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

CALIFORNIA Water Boards

State Water Resources Control Board

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Acronyms and Abbreviations

References within the text use the below acronyms and abbreviations.

Acronym/Abbreviation	Definition
AN	above normal water year type
Board or State Water Board	State Water Resources Control Board
BDMEP	Bay-Delta Monitoring and Evaluation Program
BN	below normal water year type
BiOp	Biological Opinion
C	critical water year type
CARE	Collective benefit, Authority to control, Responsibility, Ethics
cfs	cubic feet per second
CHABs	cyanobacterial harmful algal blooms
COP	Comprehensive Operations Plan
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
D	dry water year type
DCC	Delta Cross Channel
Delta eastside tributaries	Cosumnes, Mokelumne, and Calaveras Rivers
DFW	California Department of Fish and Wildlife
DO	dissolved oxygen
dS/m	deciSiemens per meter unit of electrical conductivity
DWR	California Department of Water Resources
EC	electrical conductivity
FASS	Fully Appropriated Stream Systems
FERC	Federal Energy Regulatory Commission
HABs	harmful algal blooms
HRL	Healthy Rivers and Landscapes
IEP	Interagency Ecological Program
ITP	Incidental Take Permit
LSJR	Lower San Joaquin River
MAF	million acre-feet
MOU	Memorandum of Understanding
mg/L	milligram(s) per liter

Acronym/Abbreviation	Definition
MMA	minimum monthly average
mmhos/cm	millimhos per centimeter
NDOI	Net Delta Outflow Index
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
OAL	California Office of Administrative Law
PMI	Best available estimate of the previous month's Eight River Index
Reclamation	United States Bureau of Reclamation
Regional Water Board	Regional Water Quality Control Board
RKI	River Kilometer Index
Sacramento/Delta	Sacramento River watershed, Delta eastside tributaries, and Delta
SDIP	South Delta Improvements Program
SJRMEP	San Joaquin River Monitoring and Evaluation Program
SMART	Specific, Measurable, Achievable, Relevant, and Time-bound
SMSCG	Suisun Marsh Salinity Control Gates
STM Working Group	Stanislaus, Tuolumne and Merced Working Group
SWP	State Water Project
TAF	thousand acre-feet
TBUs	Tribal and subsistence fishing beneficial uses
TEK	Traditional Ecological Knowledge
TMDL	Total Maximum Daily Load
Tribe	California Native American Tribe
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VSP	Viable Salmonid Population
VAs	Voluntary Agreements
W	wet water year type
WDRs	Waste Discharge Requirements
#DRA	#-day running average

[Note to reader: This revised draft of changes to the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Watershed (Bay-Delta) (Bay-Delta Plan) includes notes to reader like this note in italics to explain limited areas of the draft that are under development.]

Chapter 1. Introduction

1.1 Background

The San Francisco Bay/Sacramento-San Joaquin Delta watershed (Bay-Delta watershed or Bay-Delta) (Figure 1A and 1B) encompasses California's two major river systems, the Sacramento and San Joaquin Rivers, as well as numerous other tributaries to those rivers, the Delta and tributaries, Suisun Marsh, and San Francisco Bay. The Bay-Delta watershed is important to the natural environment and economy of California, providing drinking water to two-thirds of the State's population, and supplying some of the State's most productive agricultural areas. The Bay-Delta is one of the largest ecosystems for fish and wildlife habitat and production in the United States. In addition, the Bay-Delta watershed is also home to nearly 100 California Native American Tribes that rely upon these waterways, the surrounding lands, and the native fish and fauna for subsistence, cultural, ceremonial, and spiritual purposes. Historical and current human activities (e.g., water development, land use, wastewater discharges, introduced species, and harvesting), amplified by variations in natural conditions, have degraded the beneficial uses of the Bay-Delta watershed, as evidenced by the declines in populations of many native fish and other aquatic species.

The State Water Resources Control Board (State Water Board or Board) has previously adopted water quality control plans and policies to protect water quality and control the water resources that affect the beneficial uses of the Bay-Delta. These plans and policies were adopted consistent with section 13000 et seq. of the California Water Code and pursuant to the authority contained in section 13170. This Water Quality Control Plan covers the Bay-Delta estuary and tributary watersheds (Bay-Delta Plan or plan). The State Water Board will periodically review this plan, as discussed in section 4.6, pursuant to Water Code section 13240, to ensure that it provides reasonable protection for the designated beneficial uses.[1] Current and previous versions of the Bay-Delta Plan and supporting documents are available at: https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/wq_control_plans/index.html. A summary description of the most recent updates to the plan are provided in section 1.4.

[1] The federal Clean Water Act, at section 303 (c), also requires a review of federal "standards," as defined in the Act, contained in state water quality control plans. (33 U.S.C. § 1313 (c).) The review under section 13240 ordinarily is combined with a review of any federal standards in a state water quality control plan.

Figure 1. Maps of the Bay-Delta Estuary (A) and Watershed (B)

Figure 1A. Bay-Delta Estuary

Figure 1B. Bay-Delta Watershed

1.2 Purpose and Application of the Water Quality Control Plan

A water quality control plan consists of: (1) beneficial uses to be protected; (2) water quality objectives for the reasonable protection of beneficial uses; and (3) a program of implementation for achieving the water quality objectives. This plan establishes water quality objectives for which implementation can be accomplished by assigning responsibility to water right holders and water users to mitigate for the effects on the designated beneficial uses of their diversions and use of water. Together, the beneficial uses and the water quality objectives established to reasonably protect the beneficial uses are called water quality standards under the terminology of the federal Clean Water Act.

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

Most of the objectives in this plan have historically been, and will continue to be, implemented by assigning responsibilities to water right holders because the parameters to be controlled are primarily impacted by flows and water diversions. Chapter 2 identifies the beneficial uses that the plan is designed to protect; Chapter 3 contains the objectives designed to reasonably protect the beneficial uses; and Chapter 4 contains the program of implementation that identifies responsible parties and actions required to achieve the objectives. The State Water Board will implement this plan through water right or water quality actions, as necessary, including regulatory measures to protect water quality and flow, and recommendations to other entities. Where possible, implementation flexibility is provided to encourage creative collaboration and voluntary actions where appropriate.

The water quality objectives in this plan are established to protect the beneficial uses of water and prevent nuisance within the waters as specified in the plan. The program of implementation describes actions necessary to achieve the water quality objectives in this plan. Generally, if requirements contained in the Bay-Delta Plan differ from those contained in any water right order or water quality certification, the more stringent

requirement would control. Nothing in this plan precludes the State Water Board from identifying or requiring other actions in order to achieve the objectives in this plan or other plans and policies. The State Water Board retains its authority to carry out its responsibilities under the Water Code, article X, section 2 of the California Constitution, the public trust doctrine, or other legal obligations, through other water right or quality proceedings, including through regulation, water quality certifications, adjudicative water right proceedings, or other actions.

1.3 Legal Authority

The State Water Board has prepared this plan under the Porter-Cologne Water Quality Control Act. The Regional Water Boards have primary responsibility for formulating and adopting water quality control plans for their respective regions (Wat. Code, § 13240), but the State Water Board also is authorized, under Water Code section 13170, to adopt water quality control plans in accordance with the provisions of section 13240 et seq.[2]

One of the State Water Board's charges is to ensure that the State's waters are put to the best possible use, and that the public interest is served. In making decisions, the State Water Board must keep three major goals in mind: developing water resources in an orderly manner; preventing the waste and unreasonable use of water; and protecting the environment. This is consistent with the California Constitution, article X, section 2, which states:

> It is hereby declared that because of the conditions prevailing in this State the general welfare requires that the water resources of the State be put to beneficial use to the fullest extent of which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented, and that the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare. The right to water or to the use or flow of water in or from any natural stream or water course in this State is and shall be limited to such water as shall be reasonably required for the beneficial use to be served, and such right does not and shall not extend to the waste or unreasonable use or method of use or unreasonable method of diversion of water. . . .

(Cal. Const. Art. X, § 2.)

A program of implementation for achieving water quality objectives shall include, but not be limited to: (1) a description of the nature of actions which are necessary to achieve the objectives, including recommendations for appropriate action by any entity, public or private; (2) a time schedule for the actions to be taken; and (3) a description of

[2] The State Water Board also has authority to adopt State policy for water quality control under Water Code section 13140.

surveillance to be undertaken to determine compliance with the objectives. (Wat. Code, § 13242.)

Components in this plan will: (1) carry out provisions of the reasonable use doctrine (Cal. Const. Art. X, § 2; Wat. Code, §§ 100, 275, and 1050); (2) protect public trust resources (see National Audubon Society v. Superior Court (1983) 33 Cal.3d 419, 189 Cal.Rptr. 346); and (3) carry out common law and statutory principles pertaining to water rights (Wat. Code, §§ 174, 183, 1243, 1243.5, 1251, 1253, and 1256-1258). This plan addresses the interrelated fields of water quality and water supply and plans for their coordination.

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

After adopting this plan, the State Water Board will submit this plan to the U.S. Environmental Protection Agency (USEPA) for approval under the federal Clean Water Act. (33 U.S.C. section 1251 et seq.) To the extent that this plan addresses matters outside the scope of the Clean Water Act, this plan will be provided to the USEPA for its consideration as a matter of State/federal comity.

1.4 Bay-Delta Plan Updates

The Bay-Delta Plan is periodically updated. The most recent updates to the plan focus on the reasonable protection of fish and wildlife beneficial uses of water in the Sacramento River and its tributaries, Delta eastside tributaries (including the Calaveras, Cosumnes, and Mokelumne Rivers), and the Delta. These plan amendments include the following objectives and implementation measures for the reasonable protection of fish and wildlife:

[Note to reader: This section will be updated in the final draft.]

In 2018, the State Water Board adopted Bay-Delta Plan amendments at which time the following elements were updated:

- Lower San Joaquin River flow objectives to protect fish and wildlife beneficial uses and southern Delta salinity objective to protect agricultural beneficial uses;
- Program of implementation to achieve and determine compliance with the above objectives; and

- Monitoring and special studies to fill information needs and inform future updates to the objectives.

The most recent updates to the Bay-Delta Plan and the 2018 updates to the Bay-Delta plan are intended to work together to provide for the comprehensive update of the Bay-Delta Plan.

Chapter 2. Beneficial Uses

2.1 Beneficial Uses Protected by this Plan

A water quality control plan includes the designation or establishment of beneficial uses to be protected. (Wat. Code, § 13050, subd. (j).) The beneficial uses to be protected in this plan were established in the 1978 Delta Plan and the 1991 Bay-Delta Plan. These uses are carried over in this plan from earlier plans, including the 1995 and 2018 Bay-Delta Plans. This plan also designates Tribal Tradition and Culture beneficial use (CUL) for the Bay-Delta watershed, as discussed below.

The beneficial uses protected by this plan are presented below.

- Municipal and Domestic Supply (MUN) – Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.
- Industrial Service Supply (IND) – Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining cooling water supply, hydraulic conveyance, gravel washing, fire protection, and oil well repressurization.
- Industrial Process Supply (PRO) – Uses of water for industrial activities that depend primarily on water quality.
- Agricultural Supply (AGR) – Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.
- Ground Water Recharge (GWR) – Uses of water for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.
- Navigation (NAV) – Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.
- Water Contact Recreation (REC-1) – Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.
- Non-Contact Water Recreation (REC-2) – Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion is reasonably possible. These include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

- Shellfish Harvesting (SHELL) – Uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial or sports purposes.
- Commercial and Sport Fishing (COMM) – Uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.
- Warm Freshwater Habitat (WARM) – Uses of water that support warm water ecosystems including, but not limited to, preservation of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
- Cold Freshwater Habitat (COLD) – Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancements of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
- Migration of Aquatic Organisms (MIGR) – Uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.
- Spawning, Reproduction, and/or Early Development (SPWN) – Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.
- Estuarine Habitat (EST) – Uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).
- Wildlife Habitat (WILD) – Uses of water that support estuarine ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.
- Rare, Threatened, or Endangered Species (RARE) – Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under State or federal law as being rare, threatened, or endangered.
- Tribal Tradition and Culture (CUL) – Uses of water that support the cultural, spiritual, ceremonial, or traditional rights or lifeways of California Native American Tribes, including but not limited to, navigation, ceremonies, or fishing, gathering, or consumption of natural aquatic resources, including fish, shellfish, vegetation, and materials.

In addition, the plan incorporates the tribal and subsistence fishing beneficial uses defined by the State Water Board in 2017 as they relate to the reasonable protection of fish and wildlife; however, these uses are not designated by this plan for any waterbodies in the Bay-Delta watershed.

- Tribal Subsistence Fishing (T-SUB) – Uses of water involving the non-commercial catching or gathering of natural aquatic resources for consumption by individuals, households, or communities of California Native American Tribes to meet needs for sustenance.
- Subsistence Fishing (SUB) – Uses of water involving the non-commercial catching or gathering of natural aquatic resources, including fish and shellfish, for consumption by individuals, households, or communities, to meet needs for sustenance.

2.2 Designation of CUL and Incorporation of Tribal and Subsistence Fishing Beneficial Uses

In 2017, in collaboration with California Native American Tribes and the public, the State Water Board established and defined two beneficial uses unique to California Native American Tribes and a third beneficial use unique to people and communities who engage in subsistence fishing, which are Tribal Tradition and Culture (CUL), Tribal Subsistence Fishing (T-SUB), and Subsistence Fishing (SUB). Frequently, these beneficial uses are referred to collectively as Tribal Beneficial Uses (TBUs). This plan designates CUL for the Bay-Delta watershed and incorporates the other TBUs in the context of the plan's provisions for the reasonable protection of fish and wildlife.

The designation of CUL within the Bay-Delta watershed is based on substantial evidence provided to the State Water Board through tribal outreach and engagement efforts. Tribal representatives shared through written and verbal testimony the significance of salmon within tribal culture, including in creation stories, as a centerpiece of traditional ceremonies and feasts (such as traditional salmon bakes), and the general correlation of Native American life ways with the timing and locations of northern California salmon runs.

The State Water Board recognizes the centrality that vital fish populations have for cultural, spiritual, ceremonial, and traditional rights and lifeways of tribes in the Bay-Delta watershed. The CUL beneficial use is designated throughout the Bay-Delta watershed due to the cultural and spiritual importance of native fish and wildlife, particularly salmon, to California Native American Tribes. Salmonids utilize the watershed both temporally and spatially at various life stages, and the tribes' cultural and spiritual use is centered on the connectivity between themselves and their ancestors with these species and the ecosystem that supports them.

The reasonable protection of CUL as it relates to the tribes' cultural and spiritual connection to salmon overlaps with the reasonable protection of the aquatic life beneficial uses identified in the Bay-Delta Plan or designated in the applicable Regional Water Boards' water quality control plans, including EST, COLD, WARM, MIGR, SPWN, WILD, and RARE (also referred to as fish and wildlife beneficial uses), forming the basis

for implementation actions related to flow, water project operations, and physical habitat restoration. Accordingly, the objectives needed to protect both categories of beneficial uses overlap and are addressed by the objectives and program of implementation in this plan. In addition, other tribal uses and activities encompassed within the CUL use may be directly supported by flow actions, including for example, navigation, gathering of natural resources, and immersion ceremonies. In the future, additional flow-based water quality objectives or site-specific water right requirements may be considered if needed to protect other tribal uses and activities encompassed within the CUL use. In addition, the Regional Water Boards may amend their water quality control plans to recognize other CUL tribal uses and activities where they occur within the Bay-Delta watershed, and may need to consider new water quality objectives or site-specific discharge requirements for the reasonable protection of CUL uses in the watershed.

T-SUB and SUB are not designated by this plan for any waterbodies in the Bay-Delta watershed. However, while T-SUB and SUB relate to the risks to human health from consumption of noncommercial fish or shellfish at higher rates and were not developed to in and of themselves protect aquatic life, a thriving fish population could support fishing at higher consumptive rates; therefore, flow actions for the reasonable protection of fish and wildlife are related to the T-SUB and SUB beneficial uses on the same waters. Implementation measures for the reasonable protection of fish and wildlife also will inure to the benefit of subsistence fishing by tribes and non-tribal communities. Individual stream segments could also be designated for T-SUB and SUB beneficial uses as appropriate by the Regional Water Boards. The State Water Board will work with the Regional Water Boards to consider these designations as efficiently and expeditiously as possible.

There are many important water uses that must be considered carefully when determining regulatory flow requirements for fish and wildlife, including municipal, industrial, agricultural, hydropower, and recreational uses as well as other environmental uses, such as wetlands and refuges. Incorporating TBUs into the Bay-Delta Plan recognizes the tribes’ voices and participation in this process.

Chapter 3. Water Quality Objectives

3.1 Introduction

A water quality control plan must contain such water quality objectives as are needed to ensure the reasonable protection of beneficial uses and the prevention of nuisance. (Wat. Code, § 13050, subds. (h) & (j).) In establishing water quality objectives, the State Water Board must consider:

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

Flow and water project operations are controllable water quality factors within the scope of objectives that can be adopted in a water quality control plan under the Porter-Cologne Water Quality Control Act. (Wat. Code, § 13050, subd. (i) [defining “water quality control” to mean the regulation of any activity or factor which may affect the quality of waters of the state]; Wat. Code, § 13050, subd. (g) [defining “water quality” to include chemical, physical, biological, bacteriological, radiological, and other properties and characteristics of water which affect its use].)

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

Table 1, Table 2, and Table 3 contain the water quality objectives for the protection of municipal and industrial, agricultural, and fish and wildlife beneficial uses, respectively. The water quality objectives in this plan apply to waters of the San Francisco Bay/Sacramento-San Joaquin Delta watershed, including its salmon-bearing tributaries,

as specified in the objectives and program of implementation. Unless otherwise indicated, water quality objectives cited for a general area, such as for the southern Delta, are applicable for all locations in that general area and compliance locations will be used to determine compliance with the cited objectives. Determination of compliance with an objective expressed as a running average begins on the last day of the averaging period. The averaging period commences with the first day of the time period of the applicable objective. If the objective is not met on the last day of the averaging period, all days in the averaging period are considered out of compliance.

