7.2 Description of Alternatives

7.2.1 Introduction

The California Environmental Quality Act (CEQA) requires an environmental document to describe a range of reasonable alternatives to a project that "would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives." (State CEQA Guidelines §15126.6, subd. (a); Cal. Code Regs., tit. 23, § 3777, subd. (b)(3).) It need not consider every conceivable alternative to a project, but instead, it "must consider a reasonable range of potentially feasible alternatives that will foster informed decision making and public participation." (State CEQA Guidelines § 15126.6, subd. (a).) A lead agency is not required to consider alternatives that are infeasible. (*Ibid.*) This section describes the project alternatives evaluated in this Staff Report, the No Project Alternative, and the alternatives considered but eliminated from consideration during the scoping process.

With the exception of the No Project Alternative, all alternatives would add objectives and/or implementation measures to the Bay-Delta Plan and would not eliminate or modify any of the existing objectives or implementation measures. Further, in addition to the potential changes to the objectives and implementation measures discussed below and elsewhere in the Staff Report, the State Water Board is considering the addition of Tribal Beneficial Uses (TBUs) to the Bay-Delta Plan in the context of its Plan update for the reasonable protection of fish and wildlife. The State Water Board adopted definitions for TBUs in 2017, which are Tribal Subsistence Fishing (T-SUB), Tribal Tradition and Culture (CUL), and Subsistence Fishing (SUB).

The Bay-Delta Plan water quality objectives and program of implementation for the reasonable protection of fish and wildlife beneficial uses are set based on "the reasonable needs of all the consumptive and non-consumptive demands of the waters of the Estuary." (Bay-Delta Plan, Chapter III, Subsection C. *Water Quality Objectives for Fish and Wildlife Beneficial Uses.*) These needs are defined as Estuarine Habitat (EST), Cold Freshwater Habitat (COLD), Warm Freshwater Habitat (WARM), Migration of Aquatic Organisms (MIGR), Spawning, Reproduction, and/or Early Development of Fish (SPWN), Wildlife Habitat (WILD), and Rare, Threatened, or Endangered Species (RARE). In addition, related objectives are included to the extent they are to be met through the actions providing reasonable protection of EST, COLD, WARM, MIGR, SPWN, WILD, and RARE. These additional beneficial uses are Shellfish Harvesting (SHELL), Commercial and Sport Fishing (COMM), and Navigation (NAV). The proposal is to add T-SUB, SUB, and CUL to the Bay-Delta Plan using the same approach as SHELL, COMM, and NAV, which would recognize these needs as consumptive and non-consumptive demands that the actions providing reasonable protection of fish and wildlife beneficial uses are intended to meet. Because the TBUs are proposed in relation to fish and wildlife beneficial uses, they can be incorporated into the Plan relying on the environmental analyses for the current proposed updates.

7.2.2 Proposed Plan Amendments

The proposed Plan amendments are summarized in Section 7.1, *Introduction, Project Description, and Approach to Environmental Analysis*. As discussed in Section 7.1, the proposed Plan amendments are based on the 2018 State Water Board staff *Framework for a Possible Sacramento/Delta Update to*

the Bay-Delta Plan (Framework) that was released in advance of consideration of the 2018 updates to the Bay-Delta Plan and following completion of the 2017 *Scientific Basis Report in Support of possible New and Modified Requirements for Inflows from the Sacramento River and Its Tributaries and Eastside Tributaries to the Delta, Delta Outflows, Cold Water Habitat, and Interior Delta Flows* (Scientific Basis Report). The Scientific Basis Report evaluates the flow and other measures included in the proposed Plan amendments, as well as other ranges of flows evaluated in this Staff Report and described further below.

The proposed Plan amendments include the following objectives and implementation measures for the protection of fish and wildlife.

1. Inflows from the Sacramento River, its tributaries, and Delta eastside tributaries (the Cosumnes, Mokelumne, and Calaveras Rivers) that would require 55 percent unimpaired flow, with an adaptive range from 45 percent to 65 percent unimpaired flow.
2. Inflow-based Delta outflows that would require inflows required as part of the Bay-Delta Plan, including from the Sacramento/Delta tributaries and San Joaquin River and tributaries, to be provided as outflows.
3. Cold water habitat provisions that would require reservoirs to be operated in a manner that provides needed cold water habitat for salmonids or other measures to provide cold water habitat.
4. Interior Delta flows to reasonably protect native fish populations migrating through and rearing in the Delta, including: expanding the existing Bay-Delta Plan exports constraints based on San Joaquin River inflows to include all of April and May and variable exports based on hydrologic conditions; incorporation of Old and Middle River (OMR) flow constraints; and addition of October to the possible time period when the Delta Cross Channel (DCC) gate is required to be closed.
5. Monitoring, reporting, and evaluation measures and other provisions.

Following identification of the proposed Plan amendments in 2018, in 2022, when this draft Staff Report was nearing completion, the State Water Board received a memorandum of understanding (MOU) for proposed Voluntary Agreements (VAs) for updating the Bay-Delta Plan from various water users in the watershed, including the California Department of Water Resources (DWR) and U.S. Bureau of Reclamation (Reclamation), as well as the California Department of Fish and Wildlife (CDFW), California Natural Resources Agency, and California Environmental Protection Agency.

Consistent with State Water Board Resolution 2018-0059 adopting the 2018 amendments to the Bay-Delta Plan, the State Water Board is considering the proposed VAs as an alternative that could provide a possible path forward for updating the Bay-Delta Plan. The proposed VAs (Alternative 6) include flow assets and habitat restoration measures in the Sacramento/Delta for an 8-year term. The proposed VAs identify that there will be a regulatory implementation pathway that would exist in parallel with the VA implementation pathway. The staff-proposed regulatory pathway under the VA alternative would apply to non-VA parties and could apply to VA parties in the event the VAs are discontinued (this is discussed further in Section 7.2.3.7 *Proposed Voluntary Agreements [Alternative 6]*). The proposed regulatory pathway is largely consistent with the proposed Plan amendments, except that instead of being amended into the water quality objectives, the inflow, inflow-based Delta outflow, and cold water habitat provisions of the proposed Plan amendments would be included in the program of implementation and could become applicable in the future if

the VAs are not continued. Upon completion of the VA components, the State Water Board plans to hold additional public meetings and provide additional opportunities for public comments to receive input on possible incorporation of the VAs into the Bay-Delta Plan update and other input on the Plan update. The proposed VAs alternative (Alternative 6) is described in more detail below.

