board has received and considered extensive public comments during this planning process that have informed the development of the plan amendments and environmental and technical analyses. As described in Appendix A, *NOP Scoping and Other Public Meetings,* and in the discussion of the notice of preparation in Master Response 2.5, *Baseline and No Project*, the State Water Board issued the *Notice of Preparation and of Scoping Meeting* for the potential amendments to the Bay-Delta Plan, focusing on the southern Delta salinity objective and the San Joaquin River (SJR) flow objectives, and held a scoping meeting in 2009. In 2011 it issued a revised NOP with draft plan amendment language and held another scoping meeting. After the release of the 2012 Draft SED and in consideration of public comments, the State Water Board further modified the plan amendments and analyses in the 2016 Recirculated SED. In sum, the State Water Board has taken public input into account on multiple occasions during this process.

The State Water Board's consideration of water quality parameters, such as flow or salinity, as part of the Bay-Delta Plan Update, however, does not obligate the State Water Board to a specific of action in establishing the water quality objectives. For example, focusing on flow does not constrain alternatives, eliminate alternatives with fewer water supply and economic impacts, or in any way invalidate the SED analyses. The State Water Board still maintains the legal discretion to reject or refine the plan amendments. The State Water Board has not taken final action on the plan amendments, committed to a particular amount of flow or a specific salinity level, or committed to implementation through a specific proceeding. Instead, the State Water Board prepared the SED "as early as possible in the planning process to enable environmental considerations to influence project program and design and yet late enough to provide meaningful information for environmental assessment." (Cal. Code Regs., tit. 14, § 15004, subd. (b).) For a general discussion of the alternatives development, scientific basis, and summary of plan amendments, see Master Response 1.1, *General Comments*.

Feasibility of Commenter-Suggested Plans and Proposals for the LSJR Flow Objectives

As explained in this master response and Chapter 3, *Alternatives Description*, the decision to consider flow (the LSJR alternatives) in the SED is based on scientific information that was presented in Appendix C, *Technical Report on the Scientific Basis for Alternative San Joaquin River Flow and Southern Delta Salinity Objectives*. The scientific information indicates that high flows of a more natural pattern are needed from the three eastside, salmon-bearing tributaries to the LSJR during the spring (February–June) to protect fish and wildlife beneficial uses. Additional information is provided in Master Response 2.1, *Amendments to the Water Quality Control Plan*, and Master Response 3.1, *Fish Protection*, regarding the scientific justification for the plan amendments, best available science, and benefits of the plan amendments. River flows influence many critical components of watersheds, such as the types and availability of habitat, changes in the landscape, variations in water temperature, and the condition of water quality. These components provide the conditions needed to support the biological and ecosystem processes that necessary to the reasonable protection of fish and wildlife beneficial uses. Although changes to other ecosystem attributes (non-flow measures), such as floodplain habitat restoration, gravel augmentation, and invasive species control, are beneficial, they alone are insufficient to restore a healthy ecosystem if flows remain unrestored (Beechie et al. 2010). Many of the problems identified as the cause of the decline of salmon populations by commenters, such as predation, invasive species, and loss of floodplain habitat, are all related to the effects of alterations in flows. Without sufficient flow, any other measures to tackle these problems would not be effective (see Master Response 3.1 and Master Response 5.2, Incorporation of Non-Flow Measures).

The following sections describe plans and proposals suggested by commenters as alternatives to the plan amendments. Many commenters used the term “alternative” in their comments, but the use of this term does not necessarily mean that the suggested plan or proposal is a feasible alternative as defined by CEQA. Nonetheless, this master response evaluates common suggestions and concerns pursuant to CEQA guidance for alternatives selection in order to inform the public of the viability of such proposals.

Among the factors that may be used to eliminate an alternative from detailed consideration under CEQA are: (1) failure to meet most of the basic project objectives; (2) infeasibility; or (3) inability to avoid significant environmental impacts (Cal. Code Regs., tit. 14, § 15126.6, subd. (c)). Commenter-suggested plans and proposals meet one or all of these criteria, and thus are not considered viable alternatives to the LSJR alternatives evaluated in the SED. Each commenter-suggested plan or proposal is described based on the information provided by the commenter and evaluated for its ability to avoid or substantially lessen significant environmental impacts associated with the plan amendments and disclosed in the SED and for its ability to meet most of the purposes and goals described in Chapter 3. For ease of reference, the eight purposes and goals of the LSJR flow objectives are reproduced here and are as follows.

1. Maintain inflow conditions from the SJR Watershed sufficient to support and maintain the natural production of viable native fish populations migrating through the Delta.
2. Provide flows that more closely mimic the natural hydrographic conditions (including frequency, timing, magnitude, and duration of natural flows) in the LSJR and three eastside,

salmon-bearing tributaries—the Stanislaus, Tuolumne, and Merced Rivers—to which these migratory native fish species are adapted.

3. Provide flows in a quantity necessary to achieve functions essential to native fishes such as increased floodplain inundation, improved temperature conditions, improved migratory conditions, and promote other conditions that favor native fishes over nonnative fishes.
4. Allow adaptive implementation of flows that will afford maximum flexibility in establishing beneficial habitat conditions for native fishes, addressing scientific uncertainty and changing conditions, developing scientific information that will inform future management of flows, and meeting biological goals, while still reasonably protecting the fish and wildlife beneficial uses.
5. Promote transparency in decision-making and provide certainty to the regulated community by expressing flow requirements for the protection of fish and wildlife as a share of the total quantity of water available for all beneficial uses.
6. In establishing flow water quality objectives to reasonably protect fish and wildlife, take into consideration all of the demands being made and to be made on waters in the LSJR and the three eastside, salmon-bearing tributaries and the factors to be considered for establishing water quality objectives in Water Code section 13241, including, but not limited to, past, present and probable future beneficial uses and economic considerations.
7. Provide for the development and implementation of an appropriate monitoring and evaluation program to inform adaptive implementation of LSJR flows and future changes to the Bay-Delta Plan.
8. Provide for, and encourage, collaboration, coordination, and integration of regulatory, scientific, and management processes related to LSJR flows.

As discussed above in the *Overview*, most commenters did not provide information to explain how their suggested plans or proposals would avoid or substantially lessen significant effects of the plan amendments. In addition, some commenters did not provide information as to how their suggested plans or proposals would meet or better meet the purposes and goals listed above and identified in Chapter 3. For example, in general, commenters did not provide information about how their suggested plans and proposals would meet or better meet purposes and goals 5 through 8. Purposes and goals 5 through 8 are important to the State Water Board as the agency responsible for establishing and enforcing water quality objectives for the reasonable protection of beneficial uses. Unimpaired flow identifies the allocation of a seasonally and annually variable quantity of water between fish and wildlife beneficial uses and other beneficial uses of water, thus promoting transparency and reflecting the consideration of beneficial uses (purposes and goals 5 and 6). In contrast, many of the suggested plans and proposals do not meet, or are less able to meet, this transparency goal because the share of the total quantity of water allocated among beneficial uses under the proposals is less readily discernable.