Prior versions of Tables 1 through 4 included numerous footnotes. To improve the readability of these tables, this version of the plan incorporates applicable footnotes directly into the tables or into Chapter 4, *Program of Implementation*, with updates where appropriate.

3.2 Water Quality Objectives for Municipal and Industrial Beneficial Uses

The water quality objectives for chloride in Table 1 provide reasonable protection of the beneficial uses MUN, IND, and PRO, from the effects of salinity intrusion. These municipal and industrial objectives also provide protection for the beneficial uses of REC-1, REC-2, and GWR.

3.3 Water Quality Objectives for Agricultural Beneficial Uses

The water quality objectives for electrical conductivity (EC) in Table 2 provide reasonable protection of the beneficial use AGR in the western, interior, and southern Delta, from the effects of salinity intrusion and agricultural drainage. All EC values presented in this plan represent EC normalized to 25 °C and are represented in units of deciSiemens per meter dS/m (1 dS/m = 1 mmhos/cm) to correspond with the International System of Units for EC.

3.4 Water Quality Objectives for Fish and Wildlife Beneficial Uses

The narrative water quality objectives and numeric water quality objectives for EC, dissolved oxygen, inflows, cold water habitat, Delta outflows, and interior Delta flows in Table 3 provide reasonable protection of fish and wildlife beneficial uses in the Bay-Delta watershed, including EST, COLD, WARM, MIGR, SPWN, WILD, and RARE. Protection of these fish and wildlife beneficial uses also provides protection for the related CUL, T-SUB, and SUB beneficial uses, and the beneficial uses of SHELL, COMM, and NAV.

Table 1. Water Quality Objectives for Municipal and Industrial Beneficial Uses

COMPLIANCE LOCATIONS	INTERAGENCY STATION NUMBER River Kilometer Index Station Number (RKI)	PARAMETER	DESCRIPTION (UNIT)	WATER YEAR TYPE Sacramento Valley 40-30-30 (Figure 2) applies	TIME PERIOD	VALUE
Contra Costa Canal at Pumping Plant #1 -or- San Joaquin River at Antioch Water Works Intake	C-5 (CHCCC06) D12 (near) (RSAN007)	Chloride (Cl-)	Maximum mean daily 150 mg/L Cl- for at least the number of days shown during the calendar year. Must be provided in intervals of not less than two weeks duration. (Percentage of calendar year shown in parenthesis).	 W AN BN D C		No. of days each calendar year ≤150 mg/L Cl- 240 (66%) 190 (52%) 175 (48%) 165 (45%) 155 (42%)
Contra Costa Canal at Pumping Plant #1 -and- West Canal at mouth of Clifton Court Forebay -and- Delta-Mendota Canal at Jones Pumping Plant -and- Barker Slough at North Bay Aqueduct Intake -and- Cache Slough at City of Vallejo Intake (only when water is being diverted from this location)	C-5 (CHCCC06) C-9 (CHWST0) DMC-1 CHDMC004 --- (SLSAR3) C-19 (SLCCH16)	Chloride (Cl-)	Maximum mean daily (mg/L)	All	Oct-Sep	250

Table 2. Water Quality Objectives for Agricultural Beneficial Uses

COMPLIANCE LOCATIONS	INTERAGENCY STATION NUMBER River Kilometer Index Station Number (RKI)	PARAMETER	DESCRIPTION (UNIT)	WATER YEAR TYPE Sacramento Valley 40-30-30 (Figure 2) applies	TIME PERIOD	VALUE
WESTERN DELTA						
Sacramento River at Emmaton	D-22 (RSAC092)	Electrical Conductivity (EC)	Maximum 14-day running average of mean daily EC (dS/m)	W	April 1 – Aug 15	0.45
				AN	April 1 – Jul 1	0.45
				AN	Jul 1 – Aug 15	0.63
				BN	April 1 - Jun 20	0.45
				BN	Jun 20 – Aug 15	1.14
				D	April 1 – Jun 15	0.45
				D	Jun 15 – Aug 15	1.67
				C	April 1 – Aug 15	2.78
San Joaquin River at Jersey Point	D-15 (RSAN018)	Electrical Conductivity (EC)	Maximum 14-day running average of mean daily EC (dS/m)	W	April 1 – Aug 15	0.45
				AN	April 1 – Aug 15	0.45
				BN	April 1 – Jun 20	0.45
				BN	Jun 20 – Aug 15	0.74
				D	April 1 – Jun 15	0.45
				D	Jun 15 – Aug 15	1.35
				C	April 1 – Aug 15	2.20
INTERIOR DELTA						
South Fork Mokelumne River at Terminous	C-13 (RSMKL08)	Electrical Conductivity (EC)	Maximum 14-day running average of mean daily EC (dS/m)	W	April 1 – Aug 15	0.45
				AN	April 1 – Aug 15	0.45
				BN	April 1 – Aug 15	0.45
				D	April 1 – Aug 15	0.45
				C	April 1 – Aug 15	0.54
San Joaquin River at San Andreas Landing	C-4 (RSAN032)	Electrical Conductivity (EC)	Maximum 14-day running average of mean daily EC (dS/m)	W	April 1 – Aug 15	0.45
				AN	April 1 – Aug 15	0.45
				BN	April 1 – Aug 15	0.45
				D	April 1 – Jun 25	0.45
				D	Jun 25 – Aug 15	0.58
				C	April 1 – Aug 15	0.87

COMPLIANCE LOCATIONS	INTERAGENCY STATION NUMBER River Kilometer Index Station Number (RKI)	PARAMETER	DESCRIPTION (UNIT)	WATER YEAR TYPE Sacramento Valley 40-30-30 (Figure 2) applies	TIME PERIOD	VALUE
SOUTHERN DELTA						
San Joaquin River at Airport Way Bridge, Vernalis -and- San Joaquin River from Vernalis to Brandt Bridge -and- Middle River from Old River to Victoria Canal -and- Old River/Grant Line Canal from Head of Old River to West Canal	C-10 (RSAN112) C-6 (RSAN073) C-8 (ROLD69) P-12 (ROLD59)	Electrical Conductivity (EC)	Maximum 30-day running average of mean daily EC (dS/m)	All	Year-round	1.0 This objective is subject to the Variance Policy, Salinity Variance Program and Salinity Exception Program adopted in Central Valley Regional Water Board Resolution No. R5-2014-0074, as may be amended.
EXPORT AREA						
West Canal at mouth of Clifton Court Forebay -and- Delta-Mendota Canal at Jones Pumping Plant	C-9 (CHWST0) DMC-1 (CHDMC004)	Electrical Conductivity (EC)	Maximum monthly average of mean daily EC (dS/m)	All	Oct-Sep	1.0

Table 3. Water Quality Objectives for Fish and Wildlife Beneficial Uses

COMPLIANCE LOCATIONS	INTERAGENCY STATION NUMBER River Kilometer Index Station Number (RKI)	PARAMETER	DESCRIPTION (UNIT)	WATER YEAR TYPE Sacramento Valley 40-30-30 (Figure 2) applies unless otherwise stated	TIME PERIOD	VALUE
LOWER SAN JOAQUIN RIVER FLOWS						
San Joaquin River at Airport Way Bridge, Vernalis	C-10 (RSAN112)	Flow rate	Minimum monthly average flow rate (cfs)	All	Oct	1,000 cfs plus up to an additional 28 TAF pulse/attraction flow. The amount of additional water will be limited to that amount necessary to achieve a monthly average flow of 2,000 cfs. The additional 28 TAF pulse flow is not required in a critical year following a critical year.
San Joaquin River at Airport Way Bridge, Vernalis	C-10	Flow rate	Narrative and minimum 7-day running average flow rate (cfs) for February through June	Maintain inflow conditions from the San Joaquin River watershed to the Delta at Vernalis sufficient to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta. Inflow conditions that reasonably contribute toward maintaining viable native migratory San Joaquin River fish populations include, but may not be limited to, flows that more closely mimic the natural hydrographic conditions to which native fish species are adapted, including the relative magnitude, duration, timing, and spatial extent of flows as they would naturally occur. Indicators of viability include population abundance, spatial extent, distribution, structure, genetic and life history diversity, and productivity. Maintain 40% of unimpaired flow, with an allowed adaptive range between 30%–50%, inclusive, from each of the Stanislaus, Tuolumne, and Merced Rivers from February through June. Unimpaired flow represents the natural water production of a river basin, unaltered by upstream diversions, storage, or by export or import of water to or from other watersheds. Compliance with the percent of unimpaired flow from February through June in each river is determined by dividing the 7-day average observed flow at the compliance stations by the 7-day average calculated Full-Natural-Flow (FNF) at the FNF stations. Refinements to methods and measurements used to estimate FNF can be used for compliance if refinements improve accuracy and precision of FNF estimates. The total volume of water established by the percent of unimpaired flow requirement may be managed using an averaging period consistent with approved adaptive methods outlined in the program of implementation. At all times during February through June, the flow at Vernalis, as provided by the percent of unimpaired flow objective, shall be no lower than the base flow value of 1,000 cfs with an allowed adaptive management range between 800–1,200 cfs, inclusive. Flows provided to meet these numeric objectives shall be managed in a manner to avoid causing significant adverse impacts to fish and wildlife beneficial uses at other times of the year.		
Stanislaus River at Koetitz	DWR Gage KOT					
Tuolumne River at Modesto	USGS Gage 1129000					
Merced River near Stevenson	DWR Gage MST C-10					
SACRAMENTO RIVER/DELTA TRIBUTARY FLOWS						
Sacramento River and its tributaries and the Mokelumne, Calaveras and Cosumnes Rivers (collectively, Delta eastside tributaries)		Flow rate	Narrative	All	Year round	Maintain water quality conditions, including inflow conditions from the Sacramento River/Delta tributaries, together with other measures in the watershed, sufficient to support and maintain the natural production of viable native fish populations. Conditions and measures that reasonably contribute toward maintaining viable native fish populations include the relative magnitude, duration, timing, quality and spatial extent of flows as they would naturally occur.
Sacramento River at Rio Vista	D-24 (RSAC101)	Flow rate	Minimum monthly average (MMA) and minimum 7-day running average (7DRA) flow rate (cfs)	All	Sep	3,000 cfs MMA and 2,000 cfs 7DRA
				W, AN, BN, D	Oct	4,000 cfs MMA and 3,000 cfs 7DRA
				C	Oct	3,000 cfs MMA and 2,000 cfs 7DRA
				W, AN, BN, D	Nov–Dec	4,500 cfs MMA and 3,500 cfs 7DRA
				C	Nov–Dec	3,500 cfs MMA and 2,500 cfs 7DRA

COMPLIANCE LOCATIONS	INTERAGENCY STATION NUMBER River Kilometer Index Station Number (RKI)	PARAMETER	DESCRIPTION (UNIT)	WATER YEAR TYPE Sacramento Valley 40-30-30 (Figure 2) applies unless otherwise stated	TIME PERIOD	VALUE
SACRAMENTO RIVER/DELTA COLD WATER HABITAT						
Sacramento River and its tributaries and Delta eastside tributaries		Cold water habitat	Narrative	All	Year round	Maintain streamflows and reservoir storage conditions on Sacramento River/Delta tributaries to protect cold water habitat for sensitive native fish species, including Chinook salmon, steelhead, and other native cold water fish species. Cold water habitat conditions to be protected include maintaining sufficient quantities of habitat with suitable temperatures on streams to support passage, holding, spawning, incubation, and rearing while preventing stranding and dewatering due to flow fluctuations.
DELTA OUTFLOW						
Delta Outflow		Flow rate	Narrative	All	Year round	Maintain water quality conditions, including Delta outflows, together with other measures in the watershed, sufficient to support and maintain the natural production of viable native fish populations. Conditions and measures that reasonably contribute toward maintaining viable native fish populations include, but may not be limited to, flows that support fish species, including the relative magnitude, duration, timing, quality and spatial extent of flows. Indicators of viability include population abundance, spatial extent, distribution, structure, genetic and life history diversity, and productivity.
Inflow-Based Delta Outflow		Flow rate	cfs	All	Year round	The inflows required for the Sacramento/Delta tributaries and San Joaquin River tributaries are required as outflows with adjustments for downstream natural depletions and accretions.
Base Delta Outflows		Net Delta Outflow Index (NDOI)	Minimum monthly average (MMA) and minimum 7-day running average (7DRA) NDOI (cfs)	All	Jan	4,500 cfs MMA and 7DRA ≥ 3,500 cfs if the best available estimate of the Eight River Index for December is less than or equal to 800 TAF.
				All	Jan	6,000 cfs MMA and 7DRA ≥ 4,800 cfs if the best available estimate of the Eight River Index for December is greater than 800 TAF.
			Minimum 3-day running average NDOI	All	Feb–Jun	7,100 cfs or equivalent salinity-based protection plus additional flow requirements specified in Table 4 below and other onramp and drought offramp provisions.
			MMA and 7DRA NDOI	W, AN	Jul	8,000 cfs MMA and 7DRA ≥ 6,400 cfs
				BN	Jul	6,500 cfs MMA and 7DRA ≥ 5,200 cfs
				D	Jul	5,000 cfs MMA and 7DRA ≥ 4,000 cfs
				C	Jul	4,000 cfs MMA and 7DRA ≥ 3,000 cfs
				W, AN, BN	Aug	4,000 cfs MMA and 7DRA ≥ 3,000 cfs
				D	Aug	3,500 cfs MMA and 7DRA ≥ 2,500 cfs
				C	Aug	3,000 cfs MMA and 7DRA ≥ 2,000 cfs
				All	Sep	3,000 cfs MMA and 7DRA ≥ 2,000 cfs
				W, AN, BN, D	Oct	4,000 cfs MMA and 7DRA ≥ 3,000 cfs
				C	Oct	3,000 cfs MMA and 7DRA ≥ 2,000 cfs
				W, AN, BN, D	Nov–Dec	4,500 cfs MMA and 7DRA ≥ 3,500 cfs
				C	Nov–Dec	3,500 cfs MMA and 7DRA ≥ 2,500 cfs

COMPLIANCE LOCATIONS	INTERAGENCY STATION NUMBER River Kilometer Index Station Number (RKI)	PARAMETER	DESCRIPTION (UNIT)	WATER YEAR TYPE Sacramento Valley 40-30-30 (Figure 2) applies unless otherwise stated	TIME PERIOD	VALUE
INTERIOR DELTA FLOWS						
Interior Delta		Flow and water project operations	Narrative	All	Year round	Maintain water quality conditions, including flow conditions in the interior Delta, together with other measures in the watershed, sufficient to support and maintain the natural production of viable native fish populations. Conditions and measures that reasonably contribute toward maintaining viable native fish populations include the relative magnitude, duration, timing, quality, and spatial extent of flows. Indicators of viability include population abundance, spatial extent, distribution, structure, genetic and life history diversity, and productivity.
Delta Cross Channel Gates Closure		Closure of gates	Closed gates	All	Oct–Nov	Gates closed when needed for the protection of salmonids based on fisheries monitoring information and other information regarding fisheries conditions.
					Dec–Jan	Gates closed, except when opening needed to meet water quality objectives.
					Feb–May 20	Gates closed.
					May 21–Jun 15	Gates closed for a total of 14 days for the protection of salmonids.
SWP and CVP Export Facilities		Combined export rate (Clifton Court Forebay inflow rate [minus Byron-Bethany Irrigation District diversions from Clifton Court Forebay] and the export rate of the Jones pumping plant)	Maximum 3-day running average (cfs)	All	Apr 15–May 15 unless otherwise allowed	Maximum export rate is 1,500 cfs or 100% of the 3-day running average of San Joaquin River flow at Vernalis, whichever is greater.
			Maximum percent of Delta inflow diverted	All	Feb	45% of Delta inflow if best available estimate of the Eight River Index for January is ≤ 1.0 MAF. 35–45% of Delta inflow if best available estimate of the Eight River Index for January is between 1.0–1.5 MAF. 35% of Delta inflow if best available estimate of the Eight River Index for January is > 1.5 MAF.
				All	Mar–Jun	35% of Delta inflow.
				All	Jul–Jan	65% of Delta inflow.
DISSOLVED OXYGEN						
San Joaquin River between Turner Cut and Stockton	(RSAN050-RSAN061)	Dissolved oxygen (DO)	Minimum DO (mg/L)	All	Sep–Nov	6.0