7.2.3 Alternatives

This section describes additional alternatives that are also being evaluated and may be considered for adoption by the State Water Board, including both stand-alone alternatives and modular alternatives that could be layered onto the stand-alone alternatives. The stand-alone alternatives include the proposed Plan amendments, a No Project Alternative (Alternative 1), a Low Flow Alternative (lower flows than the proposed Plan amendments) (Alternative 2), a High Flow Alternative (higher flows than the proposed Plan amendments) (Alternative 3), and the Proposed Voluntary Agreements Alternative (Alternative 6). The No Project Alternative is included to provide a comparison of the impacts of approving the project with the impacts of not approving the project. The Low Flow and High Flow Alternatives (referred to as *other flow alternatives*) would require lower or higher amounts of inflow to the Delta but otherwise would be consistent with the proposed Plan amendments.

Modular Alternatives 4a, 4b, and 4c include three interior Delta flow and fall Delta outflow variations. Alternative 4a (Exclusion of Interior Delta Flow and Fall Delta Outflow Related Amendments) excludes interior Delta flow and fall Delta outflow provisions included in the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) Biological Opinions (BiOps) for operation of the SWP and CVP and CDFW Incidental Take Permit (ITP) for operation of SWP. Alternative 4b (Head of Old River Barrier Alternative) requires installation of a Head of Old River Barrier (HORB) or alternative mechanisms to prevent San Joaquin River-origin anadromous fish from being drawn into the Delta export facilities. Alternative 4c (Extended Export Constraint Alternative) would require additional export constraints as a function of San Joaquin River flows (commonly referred to as the *San Joaquin River inflow to export ratio* or *I:E*). A modular drought alternative includes two variations that could help to address limited water supplies during drought. Alternative 5a (Instream Flow Protection Provision Alternative) would require water diverters (in addition to DWR and Reclamation) to bypass water needed to meet existing water quality objectives during drought circumstances similar to existing standard water right Term 91; Alternative 5b (Shared Water Shortage Provision Alternative) would require all water users to reduce their use during drought conditions. Alternatives 4a, 4b, and 4c could be adopted in combination with the proposed Plan amendments or other flow alternatives. Alternatives 5a and 5b could be adopted in combination with the proposed Plan amendments, other flow alternatives, or the Proposed VAs. Modular Alternative 6a (Protection of Voluntary Agreement Flows Alternative) would identify as part of the program of implementation additional measures to protect the base upon which the VA flows are intended to be added from new or expanded water diversions and could be adopted in combination with the Proposed VAs.

7.2.3.1 Alternatives Analyses

Due to the size and complexity of Sacramento/Delta water supply and use, the environmental analyses are necessarily broad to cover the wide range of foreseeable compliance measures and responses that may result. The environmental impacts of changes in hydrology and water supply under the proposed Plan amendments are assessed in detail in the primary resource sections

numbered 7.3 through 7.20 in Chapter 7, *Environmental Analysis*. Environmental impacts from compliance methods and response actions that involve construction are evaluated in Sections 7.21, *Physical Habitat Restoration and Other Ecosystem Projects*, and 7.22, *New and Modified Facilities*. Economic effects of the proposed Plan amendments are evaluated in Chapter 8, *Economic Effects and Other Considerations*. The environmental impacts and economic effects of the proposed VAs (Alternative 6) are presented in Chapter 9, *Proposed Voluntary Agreements*. Except for the No Project Alternative, all alternatives have similar elements to the proposed Plan amendments; therefore, the primary analyses in Chapter 7 are relied on for comparing impacts where possible for efficiency and to avoid redundancy. The environmental impacts and economic effects of the No Project Alternative, Low Flow Alternative, High Flow Alternative, and modular alternatives are further evaluated in Section 7.24, *Alternatives Analysis*.

The alternatives are being evaluated for their ability to meet the purposes and goals of updating the Bay-Delta Plan, feasibility, and ability to avoid significant impacts on the environment. Specifically, the project is a restoration project that is intended to provide for the reasonable protection of fish and wildlife beneficial uses through restoration of the Delta ecosystem over time. The decision on how to move forward to protect such a significant resource requires careful consideration. Providing additional water to benefit the environment will be difficult for various sectors that have come to rely on this water, especially considering climate change and other factors increasing pressure on water supplies for human uses and for fish and wildlife. All alternatives and variations described in this Staff Report are available for consideration and adoption during the public planning process. After the public review of this draft Staff Report, certain alternatives may be rejected for not meeting the purposes and goals of the project or as not feasible, with written findings explaining the reasoning in the Staff Report.

7.2.3.2 No Project Alternative (Alternative 1)

California Code of Regulations, title 14, section 15126.6, subdivision (e), provides for an evaluation of a no project alternative and its impacts. The purpose of a no project alternative is to compare the impacts of approving a project with the impacts of not approving a project. When a project is the amendment of a regulatory plan, such as the Bay-Delta Plan, the no project alternative will be the continuation of the existing plan into the future. In evaluating the impacts of a no project alternative, a lead agency should consider what is reasonably expected to occur in the future.

Alternative 1 is the No Project Alternative. The No Project Alternative assumes the continued implementation of the State Water Board's 2006 Bay-Delta Plan, as implemented by State Water Board Decision 1641 (D-1641)[1] (revised March 15, 2000). However, No Project Alternative conditions differ from the existing conditions baseline because existing flows in the Sacramento/Delta watershed, including baseline Delta inflows and outflows, are generally substantially higher than the minimum flows required under D-1641 and other regulatory requirements. Under the No Project Alternative, it is expected that inflows and outflows would

[1] In December 2018, the State Water Board revised the Bay-Delta Plan to include new and revised southern Delta salinity and Lower San Joaquin River flow objectives and a revised program of implementation to achieve those objectives. It did not amend elements of the Bay-Delta Plan that are now being considered for revision in this Staff Report. For ease of reference in this discussion, this section refers to the 2006 Bay-Delta Plan instead of the 2018 Bay-Delta Plan because D-1641 implements the Sacramento River and Delta elements of the 2006 Bay-Delta Plan that have been carried forward unchanged in the 2018 Bay-Delta Plan.

decrease over time due to continuation of increasing water demands. This is based on observed historical conditions in the absence of instream flow protections.