Isolated projects on individual tributaries provide fewer opportunities for collaboration and coordination among water users and agencies than those proposed through the program of implementation in Appendix K, *Revised Water Quality Control Plan* (purposes and goals 7 and 8). Individual programs would provide less information about the protection of fish and wildlife beneficial uses in the greater watershed and through the Delta than would be accomplished through greater regional and coordinated monitoring and decision-making processes. As described in Master Response 2.1, *Amendments to the Water Quality Control Plan*, isolated implementation of the LSJR

flow objectives would provide fewer fish benefits with the same volume of water than coordinated implementation because timing flows from the tributaries would not occur. 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 SJR and within the Delta.

Many of the plans and proposals suggested by commenters would not provide for the development and implementation of a plan area-wide monitoring and evaluating program. For example, while the SFPUC-suggested alternative includes studies that would inform the monitoring and evaluation for adaptive implementation of flows for a limited area, it does not promote or contribute to a comprehensive program for fish protection throughout the larger watershed. The suggested plans and proposals would have limited ability to encourage collaboration and coordination throughout the watershed. While such coordinated efforts could occur if the stakeholders entered into regional, collaborative agreements, the suggested plans and proposals do not currently provide for such actions across the three eastside tributaries while the plan amendments already provide a framework for such coordination. See Master Response 2.2, *Adaptive Implementation*, for a discussion of the program of implementation, the Stanislaus, Tuolumne, and Merced Rivers (STM) Working Group, and the San Joaquin River Monitoring and Evaluation Program (SJR MEP).

General Plans and Proposals

Some commenters suggested flow-related alternatives that varied from the LSJR alternatives in a general manner and without specific detail. General comments regarding alternatives are largely discussed in Master Response 1.1, *General Comments* (see especially the section, *LSJR Alternatives Development*). A summary response to certain common issues raised by general comments is provided here even if comments did not necessarily meet the purposes of the alternatives analyses required under CEQA.

Several commenters recommended a number of actions, such as limitations to ocean harvest, which are not within the purview of the State Water Board's regulatory authority or are outside the scope of this particular water quality control planning process. Alternative actions beyond the scope of the State Water Board's regulatory authority are not feasible (see *Focus of Planning Efforts* section in this master response for discussion of the board's regulatory authority). Other commenters offered general suggestions for alternate or additional methods for meeting the narrative or numeric plan amendments, such as development of environmental condition metrics or determination of how flow shifting may be used, to be considered in lieu of an unimpaired flow approach. Other commenters suggested that alternative flow regimes should have been considered without specifying a particular flow regime. Several commenters stated that other methods to improve fish survival, such as targeted short duration pulse flows during juvenile salmon emigration periods, would constitute feasible alternatives that would require less use of water. To the extent that commenters proposed actions or methodologies that could take place within the adaptive implementation framework for implementation of the LSJR flow objectives, they have been considered in the SED's evaluation of the LSJR alternatives. The adaptive implementation process would afford a means to maximize the habitat, temperature, and other benefits achieved through the narrative and numeric objectives. Please refer to Master Response 2.2, *Adaptive Implementation*, for additional information on the adaptive implementation component of the plan amendments.

Some commenters stated that the alternatives analysis is flawed because the plan amendments do not specify diversion allocations, carryover storage, and water temperature requirements, and thus

do not permit evaluation of impacts under different scenarios. Please see Master Response 1.1, *General Comments*, regarding the programmatic level of analysis and responses to general comments regarding the description of the alternatives. Please see Master Response 1.2, *Water Quality Control Planning Process*, regarding implementation through future proceedings. Master Response 2.1, *Amendments to the Water Quality Control Plan*, provides information regarding the program of implementation and why it provides the appropriate level of detail to guide implementation actions. Master Response 3.2, *Surface Water Analyses and Modeling*, describes the appropriate use of the model to implement a percent of unimpaired flow and the appropriate use of operating conditions to represent implementation of the plan amendments, including carryover storage, based on a watershed level evaluation of potential water supply effects and related potential impacts.

Alternative Flow Regimes

Some commenters suggested that the SED should have evaluated alternative flow regimes other than percentages of unimpaired flow but did not explain how these alternative flow regimes would substantially lessen one or more of the significant environmental impacts identified in the SED or feasibly attain most of the purposes and goals of the plan amendments. For example, some commenters suggested that the plan amendments should address functional flows, rather than a percentage of unimpaired flow. Many commenters objected to including June in the plan timeframe because of the perceived effects on agriculture. Other commenters favored pulse flows or tailored flows. Finally, some commenters stated that only a return to natural flows would achieve the salmon doubling goals. Further, some commenters mistakenly conflated natural flows with the concept of a percent of unimpaired flows; the analysis in the SED does not use unimpaired flow as a representation of natural flow conditions. Please see Master Response 2.1 for a description of the how unimpaired flow objective is compatible with and facilitates functional flows.

Tailored Flows or Functional Flows

Some commenters suggested that the SED should have evaluated an alternative that tailored specific flow regimes for each tributary based upon different flow functionality goals or other statistical approaches. For example, some commenters suggested that specific functions, such as spawning, outmigration, and coldwater habitat could be matched up with specific tributaries, and a flow regime on each tributary could be developed implementing a specific functional flow goal. Such recommendations by commenters are consistent with the plan amendments, which accommodate possible functional flow regimes within the analyzed range of the percent(s) of unimpaired flow, and thus would not achieve additional benefits or avoid additional impacts, compared to the plan amendments. As described in the SED, the percent of unimpaired flow requirement does not need to remain at one fixed percent, but rather is intended to be adaptively implemented within a range of unimpaired flow in response to changing information and changing conditions (Chapter 3, *Alternatives Description* and Master Response 2.2, *Adaptive Implementation*).

Implementation of the plan amendments does not preclude the potential application of various experimental or analytical approaches to link specific attributes of the flow regime with fish population responses as part of the adaptive implementation process as long as it falls within the framework set forth in the plan amendments. Tailored flow regimes for each tributary may be based on information developed through by the STM Working Group and through the adaptive implementation process. Adaptive implementation allows the frequency, timing, magnitude, and

duration of flows to be adapted in order to enhance the biological benefits. Please see Master Response 2.1, *Amendments to the Water Quality Control Plan*, and Master Response 2.2, *Adaptive Implementation*, for more information regarding functional flows. Also see Master Response 2.2 for a more detailed description of how adaptive implementation can respond to changing information and changing conditions; maximize the habitat, temperature, and other benefits associated with the percent unimpaired flow approach; and support scientific experiments that are intended to assess the benefits of different flow regimes (such as shifting or shaping the flows) that could occur under the plan amendments. Please see Master Response 3.1, *Fish Protection*, regarding justification and description of plan amendments for protecting fish and benefits of the plan amendments (in particular, unimpaired flow as functional flow).

Pulse Flows

Some commenters suggested that the SED should have evaluated alternative pulse flow regimes but did not describe such alternatives or explain how they would have more benefits or fewer impacts compared to the plan amendments. Flow peaks or pulses are key components of the natural hydrograph that contribute to the overall benefits of a more natural flow regime as proposed under the plan amendments. Managed pulse flows in regulated rivers are often implemented in response to the flow needs of specific life stages or as an emergency response to environmental conditions that pose significant threats to listed populations (e.g., drought conditions that limit the availability of water to provide sufficient flows for fish passage past critical reaches or other migration barriers). Managed pulse flows have been implemented for many years on the Stanislaus River to improve attraction and passage conditions for fall-run Chinook salmon to upstream spawning areas (see recent investigation by Peterson et al. 2017) and in the LSJR to improve outmigration conditions for juveniles (Vernalis Adaptive Management Program; San Joaquin River Group Authority 2013). However, because these flows often target specific flow needs, they typically do not provide the broader range of ecological benefits associated with the natural hydrograph (see Master Response 3.1, *Fish Protection*). As such, they would not achieve the range of functions essential to native fishes, such as increased floodplain inundation, improved temperature conditions, and improved migratory conditions, or promote conditions that favor native fishes over nonnative fishes.