COMPLIANCE LOCATIONS	INTERAGENCY STATION NUMBER River Kilometer Index Station Number (RKI)	PARAMETER	DESCRIPTION (UNIT)	WATER YEAR TYPE Sacramento Valley 40-30-30 (Figure 2) applies unless otherwise stated	TIME PERIOD	VALUE
SAN JOAQUIN RIVER SALINITY						
San Joaquin River at and between Jersey Point and Prisoners Point	Jersey Point station D-15 (RSAN018) -and- Prisoners Point station D-29 (RSAN038)	Electrical conductivity (EC)	Maximum 14-day running average of mean daily EC (dS/m)	W, AN, BN, D	Apr–May	0.44 This standard does not apply in May when the best available May estimate of the Sacramento River Index for the water year is less than 8.1 MAF at the 90% exceedance level. The Sacramento River Index refers to the sum of the unimpaired runoff in the water year as published in DWR Bulletin 120 for the following locations: Sacramento River above Bend Bridge, near Red Bluff; Feather River, total unimpaired inflow to Oroville Reservoir; Yuba River at Smartville; and American River, total unimpaired inflow to Folsom Reservoir.
BRACKISH TIDAL MARSHES OF SUISUN BAY						
			Narrative	Water quality conditions sufficient to support a natural gradient in species composition and wildlife habitat characteristic of a brackish marsh throughout all elevations of the tidal marshes bordering Suisun Bay shall be maintained. Water quality conditions shall be maintained so that none of the following occurs: (a) loss of diversity; (b) conversion of brackish marsh to salt marsh; (c) for animals, decreased population abundance of those species vulnerable to increased mortality and loss of habitat from increased water salinity; or (d) for plants, significant reduction in stature or percent cover from increased water or soil salinity or other water quality parameters.		
EASTERN SUISUN MARSH SALINITY						
Sacramento River at Collinsville -and- Montezuma Slough at National Steel -and- Montezuma Slough near Belden Landing	C-2 (RSAC081) S-64 (SLMZU25) S-49 (SLMZU11)	Electrical conductivity (EC)	Maximum monthly average of both daily high tide EC values (dS/m), or demonstrate that equivalent or better protection will be provided at the location	All	Oct	19.0*
					Nov–Dec	15.5*
					Jan	12.5*
					Feb–Mar	8.0*
					Apr–May	11.0*
					*An exceedance of any of these objectives at a time when it is established through certification by the entity operating the Suisun Marsh Salinity Control Gates that the Gates are being operated to the maximum extent shall not be considered a violation of the objective.	
WESTERN SUISUN MARSH SALINITY						
Chadbourne Slough at Sunrise Duck Club -and- Suisun Slough, 300 feet south of Volanti Slough	S-21 (SLCBN1) S-42 (SLSUS12)	Electrical conductivity (EC)	Maximum monthly average of both daily high tide EC values (dS/m) or demonstrate that equivalent or better protection will be provided at the location	All but deficiency period**	Oct	19.0*
					Nov	16.5*
					Dec	15.5*
					Jan	12.5*
					Feb–Mar	8.0*
					Apr–May	11.0*
				Deficiency period**	Oct	19.0*
					Nov	16.5*
					Dec–Mar	15.6*

COMPLIANCE LOCATIONS	INTERAGENCY STATION NUMBER River Kilometer Index Station Number (RKI)	PARAMETER	DESCRIPTION (UNIT)	WATER YEAR TYPE Sacramento Valley 40-30-30 (Figure 2) applies unless otherwise stated	TIME PERIOD	VALUE
					Apr	14.0*
					May	12.5*
						*An exceedance of any of these objectives at a time when it is established through certification by the entity operating the Suisun Marsh Salinity Control Gates that the Gates are being operated to the maximum extent shall not be considered a violation of the objective.
				**A deficiency period is: (1) the second consecutive dry water year following a critical year; (2) a dry water year following a year in which the Sacramento River Index was less than 11.35; or (3) a critical water year following a dry or critical water year. The determination of a deficiency period is made using the prior year's final Water Year Type determination and a forecast of the current year's Water Year Type and remains in effect until a subsequent water year is other than a dry or critical water year as announced on May 31 by DWR and Reclamation as the final water year determination.		
SALMON PROTECTION						
			Narrative	All	Year round	Water quality conditions shall be maintained, together with other measures in the watershed, sufficient to achieve a doubling of natural production of Chinook salmon from the average production of 1967–1991, consistent with the provisions of State and federal law.
FISH VIABILITY						
			Narrative	All	Year round	Maintain water quality conditions, including flow conditions in and from tributaries and into and out of the Delta, together with other measures in the watershed, sufficient to support and maintain the natural production of viable native fish populations. Conditions and measures that reasonably contribute toward maintaining viable native fish populations include, but may not be limited to: (1) flows that support native fish species, including the relative magnitude, duration, timing, temperature, and spatial extent of flows; and (2) conditions within water bodies that enhance spawning, rearing, growth, and migration in order to contribute to improved viability. Indicators of viability include population abundance, spatial extent, distribution, structure, genetic and life history diversity, and productivity. Flows provided to meet this objective shall be managed in a manner to avoid causing significant adverse impacts to fish and wildlife beneficial uses at other times of the year.

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

Number of Days When Maximum Daily Average Electrical Conductivity of 2.64 dS/m Must be Maintained at Specified Location Based on the Best Available Estimate of the Previous Month's Eight River Index (PMI)																	
	CHIPPS ISLAND						PORT CHICAGO						PORT CHICAGO				
PMI (TAF)	(Chipps Island Station D10)					PMI (TAF)	(Port Chicago Station C14)					PMI (TAF)	(Port Chicago Station C14)				
	FEB	MAR	APR	MAY	JUN		FEB	MAR	APR	MAY	JUN		FEB	MAR	APR	MAY	JUN
≤ 500	0	0	0	0	0	**0**	0	0	0	0	0	**5250**	27	29	25	26	6
750	0	0	0	0	0	**250**	1	0	0	0	0	**5500**	27	29	26	28	9
1000	28	12	2	0	0	**500**	4	1	0	0	0	**5750**	27	29	27	28	13
1250	28	31	6	0	0	**750**	8	2	0	0	0	**6000**	27	29	27	29	16
1500	28	31	13	0	0	**1000**	12	4	0	0	0	**6250**	27	30	27	29	19
1750	28	31	20	0	0	**1250**	15	6	1	0	0	**6500**	27	30	28	30	22
2000	28	31	25	1	0	**1500**	18	9	1	0	0	**6750**	27	30	28	30	24
2250	28	31	27	3	0	**1750**	20	12	2	0	0	**7000**	27	30	28	30	26
2500	28	31	29	11	1	**2000**	21	15	4	0	0	**7250**	27	30	28	30	27
2750	28	31	29	20	2	**2250**	22	17	5	1	0	**7500**	27	30	29	30	28
3000	28	31	30	27	4	**2500**	23	19	8	1	0	**7750**	27	30	29	31	28
3250	28	31	30	29	8	**2750**	24	21	10	2	0	**8000**	27	30	29	31	29
3500	28	31	30	30	13	**3000**	25	23	12	4	0	**8250**	28	30	29	31	29
3750	28	31	30	31	18	**3250**	25	24	14	6	0	**8500**	28	30	29	31	29
4000	28	31	30	31	23	**3500**	25	25	16	9	0	**8750**	28	30	29	31	30
4250	28	31	30	31	25	**3750**	26	26	18	12	0	**9000**	28	30	29	31	30
4500	28	31	30	31	27	**4000**	26	27	20	15	0	**9250**	28	30	29	31	30
4750	28	31	30	31	28	**4250**	26	27	21	18	1	**9500**	28	31	29	31	30
5000	28	31	30	31	29	**4500**	26	28	23	21	2	**9750**	28	31	29	31	30
5250	28	31	30	31	29	**4750**	27	28	24	23	3	**10000**	28	31	30	31	30
≤ 5500	28	31	30	31	30	**5000**	27	28	25	25	4	**>10000**	28	31	30	31	30

Figure 2. Sacramento Valley Water Year Hydrologic Classification

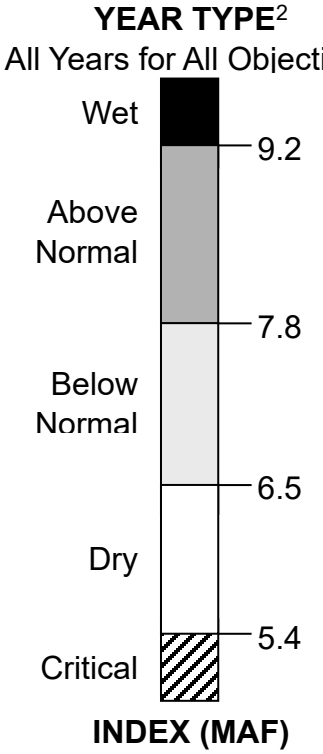
Year classification shall be determined by computation of the following equation:

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

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

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

CLASSIFICATION	INDEX MILLIONS OF ACRE-FEET (MAF)
Wet	Equal to or greater than 9.2
Above Normal	Greater than 7.8 and less than 9.2
Below Normal	Equal to or less than 7.8 and greater than 6.5
Dry	Equal to or less than 6.5 and greater than 5.4
Critical	Equal to or less than 5.4



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

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

Figure 3. San Joaquin Valley Water Year Hydrologic Classification

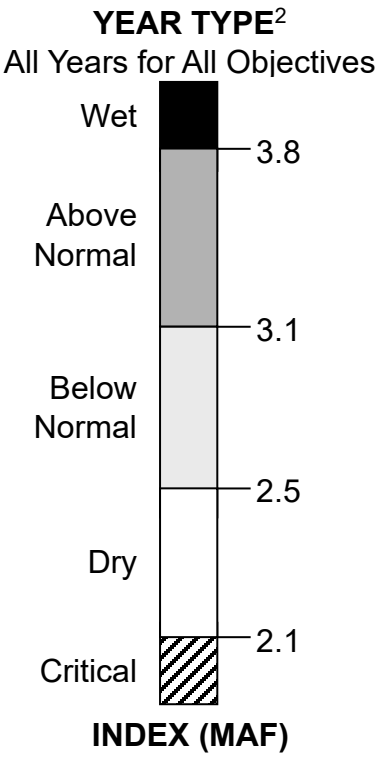
Year classification shall be determined by computation of the following equation:

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

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

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

	INDEX
CLASSIFICATION	**MILLIONS OF ACRE-FEET (MAF)**
Wet	Equal to or greater than 3.8
Above Normal	Greater than 3.1 and less than 3.8
Below Normal	Equal to or less than 3.1 and greater than 2.5
Dry	Equal to or less than 2.5 and greater than 2.1
Critical	Equal to or less than 2.1



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

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

Figure 4. NDOI[1] and Percent Inflow Diverted[2]

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

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

PERCENT INFLOW DIVERTED[3] = (CCF + JPP) ÷ DELTA INFLOW

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

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

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

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

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

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

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

where NET DELTA CONSUMPTIVE USE = GDEPL - PREC

GDEPL = Delta gross channel depletion for the previous day based on water year type using DWR's latest Delta land use study[4]

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

and where DELTA EXPORTS[5] = CCF + JPP + CCC + NBA

CCF = Clifton Court Forebay inflow for the current day[6]

JPP = Jones (previously named Tracy or TPP) Pumping Plant pumping for the current day

CCC = Contra Costa Canal pumping for the current day

NBA = North Bay Aqueduct pumping for the current day

[1] As discussed in Chapter 4, *Program of Implementation*, the State Water Board will evaluate methods for improving Delta outflow calculations, including the methodology for calculating the NDOI, to ensure the use of the best available information on inflows, Delta gross channel depletions, and Delta precipitation and runoff. Following notice and opportunity to comment, the Executive Director of the State Water Board may approve updates to Delta outflow calculation methods, including NDOI methods.

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

[3] For calculation of maximum percent Delta inflow diverted, the export rate is a 3-day running average and the Delta inflow is a 14-day running average, except when the CVP or SWP is making storage withdrawals for export, in which case both the export rate and the Delta inflow are 3-day running averages.

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

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

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

Chapter 4. Program of Implementation

4.1 Introduction

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

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

The Bay-Delta Plan establishes largely flow-dependent water quality objectives to protect beneficial uses of water in the Bay-Delta watershed from water diversion activities using the State Water Board's water rights and water quality authorities. This program of implementation focuses on flow and water project operations within the State Water Board's water rights authorities and other measures necessary to achieve the plan's narrative and numeric objectives. This program of implementation consists of measures to implement the Water Quality Objectives for Municipal and Industrial Beneficial Uses (Table 1 Objectives), Water Quality Objectives for Agricultural Beneficial Uses (Table 2 Objectives); and Water Quality Objectives for Fish and Wildlife Beneficial Uses (Table 3 Objectives). Implementation measures incorporate time schedules and flexibilities where appropriate, as well as complementary implementation measures, and monitoring and reporting provisions. Section 4.6 identifies provisions for annual and periodic review of this plan.

The State Water Board implements the Bay-Delta Plan objectives using its quasi-legislative or adjudicative authorities involving water rights and water quality. The State Water Board may implement the objectives by adopting regulations, conducting adjudicative proceedings, or both, that take into consideration the requirements of the public trust doctrine and the California Constitution, article X, section 2. The State Water Board will also continue, as necessary and appropriate, to use its Clean Water Act section 401 water quality certification authority, waste discharge requirements, and other water quality and water rights actions to implement objectives in this plan.

The State Water Board will develop and adopt regulations necessary to implement portions of the plan updates, including regulations to administer the water right priority system with applicable Bay-Delta Plan requirements and commitments.

4.2 Implementation of Water Quality Objectives for Municipal and Industrial Beneficial Uses

The objectives for municipal and industrial uses are implemented through water right actions. The water right permits and licenses of DWR and Reclamation are currently conditioned upon implementation of the Bay-Delta Plan's chloride objectives to protect municipal and industrial uses.

4.3 Implementation of Water Quality Objectives for Agricultural Beneficial Uses

4.3.1 General Salinity Control for Agricultural Beneficial Uses

Salinity objectives are implemented through a mix of water right actions (flow) and salinity control measures depending on the location and beneficial use affected. Salinity objectives and their implementation for the protection of agricultural beneficial uses include:

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

ii. Agriculture in the Southern Delta: The water rights of DWR and Reclamation are conditioned upon implementation of the southern Delta salinity objective to protect agricultural beneficial uses. Implementation of salinity objectives in the southern Delta requires a mix of salt load control and flow-related measures.

4.3.2 Southern Delta Agricultural Salinity Objective

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

4.3.2.1 State Regulatory Actions

i. San Joaquin River at Airport Way Near Vernalis: In Revised State Water Board Decision 1641 (D-1641), the State Water Board concluded that Reclamation, through its activities associated with operating the CVP in the San Joaquin River basin, has caused reduced water quality of the San Joaquin River at Vernalis.

For the San Joaquin River at Airport Way near Vernalis, D-1641 imposes conditions on Reclamation's water rights requiring implementation of EC levels of 0.7 dS/m from April through August and 1.0 dS/m from September through March. As part of implementing the salinity water quality objective for the interior southern Delta, Reclamation shall be required to continue to comply with these salinity levels as a condition of its water rights. Implementation of the southern Delta salinity objective at Vernalis may be modified by the State Water Board in a future Bay-Delta Plan update and a subsequent water right proceeding, if necessary, after adoption of a Total Maximum Daily Load (TMDL) or other salinity management plan by the State Water Board or Central Valley Regional Water Quality Control Board (Central Valley Regional Water Board) that identifies more appropriate salinity management measures.

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

The interior southern Delta salinity compliance locations are comprised of three river segments rather than three specific point locations so that compliance with the southern Delta salinity objective can be better determined in a Delta environment subject to alternating tidal flows. DWR's and Reclamation's water rights shall be conditioned to require development of information that will be used to determine the appropriate locations and methods to assess attainment of the salinity objective in the interior southern Delta, including through the Comprehensive Operations Plan, Monitoring Special Study, Modeling, and Monitoring and Reporting Plan described below. Prior to State Water Board approval of the Monitoring and Reporting Plan, compliance with the salinity objective for the interior southern Delta will be assessed at stations C-6, C-8, and P-12, which Reclamation and DWR shall be required to continue to operate as a condition of their water rights. Chapter 3 of this plan provides the general rule that unless otherwise provided, water quality objectives cited for a general area are applicable for all locations in that general area. Consistent with this, the use

of compliance locations and gage stations to determine compliance by DWR and Reclamation shall not be interpreted as a limitation on the applicability of the southern Delta salinity objective, which applies throughout the southern Delta.

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

(a) describe the actions that will fully address the impacts of SWP and CVP export operations on water levels and flow conditions that may affect salinity conditions in the southern Delta, including the availability of assimilative capacity for local sources of salinity;

(b) include detailed information regarding the configuration and operations of any facilities relied upon in the plan; and

(c) identify specific performance goals (i.e., water levels, flows, or other similar measures) for these facilities.

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

DWR and Reclamation shall submit the COP to the Executive Director for approval within six months from the date of the OAL's approval of the 2018 amendments to the Bay-Delta Plan. The Executive Director will act on the COP after providing notice and opportunity for comment. Once approved, the COP shall be reviewed annually, and updated as needed, with a corresponding report submitted by February 1 each year to the Executive Director for approval. The State Water Board will require compliance with this measure pursuant to its Porter-Cologne Water Quality Control Act authority to require technical and monitoring requirements, or as a requirement of a water right order.

[Note to reader: The Special Studies, Modeling and Monitoring and Reporting provisions previously included in section iv have been moved to section 4.5.1 to be included in the Bay-Delta Monitoring and Evaluation Program. The following section numbers have been updated to accommodate this change.]

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

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

vi. Salinity problems in the southern Delta primarily result from low flows, tidal action, diversions by the CVP, SWP and local water users, agricultural return flows, poor circulation, and channel capacity. As early as the 1991 Bay-Delta Plan, the State Water Board recognized the need to meet the salinity objectives largely through regulation of water flow. The 2018 amendments to the Bay-Delta Plan continued D-1641's obligations on the CVP and SWP to meet the salinity water quality objectives. Overall, discharges from publicly owned treatment works (POTWs) in the southern Delta have only a small effect on southern Delta salinity. Studies show the de minimis influence of POTW discharges on downstream ambient EC levels, both in low and high CVP and SWP export scenarios. The extent to which a POTW can meet salinity water quality objectives in the southern Delta is in part controlled by factors beyond its control, namely flows and circulation patterns, which are largely controlled by tidal action and water diversions. POTW discharges also reflect the EC levels of their source water, which is high in the southern Delta. POTWs are subject to the Clean Water Act and must control their salt discharges. It is reasonable to view the extent to which they must control their discharges in light of the constraints they face, the de minimis effect of their discharge on water quality related to salinity, and this implementation program's focus on water levels and flows to achieve the salinity water quality objectives. Desalination through reverse-osmosis processes can reduce salinity in POTW effluent, but is energy intensive, may be cost-prohibitive to construct and operate, and may also create brine waste disposal issues in an area that is already challenged by high salts. The State Water Board, therefore, finds that reverse-osmosis treatment for POTW wastewater discharges into the southern Delta is currently not a feasible technology for the purpose of controlling salinity in the southern Delta.

The Central Valley Regional Water Board shall regulate in-Delta discharges of salts by agricultural, municipal POTW, and other dischargers consistent with

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

(a) A performance-based effluent limitation derived using, at a minimum, the past three years of effluent data and one that considers the potential for drought conditions, changing water sources, and water conservation.