Chapter 3 identifies the magnitudes of existing Delta outflows compared to minimum required Delta outflow (MRDO), illustrating that existing outflows are generally several times greater than MRDO. Existing flows include unprotected Delta outflows that are not currently regulatorily required and as such could be diminished in the future as a result of exercising existing water rights more fully, since many water rights are not currently fully exercised, or due to new water rights in the absence of additional regulatory requirements. In addition, there are very limited existing flow requirements for inflows in the Bay-Delta Plan, and many streams have limited or no requirements that prevent flows from being completely removed from streams. Therefore, under the No Project Alternative, existing Delta inflows and Delta outflows would be expected to be reduced over time to levels below baseline.

In addition, the No Project Alternative assumes that flows and water quality conditions required under D-1641 could be suspended at times through approval of possible Temporary Urgency Change Petitions (TUCPs) that could occur during future drought and drought recovery periods. If approved by the State Water Board, future TUCPs could result in diminished Delta inflows and Delta outflows that are lower than flows required under D-1641 at times, and associated increases in salinity levels. Under D-1641, DWR and Reclamation assumed responsibility for meeting existing Delta outflow and salinity objectives and have subsequently submitted TUCPs to the State Water Board requesting modification of these obligations during drought periods and drought recovery periods. The purpose of these TUCP requests was in large part to provide for maintaining reservoir storage supplies for salinity control, minimal water supplies, and temperature management for the protection of the fishery. Exhaustion of these supplies is exacerbated in drought conditions due to the focused responsibility of DWR and Reclamation to meet these requirements rather than those obligations being distributed broadly over the watershed.

The State Water Board has approved multiple TUCPs in recent years related to SWP and CVP (collectively, Projects) D-1641 requirements, including TUCPs submitted by the Projects in 2014, 2015, 2016, 2021, 2022, and 2023 (petitions were also submitted in 2008/2009). California law identifies TUCPs as limited to urgencies that cannot otherwise be avoided through the exercise of due diligence (Wat. Code § 1435, subd. (c)). However, it is foreseeable that the State Water Board may receive and could approve TUCPs during future drought and drought recovery periods. It is not possible to precisely quantify the effect that potential TUCPs could have on Delta outflow and salinity conditions under the No Project Alternative, given that the scope and extent of TUCPs could be variable consistent with the experience of prior TUCPs. The ability to consider TUCPs involving changes to water right requirements to implement water quality objectives is also contingent on temporary suspension of other requirements through Executive Orders issued pursuant to proclaimed states of drought emergency or other mechanisms that are uncertain. However, it is reasonable to assume that future TUCPs could be submitted and could result in temporary approvals of reductions to certain D-1641 flow requirements and increases in allowable flow-dependent salinity levels.

Although increased diversions and diminished flows in the Sacramento/Delta watershed are reasonably expected to occur in the future in the absence of additional regulatory requirements, it is not possible to precisely quantify the expected increase in diversions and reduction in Delta inflows and Delta outflows that would occur under the No Project Alternative. The degree to which increased diversions would occur depends on the types, amounts, and timing of additional water

diversions and any constraints placed on those diversions. Therefore, a range of conditions and effects is possible under the No Project Alternative. At one end of the range, future diversions under the No Project Alternative would be similar to baseline conditions. This scenario is unlikely because there are currently numerous infrastructure project proposals involving new or modified storage reservoirs and points of diversion in the Sacramento/Delta watershed, and it is foreseeable that Delta outflows would be reduced in the future as a result of additional water development projects. At the other end of the range, future diversions could reduce flows to regulatory minimums, including MRDO. The likely future condition would be somewhere in between, meaning that water users likely would increase diversions beyond current levels but not to minimum required flows (including MRDO) for all months and hydrologic conditions. This likely future condition is assumed in the analysis presented in Section 7.24, *Alternatives Analysis*.

The No Project Alternative would not result in beneficial environmental effects and would not satisfy the purpose and goals of the State Water Board's current efforts to update and implement the Bay-Delta Plan, including providing reasonable protection of fish and wildlife beneficial uses. As discussed in prior chapters, implementation of the 2006 Bay-Delta Plan has not been adequate to protect fish and wildlife throughout the watershed and throughout the year. Chapter 3 discusses that native species in the Bay-Delta ecosystem are experiencing an ecological crisis. For decades, valuable habitat has been disconnected and converted to farmland and urban uses, the quality of water in the channels has been degraded, there has been substantial overall reductions in flows and significant changes in the timing and distribution of those flows, and species have been cut off from natal waters. This has led to severe declines, and in some cases extinctions, of native fish and other aquatic species. If the Bay-Delta Plan is not updated and implemented to provide for reasonable protection of fish and wildlife beneficial uses, ecological conditions are expected to continue to degrade, and populations of native fish and other aquatic species are expected to continue to decline.

Section 7.24, *Alternatives Analysis,* evaluates the potential impacts of the No Project Alternative. Since no new project would be approved or carried out in association with the No Project Alternative, potential mitigation is not included in the discussion of the impacts.

7.2.3.3 Low Flow Alternative (Alternative 2)

The Low Flow Alternative is similar to the proposed Plan amendments in that it would establish new and modified objectives and implementation measures for the protection of fish and wildlife for: (1) inflows for the Sacramento/Delta tributaries; (2) cold water habitat; (3) Delta outflows; (4) interior Delta flows (flow and water project operational requirements); and (5) other monitoring, special studies, and other associated provisions. However, under the Low Flow Alternative, the new numeric inflow objective for the Sacramento/Delta tributaries would require between 35 and 45 percent unimpaired flow. This differs from the numeric inflow objective under the proposed Plan amendments, which would require flows of 55 percent unimpaired flow with an adaptive range from 45 to 65 percent unimpaired flow. The numeric inflow objectives and Delta outflow objective under the Low Flow Alternative would require a smaller amount of inflow to the Delta, and required Delta outflows would be less than those required under the proposed Plan amendments.