The plan amendments are based on a comprehensive approach to fish protection based on characteristics of the natural hydrograph to meet the life cycle needs of salmon and other native fishes. In this manner, they are different from pulse flows because they would function over broader seasonal time periods consistent with the life cycle needs of these species and the natural hydrographic conditions to which they are adapted. In order to respond to specific flow needs or limiting factors in individual tributaries, the program of implementation provides for adaptive implementation of flows and other functional flows in concert with non-flow actions (e.g., habitat restoration) to maximize the ecological benefits of the proposed flow requirements (please see Master Response 2.2, *Adaptive Implementation*). In contrast, because of the typical short duration and frequency under which managed pulse flows occur and because pulse flows would not mimic natural hydrographic conditions or provide flexibility in allowing for the consideration of other beneficial uses of water while reasonably protecting fish and wildlife beneficial uses, they would not meet most of the plan amendments' purposes and goals. Pulse flows are generally too limited in their effects both spatially and temporally to maintain inflow conditions from the SJR Watershed sufficient to support life stage needs throughout the migratory range of the species. In addition, they would not provide the broad range of ecological functions associated with natural hydrographic

conditions (including frequency, timing, magnitude, and duration of natural flow) that support the multiple life stage needs of the species. Finally, pulse flows would not allow for adaptive implementation of the quantity or timing of the flow within the February–June timeframe or outside of it, to address scientific uncertainty and changing conditions.

Exclusion of June Flows

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 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 emigrating salmonids. (See Master Response 3.1 for a discussion of seasonal flows from February through June.)

The State Water Board did not evaluate an alternative that excluded the month of June because 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*. Furthermore, the exclusion of June flows would not support many of the purposes and goals of the plan amendments. For example, excluding flows in June would generally result in a time period that is too short in duration to maintain inflow conditions sufficient to support and maintain the natural production of viable native fish populations migrating through the Delta. In addition, excluding June from the time frame would not provide flows that more closely mimic the natural hydrographic conditions (including frequency, timing, magnitude, and duration of natural flow) because they would not function over broader seasonal time periods consistent with the life cycle needs of the species. Furthermore, without June flows, the quantity of flows would not be sufficient to achieve functions essential to native fishes. Finally, restricting the time frame to exclude June flows would not encourage successful adaptive implementation of the quantity or timing of the flow within the February–June timeframe or outside of it, to address scientific uncertainty and changing conditions.

Although commenters stated that eliminating the month of June would reduce impacts on water supply, they did not explain how such reductions would reduce or avoid the significant adverse environmental effects of the plan amendments. Moreover, because the elimination of June flows would not support the purposes and goals of the plan amendments and would overall reduce the amount of water used to reasonably protect the fish and wildlife beneficial uses, it is not considered a feasible alternative. For additional discussion of the effects on agricultural uses, water suppliers, and local and regional agricultural economic effects, see Master Responses 3.5, *Agricultural Resources*, 3.6, *Service Providers*, 8.1, *Local Agricultural Economic Effects and the SWAP Model*, and 8.2, *Regional Agricultural Economic Effects*.

Unimpaired Flow and Natural Flow

Some commenters suggested that the flow requirement should be based on natural flows (i.e., the prehistoric natural flows, as described by the California Department of Water Resources [DWR])

instead of a percent of unimpaired flow. As described in Chapter 3, *Alternatives Development*, and Master Response 2.1, *Amendments to the Water Quality Control Plan*, *unimpaired flow* represents 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. Unimpaired flow estimates at the rim dams, or full natural flow locations, are the best indicators of water supply in these tributaries, as these estimates have traditionally been developed for this purpose. The estimated water supply at these locations is the amount available from the upper watersheds for all uses. Unimpaired flow, or full natural flow, at these locations represents the amount of water from the upper watershed available to be diverted or stored or made available for an instream flow objective.

The LSJR flow objective is a percentage of unimpaired flow, which is represented by the full natural flow at the rim dams. It is not feasible for the State Water Board to establish and implement a flow objective based on full natural flow estimates on the valley floor or that achieves full natural flows. Drastic hydrologic modification of the valley floor areas minimizes the utility of basing a flow objective for the modern landscape, hydrogeography, and water supply infrastructure using full natural flow estimates for the valley floor locations. Matching full natural flow would require that very little water (if any) be diverted for other beneficial uses. Requiring full natural flow would not lessen potentially significant environmental effects on farmland and service providers.

As discussed in Master Response 2.1 and Master Response 3.1, *Fish Protection*, unimpaired flow allows for a defined volume of water that reflects a variable hydrograph (on a 7-day running average). This volume of water can be shaped within the February–June time period to provide functionally useful flows that could have greater benefits for fish and wildlife beneficial uses than prescribed, fixed monthly flow schedules, or rigid adherence to the percent of unimpaired flow requirement. This allows for the reasonable protection of the beneficial use of fish and wildlife, while considering the limitations of the systems within which the fish and wildlife live. Using percentages of unimpaired flow capture the natural pattern of variability and retains the attributes of the flow regime to which native fish adapted.

Non-Flow Measures

The State Water Board received a number of comments on non-flow measures, including comments stating that only non-flow measures should be considered, with no changes to the current flow requirements; that non-flow measures are the only solution to the fish population declines; and that flow is not needed if non-flow measures are implemented. However, proposing alternatives that do not include flow at all would not meet the fundamental purpose and goal of the plan amendments, which are to establish water quality objectives for the reasonable protection of fish and wildlife beneficial uses. As discussed under *Focus of Planning Efforts*, the essential focus of the State Water Board's efforts in updating the Bay-Delta Plan is on establishing water quality objectives that reasonably protect beneficial uses of water. Flow is a necessary water quality parameter to protect fish and wildlife beneficial uses and, thus, an essential element of the LSJR flow objectives.

Similarly, alternatives that include non-flow measures, but a limited or lesser amount of flows than evaluated under the LSJR alternatives, would not achieve the purposes and goals of the plan

amendments. The purposes and goals specifically related to the LSJR flow objectives, which are described in Chapter 3, *Alternatives Description*, Section 3.2, *Purposes and Goals*, and were reproduced previously in this master response, include maintaining inflow conditions to support and maintain the natural production of viable migratory native fish populations and providing flows to achieve hydrological conditions and functions essential to native fishes. Non-flow measures alone or in part do not meet most of these purposes and goals. As discussed in Master Response 3.1, *Fish Protection*, and Master Response 5.2, *Incorporation of Non-Flow Measures*, flow is a key driver of hydrologic health for fish and wildlife. While salmon and native fishes in the SJR Basin have been adversely affected by numerous factors, including physical habitat alteration and passage barriers, spring (February–June) flows are considered a primary limiting factor. Higher and more variable flows are anticipated to improve conditions for fish and other ecosystem attributes, the food web, habitat, and water temperature. Thus, flows are an essential element of the plan amendments.