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

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

(a) An evaluation of whether technological or economic changes have made previously deemed infeasible upgrades to control salinity in the POTW's effluent feasible.

(b) A survey of industrial sources of salinity regulated by the industrial pretreatment program, along with all annual reports submitted pursuant to that program documenting the implementation of salinity management strategies at the industrial facility within the collection system area.

(c) Documentation of source control measures taken. If alternative lower-salinity source water supplies were available but not utilized, a justification for not using such supplies shall be provided.

(d) An evaluation of the efficacy of actions taken to limit or ban the use of residential self-generating water softeners or to impose efficiency standards on water softeners within the POTW's collection system area. This evaluation shall include the estimated number of such water softeners in the POTW's collection system area. If a ban against the use of self-generating water softeners is not instituted, a justification why a ban is not feasible.

(e) Materials developed and disseminated in support of the salinity education and outreach program.

(f) Documented proof of participation in CV-SALTS.

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

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

4.3.2.2 Central Valley Regional Water Board Actions

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

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

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

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

iv. Irrigated Lands Regulatory Program: Under the Irrigated Lands Regulatory Program, the Central Valley Regional Water Board issues waste discharge requirements (WDRs) to coalition groups and individual dischargers requiring surface water quality monitoring and the preparation and implementation of management plans to address identified water quality problems, including those associated with salinity. The most recent WDRs require third parties to develop regional water quality management plans for areas where irrigated agriculture is contributing to water quality problems. It requires growers to implement practices consistent with those plans to address the identified problems.

v. Variances from Surface Water Quality Standards for Point Source Dischargers, Variance Program for Salinity, and Exception from Implementation of Water Quality Objectives for Salinity: The Central Valley Regional Water Board adopted Resolution R5-2014-0074 to amend water quality control plans for the Sacramento River and San Joaquin River basins and the Tulare Lake basin to add policies for *Variances from Surface Water Quality Standards for Point Source Dischargers (Variance Policy)*, a *Variance Program for Salinity (Salinity Variance Program)* and an *Exception from Implementation of Water Quality Objectives for Salinity (Salinity Exception Program)*. The amendments were

approved by the State Water Board on March 17, 2015, (Resolution No. 2015-0010), by OAL on June 19, 2015, and by USEPA on July 8, 2016.

(a) The *Variance Policy* will allow the Central Valley Regional Water Board the authority to grant short-term exceptions from meeting water quality-based effluent limitations to dischargers subject to NPDES permits. The policy will only apply to non-priority pollutants, which includes salinity.

(b) The *Salinity Variance Program* will allow the Central Valley Regional Water Board the authority to grant multiple discharger variances from meeting water quality-based effluent limitations for salinity constituents to publicly owned treatment works. A multiple discharger variance provides a streamlined approval procedure in which an individual discharger variance application, which is consistent with the multiple discharger variance, does not require separate review and approval from the USEPA once the multiple discharger variance is approved by USEPA.

(c) The *Salinity Exception Program* establishes procedures for dischargers that are subject to WDRs and conditional waivers to obtain a short-term exception from meeting effluent or groundwater limitations for salinity constituents.

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

4.3.2.3 State Funding of Programs

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

4.3.2.4 Current Projects and Actions by Other Agencies

The following projects may assist in meeting the southern Delta salinity objective by reducing high salinity drainage to the San Joaquin River; improving circulation in the southern Delta; and supplementing flows through recirculation. All or a portion of these projects are being funded through the above referenced programs. Each of these projects, described below, should be pursued by the identified agencies. If successful,

these projects and the actions they contain could make additional regulatory measures by the State Water Board and the Central Valley Regional Water Board unnecessary.

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

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

(a) Reduction of drainage volumes by using source control/efficient water management techniques such as replacing furrow irrigation with micro-irrigation technology and lining unlined delivery canals;

(b) Recirculation of tailwater on primary irrigation lands;

(c) Collection and reuse of tile drainage water on halophytic croplands to concentrate drainage;

(d) Installation and pumping of groundwater wells in strategic locations to eliminate groundwater infiltration into tile drains; and

(e) Treatment and disposal of remaining drainage water through reverse osmosis, evaporation and disposal or reuse of salts.

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

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

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

v. San Joaquin River Real-time Salinity Management Program: The San Joaquin River Real-time Salinity Management Program is a partnership effort between agricultural dischargers within the Lower San Joaquin River Basin, DWR, Reclamation, United States Fish and Wildlife Service (USFWS), and United States Geological Survey (USGS) that uses telemetered stream stage and salinity data and computer models to simulate and forecast water quality conditions along the lower San Joaquin River. The main objective of the project is to control and time the releases of wetland and agricultural drainage to coincide with periods when dilution flow is sufficient to meet the Vernalis salinity objective. The Central Valley Regional Water Board adopted a resolution in 2014 approving the proposed framework to establish the program (R5-2014-0151). The framework document describes completed pilot studies that establish the feasibility of the program and describes the steps to be taken to implement the program.

vi. South Delta Improvements Program: DWR and Reclamation propose to construct permanent tidal gates in the southern Delta as part of the South Delta Improvements Program (SDIP) to replace the temporary barriers that are currently constructed on an annual basis. DWR and Reclamation expect that the gates project will assist in achieving the salinity objective at the two Old River compliance measurement locations by improving water circulation in the southern Delta. Due to concern regarding the impact the gates project may have on migratory fish, additional studies are being conducted prior to the re-initiation

of consultation for Endangered Species Act permits required for this project. Consequently, implementation of this project has been postponed indefinitely.

4.4 Implementation of Water Quality Objectives for Fish and Wildlife Beneficial Uses

Water quality objectives for the reasonable protection of fish and wildlife beneficial uses include Lower San Joaquin River flow objectives, Sacramento/Delta tributaries inflow and cold water habitat objectives, Delta outflow objectives, interior Delta flow objectives, the San Joaquin River dissolved oxygen objective, San Joaquin River salinity objectives, objectives for brackish tidal marshes of Suisun Bay and Suisun Marsh salinity, and the objectives for salmon protection and fish viability. This program of implementation describes actions to implement these objectives. For the Sacramento/Delta inflow and cold water habitat objectives and inflow-based Delta outflow objective, the program of implementation includes numeric flow and reservoir storage requirements and related actions. An alternative to these requirements is provided through the voluntary agreements (VA) pathway (which also constitutes regulatory requirements), to allow for the Healthy Rivers and Landscapes (HRL) flow, habitat, and related commitments to be implemented for an 8 year period with the possibility of extension. The program of implementation also describes accounting, monitoring, reporting, and assessment provisions for compliance and effectiveness; provisions for public safety and drought; and complementary measures to protect fish and wildlife, including general provisions.

4.4.1 River Flows: Lower San Joaquin River at Airport Way Bridge, Vernalis

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

This section of the program of implementation focuses on flow-related actions on the Stanislaus, Tuolumne, and Merced Rivers (collectively, “LSJR Tributaries”) that are necessary to achieve the LSJR flow objectives. The State Water Board also recognizes that Recommended Actions, including non-flow measures, such as habitat restoration, must also be part of efforts to comprehensively address Delta aquatic ecosystem needs as a whole. The State Water Board encourages voluntary agreements that will assist in implementing the LSJR flow objectives, and will consider such agreements as part of its proceedings to implement this plan, consistent with its obligations under applicable law.

4.4.1.1 Implementation of February Through June LSJR Flow Objectives

By 2022, the State Water Board will fully implement the February through June LSJR flow objectives through water right actions or water quality actions, such as Federal Energy Regulatory Commission (FERC) hydropower licensing processes.[3]

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

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

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

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

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

4.4.1.2 Flow Requirements for February through June

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

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

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

Adaptive Methods for February through June Flows

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

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

The State Water Board may approve adaptive adjustments to the flow requirements as set forth in (a)–(d) below on an annual or long-term basis if information produced through the monitoring and review processes described in this program of

implementation, or other best available scientific information, indicates that the change for the period at issue will satisfy the following criteria for adaptive adjustments: (1) it will be sufficient to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta; and (2) it will meet any existing biological goals approved by the State Water Board. The Executive Director may approve adaptive adjustments that satisfy the criteria above and as provided below:

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

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

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

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

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

4.4.1.3 Stanislaus, Tuolumne and Merced Working Group

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

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

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

[Note to reader: The prior section 4.4.1.4 Biological Goals has been moved without any text edits to section 4.5.2 to be included in the Bay-Delta Biological Goals section. The following section numbers have been updated to accommodate this change.]

4.4.1.4 Unimpaired Flow Compliance

Implementation of the unimpaired flow requirement for February through June will require the development of information and specific measures to achieve the flow objectives and to monitor and evaluate compliance. The STM Working Group, or State Water Board staff as necessary, will, in consultation with the Delta Science Program, develop and recommend such proposed measures. The State Water Board or Executive Director will consider approving the measures within 180 days from the date of OAL's approval of the 2018 amendments to the Bay-Delta Plan. The approved measures will inform State Water Board water right proceedings, FERC licensing proceedings, or other implementation actions to achieve the February through June flows. As information and methods improve, specific measures to achieve the flow objectives and to monitor and evaluate compliance may be modified and submitted for approval.

4.4.1.5 Procedures for Implementation of Adaptive Methods

The STM Working Group, or State Water Board staff as necessary, will, in consultation with the Delta Science Program, develop proposed procedures for allowing the adaptive adjustments to the February through June flow requirements discussed above. The State Water Board or Executive Director will consider approving procedures for allowing those adaptive adjustments within one year following the date of OAL's approval of the 2018 amendments to the Bay-Delta Plan.

4.4.1.6 Annual Adaptive Operations Plan

The State Water Board will assign responsibility for submitting and implementing approved annual plans for adaptive implementation actions (annual adaptive operations plans) when it implements the LSJR flow objectives in water right or water quality actions. Proposed annual adaptive operations plans will be required for the coming season by January 10 of each year and must be approved by the State Water Board or Executive Director. Proposed annual adaptive operations plans must be subject to review by the STM Working Group prior to submission to the State Water Board. The State Water Board or Executive Director will consider the recommendations of the STM Working Group when acting on annual adaptive operations plans, along with the requirements and procedures for adaptive implementation and other relevant information. The State Water Board recognizes that an annual operations plan is based on a forecast from the best available information and may not accurately reflect actual conditions that occur during the February through June period. Accordingly, the State Water Board will consider this factor and whether the hydrologic condition could have been planned for in evaluating deviations from approved operations plans. An annual operations plan shall include actions and operations that consider and will work under a

reasonable range of hydrological conditions. It shall also identify how unimpaired flows are calculated and adjustments to be made as updated information becomes available, such as DWR's Bulletin 120.[4] An annual operations plan shall be informed by the review activities described below and may be modified with the approval of the State Water Board or Executive Director. A multi-year operations plan meeting these requirements may be submitted at any time.

4.4.1.7 Implementation of October Pulse Flow Objective

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

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

4.4.1.8 State of Emergency

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

[Note to reader: The prior section 4.4.1.10 San Joaquin River Monitoring and Evaluation Program has been moved to section 4.5.1 to be included in the Bay-Delta Monitoring and Evaluation Program. One edit was made to this section that changes the due date for the Annual Report from December 31 to May 31 to be consistent with reporting dates in the Bay-Delta Monitoring and Evaluation Program. The following section numbers have been updated to accommodate this change.]

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

4.4.1.9 Voluntary Agreements

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

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

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

4.4.2 Sacramento/Delta Tributary Inflow, Cold Water Habitat, and Delta Outflow Objectives

The Sacramento/Delta Tributary Inflow, Cold Water Habitat, and Delta outflow objectives are implemented by the regulatory requirements described below in sections 4.4.2.1 through 4.4.2.7 as well as the VA pathway requirements for certain objectives as described in section 4.4.9.

4.4.2.1 Sacramento River at Rio Vista (Base Fall Inflows)

D-1641 imposes conditions on DWR's and Reclamation's water rights requiring implementation of the base fall Sacramento River flow objective at Rio Vista. DWR and Reclamation will continue to maintain responsibility for meeting the base fall Sacramento River flow objective. Compliance with the year-round Sacramento and Delta tributary flow requirements discussed in section 4.4.2.2 will also contribute to achieving the Sacramento River at Rio Vista flow objective.

4.4.2.2 Narrative Inflow Objective for Sacramento/Delta Tributaries

The inflow objective applies throughout the Sacramento/Delta watershed, including on upstream tributaries, on the Sacramento/Delta tributaries that support or contribute to the protection of anadromous fish species, including the following rivers and streams

that are tributaries to the Sacramento River or Delta: American River, Antelope Creek, Battle Creek, Bear Creek, Bear River, Big Chico Creek, Butte Creek, Cache Creek, Calaveras River, Clear Creek, Cosumnes River, Cottonwood Creek, Cow Creek, Deer Creek, Elder Creek, Feather River, Mill Creek, Mokelumne River, Paynes Creek, Putah Creek, mainstem Sacramento River, Stony Creek, Thomes Creek, and Yuba River. The narrative inflow objective is implemented through the numeric requirements described below in this section (4.4.2.2) and the VA pathway requirements described in section 4.4.9, as well as other complementary actions described in this program of implementation.

All water rights not covered under the VA pathway on the tributaries identified above are subject to the numeric inflow requirements, except those determined to have a de minimis effect on inflows. De minimis water diversions are defined as diversions of 10 acre-feet or less per year unless otherwise specified by the State Water Board through an annual or periodic review, water right, or water quality action, as necessary, to implement the inflow objective including through the development of a regulation.

Except where specific exceptions apply, including for water supply adjustments (WSAs) and approved adaptive implementation provisions described below, inflows from Sacramento/Delta tributaries shall be maintained at 55 percent of unimpaired flow year-round on a 7-day running average to achieve the narrative inflow objective.

For any water rights obtained on or before December 31, 2025, the starting point for the inflow requirement is reduced below 55 percent by the WSAs. Whether, and to what extent, WSAs are applied to water rights obtained after December 31, 2025, including any permits issued after that date pursuant to applications filed by the State under Water Code section 10500, will be addressed as part of the processing of those water right applications consistent with section 4.4.9.1. The WSAs are as follows:

- Watershed-wide WSAs: apply based on the best available estimate of the cumulative sum of the prior 12 months of the Sacramento Valley Four River Index (four river index).[5] Under the watershed-wide WSAs, 55% of unimpaired flow is required in the wettest 1/3 of hydrologic conditions, 45 percent of unimpaired flow in the middle 1/3 of conditions, and 35 percent of unimpaired flow in the driest 1/3 of conditions based on specified rounded thresholds for the last 30 years of the four river index, with these indices subject to update through the periodic review process. For each month during October through May, when the 12-month four river index is below 20,200,000 acre-feet, the flow requirement is reduced to 45 percent of unimpaired flow watershed-wide and when the 12-month four river index is below 13,200,000 acre-feet, the flow requirement is reduced to 35

[5] The four river index refers to the sum of the unimpaired runoff as published in the DWR Bulletin 120 for the following locations: Sacramento River flow at Bend Bridge, near Red Bluff; Feather River, total inflow to Oroville Reservoir; Yuba River flow at Smartville; American River, total inflow to Folsom Reservoir.

percent of unimpaired flow watershed-wide. The requirement for May applies for June through September.

- Tributary-specific WSAs: apply for specified rainfall dominated and municipal supply dominated tributaries based on local storage conditions as defined in Table 5 which reduce or remove the flow requirements during low storage conditions. The tributary-specific WSAs are based on the fraction of total regulated storage capacity, which is defined as the allowable flood control storage level as specified by the United States Army Corps of Engineers (USACE) or other appropriate flood control agency acceptable to the Executive Director. On the 1st of each month, if the storage is below the fraction of total regulated storage capacity listed in Table 5, the flow requirement is reduced or off-ramped accordingly for that month. The applicable flow requirement is the lower of the watershed-wide and tributary-specific WSAs for each tributary.

Table 5. Tributary-Specific WSAs

Tributary	Reservoir	Fraction of Total Regulated Storage Capacity	Required Percent of Unimpaired Flow
Mokelumne River	Camanche Reservoir	<0.72	35%
		<0.53	0%
Putah Creek	Lake Berryessa	<0.9	35%
		<0.57	0%
Calaveras River	New Hogan Reservoir	<0.72	35%
		<0.42	0%

The required percentage of unimpaired flow does not apply to an individual tributary during periods when flows from that tributary could cause or contribute to flooding or other related public safety concerns, as determined by the State Water Board or Executive Director through consultation with federal, state, and local agencies and other entities with expertise in flood management. The development of the implementation methodology will include a public process to determine these provisions and any needed provisions for limits on maximum release amounts due to existing reservoir release capacities and related existing infrastructure limitations.

The numeric inflow requirements for the Sacramento/Delta tributaries will primarily be implemented by limiting water diversions to ensure that the applicable flow requirements

remain instream. In order to implement the numeric inflow requirements in accordance with water right priorities, demands for water that exceed the available supplies while preserving the instream flows and amounts needed to serve senior water right demands will be subject to curtailment in order of water right priority unless an exception to curtailment applies. Water that would otherwise be available under the water right's priority of right that is bypassed or released from storage to meet the inflow requirements is not abandoned and is not available for diversion downstream by other water right holders and claimants. Water Code section 1707 petitions are not required to protect this water from subsequent diversions. As discussed in section 4.4.3, an implementation methodology will be developed to determine when water is not available under specific water rights.

Implementation of the Sacramento/Delta inflow requirements discussed in this section will begin within two years of approval of the current plan amendments by OAL. An extension of up to one year to this time period may be granted by the Executive Director for good cause, including where significant efforts are underway to develop local cooperative solutions. The Executive Director may also approve incremental implementation of the inflow requirements for good cause, such that the inflow requirements are fully implemented within five years of initial implementation.