Implementation of this alternative would result in changes in Sacramento/Delta tributary inflows, reservoir levels, Delta inflows, Delta interior flows, and Delta outflows compared to baseline conditions. Implementation of the Low Flow Alternative would also result in reductions of

Sacramento/Delta supply for agricultural and municipal uses, and refuges. Chapter 2, *Hydrology and Water Supply*, provides details about current conditions as a percentage of unimpaired flow for individual tributaries in the Sacramento/Delta watershed. Chapter 6, *Changes in Hydrology and Water Supply*, and Appendix A1, *Sacramento Water Allocation Model Methods and Results*, provide details regarding modeled changes in hydrology and changes in water supply under the Low Flow Alternative, the proposed Plan amendments, and the High Flow Alternative. Overall, the changes in hydrology and water supply that would occur under the Low Flow Alternative are similar to but less than those that would occur under the proposed Plan amendments. Compared to baseline conditions, the changes in hydrology that would occur under the Low Flow Alternative would generally be smaller in magnitude and closer to baseline conditions compared to the changes that would occur under the proposed Plan amendments.

At the same time, many of the beneficial environmental effects under the Low Flow Alternative would be more limited compared to those under the proposed Plan amendments. Compared to the proposed Plan amendments, this alternative would be less effective at meeting the purpose and goals of the State Water Board's current efforts to update and implement the Bay-Delta Plan, including providing reasonable protection of fish and wildlife beneficial uses.

Section 7.24, *Alternatives Analysis*, provides a discussion of the potential environmental impacts of the Low Flow Alternative. The potentially significant, less-than-significant, and beneficial environmental effects of the Low Flow Alternative on various environmental resource areas are identified in Section 7.24. Section 7.24 also identifies mitigation measures that could avoid or reduce potentially significant impacts of the Low Flow Alternative.

7.2.3.4 High Flow Alternative (Alternative 3)

The High Flow Alternative is similar to the proposed Plan amendments and the Low Flow Alternative (Alternative 2) in that it would establish new and modified objectives and implementation measures for the protection of fish and wildlife for: (1) inflows for the Sacramento/Delta tributaries; (2) cold water habitat; (3) Delta outflows; (4) interior Delta flows (flow and water project operational requirements); and (5) other monitoring, special studies, and other associated provisions. However, under the High Flow Alternative, the new numeric inflow objective for the Sacramento/Delta tributaries would require between 65 and 75 percent unimpaired flow. This differs from the numeric inflow objective under the proposed Plan amendments, which would require flows of 55 percent unimpaired flow with an adaptive range from 45 to 65 percent unimpaired flow. The numeric inflow objective and Delta outflow objective under the High Flow Alternative would require a larger amount of inflow to the Delta, and required Delta outflows would be greater than those under the proposed Plan amendments.

This alternative could provide for Delta inflows and Delta outflows identified in the State Water Board's 2010 report titled *Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem* (Delta Flow Criteria Report) (^SWRCB 2010). The Delta Flow Criteria Report made a number of findings and identified specific criteria for inflows, outflows, and interior Delta flows if fishery protection was the sole purpose for which waters were put to beneficial use without considering the need for cold water reserves and balancing of supplies for other beneficial uses of water. The Delta Flow Criteria Report specifically identified a Delta outflow criteria of 75 percent unimpaired Delta outflow from January through June and an inflow criteria of 75 percent unimpaired Sacramento River inflow from November through June.

However, the Delta Flow Criteria Report acknowledged that it may not be possible to attain all the identified flow criteria in all years and maintain adequate storage for temperature management for the various runs of Chinook salmon and other sensitive species. The report also noted that there are many other important beneficial uses that these waters support such as municipal, industrial, agricultural, hydropower, recreation, and environmental uses such as wetlands and refuge water supplies that must be considered when determining regulatory flow requirements. Those other considerations are part of the analysis of this alternative, the proposed Plan amendments, and the other alternatives.

The High Flow Alternative would result in changes in Sacramento/Delta tributary inflows, reservoir levels, Delta inflows, Delta interior flows, and Delta outflows compared to baseline conditions. The High Flow Alternative would also result in reductions of Sacramento/Delta supply for agriculture and municipal uses, and refuges. Chapter 2, *Hydrology and Water Supply*, provides details about current conditions as a percentage of unimpaired flow for individual tributaries in the Sacramento/Delta watershed. Chapter 6, *Changes in Hydrology and Water Supply*, and Appendix A1, *Sacramento Water Allocation Model Methods and Results*, provide details regarding modeled changes in hydrology and changes in water supply under the Low Flow Alternative, the proposed Plan amendments, and the High Flow Alternative. Overall, the changes in hydrology and water supply that would occur under the High Flow Alternative are similar to but greater than those that would occur under the proposed Plan amendments. Compared to baseline conditions, the changes in hydrology that would occur under the High Flow Alternative would generally be larger in magnitude and further from baseline conditions compared to the changes that would occur under the proposed Plan amendments. With respect to carryover storage in rim reservoirs (needed for cold water habitat), with higher instream flow requirements, it would be difficult to maintain storage levels while maintaining even greatly reduced levels of water supplies. In addition, the changes in water supply that would occur under the High Flow Alternative would also be greater in magnitude and further from baseline conditions compared to the changes that would occur under the proposed Plan amendments. Because environmental impacts would be greater under the High Flow Alternative than the proposed Plan amendments, many of the potentially significant impacts are not likely to be mitigated to less-than-significant levels.

Although the required Delta inflows would be higher under the High Flow Alternative compared to the proposed Plan amendments and would provide ecosystem benefits, the beneficial environmental effects under the High Flow Alternative would be limited due to significant challenges in maintaining suitable water temperatures for cold water aquatic species and carryover storage for environmental and water supply purposes. The Delta Flow Criteria Report acknowledged that the identified flow criteria should be tempered by the additional need to maintain cold water resources in reservoirs on tributaries to the Delta until improved passage and other measures are taken that would reduce the need for maintaining cold water supplies in reservoirs. Reservoir storage results presented in Chapter 6 and Appendix A1 suggest that carryover storage levels would be greatly reduced under the High Flow Alternative (particularly the 75 scenario) in numerous reservoirs in the Sacramento/Delta watershed. Without adequate carryover storage, there would be significant challenges in maintaining suitable downstream water temperatures to support native cold water fish species such as Chinook salmon and steelhead. Temperature modeling results presented in Appendix A6, *Water Temperature Modeling for the Sacramento, Feather, and American Rivers*, specifically suggest significant challenges in maintaining suitable water temperatures on the Sacramento, Feather, and American Rivers under the High Flow Alternative.