It is not feasible to establish water quality objectives without considering flow, and eliminating or reducing flow as an element of the plan amendments would not achieve their established purposes and goals. Table 2.4-1 summarizes the performance of non-flow measures alone to meet the purposes and goals 1 through 4 of the plan amendments, which are particularly dependent on flow to protect to aquatic ecosystem health. (Purposes and goals 5 through 8 are discussed above.) See also Master Response 1.1, for responses to comments regarding the unimpaired flow requirement and comments that support lower percentages of unimpaired flow. As set forth in Appendix K and discussed in Master Response 5.2, the SED has recognized that non-flow measures can complement protections afforded by the LSJR flow objectives; thus, the plan amendments include recommendations for non-flow measures, such as floodplain and riparian habitat restoration, predatory control, fish hatchery development or modifications, and fishing restrictions, and fish transportation, as part of the program of implementation. As also described in Master Response 5.2, the State Water Board's authority to require and enforce the implementation of non-flow actions depends on the proposed non-flow action and whether the facts and circumstances support requiring them in any given situation. Such facts and circumstances are currently unknown. The State Water Board recommends, but does not require non-flow actions in the plan amendments because, in part, there is no evidence in this proceeding that supports a physical solution that imposes a requirement on a particular party in this proceeding. For example, there is no evidence of the efficacy of non-flow measures to protect fish and wildlife beneficial uses, the amount of water that would be saved through the non-flow measures, or how the non-flow measures would achieve the plan amendment's goals and objectives described in Chapter 3, *Alternatives Description*. Moreover, the State Water Board is not imposing enforceable obligations to implement the water quality objectives in this regulatory proceeding. In sum, the record supporting the imposition of specific non-flow actions, and the allocation of responsibility for undertaking them, is lacking. In this respect, as stated in the SED, the State Water Board's authority to impose non-flow measures is limited. Accordingly, such measures are not a feasible alternative to the plan amendments to reasonably protect fish and wildlife beneficial uses. Finally, non-flow measures do not avoid significant impacts. In addition, Chapter 16, *Evaluation of Other Indirect and Additional Actions*, discloses that there may be unavoidable significant impacts related to the take of protected species in connection with the construction of certain non-flow actions.

Table 2.4-1. Performance of Non-Flow Measures Alone to Meet Certain Purposes and Goals[a]

Purpose and Goal[b]	Non-Flow Measures
1. Maintain inflow conditions from the SJR Watershed sufficient to support and maintain the natural production of viable native fish populations migrating through the Delta	Implementing non-flow measures alone would not generate flows and thus would not maintain inflow conditions from the watershed sufficient to support and maintain the natural production of viable native fish population migrating through the Delta. **Thus non-flow measures do not meet this purpose and goal**.
2. Provide flows that more closely mimic the natural hydrographic conditions (including frequency, timing, magnitude, and duration of natural flows) in the LSJR and three eastside, salmon-bearing tributaries—the Stanislaus, Tuolumne, and Merced Rivers—to which these migratory native fish species are adapted	Implementing non-flow measures alone would not generate or modify flows to mimic the natural hydrograph and allow more variability in the SJR Watershed or the three eastside salmon-bearing tributaries. **Thus non-flow measures do not meet this purpose and goal.**
3. Provide flows in a quantity necessary to achieve functions essential to native fishes such as increased floodplain inundation, improved temperature conditions, improved migratory conditions, and promote other conditions that favor native fishes over nonnative fishes	Non-flow measures alone could help achieve some functions essential to native fishes depending on the location and type of non-flow measure implemented, but would be in discrete areas and still depend on a more natural flow regime to be successful. Non-flow measures alone would not provide flows necessary to achieve essential functions that can only be provided by flows. **Thus non-flow measures alone are limited in meeting this purpose and goal.**
4. Allow adaptive implementation of flows that will afford maximum flexibility in establishing beneficial habitat conditions for native fishes, addressing scientific uncertainty and changing conditions, developing scientific information that will inform future management of flows, and meeting biological goals, while still reasonably protecting the fish and wildlife beneficial uses	Non-flow measures may inform the adaptive implementation of flows, but do not in and of themselves, generate flows or provide maximum flexibility in establishing beneficial habitat conditions. **Thus non-flow measures alone do not meet this purpose and goal.**

[a]Purposes and goals 4 through 8 are discussed under Feasibility of Commenter-Suggested Plans and Proposals for the LSJR Flow Objectives.

[b]Purposes and goals of the plan amendments as outlined in Chapter 3, *Alternatives Description*.

Merced Irrigation District S.A.F.E. Plan

Multiple commenters asked that the State Water Board consider the Merced ID's S.A.F.E. Plan as an alternative to the plan amendments. Efforts to obtain a full description of the S.A.F.E. Plan and its supporting data from Merced ID have to date been unsuccessful, and the plan and supporting data have not been provided to the State Water Board for consideration (Satkowski pers. comm.). Therefore, the State Water Board has relied on the description of the S.A.F.E Plan from the Merced ID's website (Merced ID 2017). The specific elements of the S.A.F.E. Plan identified on the Merced ID website are the following.

- Increased flows using science to dictate the amounts and timing.
- Restoration of riparian and salmonid habitat on a 5-mile stretch of the Merced River from the Crocker-Huffman Diversion Dam downstream to the town of Snelling.
- Protection of local drinking water quality.
- Providing predation control.
- Improvements to salmon production and rearing at the state's Merced River Hatchery.

While the S.A.F.E Plan suggests the concept of a flow component, due to the limited information provided, it is unclear specifically how and to what extent the flows compare to the benefits of the plan amendments. However, they appear to be less than the flows under LSJR Alternative 3 (40 percent unimpaired flow requirement with adaptive implementation). The S.A.F.E Plan identifies an increase in flows using science to dictate the amounts and timing. According to the website, the S.A.F.E Plan "advocates increased flows which are consistent with Merced ID's federal licensing application of the New Exchequer Hydroelectric Project Final Environmental Impact Statement" (an average increase over baseline of 96,400 acre-feet per year) (Merced ID 2017). This proposal is not consistent with the recommendations by multiple resource agencies in Table 3-9 of that document (FERC 2015). The flow element of the S.A.F.E. Plan on Merced ID's website is described by one bar chart of flows by year type at Shaffer Bridge and, as such, the amount and timing of flows is unclear (State Water Board 2017).

The State Water Board's SED analyses provides a detailed description of the LSJR flow objectives and the benefits of these flows for native fishes in terms of increased floodplain inundation and improved water temperatures in the Merced River (see Tables 19-3 and 19-9 of Chapter 19, *Analyses of Benefits to Native Fish Populations*; Master Response 2.1, *Amendments to the Water Quality Control Plan*; and Master Response 3.1, *Fish Benefits*). The plan amendments are expected to result in improvements to instream temperatures, or instream coldwater habitat improvement for spawning, rearing, and migrating for different life stages (e.g., adult and juvenile), along approximately 52 miles of Merced River habitat and another 34 miles of the LSJR. This is evidenced by longitudinal profiles presented in Appendix F.1, *Hydrologic and Water Quality Modeling*, and Master Response 3.1. Appendix F.1, Section F.1.6, *Temperature Modeling*, presents longitudinal profiles of temperature along Merced River for the years 1987–1990 (considered dry), and these profiles show miles of temperature improvement depending on the year and month (e.g., April–May 1988). Master Response 3.1 also contains longitudinal profiles for June on the Merced River, which show temperature improvements under the plan amendments.