Initial compliance points where the numeric inflow requirements apply (Table 6) include the confluence of Sacramento/Delta tributaries with the Sacramento River; at the confluence with the Legal Delta for the Cosumnes, Calaveras, and Mokelumne Rivers; on the mainstem of the Sacramento River at the confluence with the Delta; and, at upstream locations on Sacramento/Delta tributaries at the confluence of every major fork, branch, and tributary of the tributaries subject to the inflow requirements unless determined through the implementation process that they are not needed or appropriate. Compliance points are the locations that will be used to define the percent of unimpaired flow, determine the required contributions upstream of the compliance point location, inform assessment of compliance with the instream flow requirement, and determine whether any refinements to implementation of the inflow requirements are needed, including refinements to the implementation methodology. Updates to these compliance locations may be approved by the Executive Director as part of the process to develop and update the implementation methodology after opportunity for public review and comment or through the Bay-Delta Plan annual and periodic review processes.

Table 6. Tributaries That Are Initially Subject to the Sacramento/Delta Inflow Requirement[1]

TRIBUTARY	TRIBUTARY	TRIBUTARY
Cow Creek	Clear Creek	Mokelumne River
Battle Creek	Big Chico Creek	Calaveras River
Bear Creek	Feather River	Stony Creek

TRIBUTARY	TRIBUTARY	TRIBUTARY
Butte Creek	Yuba River	Cottonwood Creek
Antelope Creek	Bear River	Thomes Creek
Deer Creek	American River	Elder Creek
Mill Creek	Sacramento River	Cache Creek
Paynes Creek	Cosumnes River	Putah Creek

[1] Compliance locations will be determined based on consideration of the most appropriate locations to accurately measure flows, including factors such as the extent of tidal influences and backwater effects. To the extent that existing flow gages are located at or near the confluence location, existing gages will be used for compliance purposes as feasible. Compliance locations also include the confluence of every major fork, branch, and tributary of the tributaries listed in this table unless determined through the implementation process that they are not needed or appropriate.

If the State Water Board conducts a specific public regulatory instream flow setting process for a tributary that meets the narrative inflow objective, including in response to recommendations provided by DFW pursuant to Public Resources Code sections 10000 through 10005, those inflow requirements may replace the required inflows specified in the numeric inflow requirement for that tributary. For this to occur, the State Water Board must find, after notice and opportunity for public comment, that those flows provide comparable protection of fish and wildlife beneficial uses as provided by the required percent of unimpaired flow and the change would not result in more than a de minimis reduction in Delta outflows for the protection of fish and wildlife beneficial uses.

Adaptive Implementation

Provisions for adaptive implementation of the numeric inflow requirements are provided to optimize flows to benefit native fish and wildlife while also minimizing water supply impacts, and for the numeric inflow requirements to be implemented in a coordinated fashion with the cold water habitat and inflow-based Delta outflow requirements. Adaptive implementation may be allowed on a seasonal, annual, or long-term basis as part of local cooperative solutions or may be required by the Executive Director or State Water Board. Adaptive implementation may also be used to integrate, as appropriate, Bay-Delta Plan requirements with water quality certification requirements, water right orders, or other existing environmental requirements.[6] Adjustments on a seasonal or one-year basis may be approved or directed by the Executive Director, and adjustments on a longer-term basis may be approved or directed by the State Water Board. Any such adjustments will be subject to public review and comment prior to a decision by the Executive Director or State Water Board, in conjunction with the annual and periodic review processes described below. Any decision to approve or direct adaptive

[6] Bay-Delta Plan requirements are not intended to trigger higher flow requirements in other water right orders or water quality certifications. For example, where a water right order or water quality certification bases a subsequent flow requirement on flows in a previous period, flows required under the Bay-Delta Plan are not intended to trigger unrelated flow requirements. Adaptive implementation provisions are expected to be used to integrate related flow requirements for the reasonable protection of fish and wildlife and other beneficial uses.

implementation must be informed by best available scientific information, including monitoring and evaluation of the effectiveness of the measures in meeting the narrative objectives, and biological goals (section 4.5.2) when available.

Flow Shaping

For each tributary, the numeric inflows may be managed as a total volume of water on a water year basis and released on an adaptive schedule to meet the inflow requirements. The required inflows, including any shaping, are required as outflow, as further specified in section 4.4.2.6. Any shaping of the numeric inflow requirements must be for the benefit of native fish and wildlife, including for the purpose of protecting fish and wildlife on a year-round basis both within the tributaries and the Delta, including: targeted pulse flows to cue migration, flows timed to respond to observed presence of native aquatic species, cold water releases to provide for temperature management, minimum flow levels to provide for fish passage, flows to avoid stranding and dewatering, floodplain inundation flows to support juvenile salmonid rearing, appropriately timed contributions to Delta outflows, and other functions supported by inflows and Delta outflows to protect native fishes. The total volume of water provided within a water year must be no lower than the volume of water that would have resulted from meeting the applicable unimpaired flow percentage on a 7-day running average, including applicable WSAs. Flows that would have occurred absent flow shaping (releases for water diversions, flood control purposes, hydropower releases, or other uncontrolled flows in excess of the applicable unimpaired flow percentage) do not reduce overall required inflow levels.

Unimpaired Flow Range

In addition to the WSAs to the numeric flow requirement discussed above for water rights obtained on or before December 31, 2025, the required percent of unimpaired flow may be adjusted to any value between 45 and 65 percent of unimpaired flow, inclusive. Adjustments to the required percent of unimpaired flow between 45 and 65 percent of unimpaired flow may incorporate the WSAs for water rights obtained on or before December 31, 2025, provided that flows during January through June are no lower than what would be provided by the inflow requirements with the WSAs described above or 45 percent of unimpaired flow without WSAs, whichever is lower. Flows may be lower in the range if: (1) lower flows provide for the reasonable protection of fish and wildlife or to further assist in meeting the narrative cold water habitat and inflow objectives, including to preserve reservoir storage supplies needed to maintain water quality and temperature conditions later in the same year or in the following year or for the protection of native fish species; or (2) where there are successful local cooperative solutions demonstrating that they achieve the inflow objective and the cold water habitat objective using a combination of flow and other measures to achieve comparable benefits as would be achieved under default implementation.

The required percent of unimpaired flow may only be required by the State Water Board to be higher, including possible removal of WSAs, based on best available science for

the following reasons: 1) flows in a tributary are already higher than the required percent of unimpaired flow on average and the State Water Board determines that the higher flows need to be maintained to provide for the reasonable protection of fish and wildlife; or 2) the State Water Board finds that higher flow levels are needed to provide for the reasonable protection of fish and wildlife, including due to changes in other regulatory requirements that generate inflows and Delta outflows, as determined through the periodic review process described below.

Other Sacramento/Delta Tributaries
Streams in the Sacramento/Delta watershed not included in the list above, including smaller streams and naturally intermittent streams, are not subject to the inflow objective at this time. The State Water Board may consider water quality objectives and numeric inflow requirements for smaller streams in the Sacramento/Delta watershed in future updates to this plan, including as the result of periodic review of the plan.

Wildlife Refuge Provision
In implementing the numeric inflow requirements, the Executive Director may approve exceptions to curtailments for Central Valley Project Improvement Act (CVPIA) wildlife refuge supplies. In addition, the Executive Director may consider a request for an exception to curtailment for other State or federal designated refuges or reserves. Any such request should include appropriate supporting information to substantiate the need for an exception to curtailment, including information requested by State Water Board staff.

Human Health and Safety and Other Appropriate Provisions
The State Water Board will develop appropriate provisions to address human health and safety needs and other possible reasons for short-term and long-term exceptions to curtailments associated with implementation of the Bay-Delta Plan for specific purposes. Those purposes include provisions to allow continued diversions for minimum human health and safety water supplies where alternate supplies are not available, for other emergency circumstances such as emergency firefighting, and where diversions are for non-consumptive purposes and do not cause a reduction in stream flows or change the timing in a material way that affects implementation of the numeric inflow requirements and the inflow-based Delta outflow requirements described below. Those provisions may be informed by other relevant regulatory efforts in order to provide for consistency as appropriate.

4.4.2.3 Sacramento/Delta Cold Water Habitat Objective
The cold water habitat objective applies on all Sacramento/Delta tributaries subject to the inflow objective discussed above. The narrative cold water habitat objective is implemented through the requirements described below in this section (4.4.2.3) and the VA pathway requirements described in section 4.4.9, as well as other complementary actions described in this program of implementation. The cold water habitat requirements in this section require management of cold water storage and releases

and/or alternative protection measures to ensure that fish below dams are kept in good condition consistent with Fish and Game Code section 5937. The cold water habitat implementation actions described in this section are to be integrated with the inflow implementation actions described in section 4.4.2.2, including the WSAs and adaptive implementation actions described above. All water rights not covered under the VA pathway that affect temperature management are subject to the cold water habitat requirements of this section and reservoir owners/operators identified in Table 7 will be required to undertake specific implementation actions identified below. As necessary, as part of the process to implement the Sacramento/Delta updates to the Bay-Delta Plan, the State Water Board will update the water rights or other regulatory requirements of these parties to implement these provisions. To the extent that other water right holders also affect temperature management, they may also be subject to undertaking actions as part of the implementation process for the cold water habitat requirements after opportunity for public review and comment, including as a result of annual or periodic review described below.

Table 7. Reservoirs and Water Right Holders Subject to Initial Cold Water Habitat Implementation Actions on the Sacramento/Delta Tributaries

TRIBUTARY	RESERVOIR	RESERVOIR OWNER/OPERATOR
Clear Creek	Whiskeytown Reservoir	Reclamation
Feather River	Oroville Reservoir/Thermalito Afterbay	DWR
Yuba River	New Bullards Bar Reservoir	Yuba County Water Agency
Bear River	Camp Far West Reservoir	South Sutter Water District
American River	Folsom Reservoir/Lake Natoma	Reclamation
Sacramento River	Shasta Reservoir/Keswick Reservoir	Reclamation
Mokelumne River	Pardee Reservoir/Camanche Reservoir	East Bay Municipal Utility District
Calaveras River	New Hogan Reservoir	Stockton East Water District
Stony Creek[1]	Black Butte Reservoir	Reclamation
Putah Creek	Lake Berryessa	Reclamation /Solano County Water Agency
Cache Creek[1]	Indian Valley Reservoir	Yolo County Flood Control & Water Conservation District

[1] Stony Creek and Cache Creek are initially not subject to carryover storage requirements but will be required to submit a long-term temperature management strategy.

Long-term Temperature Management Strategies and Annual Plans

The State Water Board will require the water right holders and reservoir owners/operators identified in Table 7 for water rights not covered under the VA pathway to develop long-term temperature management strategies for operations of the reservoirs and associated facilities identifying how the reservoirs and related facilities will be operated to meet the cold water habitat requirements based on the best available

scientific and technical information.[7] The long-term temperature management strategies must include proposed carryover storage levels as described further below, while meeting applicable inflow requirements and other regulatory requirements. The strategies must also identify temperature targets and locations where those targets will be measured; decision-making processes for temperature management operations, including coordination with the State Water Board, fisheries agencies, and other appropriate entities; modeling, monitoring, and assessment provisions to support development and implementation of temperature management operations; and any appropriate adaptive management provisions. The strategies are also required to evaluate other available measures to improve temperature management, including passage, temperature control device measures, riparian habitat improvements, and other measures that will be implemented to contribute to meeting the narrative cold water habitat objective and a timeline for implementing those measures.

The long-term temperature management strategies, including the identification of the proposed end of September carryover storage requirement, must be submitted to the Executive Director for approval no later than one year from the date of applicability of the cold water habitat requirements of this section to a specific reservoir owner/operator identified in Table 7. The State Water Board will require implementation of the strategies, including any conditions of approval, to begin upon approval by the Executive Director. The Executive Director may grant up to a one-year extension of the due date for good cause.

The temperature management strategies will be subject to review and possible modification as needed as directed by the Executive Director after public review and opportunity for comment. The Executive Director may require upstream and downstream water right holders to participate in development and implementation of the long-term temperature management strategies and annual operations plans, described further below, to the extent that their operations affect achievement of the cold water habitat objective. As necessary to resolve needed cold water habitat management actions to implement the narrative cold water habitat objective, the State Water Board may undertake tributary-specific temperature management proceedings as part of a public process. As part of any tributary-specific temperature management proceeding, the State Water Board may refine and/or further specify the actions needed to comply with the cold water habitat objective.

The State Water Board will require water right holders and reservoir owners/operators identified in Table 7 to develop and submit annual temperature management plans by March 31 of each year for Executive Director approval following approval of the long-term temperature management strategies, unless an alternate compliance date is approved as part of the long-term temperature management strategy. The annual

[7] As specified in section 1.2, where there are existing water right or water quality orders (e.g., Water Right Order 90-5), the more stringent requirement controls.

temperature management plans must identify planned annual operations in compliance with approved long-term temperature management strategies. Specifically, each annual operations plan must describe how temperature protection and related operations for the protection of salmonids and other native species will be achieved on the tributary in the upcoming year, including provisions for reservoir storage levels; reservoir releases; measures to avoid salmonid stranding and dewatering concerns; reservoir temperature control device operations; and other relevant provisions, as well as the technical basis for those provisions. At a minimum, the annual operations plan must describe how the tributary-specific end of September carryover storage requirements, or alternative approved measures, will be implemented in combination with the inflow requirements. The Board will require implementation of temperature management plans as approved by the Executive Director.

Carryover Storage Requirements

The water right holders and reservoir owners/operators identified in Table 7 (initially excluding Stony Creek and Cache Creek) will be required to develop proposed end of September carryover storage requirements as part of their long-term temperature management strategies within the ranges identified below in Table 8, which are intended to provide for maintenance of cold water supplies during the fall months and into the subsequent water year, as well as minimum supplies for health and safety needs and other purposes. Water right holders may develop proposed carryover storage requirements outside of this range (including the dates for meeting carryover storage levels) based on evidence and documentation that carryover storage requirements outside of these ranges will provide for protection of cold water habitat and other critical purposes, including health and safety supplies. In the event that water right holders do not develop proposed carryover storage levels, State Water Board staff will undertake a public process to develop those requirements. Water year types are based on the Sacramento Valley Water Year Hydrologic Classification defined in Figure 2.

Table 8. Carryover (End-of-September) Storage Target Ranges (TAF)[1]

Reservoir	Drought Years[2]	Non-Drought Years
Shasta Reservoir	1,500 – 2,000	>2,000 – 3,000
Whiskeytown Reservoir[3]	200 – 210	>210 – 240
Oroville Reservoir	1,000 – 1,200	>1,200 – 1,600
New Bullards Bar Reservoir	400 – 600	400 – 600
Camp Far West Reservoir	10 – 20	>20 – 50
Folsom Reservoir	300 – 400	>400 – 500

Camanche Reservoir[4]	150 – 200	>200 – 250
Pardee Reservoir[4]	100 – 160	>160 – 180
New Hogan Reservoir	50	>50 – 100
Lake Berryessa	500 – 700	>700 – 1,000

[1] These ranges are designed to prevent reservoir depletion for multiple purposes (health and safety, meeting other minimum flows, etc.) and provide some level of protection for cold water habitat in the fall. In most cases, at the low end of ranges, additional actions would likely be needed to protect cold water habitat.

[2] Drought is defined as two or more consecutive dry or critically dry water years or years in which there is proclamation of drought in the applicable watershed issued by the governor of California. Under the most extreme drought circumstances, lower carryover storage levels could also apply on a temporary one-year basis as approved by the Executive Director.

[3] As part of Reclamation's development of a long-term temperature management strategy, Reclamation may propose for the Board's approval that Whiskeytown Reservoir does not require carryover storage levels or levels within this range to maintain temperature management on Clear Creek, while avoiding redirected impacts to the Trinity River.

[4] Pardee and Camanche Reservoirs are operated jointly to manage temperature in the Mokelumne River. As such, the storage target ranges may be evaluated on the basis of the total storage of both reservoirs, and the operations of both reservoirs should be addressed in the same temperature management strategy.

After opportunity for public review and comment, including as part of the periodic review process described below, the Executive Director may approve or require adjustments to the carryover storage requirements based on best available scientific and technical information.

Additional Sacramento/Delta Tributaries and Stream Segments

The Executive Director of the State Water Board may require long-term temperature management strategies and annual operations plans on additional Sacramento/Delta tributaries or stream segments as part of the periodic review process based on information indicating that water diversion and use practices are causing elevated water temperatures that negatively affect the aquatic ecosystem. All water right holders and claimants in the tributary watershed, except those with a de minimis effect on water temperature, may be required to participate in the development of the long-term temperature management strategy and annual operations plans.

4.4.2.4 Local Cooperative Solutions

Water right holders may propose local cooperative solutions to comply with the applicable Sacramento/Delta inflow and cold water habitat requirements identified above in sections 4.4.2.2 and 4.4.2.3. Local cooperative solutions may utilize the adaptive implementation provisions described above, including shaping of flows and operating lower in the required inflow range by implementing those flows in combination with other complementary ecosystem protection measures and cold water habitat

protection measures, including habitat restoration, passage, improvements in cold water management structures, or other measures that provide comparable benefits as would be expected absent the local cooperative solution. Water right holders may also propose local cooperative solutions that share responsibilities between water right holders in different manners than would occur by implementing the objectives in strict water right priority, provided that doing so provides the same level of inflow, does not impact other legal users of water, and does not reduce benefits or cause adverse impacts to fish and wildlife.

Water right holders may propose local cooperative solutions for individual tributaries, two or more tributaries, or for regions, including the Delta. If a local cooperative solution is developed for two or more tributaries, the tributaries may work together to meet the combined numeric inflow requirements provided that the narrative inflow and cold water habitat objectives are met on each individual tributary. Specific quantitative accounting, including modeling and monitoring data as appropriate, must show that the combined inflows are at least equal to what would have been provided by individual tributary implementation.