Section 7.24, *Alternatives Analysis*, provides a discussion of the potential environmental impacts of the High Flow Alternative. The potentially significant, less-than-significant, and beneficial environmental effects of the High Flow Alternative on various environmental resource areas are identified in Section 7.24. Section 7.24 also identifies mitigation measures that could avoid or reduce potentially significant impacts of the High Flow Alternative.

7.2.3.5 Modular Alternatives for Interior Delta Flows/Fall Delta Outflow (Alternatives 4a, 4b, and 4c)

As discussed in Chapter 5, *Proposed Changes to the Bay-Delta Plan for the Sacramento/Delta*, the Bay-Delta Plan includes objectives in the interior Delta to protect fish and wildlife from impacts related to the operations of the SWP and CVP that limit exports and require closing of the DCC at specified times. As described in more detail in Chapter 5 and Section 7.1, *Introduction, Project Description, and Approach to Environmental Analysis*, the proposed Plan amendments (and other flow alternatives) would add additional restrictions on exports as a function of San Joaquin River flows (I:E), DCC gate requirements, OMR reverse flow constraints, and fall Delta outflow requirements that are based on constraints from NMFS and USFWS BiOps and the CDFW ITP for the operations of the SWP and CVP.

Alternative 4 includes three modular alternatives that could modify the interior Delta flow and fall Delta outflow provisions of the proposed Plan amendments or the other flow alternatives. In recognition that it may not be necessary or supported to incorporate interior Delta flow and fall Delta outflow constraints that are addressed in BiOps and the ITP for the operations of the SWP and CVP in the Bay-Delta Plan, Alternative 4a (Exclusion of Interior Delta Flow and Fall Delta Outflow Related Amendments) was developed to evaluate impacts if these provisions were removed from the proposed Plan amendments. The Head of Old River Barrier Alternative (Alternative 4b) was developed in response to scoping comments and would require installation of the HORB by DWR and Reclamation during April and May, or similar measures to achieve equivalent benefits as the HORB, to protect outmigrating juvenile Chinook salmon and steelhead from the Lower San Joaquin River from the impacts of exports. The Extended Export Constraint Alternative (Alternative 4c) was also developed in response to scoping comments and would extend the export constraints based on San Joaquin River flows during the entire February through June time period of the Lower San Joaquin River flow objectives adopted in 2018 to provide additional protection from export related effects to juvenile fish species that are present in the interior Delta during the spring, including outmigrating juvenile salmonids that are intended to be protected by the Lower San Joaquin River flow objectives that were adopted in 2018.

Section 7.24, *Alternatives Analysis*, provides a discussion of the potential environmental impacts of the Exclusion of Interior Delta Flow and Fall Delta Outflow Related Amendments, Head of Old River Barrier, and Extended Export Constraint modular alternatives. The potentially significant, less-than-significant, and beneficial environmental effects on various environmental resource areas are identified in Section 7.24. Section 7.24 also identifies mitigation measures that could avoid or reduce potentially significant impacts of these modular alternatives for interior Delta flows and fall Delta outflow.

Exclusion of Interior Delta Flow and Fall Delta Outflow Related Amendments (Alternative 4a)

The proposed Plan amendments and other flow alternatives include interior Delta flows and fall Delta outflow provisions that are based on BiOp and ITP provisions, including additional restrictions

on exports as a function of San Joaquin River flows (I:E), OMR reverse flow constraints, and fall Delta outflow requirements that are based on constraints from NMFS and USFWS BiOps and the CDFW ITP for the operations of the SWP and CVP. The BiOps and ITP have changed since the 2018 Framework was released identifying the proposed Plan amendments. The most significant change related to interior Delta flows was removal of CVP export constraints as a function of San Joaquin River flows that resulted from the 2019 NMFS BiOp.

The BiOps and ITP are in the process of being updated further, with anticipated possible changes to interior Delta flow requirements for OMR flows and export constraints as a function of San Joaquin River flows (referred to as *spring Delta outflow* in the ITP). No changes to DCC gate closure requirements are anticipated. As described further in Chapter 5, *Proposed Changes to the Bay-Delta Plan for the Sacramento/Delta*, and Section 7.1, *Introduction, Project Description, and Approach to Environmental Analysis*, the proposed Plan amendments (and other flow alternatives) include flexibility in the proposed OMR flow provisions that can provide for consistency with updated BiOp and ITP provisions as appropriate. The export constraints based on San Joaquin River flows included in the proposed Plan amendments and other flow Alternatives, however, do not reflect removal of these constraints from the CVP. The fall Delta outflow provisions that are included in the proposed Plan amendments and other flow alternatives are consistent with the existing BiOps and ITP and are not expected to change significantly.

The Exclusion of Interior Delta Flow and Fall Delta Outflow Related Amendments Alternative evaluates the effects of excluding the new interior Delta flow and fall Delta outflow components of the proposed Plan amendments and other flow alternatives that are based on BiOp and ITP provisions. Because the OMR flow, DCC gate closure, and fall Delta outflow provisions of the proposed Plan amendments are largely consistent with current and expected future conditions, removal of these provisions would not be expected to be significant. However, removal of the export constraints based on San Joaquin River inflows could have a larger effect if those provisions are not maintained into the future, with greater effects at lower flow levels. Accordingly, this alternative largely evaluates removal of the new I:E provisions from the proposed Plan amendments and other flow alternatives.

Head of Old River Barrier Alternative (Alternative 4b)

The Head of Old River Barrier Alternative would require installation of the HORB by DWR and Reclamation during April and May to prevent juvenile Chinook salmon and steelhead from the San Joaquin River from being entrained into the interior Delta and impinged at the SWP and CVP facilities, or otherwise being subject to poor habitat conditions and associated low survival in the interior Delta. As part of this alternative, DWR and Reclamation could propose similar measures to the State Water Board for approval to achieve equivalent benefits as the HORB (e.g., nonphysical barriers).