The limited information about the S.A.F.E. Plan does not explain how non-flow measures would complement the flow component of the S.A.F.E plan. As explained in this master response and in the *Executive Summary*, non-flow measures, such as restoration of miles of riparian habitat, predation control, and improvements to hatcheries, are important measures that complement the LSJR flow objectives. Increased flows, however, remain the principal focus of the LSJR alternatives because the science supports the conclusion that flow is critical in protecting fish and wildlife beneficial uses in the LSJR.

The S.A.F.E Plan website identifies the protection of local drinking water quality, but does not identify how the protection would occur. This could potentially support the plan amendments' purpose and goal 6 (as listed in this master response under *Feasibility of Commenter-Suggested Plans and Proposals for the LSJR Flow Objectives*). However, without information as to how such protection

under the S.A.F.E Plan would be achieved, it is not apparent that the SED's purpose and goal would be met.

Finally, as described on the website, the S.A.F.E Plan would apply only to a limited geographic area on the Merced River. This does not meet the first purpose and goal of the plan amendments, which extends to all three eastside tributaries salmon-bearing tributaries and the LSJR and calls for providing flows that more closely mimic the natural hydrographic conditions (including frequency, timing, magnitude, and duration of natural flows) in those waters to which migratory native fish species are adapted. As described in Master Response 2.1, the three eastside tributaries support salmon populations, provide the greatest combined source of flow to the Delta from the SJR Watershed, and provide spatial diversity. The plan amendments include all three rivers to increase spatial and temporal access to food and coldwater habitat for juvenile fall-run Chinook salmon and steelhead. 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. 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 also Chapter 3 of Appendix C, *Technical Report on the Scientific Basis for Alternative San Joaquin River Flow and Southern Delta Salinity Objectives*). The plan amendments allow the coordination of flows on all three tributaries, thus extending the cumulative benefits of these flows to the Delta. As identified in Master Response 3.1, *Fish Protection*, the temperature effects of the plan amendment flows during June are highly beneficial. Please also see Appendix F.1, Section F.1.6.2, *Temperature Model Results*. Data supporting the needed temperatures within the plan area are shown in Chapter 19, Figures 19-3 through 19-14, with temperatures specific to the Merced River are illustrated Figures 19-9 through 19-11. It is unclear, and in fact appears unlikely, from the information available about the S.A.F.E. Plan whether it would provide similar benefits as the plan amendments.

Given the limited information available regarding the S.A.F.E Plan, including lack of details, data, analyses, or other supporting information, it is not possible to fully evaluate if the S.A.F.E Plan would meet the purposes and goals of the plan amendments or would avoid or substantially lessen significant impacts. It does not appear that the S.A.F.E. Plan would provide similar benefits to the plan amendments. Thus, the S.A.F.E Plan is not considered a reasonable or feasible alternative to the plan amendments to reasonably protect fish and wildlife beneficial uses.

San Francisco Public Utilities Commission Alternative

In its comments on the SED, the San Francisco Public Utilities Commission (SFPUC), a department of the City and County of San Francisco (CCSF), proposed an alternative (the SFPUC Alternative) for the stated purpose of promoting "the expansion of fall-run chinook salmon and *Oncorhynchus mykiss* populations in the lower Tuolumne River while maintaining water supply reliability (Comment 1166-81)." The SFPUC Alternative consists of components for managing habitat, predation, environmental flows, and hatcheries based on a number of scientific studies cited in the comment letter (Comment 1166-81-99). The geographic extent of the SFPUC Alternative, according to Figure 1 in Attachment 2 to Letter Number 1166, referenced in Comment Number 82, extends along the Tuolumne River/Dry Creek Watershed from La Grange Diversion Dam to the confluence with the SJR.

The SFPUC Alternative includes actions to improve habitat with spawning gravel, large woody debris, and riparian vegetation enhancements; invasive plant removal; hatchery management (by others); and predation control. As described above, the State Water Board acknowledges that non-flow measures such as habitat restoration, predation control, and improvements to hatcheries are important. However, without a sufficient flow component, the SFPUC Alternative fails to meet the fundamental purpose and goal to establish flow objectives for the reasonable protection of fish and wildlife beneficial uses in the LSJR watershed, consistent with the State Water Board's authority and responsibilities under the Porter-Cologne Act. It also does not meet the other specific purposes and goals associated with the LSJR alternatives. Although the program of implementation does not require non-flow actions, it acknowledges that voluntary agreements may include non-flow actions that support a change in the required percent of unimpaired flow, within the prescribed range, if the criteria for adaptive adjustments are met. For a discussion of the complementary role of non-flow measures and recommendation for non-flow measures in the plan amendments, see Master Response 5.2, *Incorporation of Non-Flow Measures*.

The SFPUC Alternative does include a flow component; however, it does not achieve the benefits sought by the plan amendments. The flow component of the SFPUC Alternative is described on pages 8-12 of Attachment 2 to Letter Number 1166, Comment Number 89. This flow component is insufficient to meet the fundamental purpose and goal of the plan amendments, which is to provide reasonable protection to fish and wildlife beneficial uses. For example, the flow component does not maintain inflow conditions or provide flows that more closely mimic natural hydrographic conditions (including frequency, timing, magnitude, and duration) and, thus, is insufficient to support and maintain the natural production of viable migratory native fish populations in the geographic area considered in the plan amendments.

The SFPUC-proposed flows are between 150 and 250 cubic feet per second (cfs) year-round, depending on the time period, with all migration flows occurring in April and May. Protecting migrants during the entire February–June period, however, is important for maintaining genetic and life history diversity. Under the SFPUC Alternative, pulse flows would occur during April and May using an additional volume of water (11 to 150 thousand acre-feet, depending on water year and based on monitoring of the pulse flow). However, limiting the pulse flows to two months (April and May) and monitoring those flows to potentially adjust does not achieve the benefits (floodplain inundation, water temperature improvement, and variability in juvenile migrant behavior) that are expected by mimicking the natural hydrograph over the entire juvenile rearing and emigration period (February–June) considered under the plan amendments. Please see Master Response 3.1, *Fish Protection*, 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) regarding the necessity of including June to support the lifecycles of salmon and other native fish species. Under the plan amendments, the water temperature benefits in the Tuolumne River extend from March through June (Chapter 19, *Analyses of Benefits to Native Fish Populations*, Tables 19-6) and floodplain benefits extend from April through June (Chapter 19, Table 19-23) because the June period affords temperature benefits and improved opportunities for protecting life stage diversity of emigrating salmonids.

Additionally, the SFPUC-recommended flows would be, in some cases, lethal to fish. The statement in Comment 1166 that "[i]ncreasing flows above those provided through April 15 serve to keep river temperatures favorable" is inaccurate. For example, as shown in Figure 3.1-36 in Master Response 3.1, a flow of 250 cfs in the Tuolumne River in May at River Mile (RM) 28 frequently corresponds to

lethal or near-lethal water temperatures for rearing and emigrating salmonids (>70°F or >21°C). Please see Chapter 19, Section 19.2.3, *Results of Temperature Evaluation*, including Figures 19-3 through 19-14 (Tuolumne River Figures: 19-6 through 19-8; San Joaquin River Figures 19-12 through 19-14), which show how changes in the flow regime may affect water temperatures and the expected benefits of water temperature reductions for fish. Please also see Master Response 3.1 for a discussion of reductions in harmful and lethal temperatures expected from implementation of the plan amendments.