At a minimum, local cooperative solutions must identify the following:

i. Specific proposed flow and cold water habitat measures as applicable, including identification of proposed flow schedules and quantities in conformance with the above adaptive implementation provisions, proposed cold water habitat provisions in conformance with the above cold water habit provisions, implementation measures for the proposed flow and cold water habitat measures, and other relevant information regarding the proposed flow and cold water habitat actions.

ii. Specific information regarding the participants and their roles and responsibilities in implementing the proposed local cooperative solution, including all water right holders and claimants who have agreed to participate in the local cooperative solution and all associated water rights and claims.

iii. A time schedule for implementation and specific commitments by participants. The time schedule may include interim milestones and deliverables in accordance with the time schedules identified above.

iv. A description of any other complementary habitat restoration or other measures that will be implemented; and an analysis of how the proposed measures meet the objectives and other requirements as applicable. For local cooperative solutions that propose flows below the required percent of unimpaired flow, robust scientific information, including quantitative evaluations of the benefits to native species indicating that the combined flow and non-flow actions included in the proposal achieve comparable protection as default implementation and are in compliance with the applicable narrative objectives.

v. Compliance monitoring measures including provisions for measuring flow and temperature levels and reporting the monitoring data electronically on a regular

basis to verify that flows necessary to meet the plan objectives, as well as flows needed to meet downstream senior water right demands, are provided; and other provisions necessary to ensure compliance with the objectives and avoid impacts to other legal users of water in conformance with the monitoring and reporting provisions of this plan in section 4.5.

vi. Effectiveness monitoring, special study, evaluation, and reporting provisions in conformance with the monitoring and reporting provisions of this plan in section 4.5.

vii. Provisions for assessment, review, and possible modification of the local cooperative solution consistent with annual and periodic review provisions of this plan.

viii. Provisions identifying measures to minimize or avoid redirected impacts including but not limited to integration with SGMA and measures to protect refuge water supplies and native terrestrial species of concern.

Prior to submittal of any proposed local cooperative solution to the State Water Board, participants must consult with DFW, appropriate California Native American Tribes, USFWS, NMFS, and other appropriate entities and provide any comments to the State Water Board for consideration. Prior to any approval of a local cooperative solution, the State Water Board will provide a minimum 30-day public comment period.

Local cooperative solutions that achieve at least the required percent of unimpaired flow and relevant cold water habitat provisions may be approved by the State Water Board's Executive Director. Local cooperative solutions that would provide less than the required percent of unimpaired flow require approval by the State Water Board. In evaluating any local cooperative solution, the State Water Board will make an independent finding that the local cooperative solution is enforceable and is expected to provide comparable protection to what would be provided under default implementation for achieving the water quality objectives.

4.4.2.5 Narrative Delta Outflow Objective

The narrative Delta outflow objective applies throughout the watershed and is to be implemented through the actions described in sections 4.4.2. through 4.4.2.7 below, as well as other complementary actions described in this program of implementation.

4.4.2.6 Inflow-Based Delta Outflow Objective

The inflow-based Delta outflow objective requires that the required inflows from the Sacramento/Delta tributaries including equivalent accretions from the Sacramento Valley Floor and Delta as defined in section 4.4.2, and required inflows from the Lower San Joaquin River as defined in section 4.4.1, are provided as Delta outflows with adjustments for downstream natural depletions. Implementation of the inflow-based Delta outflow objective is required to be met in order of water right priority, unless exceptions apply, using the implementation methodology. The required Delta outflow is to be calculated by adding up the applicable required inflows from the Sacramento/Delta

tributaries, including an equivalent amount of Sacramento Valley Floor and Delta accretions, and required lower San Joaquin River flows making appropriate adjustments for natural losses. The required inflows are the flows provided pursuant to the Sacramento/Delta and lower San Joaquin River flow requirements, including any flow shaping or other adaptive implementation measures. These flows are in addition to any approved HRL flow contributions to Delta outflows described in section 4.4.9.

Implementation of the inflow-based Delta outflow objective will begin within two years of approval of the current plan amendments by OAL and proceed in coordination with implementation of the Sacramento/Delta tributary inflow objective. An extension of up to one year to this time may be granted by the Executive Director for good cause, including where significant efforts are underway to develop local cooperative solutions. The Executive Director may also approve incremental implementation of the inflow-based Delta outflow objective for good cause, such that the objective is fully implemented within five years of initial implementation.

The State Water Board, in coordination with other appropriate agencies and entities, will conduct analyses of water use on irrigated lands below sea level in the Delta and undertake a public process to evaluate the effectiveness of curtailments of agricultural diversions on lands below sea level. Based on those analyses, the State Water Board may consider exemptions to the inflow-based Delta outflow requirements during implementation or during periodic review processes for water rights in which the diversion and use of water is limited to irrigation of lands below sea level in the Legal Delta.

4.4.2.7 Base and Table 4 Delta Outflow Objectives

Compliance with the inflow-based Delta outflow objective described above will contribute to meeting the base Delta outflow objectives in Table 3 and the additional Delta outflow objectives in Table 4 (Number of Days When Maximum Daily Average Electrical Conductivity of 2.64 dS/m Must Be Maintained at Specified Location). DWR and Reclamation's water rights for the SWP and CVP will also continue to be conditioned to ensure that the Table 3 base Delta outflow and Table 4 Delta outflow objectives are met.

During the period from February through June, the following provisions apply related to implementation of the base Delta outflow objectives included in Table 3:

i. The requirement is met if either the daily average or 14-day running average EC at the confluence of the Sacramento and the San Joaquin rivers is less than or equal to 2.64 dS/m (Collinsville station C2).

ii. If the best available estimate of the Eight River Index[8] for January is more than 900 TAF, the daily average or 14-day running average EC at station C2 shall be less than or equal to 2.64 dS/m for at least one day between February 1 and February 14. If the best available estimate of the Eight River Index for January is between 650 TAF and 900 TAF, the Executive Director of the State Water Board shall decide whether this requirement applies.

iii. If the best available estimate of the Eight River Index for February is less than 500 TAF, the standard may be further relaxed in March upon the request of DWR and Reclamation, subject to the approval of the Executive Director of the State Water Board.

iv. If the best available May estimate of the Sacramento River Index for the water year is less than 8.1 MAF at the 90 percent exceedance level, the standard does not apply in May and June. Under this circumstance, a minimum 14-day running average flow of 4,000 cfs is required in May and June.

The following provisions apply related to implementation of the Delta outflow objectives included in Table 4:

i. The requirement for number of days the maximum daily average EC of 2.64 dS/m must be maintained at Chipps Island and Port Chicago can also be met with maximum 14-day running average EC of 2.64 dS/m, or 3-day running average NDOIs of 11,400 cfs and 29,200 cfs, respectively. If salinity/flow objectives are met for a greater number of days than the requirements for any month from February through May, the excess days shall be applied to meeting the requirements for the following month. The number of days for values of the best available estimate of the previous month's Eight River Index (PMI) between those specified in Table 4 shall be determined by linear interpolation.

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

iii. The Port Chicago standard applies only in months when the average EC at Port Chicago during the 14 days immediately prior to the first day of the month is less than or equal to 2.64 dS/m.

[8]The Eight River Index refers to the sum of the unimpaired runoff as published in the DWR Bulletin 120 for the following locations: Sacramento River flow at Bend Bridge, near Red Bluff; Feather River, total inflow to Oroville Reservoir; Yuba River flow at Smartville; American River, total inflow to Folsom Reservoir; Stanislaus River, total inflow to New Melones Reservoir; Tuolumne River, total inflow to Don Pedro Reservoir; Merced River, total inflow to Exchequer Reservoir; and San Joaquin River, total inflow to Millerton Lake.

In consultation with DWR, Reclamation, and other appropriate entities, the State Water Board will evaluate methods for improving Delta outflow calculations, including the methodology for calculating the Net Delta Outflow Index (NDOI) identified in Figure 4, to ensure the use of the best available information on inflows, Delta gross channel depletions, and Delta precipitation and runoff. Actions to improve NDOI may include but are not limited to: installing or requiring the installation of gages at new or different locations to better measure inflows; refining or requiring the refinement of estimates of Delta gross channel depletions to better reflect variations in hydrology that occur; and refining or requiring the refinement of measurements and estimates of Delta precipitation and runoff to better reflect actual conditions throughout the Delta. The State Water Board's evaluation shall be completed within three years of approval of the current plan amendments by OAL and will be followed by an opportunity for public review and comment. Following public review, the Executive Director of the State Water Board may approve updates to Delta outflow calculation methods including adjustments to the NDOI calculation as necessary.

4.4.3 Methodology to Determine Water Unavailability and Implement the Bay-Delta Plan and Associated Water Right Curtailments

To implement the Sacramento/Delta updates to the Bay-Delta Plan, as necessary the State Water Board will issue water right curtailments based on water right priorities for appropriative rights and pre-1914 appropriative and riparian claims of right, including adjudicated rights, when it is determined that:

i. Water is not available at water right priorities regardless of instream flow requirements. These curtailments would apply to all water rights, including for HRL water rights that are part of the VA pathway described in section 4.4.9, unless an approved exception to curtailment applies, as described further below.

ii. Water is not available at the applicable compliance location based on water right priorities due to responsibility for meeting the tributary inflow and the inflow-based Delta outflow requirements, unless an approved exception to curtailment applies, as described further below.

In order to inform the above curtailments, the State Water Board will develop an implementation methodology to determine when water is not available at water right holders' priorities of right. This methodology will be developed through a public process within one year of approval of the current plan amendments by OAL. The implementation methodology is intended to be integrated with the methodology to implement Lower San Joaquin River instream flows, to the extent possible.

In determining whether water is unavailable, the State Water Board will consider relevant available information regarding unimpaired flows, including natural accretions, for determining unimpaired flow requirements and natural flows available for diversion; other flows available for diversion, including return flows from agricultural and municipal water uses; depletions from factors other than surface water diversions, including

seepage, evaporation, and transpiration from open water as well as riparian and floodplain vegetation that reduce flows available for all purposes; information related to water right priority dates; water right demands and diversions, including actual and projected consumptive use demands for and diversions of water and changes in the timing of flows from non-consumptive demands; travel times for flows; and other relevant information. In implementing curtailments, the Board will consider and accommodate as appropriate relevant court decrees, settlement agreements, and other arrangements that affect water diversion and use to the extent consistent with the water right priority system. As appropriate based on improved data or methods, the implementation methodology will be subject to regular review and update, including opportunity for public review and comment.

Within two years of approval of the current plan amendments by OAL, the State Water Board will adopt curtailment regulations consistent with the above that will identify specific curtailment procedures and requirements. Those requirements will include monitoring and reporting of diversions and related information needed to inform curtailment decisions, which may be in addition to other required monitoring and reporting. The Board may consider implementation procedures other than, or in addition to curtailment regulations, that are designed to achieve comparable protections.

4.4.4 Interior Delta Flow Objectives

The interior Delta flow objectives for the reasonable protection of fish and wildlife beneficial uses include a narrative interior Delta flow objective and numeric interior Delta flow objectives for operation of the Delta Cross Channel Gates and SWP and CVP export limits. As necessary, as part of the process to implement the Sacramento/Delta updates to the Bay-Delta Plan, the State Water Board will update the water right or other regulatory requirements of the SWP and CVP, as appropriate, to implement these objectives consistent with the Bay-Delta Plan.

4.4.4.1 Narrative Objective for Interior Delta Flows

The narrative objective for interior Delta flows is implemented through compliance by the SWP and CVP with the numeric interior Delta flow objectives and implementation measures described below and the USFWS and NMFS BiOps and DFW ITP requirements for the operations of the CVP and SWP export facilities. As appropriate, during the annual or periodic review of the Bay-Delta Plan and its implementation, the State Water Board will evaluate the effectiveness of the interior Delta flow objectives and implementation actions and any needed changes to the Bay-Delta Plan or its implementation to ensure the reasonable protection of fish and wildlife beneficial uses, including to provide for consistent operations of the CVP and SWP export facilities for the reasonable protection of fish and wildlife.

4.4.4.2 Delta Cross Channel Gates Closure

The Delta Cross Channel Gate closure objective is implemented through water right requirements of the CVP and the NMFS BiOp for CVP operations. Specific implementation provisions are as follows:

i. During the period from October 1 through November 30, the Delta Cross Channel Gates may be required to be closed for the protection of salmonids based on fisheries monitoring data and other information regarding fisheries conditions, including provisions of the NMFS BiOp for the CVP.

ii. During the period of May 21 through June 15, the timing and duration of the gate closures will be determined based on evaluation of monitoring and related information regarding needed measures for the protection of salmonids in consultation with NMFS, DFW, and State Water Board staff. Any disagreement on gate closures pursuant to the Bay-Delta Plan shall be resolved by the Executive Director of the State Water Board.

4.4.4.3 April 15 Through May 15 Export Limits Based on San Joaquin River Flows

The April 15 to May 15 export limits based on San Joaquin River flows is implemented by water right requirements on the SWP and CVP. The start and end dates for this 31-day export limit may be varied based on real-time monitoring and other fisheries conditions information, provided USFWS, NMFS, and DFW (fisheries agencies) concur, and the Executive Director of the State Water Board does not object. Any proposed modification to the time period for this objective shall be submitted to the Executive Director with the concurrences of the fisheries agencies at least 10 working days in advance of the proposed change.

4.4.4.4 Export Limits Based on Delta Inflows

The export limits based on Delta inflows objective is implemented through water right requirements of the SWP and CVP. The Percent of Delta inflow diverted is defined in Figure 4. For the calculation of maximum percent Delta inflow diverted, the export rate is a 3-day running average and the Delta inflow is a 14-day running average, except when the CVP or the SWP is making storage withdrawals for export, in which case both the export rate and the Delta inflow are 3-day running averages. For February, when the best estimate of the January Eight River Index is between 1.0 and 1.5 MAF, an export limit of 35 percent applies unless DFW, USFWS, and NMFS concur, and the Executive Director does not object, that a higher export limit up to 45 percent can be implemented while providing for the reasonable protection of fish and wildlife. Any proposal to increase the export limit above 35 percent shall be submitted to the Executive Director with the concurrences of the fisheries agencies at least 10 working days in advance of the proposed effective date.

4.4.5 San Joaquin River Dissolved Oxygen

The San Joaquin River dissolved oxygen objective is implemented through the Central Valley Regional Water Board's Control Program for the Dissolved Oxygen Impairment in the Stockton Deep Water Ship Channel. In addition, implementation of the LSJR flow objectives are expected to support improved dissolved oxygen conditions in the Stockton Deep Water Ship Channel. As appropriate, during the periodic review process the State Water Board will evaluate whether additional actions are needed to implement the dissolved oxygen objective.

4.4.6 San Joaquin River Salinity

The salinity objectives to protect fish and wildlife beneficial uses in the San Joaquin River are implemented through water right requirements on the SWP and CVP.

4.4.7 Suisun Marsh Salinity Objectives

4.4.7.1 Narrative Objective for Brackish Tidal Marshes of Suisun Bay

The narrative objective for Suisun Marsh is expected to be achieved through implementation of the Delta outflow objectives, Suisun Marsh salinity objectives, and operation of the Suisun Marsh Salinity Control Gates. Additionally, ongoing Suisun Marsh habitat restoration actions and actions in the BiOps and ITP for the SWP and CVP are also expected to contribute to accomplishing the narrative objective. As appropriate, during the periodic review process the State Water Board will evaluate whether additional actions are needed to implement the narrative objective for brackish tidal marshes of Suisun Bay.

4.4.7.2 Numeric Objectives for Suisun Marsh

The numeric objectives for Suisun Marsh include Eastern Suisun Marsh salinity objectives and Western Suisun Marsh salinity objectives. These objectives are implemented through water right requirements of the SWP and CVP.

4.4.8 Narrative Objectives for Salmon Protection and Fish Viability

The narrative objectives for salmon protection and fish viability are implemented by the collective actions identified in the Bay-Delta Plan for the protection of fish and wildlife beneficial uses, including flow and water quality actions taken by the State Water Board and Regional Water Boards and actions by other entities to improve habitat and other conditions for the protection of salmon. As part of the periodic review process, the State Water Board will evaluate progress toward implementation of the narrative salmon protection and fish viability objectives, including progress toward achieving biological goals discussed further below, and whether changes to the Bay-Delta Plan or its implementation are needed to achieve the objectives.

4.4.9 Implementation of Healthy Rivers and Landscapes Commitments Under the Voluntary Agreement (VA) Pathway

This section describes the actions that will be required to implement the Healthy Rivers and Landscapes (HRL) commitments for the water rights and claims of right identified in Appendix B.1 (HRL water rights) to utilize the VA pathway over an eight-year term, with the possibility of extension (described further below), in lieu of implementing the implementation provisions described in sections 4.4.2.2, 4.4.2.3, and 4.4.2.6. The HRL actions described in this section are intended to contribute to the implementation of the Sacramento/Delta tributary inflow, Sacramento/Delta cold water habitat, narrative Delta outflow, inflow-based Delta outflow, salmon protection, and fish viability objectives. Implementation of the VA pathway for HRL water rights will commence no later than January 1, 2027. Modifications to this schedule of up to one year may be approved by the Executive Director for good cause shown. Specifically, this section describes the flow and habitat restoration commitments to be provided within the following watersheds: from the Sacramento River, Feather River, Bear River, Auburn Ravine, Yuba River, American River, Putah Creek, Mokelumne River, Friant area, and the Delta. This section also describes associated required monitoring, evaluation, and other provisions for implementation of this pathway. For the purposes of the Bay-Delta Plan, the language of this plan controls unless expressly provided otherwise. The State Water Board may issue Government Code section 11415.60 decisions by settlement or other decisions, orders, or regulations to enforce HRL commitments in accordance with the below provisions. The holders of the HRL water rights are referred to throughout this section as HRL participants for ease of reference; however, the VA pathway is only applicable to the HRL water rights identified in Appendix B.1. HRL participants may also hold water rights that are not covered under the VA pathway.