The rock barrier at the confluence of the lower San Joaquin River with Old River in the Delta near the SWP and CVP export facilities, referred to as the *HORB*, was previously installed for these purposes and others beginning in 1969. The HORB was also included as part of the Vernalis Adaptive Management Program (VAMP) that was implemented as an experiment pursuant to D-1641 in lieu of implementation of the 1995 Bay-Delta Plan Lower San Joaquin River flow objectives for an interim period. The studies conducted pursuant to the VAMP studies and other studies have indicated that the HORB may be an effective mechanism to protect outmigrating San Joaquin River salmonids that are most susceptible to the impacts of the SWP and CVP exports due to

the location of the export facilities at the confluence of the lower San Joaquin River with the Delta. However, the HORB was discontinued as part of the 2019 BiOp reconsultation process due to some uncertainty about its effectiveness.

Alternative 4b would require installation of the HORB, or alternate measures, for an interim period (10 years) and would require associated monitoring and evaluations to further assess its effectiveness, including independent peer review to confirm the findings of those analyses. Under this alternative, if the HORB is found to be effective, it could be required to be continued beyond the initial 10-year period. If the HORB is found to be ineffective, it would be discontinued.

Extended Export Constraint Alternative (Alternative 4c)

Under the Extended Export Constraint Alternative, the San Joaquin River flow-based export constraints would be expanded and extended to provide for improved protection of migrating San Joaquin River salmonids and other native species. This alternative would modify the San Joaquin export constraint portion of the proposed Plan amendments or other flow alternatives but otherwise would not modify these alternatives. Under the current Bay-Delta Plan, exports are limited to 100 percent of the flow of the San Joaquin River at Vernalis or 1,500 cubic feet per second, whichever is larger, during the San Joaquin River 31-day pulse flow period of roughly April 15–May 15 of each year. This constraint is referred to as the *inflow-to-export objective* or *I:E objective*. As discussed in Chapter 5, *Proposed Changes to the Bay-Delta Plan for the Sacramento/Delta*, under the proposed Plan amendments, the existing I:E objective would be made consistent with the 2009 NMFS BiOp, with offramps consistent with the 2020 ITP, which requires limited exports of 25 to 100 percent of San Joaquin River flows based on water year type from April 1–May 31. The proposed Plan amendments provide flexibility to shift the 61-day window to apply at any time during the February through June San Joaquin River flow and spring pulse flow period to maximize protection for fish species, if agreeable to NMFS and CDFW.

Under the Extended Export Constraint Alternative, the export constraints would be expanded to cover the entire San Joaquin River spring and spring pulse flow period of February through June to provide for expanded and enhanced protection of migrating San Joaquin River salmonids and other native species by providing more natural outflow conditions from the San Joaquin River to the Delta and San Francisco Bay. As discussed in more detail in Chapter 3, *Scientific Knowledge to Inform Fish and Wildlife Flow Recommendations*, currently, a significant portion of the San Joaquin River is diverted at the export facilities, resulting in unnatural flow patterns and inhospitable conditions for native fish species in the Delta and migrating in the San Joaquin River. This modular alternative would be expected to provide for improved, more natural flow patterns to benefit native species. However, this alternative would also result in significant additional water supply impacts that may not be reasonable.

7.2.3.6 Modular Drought Alternatives (Alternatives 5a and 5b)

During the adoption of the 2018 Bay Delta Plan, the State Water Board directed staff to evaluate drought-related measures in the Sacramento/Delta Update to the Bay-Delta Plan. Consistent with this direction and to address the issue of limited water supplies during dry periods, the modular drought alternatives include two possible implementation provisions that could be applied as part of the proposed Plan amendments, other flow alternatives or the proposed VAs during dry periods, such as declared drought emergencies, to address limited water supplies for meeting flow-based water quality objectives and related requirements. During all drought years since the 1995 Bay-

Delta Plan was implemented, there have been difficulties meeting the existing flow-based water quality objectives; and associated TUCPs have been submitted by the Projects requesting modification of terms of the CVP and SWP water right permits and licenses included in D-1641, including requirements to meet Delta outflow and salinity requirements, as well as other requirements.

The modular drought alternatives include two possible variations, an Instream Flow Protection Provision and a Shared Water Shortage Provision. Alternative 5a (Instream Flow Protection Provision) would build upon recent drought-related curtailments under emergency regulations that required water right holders to curtail their water diversions when no water was available at their priority of right. Alternative 5b (Shared Water Shortage Provision) would require all water users in the Sacramento/Delta watershed to conserve water during times of drought in order to contribute toward meeting the Bay-Delta Plan objectives, including instream flows, cold water habitat, and salinity control.

Section 7.24, *Alternatives Analysis*, discusses the potential environmental impacts of the Instream Flow Protection and Shared Water Shortage Provisions. The potentially significant, less-than-significant, and beneficial environmental effects on various environmental resources are identified in Section 7.24. Section 7.24 also identifies mitigation measures that could avoid or reduce potentially significant impacts from these modular drought alternatives.

Instream Flow Protection Provision (Alternative 5a)

Currently, pursuant to D-1641, DWR's water rights for the SWP and Reclamation's water rights for the CVP are conditioned on meeting Delta flow-dependent water quality objectives included in the Bay-Delta Plan. At times, DWR and Reclamation meet the flow and water quality objectives by bypassing flows, releasing previously stored water, or reducing Delta diversions. When natural and abandoned flows are inadequate to meet Delta flow and water quality requirements, diversions by other water users can also result in the need for the Projects to release previously stored water in order to meet water quality requirements. During drought conditions, these quantities of water can be significant and can deplete reservoir storage supplies needed for multiple purposes, including meeting water quality and temperature requirements later in the same year or in the following year.

To protect previously stored Project water and to prevent water users from diverting natural flows contributing to Delta flow and water quality requirements, the State Water Board included Term 91 in the permits and licenses of the most junior water diverters in the Delta watershed. Term 91 enables the State Water Board to curtail water diversions when the Projects are required to release previously stored water to meet Delta flow and water quality requirements and other in-basin (within the Delta watershed) non-Project demands, referred to as *supplemental Project water*. Term 91 effectively prevents water right holders subject to the term from diverting the Projects' stored water and makes those users partially responsible for bypassing natural and abandoned flows needed to meet Delta flow-dependent water quality objectives.