Although the SFPUC Alternative provides for monitoring the success of its proposed pulse flows, it is limited to the time period of April and May and seems to focus on only on adjustments to the pulse flows. As discussed in Master Response 2.2, *Adaptive Implementation*, adaptive implementation is a key feature of the LSJR program of implementation that allows for adjustment of the required percentage of unimpaired flow in specified ways to improve the functions of those flows and better achieve the water quality objective.

Finally, the SFPUC Alternative would apply only to a limited geographic area, the Tuolumne River/Dry Creek Watershed. This does not meet the first purpose and goal of the plan amendments, which extends to all three eastside salmon-bearing tributaries and the LSJR and calls for providing flows that more closely mimic the natural hydrographic conditions (including frequency, timing, magnitude, and duration of natural flows) in those waters to which migratory native fish species are adapted). As described in Master Response 2.1, *Amendments to the Water Quality Control Plan*, the three rivers support salmon populations, provide the greatest combined source of flow to the Delta from the SJR Watershed, and provide spatial diversity. The plan amendments include all three tributaries to increase spatial and temporal access to food and coldwater habitat for juvenile fall-run Chinook salmon and steelhead. 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. 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 also Chapter 3 of Appendix C). The plan amendments allow for times when all three tributaries would work together, thus extending the cumulative benefits of these flow to the Delta. As identified in Master Response 3.1, the temperature effects of the plan amendment flows through June are highly beneficial. Please also see Appendix F.1, Section F.1.6.2, *Temperature Model Results*. Data supporting the needed temperatures within the plan amendment area are shown in Chapter 19, Figures 19-3 through 19-14. Data specific to the Tuolumne River are illustrated on Figures 19-9 through 19-11.

Table 2.4-2 summarizes the performance of the SFPUC alternative to meet the purposes and goals 1 through 4 of the plan amendments, which are particularly dependent on flow to protect to aquatic ecosystem health (purposes and goals 5 through 8 are discussed under *Feasibility of Commenter Suggested Plans and Proposals for the LSJR Flow Objectives*.). Furthermore, the alternative does not support a conclusion that it would substantially reduce or avoid significant environmental impacts; instead, the alternative would result in additional impacts on fish and wildlife beneficial uses, including temperature impacts. Thus, the SFPUC Alternative is not a feasible alternative to the plan amendments to reasonably protect fish and wildlife beneficial uses. Please see Master Response 8.5, *Assessment of Potential Effects on the San Francisco Bay Area Regional Water System*, for additional

information regarding comments raised concerning the scope and type of analyses associated with potential water supply reductions to SFPUC as a result of implementation of the plan amendments.

Table 2.4-2 Performance of SFPUC Alternative to Meet Certain Purposes and Goals[a]

Purpose and Goal[b]	SFPUC Alternative
1. Maintain inflow conditions from the SJR Watershed sufficient to support and maintain the natural production of viable native fish populations migrating through the Delta	Implementing the SFPUC Alternative would not generate or modify flows in a manner that comprehensively addresses the flow needs of native fishes throughout their spawning, rearing, and migratory habitat in the SJR watershed. Therefore, it would not maintain inflow conditions from the watershed sufficient to support and maintain the natural production of viable native fish population migrating through the Delta. Moreover, the flow component is insufficient to meet this purpose and goal in the Tuolumne watershed. **Thus the SFPUC Alternative does not meet this purpose and goal.**
2. Provide flows that more closely mimic the natural hydrographic conditions (including frequency, timing, magnitude, and duration of natural flows) in the LSJR and three eastside, salmon-bearing tributaries—the Stanislaus, Tuolumne, and Merced Rivers—to which these migratory native fish species are adapted	Implementing the SFPUC Alternative would not generate or modify flows to mimic a more natural hydrograph with more variable flow in the SJR Watershed or the Tuolumne River Watershed. Although little information is provided on temperature management, the flows in late spring are likely to be inadequate to maintain suitable habitat. Flows between 150–250 year round with additional pulse flows occurring only during April and May would be insufficient to support and maintain the natural production of viable native fish population migrating through the Delta. **Thus the SFPUC Alternative does not meet this purpose and goal.**
3. Provide flows in a quantity necessary to achieve functions essential to native fishes such as increased floodplain inundation, improved temperature conditions, improved migratory conditions, and promote other conditions that favor native fishes over nonnative fishes	Implementing the non-flow portions of the SFPUC Alternative could help achieve some functions essential to native fishes depending on the location and type of non-flow measure implemented. However, the flow elements would not provide the flows necessary to achieve the broad range of essential functions associated with a more natural hydrograph. **Thus the SFPUC Alternative is constrained in meeting this purpose and goal.**
4. Allow adaptive implementation of flows that will afford maximum flexibility in establishing beneficial habitat conditions for native fishes, addressing scientific uncertainty and changing conditions, developing scientific	Implementing the SFPUC Alternative allows for monitoring of pulse flows but these flows would be restricted to April and May and therefore would not achieve

information that will inform future management of flows, and meeting biological goals, while still reasonably protecting the fish and wildlife beneficial uses	the benefits that are expected by mimicking the natural hydrograph over the entire juvenile rearing and emigration period (February–June) considered under the plan amendments. **Thus the SFPUC Alternative is constrained in meeting this purpose and goal.**

[a]Purposes and goals 4 through 8 are discussed under Feasibility of Commenter-Suggested Plans and Proposals for the LSJR Flow Objectives

[b]Purposes and goals of the plan amendments as outlined in Chapter 3, *Alternatives Description*.

Upper San Joaquin River and Other Parts of the Watershed

As described in Chapter 3, *Alternatives Description*, and Master Response 2.1, *Amendments to the Water Quality Control Plan*, the SED evaluates a flow objective that includes the Stanislaus, Tuolumne, and Merced Rivers because these tributaries support a variety of critical life history stages needed to maintain the natural production of SJR fall-run Chinook salmon. Flows from these tributaries are necessary to support juvenile rearing in the tributary streams and migration through the Delta. Some commenters suggest that the plan amendments should include the Upper SJR Watershed and other parts of the SJR watershed. Please refer to Master Response 2.1 for information regarding the LSJR and Upper SJR Watersheds.

As explained in Master Response 2.1, the SJR upstream of the Merced River confluence does not currently support viable native fish populations migrating through the Delta. Further, including this area as either a standalone alternative or as part of the plan amendments would not avoid or lessen any substantial environmental impacts of the plan amendments. Flows from the Stanislaus, Tuolumne, and Merced Rivers would still be necessary to achieve the purpose and goals of the plan amendments, which focus on salmon-bearing tributaries. Furthermore, an Upper SJR alternative would not reduce the quantity of water needed from those tributaries; thus, an Upper SJR alternative would not avoid or substantially lessen the significant environmental impacts of the project. To the contrary, flow requirements for the SJR upstream of the Merced River confluence could increase the adverse environmental effects of the LSJR alternatives in a larger geographic area by reducing the quantity of water available for other uses in areas that rely upon water supplies in the SJR upstream of Merced River confluence. The plan amendments, however, acknowledge the efforts associated with the San Joaquin River Restoration Program and recommend that federal and state agencies, in coordination with the STM Working Group and other parties, evaluate the program's 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 updates to the Bay-Delta Plan.