Water rights that are not identified in Appendix B.1 are subject to the Sacramento/Delta inflow and cold water habitat provisions and inflow-based Delta outflow provisions described in sections 4.4.2.2, 4.4.2.3, and 4.4.2.6, unless an exception applies. Water rights identified in Appendix B.1 may also be subject to these provisions as specified in section 4.4.9.10 below. Minor modifications to the water rights listed in Appendix B.1, including inclusion of existing water rights less than or equal to 100 acre-feet on a specific HRL water right list, may be approved by the Executive Director after a minimum 45-day public comment period if they fall within the scope of the analyses supporting inclusion of the VA pathway for HRL water rights in this plan. Substantive modifications, including inclusion of water rights larger than 100 acre-feet that were not previously identified, inclusion of newly issued water rights approved after December 31, 2025, or inclusion of water rights on new tributaries, to the water right list in Appendix B.1 could be considered for approval by the Board as part of the annual or periodic review process, along with any necessary supporting environmental and scientific documentation or other documentation determined to be needed by the Executive Director, after notice and opportunity for public comment.

4.4.9.1 Protection of Base Flows Applicable to New Water Supply Projects

To help ensure that water quality conditions, including existing flows, together with other measures in the watershed, supporting the Bay-Delta Plan's 2025 update continue to support and maintain natural production of viable native fish populations, in future water right actions the State Water Board will consider imposing requirements, based on the record established during the administrative proceeding, including any hearing, to ensure that the use of water is consistent with and supports the salmon protection, fish viability, inflow, inflow-based Delta outflow, and interior Delta flow objectives.

4.4.9.2 HRL Flow Commitments

Flow commitments are specified below for each water source and water year type. In order for HRL water rights to utilize the VA pathway, these flows must be provided consistent with the accounting procedures described below and further specified in Appendix B.1 to this plan. The purpose of the flow accounting procedures is to ensure that HRL commitments are met consistent with water right priorities, including to ensure that HRL flow commitments are provided in addition to flows needed to meet senior water right demands; and in addition to defined base flows, including flows required by D-1641, other regulatory requirements, and other non-regulatory flows that would be present absent HRL flow commitments. HRL flow commitments are in addition to flows resulting from flows provided by non-HRL water rights pursuant to the Bay-Delta Plan, including the Lower San Joaquin River flow requirements; and other instream flow dedications, including Water Code section 1707 instream flow dedications to the extent applicable.

All HRL flows, except where otherwise stated below, must be additive Delta outflow above defined base Delta outflows as approved by the State Water Board. Unless otherwise specified below, HRL flows are to be provided according to the Sacramento Valley Water Year Hydrologic Classification defined in Figure 2. In addition, certain other criteria must be met in order for HRL flows dedicated to instream use to be protected. HRL flow commitments, including water purchases, must not be provided from a water right that is duplicative of another right still being used for consumptive purposes. HRL flow commitments must be consistent with water right priorities and within the scope of the water right proposed to be dedicated. For water rights proposed to be dedicated instream from water purchases, HRL participants must demonstrate that the water purchase would provide benefits to native fish and wildlife. Within 6 months of adoption of the current plan amendments, HRL participants will provide a list of the water rights, and any accompanying substantiating information requested by the Executive Director, that could be dedicated instream to enable notification to the public and initial verification of the water rights. To modify the list, HRL participants may submit proposed modifications 6 months before the planned use of any new water rights. Water rights will only be protected to the extent consistent with water right priorities and if HRL participants demonstrate they are meeting the criteria described above. Water Code

section 1707 petitions are not required to protect this water from subsequent diversions. Each year, the specific water rights under which HRL flow commitments are to be provided for instream flow and Delta outflow purposes must be identified at least 90 days in advance of the planned use.

Implementation of HRL flow commitments is subject to a default schedule and flexibility brackets for each water source and water year type. The default schedule defines the proportion of the annual HRL flow commitments to be provided in each month on a default basis. Each HRL flow commitment may also be shaped for the benefit of native fish and wildlife within defined flexibility brackets (Table 10 through Table 14) such that the average schedule of each HRL flow commitment over the eight-year term of the VA pathway is consistent with the default schedule for January through June. The HRL participants will determine the proposed schedule for release of HRL flow commitments on a tributary/water source basis each year in consultation with the State Water Board.

Any proposal to release HRL flows outside the flexibility brackets or that would result in less HRL flows during January through June than the default schedule, regardless of flexibility brackets, is subject to approval by the Executive Director and must be requested with appropriate supporting information at least 90 days in advance of any proposed operations. Any such proposal must include an analysis demonstrating that the release of HRL flows outside the flexibility brackets or outside January through June is needed for the protection of fish and wildlife and is consistent with the narrative native fish viability and salmon protection objectives, and the supporting information must provide the biological rationale for the proposed change. If the proposed release schedule is not within the scope of the original environmental and scientific analyses, the supporting information must also include additional environmental and scientific analyses to support the proposal. The Executive Director will consider any such proposal and make a determination with potential conditions following a minimum 30-day public comment period and will notify HRL participants of the decision at least 10 working days before the start of the proposed schedule.

Avoiding Redirected Impacts

The HRL flows must be implemented in a manner consistent with water right priorities avoiding impacts to native aquatic species, including the following specific provisions.

In order to protect HRL flows from diversion by other water right holders, HRL water rights are subject to curtailment when water is not available at that priority of right, as described further in section 4.4.3. HRL water rights will be excepted from curtailments to meet the new tributary inflow and inflow-based Delta outflow requirements in a manner that does not change curtailments for non-HRL water rights. The water rights that are being dedicated to instream flow purposes under the VA pathway will be required to be identified as described above and any other necessary supporting information as determined by the Executive Director provided to ensure that the right can be dedicated

instream and protected from diversion by other water right holders at the time water is proposed to be dedicated, consistent with water right priorities.

The VA pathway for HRL water rights must be implemented in a manner consistent with SGMA and must not result in redirected impacts to fish and wildlife from groundwater substitution. Any reduction in instream flows that result from groundwater substitution shall be accounted for and deducted from HRL flow contributions.

Cold Water Habitat

The HRL commitments are required to be implemented in a manner to improve temperatures to the extent possible and avoid redirected impacts to water temperatures. As part of the annual and periodic review processes, the HRL participants will be required to report on measures they have undertaken to address temperature impairments in their stream systems in coordination with HRL implementation measures.

4.4.9.3 Additive Flows Above HRL Base

Table 9. Flow and Non-Flow Commitments

LOCATION	ADDITIVE DELTA INFLOWS AND OUTFLOWS (TAF) ABOVE BASE CONDITIONS BY WATER YEAR TYPE					RESTORATION (ACRES)		
	C	D	BN	AN	W	SPAWNING	INSTREAM REARING	FLOODPLAIN
Sacramento		100	100	100		113.5	137.5	40,000[4]
American[1]	30	40	10	10		25	75	
Yuba[1]		50	50	50			50	100
Feather		60	60	60		15	5.25	1,655
Auburn Ravine (NID) C1 [1,2]		0-3.6	0-3.6	0-3.6				
Bear (NID) C2 [2]		5.6	5.6	5.6				
Yuba (NID) C3 [2]		5.6	5.6	5.6				
Bear (SSWD) C1 [3]		0-4.4	0-4.4	0-4.4				
Bear (SSWD) C2 [3]		0-4.4	0-4.4	0-4.4				
Putah[1]	7	6	6	6		1.4		
Putah (YCFCWCD)[1]		5	5	5				
Mokelumne[1]		5	5	7			1	25
Delta forgone exports		125	125	175				5,227.5[5]
Friant (by San Joaquin River Restoration Program		50	50	50				

LOCATION	ADDITIVE DELTA INFLOWS AND OUTFLOWS (TAF) ABOVE BASE CONDITIONS BY WATER YEAR TYPE					RESTORATION (ACRES)		
	C	D	BN	AN	W	SPAWNING	INSTREAM REARING	FLOODPLAIN
Water Year Type)[1]								
PWA Fixed Price Purchases	3	63.5	84.5	99.5	27			
PWA Market Price Purchases		50	61	85				
Permanent State Water Purchases	65	108	9	52	123			

Blank cells indicate no proposed commitments in that category. Water year types are based on Sacramento Valley Index unless otherwise noted. C = Critical, D = Dry, BN = Below Normal, AN = Above Normal, W = Wet, NID = Nevada Irrigation District, SSWD = South Sutter Water District, YCFCWCD = Yolo County Flood Control and Water Conservation District, PWA = Public Water Agency, C1 = Component 1, C2 = Component 2, C3 = Component 3.

[1] These flow volumes are provided either partially or fully through reservoir reoperations, through redirected water from another tributary, or in the case of Friant through limitations on future abilities to recapture flows and are up to amounts that are not expected to match these volumes in all years. Some or all of these flow commitments may not be accounted for as contributing to additive Delta outflows above base conditions as specified below and in Appendix B.1. Appendix B.1 includes more information about the specific commitments.

[2] Upon issuance of a new FERC license for the Yuba-Bear Hydroelectric Project, components 1 and 2 water will cease and component 3 will begin.

[3] Upon issuance of a new FERC license for Camp Far West Powerhouse, component 1 will cease and component 2 will begin.

[4] 20,000 acres of floodplain habitat will be restored, and 20,000 additional acres will be used for fish food production.

[5] Includes tidal wetland habitat.

Sacramento River

In order to utilize the VA pathway for the HRL water rights identified in Appendix B.1, the Sacramento River HRL participants must provide 100 TAF of additional Sacramento River inflow and associated Delta outflows above approved base conditions defined in Appendix B.1 in dry, below normal, and above normal years. No more than 20 TAF of water each year may be provided through groundwater substitution sources. Flows may only be provided in a manner that does not have redirected impacts on fish and wildlife and in a manner consistent with SGMA as specified in section 4.4.9.2. Any proposal to maintain Sacramento River flow volumes in storage for cold water and associated temperature management purposes may only occur in dry years, must be approved by the Executive Director consistent with section 4.4.9.2, and must be supported by DFW and NMFS. Any portion of the flow contribution stored for cold water purposes and released in a subsequent year is subject to the same provisions as would apply absent

shifting the flows to another year, including section 4.4.9.2 and approved accounting procedures, and must result in additional Delta outflow at a time with benefits to fishes.

American River
In order to utilize the VA pathway for the HRL water rights identified in Appendix B.1, the American River HRL participants must provide 30, 40, 10, and 10 TAF of additive inflow and associated Delta outflows above approved base conditions defined in Appendix B.1 in critical, dry, below normal, and above normal years, respectively. Flows must be provided in the first three dry or critical years and in the first three above normal or below normal years during the eight-year term of the VA pathway. A portion of American River HRL flows may be provided through groundwater substitution and may only be provided in a manner that does not have redirected impacts on fish and wildlife and in a manner consistent with SGMA as specified in section 4.4.9.2.

Yuba River
In order to utilize the VA pathway for the HRL water rights identified in Appendix B.1, the Yuba River HRL participants must provide up to 50 TAF of additive inflow and associated Delta outflows above approved base conditions defined in Appendix B.1 in dry, below normal, and above normal years.

Feather River
In order to utilize the VA pathway for the HRL water rights identified in Appendix B.1, the Feather River HRL participants must provide 60 TAF of additive inflow and associated Delta outflows above approved base conditions defined in Appendix B.1 in dry, below normal, and above normal years. A portion of Feather River HRL flow commitments may be provided through groundwater substitution and may only be provided in a manner that does not have redirected impacts on fish and wildlife and is consistent with SGMA as specified in section 4.4.9.2.

Bear River, Yuba River, and Auburn Ravine (NID)
In order to utilize the VA pathway for the HRL water rights identified in Appendix B.1, the Bear River and Auburn Ravine (NID) HRL participants must provide the HRL flow commitments for components 1 and 2 or component 3. Component 1 is a commitment to redirect up to 3.6 TAF of Bear River flow to be additive to Auburn Ravine flows above approved base conditions defined in Appendix B.1 in dry, below normal, and above normal years. Component 1 will not be additive to Delta outflow. Component 2 is a commitment of 5.6 TAF of additive Bear River inflow and associated Delta outflows above approved base conditions defined in Appendix B.1 in dry, below normal, and above normal years. Component 3 is a commitment of 5.6 TAF of additive Yuba River inflow and associated Delta outflows above approved base conditions defined in Appendix B.1 in dry, below normal, and above normal years, provided through reduced diversions on the Yuba River. Upon issuance of a new FERC license, components 1 and 2 water will cease and component 3 will begin.

Bear River (SSWD)
In order to utilize the VA pathway for the HRL water rights identified in Appendix B.1, the Bear River (SSWD) HRL participants must provide the HRL flow commitments for components 1 or 2. Component 1 is a commitment to provide up to 4.4 TAF of additive Bear River inflow and associated Delta outflows above approved base conditions defined in Appendix B.1 in dry, below normal, and above normal years prior to issuance of a new FERC license. After issuance of a new FERC license, component 2 flows will be provided, of which up to 4.4 TAF will contribute to additive Delta outflows above approved base conditions in dry, below normal, and above normal years.

Putah Creek
In order to utilize the VA pathway for the HRL water rights identified in Appendix B.1, the Putah Creek HRL participants must provide 7, 6, 6, and 6 TAF of additive lower Putah Creek inflow above approved base conditions defined in Appendix B.1 in critical, dry, below normal, and above normal years, respectively. The Putah Creek HRL flows are not being accounted for as contributing to increases in Delta outflows above approved base conditions.

Putah Creek (YCFCWCD)
In order to utilize the VA pathway for the HRL water rights identified in Appendix B.1, the Putah Creek (YCFCWCD) HRL participants must provide 5 TAF of additive lower Putah Creek inflow above approved base conditions defined in Appendix B.1 in dry, below normal, and above normal years. The Putah Creek (YCFCWCD) HRL flows are not being accounted for as contributing to increases in Delta outflows above approved base conditions.

If YCFCWCD can demonstrate no significant adverse water quality effects to Putah Creek based on the approved monitoring described below and as determined by the Executive Director of the State Water Board in coordination with Central Valley Regional Water Quality Control Board staff, the Putah Creek (YCFCWCD) HRL flow commitment may involve routing surface water from Cache Creek to lower Putah Creek and/or conducting groundwater recharge and later utilizing a portion of the banked groundwater from its recharge efforts to provide the HRL flow commitments to lower Putah Creek. If the aforementioned criteria are not met, or if required permits are not obtained to divert from Cache Creek, YCFCWCD will provide the remainder of a year's flow commitment via purchases or exchanges that will result in additive flows to lower Putah Creek.

Prior to releasing any Cache Creek surface water or banked groundwater into Putah Creek, YCFCWCD will develop, in consultation with State Water Board and Central Valley Regional Water Quality Control Board staff, a monitoring plan to inform whether releases would result in adverse water quality effects in Putah Creek. The monitoring plan will be subject to approval by the Executive Director of the State Water Board, including any conditions of approval. Once approved, YCFCWCD will conduct

monitoring in accordance with that approved plan. The monitoring must include provisions for monitoring of Cache Creek water quality and banked groundwater quality prior to diversion into Putah Creek, and Putah Creek water quality before releases of Cache Creek water or banked groundwater into Putah Creek and during and after releases of Cache Creek water into Putah Creek. If monitoring information indicates possible significant adverse effects to Putah Creek water quality, YCFCWCD will notify the State Water Board and Central Valley Water Board immediately and cease releasing water into Putah Creek until the Executive Director of the State Water Board in coordination with Central Valley Water Board staff determine that significant adverse effects to water quality in Putah Creek are no longer expected.

Mokelumne River

In order to utilize the VA pathway for the HRL water rights identified in Appendix B.1, the Mokelumne River HRL participants must preserve existing instream flows above the 1998 Joint Settlement Agreement (JSA) minimum instream flow requirement by 10, 20, and 45 TAF per year for dry, below normal, and normal and above JSA water year types, respectively, in order to provide an estimated increase of 5, 5, and 7 TAF of additional Delta inflow and associated Delta outflows above base conditions in dry, below normal, and above normal Sacramento Valley Index years based on long-term modeling. However, these estimated contributions are not being accounted for as Delta outflows. Instead, Mokelumne River HRL participants must provide for purchases of 1 and 2 TAF of contributions to Delta outflows in below normal and above normal Sacramento Valley Index years through market-price water purchases under the public water agency (PWA) water purchase program described below.

Friant Contributions to Delta Outflows

In order to implement the Friant HRL commitments, San Joaquin River Restoration Program (SJRRP) flows of up to 50 TAF will be provided in dry, normal-dry, and normal-wet years, as determined by SJRRP water year types in order to contribute to Delta outflows above approved base conditions defined in Appendix B.1. If 50 TAF of contributions to Delta outflow would not be provided absent limitations on recapture of SJRRP flows, recapture of SJRRP flows will be reduced by 50 percent as needed to contribute toward the flow commitment of 50 TAF of Delta outflow.

SWP and CVP Export Provisions

In order to utilize the VA pathway for the HRL water rights identified in Appendix B.1, the HRL participants responsible for providing SWP and CVP export contributions, including DWR and Reclamation, must reduce exports compared to what would have occurred under base conditions by 125 TAF in both dry and below normal water year types, and 175 TAF in above normal water year types, in order to provide additive Delta outflows above approved base conditions defined in Appendix B.1. All diverters in the Delta watershed, including the SWP and CVP must also bypass other HRL flow commitments to achieve the additive HRL Delta outflow commitments above base conditions, as well as other flows provided by non-HRL water rights, that are above approved base

conditions, to meet Bay-Delta Plan regulatory requirements and other instream flow dedications as specified in approved accounting provisions included in Appendix B.1 and approved as part of the implementation methodology and associated regulation for the current update to the Bay-Delta Plan.

Water Purchases

[Note to reader: Draft generalized flow accounting measures have been developed for Public Water Agency water purchases, but accounting has not yet been provided for permanent state water purchases. If the sources of permanent state water purchases, specific sources for fixed price water purchases, and specific accounting for those purchases are identified before plan adoption, this section will be updated accordingly. Otherwise, those sources will be approved through the procedure identified below and in section 4.4.9.2.*]*

In order to utilize the VA pathway for the HRL water rights listed in Appendix B.1, HRL participants must provide the following additive Delta outflows above approved base conditions:

i. PWA water purchases consisting of:

   (a) Fixed price purchases of 3 TAF in critical, 63.5 TAF in dry, 84.5 TAF in below normal, 99.5 TAF in above normal, and 27 TAF in wet water year types.