Term 91 has been in use for over 40 years. However, Term 91 currently applies only to a very small number (115) of the roughly 17,000 water rights and claims of right in the Delta watershed, which significantly limits the effectiveness of these curtailments. To address water supply shortages during drought, this modular alternative would expand a Term 91-type approach to other more senior water right holders and claimants.

Expansion of a Term 91-type approach has been evaluated by the State Water Board in the past, including in the December 2021 Staff Workshop on Possible Alternative Approaches to Address Water Supply Shortages in the Delta Watershed, November 1999 Environmental Impact Report for implementation of the 1995 Bay-Delta Plan and a 2012 report from the State Water Board's Delta Watermaster. Expansion of a Term 91-type approach would reduce the need for the Projects to release previously stored water to meet the existing Bay-Delta Plan objectives. Instead, other diverters in addition to the Projects would need to bypass natural flows until the objectives are met. The Projects would still have initial responsibility for bypassing flows to meet the objectives, but if more water was needed, others would also need to bypass flows. This could reduce or eliminate the need for the Projects to release previously stored water, which could reduce or avoid instances where TUCPs are submitted by the Projects during drought and recovery periods that request modifications of Delta outflows, salinity, and other requirements in the Bay-Delta Plan to preserve coldwater pools and carryover storage.

Shared Water Shortage Provision (Alternative 5b)

Under the Shared Water Shortage Provision, all water right holders and claimants (except *de minimis* users) in the Sacramento/Delta watershed would be required to conserve water under drought conditions (including declared drought emergencies) to contribute toward meeting the Bay-Delta Plan objectives, including instream flows, cold water habitat, and salinity control requirements. This provision would specify that all water users have an obligation to contribute to water quality and flow in the Delta, and these obligations would not be the sole responsibility of the Projects as currently required under D-1641. Under this alternative, all water right holders and claimants would be required to reduce their consumptive use of water by a specific percentage (e.g., 20 percent) to contribute toward instream flows under drought conditions. The flow contributions would be required to remain instream and would be unavailable for diversion by other users. This provision would help to avoid TUCPs and degraded environmental conditions during drought and reduce concentrating water supply-related impacts on a small number of users through sharing of smaller water supply shortages to a broad group of users.

Section 7.24, *Alternatives Analysis*, discusses the potential environmental impacts of the Shared Water Shortage Provision Alternative. The potentially significant, less-than-significant, and beneficial environmental effects of the Shared Water Shortage Provision Alternative on various environmental resource areas are identified in Section 7.24. Section 7.24 also identifies mitigation measures that could avoid or reduce potentially significant impacts of the Shared Water Shortage Provision Alternative.

7.2.3.7 Proposed Voluntary Agreements (Alternative 6)

As discussed above and in more detail in Chapter 9, *Proposed Voluntary Agreements*, in 2022 during the process to prepare this draft Staff Report, the State Water Board received a memorandum of understanding (MOU) signed by state and federal agencies and water users proposing VAs for updating and implementing the Bay-Delta Plan (also referred to as the VA Term Sheet). The State Water Board is in the process of evaluating and considering the proposed VAs and may decide to move forward with the proposed VAs for updating and implementing the Bay-Delta Plan for VA tributaries upon completion of additional components of the proposed VAs and after consideration of comments on this draft Staff Report.

The proposed VAs (Alternative 6) include a combination of proposed flow and non-flow habitat restoration measures on a portion of the Sacramento/Delta tributaries (see Table 7.2-1) that are proposed over 8 years (with the intent to extend the term), including varying amounts of increased flows (depending on water year type) and non-flow habitat restoration actions targeted at improving spawning and rearing capacity for juvenile salmonids, estuarine species, and other native fish and wildlife. The VA flows are intended to be additive to the Delta outflows required by D-1641 and resulting from the 2019 BiOps (though the VAs acknowledge that the BiOps may change). A possible mechanism for protecting the VA flows from diversion by other water users and ensuring that the conditions upon which the VAs are intended to be additive are not reduced is discussed below in Modular Alternative 6a.

Table 7.2-1. Proposed VA Assets

	Flows (thousand acre-feet) by Water Year Type					Physical Habitat Restoration (acres)		
Location	C	D	BN	AN	W	Spawning	Instream Rearing	Floodplain
Sacramento		100	100	100		113.5	137.5	20,000
American[1]	30	40	10	10		25	75	
Yuba		50	50	50			50	100
Feather		60	60	60		15	5.25	1,655
Putah[2]	7	6	6	6		1.4		
Mokelumne (by Mokelumne Water Year Type)[3]		5	5	7			1	25
Delta		125*	125*	175*				5,227.5**
PWA Fixed Price Purchases	3	63.5	84.5	99.5	27			
PWA Market Price Purchases		50	60	83				
Permanent State Water purchases	65	108	9	52	123			
Friant (by San Joaquin Water Year Type)[4]		0-50	0-50	0-50				
Tuolumne (by San Joaquin Water Year Type)	37	62	78	27				

Flow assets are proposed to be additive to the Delta outflows resulting from State Water Board Revised Water Right Decision 1641 (D-1641) and implementation of the 2019 Biological Opinions for operations of the State Water Project and Central Valley Project.
C = Critical, D = Dry, BN = Below Normal, AN = Above Normal, W = Wet, * = foregone exports, ** = includes tidal wetland habitat. Blank cells indicate no proposed assets in that category. Water Year Types are based on Sacramento Valley Index unless otherwise noted.
[1] These flows would be deployed in three out of eight years of the VA in AN, BN, D, or C years.
[2] Flow contributions would be from modified operations and not be protected as Delta outflow. Discussions for these VAs are still underway.
[3] Flow contributions would be from modified operations and not be protected as Delta outflow. Discussions for these VAs are still underway. Mokelumne VA reflects updated volumes from the Mokelumne VA Term Sheet addendum (August 2022); Mokelumne VA based on Joint Settlement Agreement water year types.

[4] Flow contributions were intended to result from forgone recapture of up to 50 TAF of San Joaquin River Restoration Program flows provided based on San Joaquin Water Year Type. The Friant parties have withdrawn from providing VA flows at the time of this writing and future participation is uncertain.