River segments on the west side of the SJR are considered infeasible as either standalone alternatives to the plan amendments or as part of the plan amendments because they do not support salmon and do not contribute to the greatest combined source of flow to the Delta. Because these rivers do not support salmon, they would not support the basic purposes and needs of the plan amendments, which are 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. Furthermore, the inclusion of these river segments would not support and maintain the natural production of

viable native fish populations migrating through the Delta because there is no viable native fish population in those segments. The Stanislaus, Tuolumne, and Merced Rivers support salmon runs and account for more than 60 percent of the unimpaired flow in SJR Basin (Master Response 2.1, Table 2.1-2). In addition, the inclusion of these westside river segments would not reduce significant impacts identified in the SED because they contribute to a very small percent (i.e., less than 1 percent) of the available average unimpaired flow (Master Response 2.1, Table 2.1-2). Thus, any flow they could potentially provide is a very small volume and is not sufficient to maintain inflow or provide sufficient flows to meet the plan amendments purposes and goals. Further, similar to the Upper SJR, flow requirements in these other geographic areas would not reduce the quantity of water needed from the three eastside salmon-bearing tributaries and, thus, would not avoid or substantially lessen the significant environmental impacts; instead, they may create additional adverse environmental impacts.

Please also refer to Master Response 1.1, *General Comments*, for information regarding the watersheds considered. Please also refer to Master Response 1.2, *Water Quality Control Planning Process*, regarding the scope of the Bay-Delta Plan proceedings and considering plan amendments for different watersheds in independent proceedings.

Feasibility of Commenter-Suggested Plans and Proposals for the SDWQ Objective

The State Water Board is also considering establishing a salinity objective (SDWQ alternatives) for the reasonable protection of agricultural beneficial uses in the southern Delta. Please refer to Appendix K, *Revised Water Quality Control Plan*, and Master Response 2.1, *Amendments to the Water Quality Control Plan*, for the text of the plan amendments, information regarding the justification for the salinity objective, and a summary description of the salinity objective and the related program of implementation, including actions by the Central Valley Regional Water Quality Control Board (Central Valley Water Board). Please see Master Response 3.3, *Southern Delta Water Quality*, for more information regarding the amendments to the SDWQ objectives, southern Delta water quality, modifications requested by commenters, and a wide range of water quality related issues. Appendix C, *Technical Report on the Scientific Basis for Alternative San Joaquin River Flow and Southern Delta Salinity Objectives*, explains how the salinity objective would achieve salinity conditions that are reasonably protective of agricultural beneficial uses of surface waters in the southern Delta, taking into consideration salt-sensitive crops grown in the area, among other factors.

Similar to the evaluation of the commenter-suggested plans and proposals for the narrative and numeric LSJR flow objective, the following sections describe plans and proposals suggested by commenters as alternatives to the numeric SDWQ objective. Each commenter plan or proposal is described based on the description and information provided in the comment(s), and evaluated for its ability to meet the plan amendments' purposes and goals, as described in Chapter 3, *Alternatives Description*, Master Response 2.1, and to substantially reduce or avoid significant environmental impacts.

The amendments to the numeric SDWQ objective have been viewed as a separate issue from the LSJR flow objectives by many commenters, some of whom have suggested that the salinity objective should be calculated differently or set at an alternative level. However, while it is correct that the update of the salinity objective is only one element of the State Water Board's proposed update to

the 2006 Bay-Delta Plan, the salinity and flow objectives are connected components of the plan amendments. Some commenters have recommended alternative actions that could be taken south of the Delta to lower salinity levels in the LSJR and southern Delta. Other commenters have stated that the objective should include imposing a requirement for Delta diverters for agricultural uses in the reaches downstream of Vernalis.

As discussed in Chapter 3, Section 3.4.1, *Attributes of the SDWQ Objectives*, and in this master response under *Focus of Planning Efforts*, several attributes guide the development and selection of the alternatives evaluated in the SED. These attributes include magnitude/level of protection, seasonality and averaging period, geographic scope, and other measures, such as improved circulation. The attributes informed the feasibility of the SDWQ alternatives in the SED and the ability of alternatives to avoid or substantially lessen any of the significant effects of the plan amendments. The fundamental purpose and goal of the salinity objective is to establish an SDWQ objective for the reasonable protection of southern Delta agricultural beneficial uses and a program of implementation to achieve the objective. Analyses of southern Delta water quality and crop salinity requirements have shown that existing salinity conditions in the overall southern Delta are suitable for all agricultural crops. Because the existing 0.7 deciSiemens per meter (dS/m) April–August objective is lower than is needed to reasonably protect the agricultural beneficial uses, the State Water Board is considering amending the southern Delta salinity objective to better reflect conditions needed to protect the beneficial use. Thus, the plan amendments are limited in their purpose and geographic scope based on available scientific information. However, the plan amendments do not preclude future actions that might help reduce salinity, such as those that may be associated with the CV-SALTS initiative, the total maximum daily load for salt and boron in the LSJR, or future monitoring and modeling studies to better understand the characteristics of salinity conditions in the southern Delta. Please refer to Appendix K for information regarding the program of implementation and actions by the Central Valley Water Board.

The purposes and goals for the SDWQ objective and associated program of implementation are described in Chapter 3. For ease of reference, the five purposes and goals of the SDWQ objective are reproduced here and are as follows.

1. Provide salinity conditions that reasonably protect agricultural beneficial uses of surface waters in the southern Delta.
2. In establishing salinity water quality objectives to reasonably protect agricultural beneficial uses, take into consideration all of the demands being made and to be made on waters in the southern Delta, the LSJR and the three eastside, salmon-bearing tributaries and the factors to be considered for establishing water quality objectives in Water Code section 13241, including, but not limited to, past, present and probable future beneficial uses and economic considerations.
3. Establish a salinity objective, supported by existing scientific information, which is not lower than necessary to reasonably protect the most salt sensitive crops currently grown or suitable to be grown on saline- and drainage-impaired soils in the southern Delta.
4. Maintain or improve salinity conditions in the southern Delta to comply with state and federal antidegradation policies.
5. Provide for development and implementation of monitoring and modeling studies needed to better understand the characteristics of salinity conditions in the southern Delta and the dynamics of factors controlling or contributing to those conditions.

Please refer to Master Response 3.3 for additional information on the purpose and goals for the SDWQ alternatives, including the responsibilities for meeting the SDWQ numeric objective and for establishing temporary barriers. Please also see Master Response 3.6, *Service Providers*, regarding concerns raised about salinity levels and wastewater treatment plants or publicly owned treatment works.

Changes to the Numeric Salinity Objectives

Some commenters stated that the SDWQ alternatives should have salinity (EC, or electrical conductivity) objectives for a time increment other than a 30-day running average (e.g., annual average). Steady-state modeling presented in Appendix E, Salt Tolerance of Crops in the Southern Sacramento-San Joaquin Delta, and the results from other transient model studies suggest that the water quality objective could be increased up to 0.9 to 1.1 dS/m and be protective of all crops normally grown in the southern Delta under current irrigation practices. The analysis assumes constant salinity, rather than variable mean annual or variable mean seasonal salinity. As identified in Chapter 3, *Alternatives Description*, long averaging periods, such an annual averaging as suggested by some commenters, would have the potential to cause more significant local and seasonal negative effects on agriculture. Averaging salinity over long periods would combine many high and low salinity values into a single intermediate number and could hide relatively short term, high salinity conditions (Chapter 3, *Alternatives Description*). Crop water uptake occurs on a shorter timespan than annually and prolonged exposure to high salinity conditions during water uptake could impact the crops, especially during sensitive growing stages such as emergence and seedling development. Annual averages are infeasible because they would represent conditions that are less protective of the agricultural beneficial uses and, thus, they would not meet the purpose and goals of the SDWQ objective to reasonably protect agricultural uses (purpose and goal 1). They also would not comply with antidegradation policies (purpose and goal 4).

Some commenters asserted the numeric salinity objective should be set at a higher level (e.g., 1.3 to 1.4 ds/m) for the Delta downstream of Vernalis to allow for an increase in salinity in fall and winter (September to March). The suggestion to increase the objective downstream of Vernalis during this period would not meet important purposes and goals. It does not meet the fundamental purpose and goal of the salinity objective or purpose and goal 1 as well as the proposed year-round SDWQ objective of 1.0 dS/m, because it would require salinity in the southern Delta at levels less protective of agricultural beneficial uses. Crop water demand is a function of weather and crop type, and annual crops, such as winter grain and sugar beets, or perennials, such as alfalfa or orchard crops, may require irrigation during the time period of September to March (Irrigation Association 2011:93; Chapter 11, *Agricultural Resources*). Some areas in the southern Delta are poorly drained making salinity management a challenge (Appendix E, *Salt Tolerance of Crops in the Southern Sacramento-San Joaquin Delta*). In addition, water logged soils especially during periods of high crop water demand can cause crop damage due to reduced soil oxygen levels that may result in toxic elements or enable the growth of plant pathogens (Bohn et al., 1985). Therefore, in order to achieve leaching in poorly drained soils and not harm the crop a recommended practice is to leach during the dormant season (i.e., September to March) (Doll 2015; Leinfelder-Miles 2018). A higher salinity objective during September to March 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. Water quality better than 1.4 dS/m could be and has been achieved (see Chapter 5, Hydrology, section 5.2.8 [maximum monthly values have rarely exceeded 1.200 dS/m in the interior

Delta]). Finally, salinity objectives for the protection of agricultural beneficial uses at the intakes of the Central Valley Project (Delta Mendota Canal at Tracy Pumping Plant) and State Water Project (West Canal at Clifton Court Forebay) are established at 1.0 dS/m on a monthly average, year round (Chapter 3, *Alternatives Description*). These locations are west, and generally downstream of, the southern Delta salinity stations. As such a 1.0 dS/m year round SDWQ objective would be consistent with the existing objective at these locations, with the same purpose, to reasonably protect agricultural beneficial uses. Please refer to Master Response 3.3, *Southern Delta Water Quality*, for a more detailed discussion of the numeric EC objective.

Some commenters suggested that the SDWQ alternatives should consider other monitoring locations. Vernalis is selected as the location for compliance because it represents where water enters the Delta from the SJR system. The plan amendments propose evaluating salinity compliance in three river segments in the southern Delta and not at the current compliance locations (see Master Response 3.3). Specific gage stations are proposed to be established as part of the Comprehensive Operations Plan (see Appendix K, *Revised Water Quality Control Plan*) and additional monitoring studies.

Actions Outside of the Plan Area or by Other Entities

Several commenters recommended alternative actions that could be taken primarily south of the Delta to lower EC levels in the LSJR or actions that could be taken by other entities as potential alternatives to the plan amendments, including the following.

- Impose conditions upon the San Luis Unit permits to release water from the San Luis or Delta Mendota Canals.
- Evaluate actions to reduce or eliminate salinity at the wetlands and wildlife refuges by, for example, requiring wetland and wildlife refuges to reserve water supplies to dilute the discharge in spring.
- Evaluate additional drainage reuse and other actions to control these discharges or change the timing of these discharges to occur when there is natural assimilative capacity in the SJR or adopt irrigation management (scheduling).
- Adopt salinity objectives for the entire river to be implemented through waste discharge permits that would prohibit discharge rather than control its timing.
- Include Delta diverters with agricultural drainage in the requirements for achieving the salinity standards in the reaches downstream of Vernalis or consolidate diversions and extend agricultural pumps in the Delta.

None of the above actions suggested by commenters constitutes a feasible alternative to the plan amendments because there is no information to support the conclusion that they would substantially lessen or avoid significant environmental effects or meet the plan amendments' purposes and goals. For example, greenhouse gas emissions from construction activities related to methods of compliance evaluated in the SED (Chapter 16, *Evaluation of Other Indirect and Additional Actions*) would not be reduced if actions south of the Delta were implemented. In addition, it is unlikely any of the potentially significant environmental effects summarized in Chapter 18, *Summary of Impacts and Comparison of Alternatives,* Table 18-8, would be reduced if these proposed actions were employed. This is because they would be primarily located south of Vernalis and would not assist in reducing the impacts that are related to actions taken by the regulated community

within the southern Delta. In addition, these actions themselves may have significant environmental effects. For example, actions that might require construction, such as prohibiting discharge, could result in significant environmental effects either in the southern Delta or south of the Delta, depending on where they were to occur. These potential construction impacts could be similar to those evaluated in the SED under agricultural return flow salinity control (Chapter 16, Section 16.4.4, *Agricultural Return Flow Salinity Control*). With respect to consolidating diversions and extending agricultural pumps in the Delta in lieu of the temporary barriers, DWR and the U.S. Bureau of Reclamation can consider appropriate other reasonable measures than the temporary barriers. However, consolidating diversions and extending agricultural pumps would be unlikely to reduced significant environmental effects (see Master Response 3.3, *Southern Delta Water Quality*, for more information). To the extent that the proposed actions address a wider array of water quality issues or a greater geographic area, they do not meet the purposes and goals of the plan amendments. As discussed throughout this master response and the SED, the plan amendments, in part, focus on the reasonable protection of agricultural beneficial uses in the southern Delta.

The program of implementation is not changing the requirement for USBR to meet existing requirements at Vernalis (i.e., 0.7 dS/m from April–August and 1.0 dS/m from September–March). The historical range of salinity would continue to exist in the southern Delta (see Chapter 5, *Surface Hydrology and Water Quality*, Impact WQ-2: *Substantially degrade water quality by increasing Vernalis or southern Delta EC such that agricultural beneficial uses are impaired*). As such, the incentive to implement the actions proposed by commenters is the same as under baseline conditions, and these actions were not implemented under baseline conditions. Consequently, the plan amendments would not increase the likelihood that these actions would be taken. In addition, based on the plan amendment SDWQ objective of 1.0 ds/m, these suggested actions may not be needed because exceedances would potentially decrease in the southern Delta, and the historical range of salinity would stay the same (see Chapter 5, Section 5.2.8, *Southern Delta Water Quality and Salinity*). As discussed in Chapter 16, *Evaluation of Other Indirect and Additional Actions*, Section 16.4.4, *Agricultural Return Flow Salinity Control*, the SDWQ alternatives do not preclude diverters in the southern Delta from implementing agricultural return flow salinity control, and this could be a method of compliance the regulated community selects to control salinity. Studies will continue according to the purpose and goals of the SDWQ alternatives to provide for development and implementation of monitoring and modeling studies needed to better understand the characteristics of salinity conditions in the southern Delta and the dynamics of factors controlling or contributing to those conditions.

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