The VA flow and non-flow restoration actions are proposed as implementation measures for an existing and proposed new narrative water quality objective in the Bay-Delta Plan. Specifically, the VAs propose (1) a new narrative objective to achieve the viability of native fish populations; and (2) to provide the participating parties' share, during implementation of the VAs, to contribute to achieving the existing Narrative Salmon Protection Objective by 2050.

The VAs include proposed governance and science programs to direct flows and habitat restoration, conduct assessments, and develop strategic plans and annual reports. The VAs propose that, in the eighth year of VA implementation, the State Water Board would consider the reports, analyses, information, and data from the VA science program, as well as recommendations from the VA governance committee and the Delta Independent Science Board, to decide the future of the VA program. The VA parties propose that if VA implementation is substantially achieving the stated objectives, the VA parties would continue implementation of the VAs without any substantial modification in terms. If the VAs are expected to achieve the stated objectives with some modifications, the VA parties could continue implementation with substantive modifications in terms. The VA parties propose that if in year 8 the VAs are not expected to achieve the stated objectives, then either: 1) new agreements may be negotiated, or 2) the State Water Board would impose a regulatory implementation pathway. This regulatory implementation pathway also would apply to non-VA parties. The proposed regulatory implementation pathway would be identified in the program of implementation for the Bay-Delta Plan and would require inflows, inflow-based Delta outflows, and cold water habitat measures consistent with the proposed Plan amendments, except that all of the operative provisions would be included in the program of implementation rather than in the objectives.

Because the proposed VAs were received after much of this Staff Report had been prepared, the proposed VAs are analyzed separately in Chapter 9. Additional detail regarding the proposed VAs is included in Chapter 9 and the associated appendices prepared by the VA parties to describe the proposed VAs, and the draft Scientific Basis Report Supplement. Chapter 9 provides a full environmental analysis of the VAs, including evaluation of the potentially significant, less-than-significant, and beneficial environmental effects of the proposed VAs and the Protection of Voluntary Agreement Flows modular alternative. Chapter 9 also identifies mitigation measures that could avoid or reduce potentially significant impacts of the VA proposal.

Protection of Voluntary Agreement Flows (Alternative 6a)

The VA Term Sheet identifies that the State Water Board will use its legal authorities to protect VA flows against diversions for other purposes for the term of the VAs. Protection of the VA flows is proposed as part of the VA alternative. The VA Term Sheet also identifies that all San Joaquin River watershed flows required as a result of implementing the 2018 Bay Delta Plan Update or VAs will be protected as Delta outflows. It is expected that the accounting developed for the VAs that is required to be approved by the State Water Board will provide for these flows to be bypassed by the SWP and CVP and contribute to Delta outflows. Because the VA flows are intended to be additive to required flows under D-1641 and resulting flows under the 2019 BiOps, additional mechanisms are needed to protect the base upon which the VA flows are intended to be additive from diversion.

Modular Alternative 6a, Protection of Voluntary Agreement Flows, would identify as part of the program of implementation additional measures to protect the base upon which the VA flows are intended to be added from new or expanded water diversions. Specifically, any new point of diversion of water or expanded point of diversion of water would not be authorized to divert water during the January through June time period unless Delta outflows were at levels determined in the State Water Board's 2017 Scientific Basis Report, or future equivalent analyses, to provide conditions expected to result in the recovery of a wide array of native fish and wildlife species. The Delta above Collinsville already is included in the State Water Board's list of Fully Appropriated Streams (FAS) from June 15 through August 31. This FAS listing would also be proposed to be expanded to include September through December except during high-flow events defined as the wettest 5 percent of historical hydrologic conditions. This alternative could also include an exception for *de minimis* diversions.

7.2.3.8 Other Alternatives Considered

The State Water Board already considered and rejected other alternative approaches to establishing flow requirements, including fixed flow schedules based on water year types. As discussed in the State Water Board's 2017 Scientific Basis Report (^SWRCB 2017b), retaining the spatial and temporal variability of a more natural flow regime is important in protecting a wide variety of ecosystem processes. Thus, the project purposes and goals reflect the importance of mimicking natural hydrographic conditions and providing functions essential to native fishes. Iterations of flow regimes that support these project purposes and goals are analyzed in this Staff Report under the alternatives. More rigid flow regimes that do not provide the functionality and variability of flows do not meet the project purposes and goals. Further, a fixed flow schedule is not adaptive to the changing climate.

The State Water Board also considered comments regarding the geographic scope of the Plan amendments, and identified and rejected an alternative that would limit the number of tributaries subject to the Bay-Delta Plan because it would not meet the project purpose and goals for providing flows that support connectivity between tributaries that support salmonids and other native fish species and the Delta.

The State Water Board also considered an alternative that would reduce existing Delta outflow and increase Delta salinity requirements during drought conditions in recognition of difficulties meeting existing requirements during drought conditions. This alternative was rejected for not meeting the project purposes and goals to support recovery and protection of native fish species. Instead, drought alternatives that help to meet existing Delta outflow and salinity requirements were developed (Alternatives 5a and 5b and alternatives that increase flows and the sources of those flows during dry periods).

The State Water Board also considered the linkage between inflow, reservoir operations, and cold water habitat protection, resulting in inclusion of cold water habitat protection provisions in the Flow Alternatives. All of the primary alternatives recognize the importance of connecting flows to appropriate physical habitat conditions and include non-flow habitat restoration actions. The Proposed Voluntary Agreements Alternative includes proposed non-flow habitat restoration actions; the Flow Alternatives provide for voluntary implementation plans that include physical habitat restoration and include recommendations to other entities for habitat restoration and other non-flow measures that may not be directly within the State Water Board's regulatory purview.

7.2.4 References Cited

7.2.4.1 Common References

^State Water Resources Control Board (SWRCB). 2010. *Development of Flow Criteria for the Sacramento–San Joaquin Delta Ecosystem*. Prepared pursuant to the Sacramento–San Joaquin Delta Reform Act of 2009. Final. August 3. Sacramento, CA.

^State Water Resources Control Board (SWRCB). 2017b. *Scientific Basis Report in Support of New and Modified Requirements for Inflows from the Sacramento River and its Tributaries and Eastside Tributaries to the Delta, Delta Outflows, Cold Water Habitat, and Interior Delta Flows*. Sacramento, CA.