   (b) Market price purchases of 50 TAF in dry, 61 TAF in below normal, and 85 TAF in above normal water year types (inclusive of 1 and 2 TAF Mokelumne River HRL participant contributions).

ii. Permanent state water purchases of 65 TAF in critical, 108 TAF in dry, 9 TAF in below normal, 52 TAF in above normal, and 123 TAF in wet water year types. Within 6 months of adoption of the current plan amendments, HRL participants will provide a list of the water rights, and any accompanying substantiating information requested by the Executive Director, for water purchases that could be dedicated instream in accordance with the procedures and criteria identified in section 4.4.9.2.

Table 10. Default Schedule and Flexibility Bracket for HRL Flows in Critical Water Years

For each water source, the upper row of bolded numbers represents the default schedule and the lower row of numbers separated by a hyphen (-) represents the flexibility bracket for any given month. Multi-month flexibility brackets are represented in merged cells.

SOURCE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
American	**0%**	**0%**	**0%**	**0%**	**0%**	**50%**	**50%**	**0%**	**0%**	**0%**	**0%**	**0%**
						33-66%	33-66%	0-33%				
Putah	**0%**	**16.7%**	**16.7%**	**16.7%**	**16.7%**	**16.7%**	**8.3%**	**8.3%**	**0%**	**0%**	**0%**	**0%**
		0-75%	0-75%	0-75%	0-84%	0-74%	0-54%	0-57%				
PWA Water Purchase Program	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**50%**	**50%**	**0%**	**0%**	**0%**	**0%**
						0-40%	60-100%		0-40%			
Permanent State Water Purchases	**0%**	**0%**	**0%**	**0%**	**0%**	**33.3%**	**33.3%**	**33.3%**	**0%**	**0%**	**0%**	**0%**
					0-40%	60-100%			0-40%			

Table 11. Default Schedule and Flexibility Bracket for HRL Flows in Dry Water Years

For each water source, the upper row of bolded numbers represents the default schedule and the lower row of numbers separated by a hyphen (-) represents the flexibility bracket for any given month. Multi-month flexibility brackets are represented in merged cells.

SOURCE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
Friant (SJRRP year type)	**0%**	**0%**	**0%**	**0%**	**0%**	**40%**	**30%**	**30%**	**0%**	**0%**	**0%**	**0%**
						40-75%	25-30%	0-30%				
Sacramento	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**50%**	**50%**	**0%**	**0%**	**0%**	**0%**

SOURCE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
	0-25%	0-25%	0-25%	0-25%	0-25%	0-50%	0-50%	0-50%	0-25%	0-25%	0-25%	0-25%
Feather	**0%**	**0%**	**0%**	**0%**	**0%**	**33.3%**	**33.3%**	**33.3%**	**0%**	**0%**	**0%**	**0%**
						0-100%	0-100%	0-100%				
Yuba	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**50%**	**50%**	**0%**	**0%**	**0%**	**0%**
							33-66%	33-66%	0-33%			
American	**0%**	**0%**	**0%**	**0%**	**0%**	**33.3%**	**33.3%**	**33.3%**	**0%**	**0%**	**0%**	**0%**
						20-40%	20-40%	20-40%				
Mokelumne	**25%**	**0%**	**0%**	**0%**	**0%**	**15%**	**34%**	**26%**	**0%**	**0%**	**0%**	**0%**
	10-30%					70-90%						
Auburn Ravine (NID) C1	**0%**	**0%**	**0%**	**0%**	**0%**	**67%**	**33%**	**0%**	**0%**	**0%**	**0%**	**0%**
						0-100%	0-100%					
Bear (NID) C2	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**3%**	**17%**	**45%**	**35%**	**0%**	**0%**
							0-100%	0-100%	0-100%	0-100%		
Yuba (NID) C3	**0%**	**0%**	**0%**	**13%**	**11%**	**13%**	**32%**	**31%**	**0%**	**0%**	**0%**	**0%**
				0-100%	0-100%	0-100%	0-100%	0-100%				
Bear (SSWD) C1	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	0%	50%	50%	0%	**0%**	**0%**
				0-100%	0-100%	0-100%	0-100%	0-100%	0-100%			
Bear (SSWD) C2	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	0%	50%	50%	0%	**0%**	**0%**
				0-100%	0-100%	0-100%	0-100%	0-100%	0-100%			

SOURCE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
Putah	**0%**	**16.7%**	**16.7%**	**16.7%**	**16.7%**	**16.7%**	**8.3%**	**8.3%**	**0%**	**0%**	**0%**	**0%**
		0-75%	0-75%	0-75%	0-84%	0-74%	0-54%	0-57%				
Putah (YCFCWCD)	**8.3%**	**16.7%**	**16.7%**	**16.7%**	**16.7%**	**16.7%**	**8.2%**	**0%**	**0%**	**0%**	**0%**	**0%**
	0-57%	0-75%	0-75%	0-75%	0-84%	0-74%	0-54%					
CVP/SWP Export Reduction	**0%**	**0%**	**0%**	**0%**	**0%**	**33.3%**	**33.3%**	**33.3%**	**0%**	**0%**	**0%**	**0%**
						20-80%	20-80%	0-50%				
PWA Water Purchase Program	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**50%**	**50%**	**0%**	**0%**	**0%**	**0%**
						0-40%	60-100%		0-40%			
Permanent State Water Purchases	**0%**	**0%**	**0%**	**0%**	**0%**	**33.3%**	**33.3%**	**33.3%**	**0%**	**0%**	**0%**	**0%**
					0-40%	60-100%			0-40%			

Table 12. Default Schedule and Flexibility Bracket for HRL Flows in Below Normal Water Years

For each water source, the upper row of bolded numbers represents the default schedule and the lower row of numbers separated by a hyphen (-) represents the flexibility bracket for any given month. Multi-month flexibility brackets are represented in merged cells.

SOURCE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
Friant (SJRRP year type)	**0%**	**0%**	**0%**	**0%**	**5%**	**20%**	**40%**	**35%**	**0%**	**0%**	**0%**	**0%**
					0-5%	15-30%	35-70%	0-35%				
Sacramento	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**50%**	**50%**	**0%**	**0%**	**0%**	**0%**
	0-25%	0-25%	0-25%	0-25%	0-25%	0-50%	0-50%	0-50%	0-25%	0-25%	0-25%	0-25%

SOURCE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
Feather	**0%**	**0%**	**0%**	**0%**	**0%**	**25%**	**50%**	**25%**	**0%**	**0%**	**0%**	**0%**
						0-100%	0-100%	0-100%				
Yuba	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**50%**	**50%**	**0%**	**0%**	**0%**	**0%**
							33-66%	33-66%	0-33%			
American	**0%**	**0%**	**0%**	**0%**	**0%**	**50%**	**50%**	**0%**	**0%**	**0%**	**0%**	**0%**
						33-66%	33-66%	0-33%				
Mokelumne	**26%**	**0%**	**0%**	**0%**	**0%**	**17%**	**32%**	**25%**	**0%**	**0%**	**0%**	**0%**
	10-30%					70-90%						
Auburn Ravine (NID) C1	**0%**	**0%**	**0%**	**0%**	**0%**	**67%**	**33%**	**0%**	**0%**	**0%**	**0%**	**0%**
						0-100%	0-100%					
Bear (NID) C2	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**5%**	**30%**	**55%**	**10%**	**0%**
								0-100%	0-100%	0-100%	0-100%	
Yuba (NID) C3	**0%**	**0%**	**0%**	**27%**	**29%**	**44%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
				0-100%	0-100%	0-100%						
Bear (SSWD) C1	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**50%**	**50%**	**0%**	**0%**	**0%**
				0-100%	0-100%	0-100%	0-100%	**0-100%**	**0-100%**			
Bear (SSWD) C2	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**50%**	**50%**	**0%**	**0%**	**0%**
				0-100%	0-100%	0-100%	0-100%	**0-100%**	**0-100%**			
Putah	**0%**	**16.7%**	**16.7%**	**16.7%**	**16.7%**	**16.7%**	**8.3%**	**8.3%**	**0%**	**0%**	**0%**	**0%**

SOURCE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
		0-75%	0-75%	0-75%	0-84%	0-74%	0-54%	0-57%				
Putah (YCFCWCD)	**8.3%**	**16.7%**	**16.7%**	**16.7%**	**16.7%**	**16.7%**	**8.2%**	**0%**	**0%**	**0%**	**0%**	**0%**
	0-57%	0-75%	0-75%	0-75%	0-84%	0-74%	0-54%					
CVP/SWP Export Reduction	**0%**	**0%**	**0%**	**0%**	**0%**	**33.3%**	**33.3%**	**33.3%**	**0%**	**0%**	**0%**	**0%**
						20-80%	20-80%	0-50%				
PWA Water Purchase Program	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**50%**	**50%**	**0%**	**0%**	**0%**	**0%**
						0-40%	60-100%		0-40%			
Permanent State Water Purchases	**0%**	**0%**	**0%**	**0%**	**0%**	**33.3%**	**33.3%**	**33.3%**	**0%**	**0%**	**0%**	**0%**
					0-40%	60-100%			0-40%			

Table 13. Default Schedule and Flexibility Bracket for HRL Flows in Above Normal Water Years

For each water source, the upper row of bolded numbers represents the default schedule and the lower row of numbers separated by a hyphen (-) represents the flexibility bracket for any given month. Multi-month flexibility brackets are represented in merged cells.

SOURCE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
Friant (SJRRP year type)	**0%**	**0%**	**0%**	**0%**	**5%**	**20%**	**40%**	**35%**	**0%**	**0%**	**0%**	**0%**
					0-5%	15-30%	35-70%	0-35%				
Sacramento	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**50%**	**50%**	**0%**	**0%**	**0%**	**0%**
				0-25%	0-25%	0-25%	0-100%	0-100%	0-25%			
Feather	**0%**	**0%**	**0%**	**0%**	**0%**	**50%**	**25%**	**25%**	**0%**	**0%**	**0%**	**0%**

SOURCE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
						0-100%	0-100%	0-100%				
Yuba	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**50%**	**50%**	**0%**	**0%**	**0%**	**0%**
							33-66%	33-66%	0-33%			
American	**0%**	**0%**	**0%**	**0%**	**0%**	**50%**	**50%**	**0%**	**0%**	**0%**	**0%**	**0%**
						33-66%	33-66%	0-33%				
Mokelumne	**13%**	**0%**	**0%**	**0%**	**0%**	**8%**	**43%**	**36%**	**0%**	**0%**	**0%**	**0%**
	10-30%					70-90%						
Auburn Ravine (NID) C1	**0%**	**0%**	**0%**	**0%**	**0%**	**67%**	**33%**	**0%**	**0%**	**0%**	**0%**	**0%**
						0-100%	0-100%					
Bear (NID) C2	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**2%**	**25%**	**50%**	**23%**	**0%**
								0-100%	0-100%	0-100%	0-100%	
Yuba (NID) C3	**0%**	**0%**	**0%**	**32%**	**44%**	**24%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
				0-100%	0-100%	0-100%						
Bear (SSWD) C1	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**50%**	50%	**0%**	**0%**	**0%**	**0%**
				0-100%	0-100%	0-100%	0-100%	0-100%	0-100%			
Bear (SSWD) C2	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**50%**	50%	**0%**	**0%**	**0%**	**0%**
				0-100%	0-100%	0-100%	0-100%	0-100%	0-100%			
Putah	**0%**	**16.7%**	**16.7%**	**16.7%**	**16.7%**	**16.7%**	**8.3%**	**8.3%**	**0%**	**0%**	**0%**	**0%**
		0-75%	0-75%	0-75%	0-84%	0-74%	0-54%	0-57%				

SOURCE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
Putah (YCFCWCD)	**8.3%**	**16.7%**	**16.7%**	**16.7%**	**16.7%**	**16.7%**	**8.2%**	**0%**	**0%**	**0%**	**0%**	**0%**
	0-57%	0-75%	0-75%	0-75%	0-84%	0-74%	0-54%					
CVP/SWP Export Reduction	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**50%**	**50%**	**0%**	**0%**	**0%**	**0%**
						0-30%	30-70%	30-70%	0-30%			
PWA Water Purchase Program	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**50%**	**50%**	**0%**	**0%**	**0%**	**0%**
						0-40%	60-100%		0-40%			
Permanent State Water Purchases	**0%**	**0%**	**0%**	**0%**	**0%**	**33.3%**	**33.3%**	**33.3%**	**0%**	**0%**	**0%**	**0%**
					0-40%	60-100%			0-40%			

Table 14. Default Schedule and Flexibility Bracket for HRL Flows in Wet Water Years

For each water source, the upper row of bolded numbers represents the default schedule and the lower row of numbers separated by a hyphen (-) represents the flexibility bracket for any given month. Multi-month flexibility brackets are represented in merged cells.

SOURCE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
PWA Water Purchase Program	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**50%**	**50%**	**0%**	**0%**	**0%**	**0%**
						0-40%	60-100%		0-40%			
Permanent State Water Purchases	**0%**	**0%**	**0%**	**0%**	**0%**	**33.3%**	**33.3%**	**33.3%**	**0%**	**0%**	**0%**	**0%**
					0-40%	60-100%			0-40%			

4.4.9.4 Flow Accounting

Flows provided to meet the HRL flow commitments must be provided consistent with the specific flow accounting protocols included in Appendix B.1, as approved by the State Water Board, including any appropriate conditions to ensure that full HRL flow commitments are met consistent with water right priorities. HRL flow commitments must be in addition to flows needed to meet senior water right demands and in addition to approved base flows defined in Appendix B.1, including both required base flows and other base flows in the system that may not be required (compliance buffers, flood flows, uncontrolled flows, hydropower generation flows, and other flows that would have been present absent HRL flow commitments), hereafter referred to as approved base conditions. Flow accounting must demonstrate that all HRL flows are overall or seasonally new additive water over this base flow by demonstrating that the water came from any of the following sources with further defined accounting requirements below: 1) a new source of water that is replacing the source to be left instream (e.g., groundwater substitution); 2) an overall reduction in consumptive water use relative to base conditions in order to provide this source instream (e.g., land fallowing, an overall reduction in exports that would have occurred relative to base conditions); or 3) in the case of reservoir reoperations or Friant contributions that may not be fully additive to base conditions, that the operations are consistent with the expectations for additive inflow and outflows, where applicable, as described in Appendix B.1.

The following general independently verifiable accounting requirements apply:

i. Transparent reporting of base conditions and additive HRL flows posted on a common user-friendly website for the HRL commitments on at least a weekly basis with monthly running summaries culminating in annual reports;

ii. Documentation of the assumptions and rationale used to define base conditions as compared to operations with HRL flows;

iii. Documentation that HRL flow measures did not affect base conditions, including on a seasonal basis and from year to year;

iv. Demonstration that water use has not expanded to reduce base flows in a manner inconsistent with the provision to protect the flow base described above in section 4.4.9.1;

v. Verification that implementation of the VA pathway has not resulted in another HRL water right holder included in the list of water rights in appendix B.1, including as appendix B.1 may be modified, reducing the amount of flow they bypass or release from storage, including to meet other regulatory obligations, due to the provision of HRL flow commitments;

vi. Demonstration that HRL flows are additive to flows provided by water rights not covered by the VA pathway that are above base conditions as approved by the State Water Board or delegee, subject to regulatory provisions of the Bay-Delta Plan (including the Lower San Joaquin River flow requirements), including any losses as appropriate as determined by the State Water Board, upon

implementation of the implementing regulation for the current update to the Bay-Delta Plan;

vii. Documentation of the specific methods used to determine export limits in order to bypass other HRL flows, HRL flows provided by export reductions, other regulatory flows provided to meet Bay-Delta Plan requirements and other instream flow dedications; and

viii. Documentation of all other methods needed to account for the addition of HRL flows to approved base conditions on a near real-time basis and annually.

The following specific accounting provisions apply to HRL flows made available through groundwater substitution:

i. Measurement and reporting of the amount of increased groundwater pumping conducted to provide HRL flows;

ii. Identification of the location and characteristics of the groundwater wells used;

iii. Historical groundwater pumping records for identified wells used for that pumping;

iv. Development of a monitoring plan to assess the effects of groundwater pumping

v. Verification methods to ensure that any water made available through groundwater substitution is producing additive flows without redirected impacts to fish and wildlife and consistent with SGMA; and

vi. Measurement or best available estimate of any reductions in streamflow resulting from groundwater substitution, which shall be deducted from the HRL flow contribution.

The following specific accounting provisions apply to HRL flows made available through land fallowing:

i. Identification of the specific fallowed parcels by March 1 of each year;

ii. Verification of the baseline cropland planting conditions absent HRL actions;

iii. Documented calculations of the volume of water provided by fallowing over approved base conditions using assumptions approved by the Executive Director; and

iv. Crop maps and monitoring methods used to conduct field monitoring activities to confirm fallowing.

The following specific accounting provisions apply to HRL flows made available through reservoir reoperations:

i. Verification that net additive flows are provided during January through June above approved base conditions; and

ii. Applicable reservoir refill accounting provisions as specified in Appendix B.1.

Additional flow accounting procedures are identified in Appendix B.1 to this plan. The flow accounting procedures included in Appendix B.1 may be refined by the Executive Director as part of the annual and periodic review processes described below after an opportunity for public review and comment in order to determine compliance with the HRL flow commitments approved in this plan.

4.4.9.5 HRL Non-Flow Habitat Restoration Actions

Table 9 identifies the minimum additive contributions to physical habitat restoration, in acres and by general location, that must be completed by HRL participants within the initial eight-year term in order to utilize the VA pathway for HRL water rights. HRL habitat restoration includes activities to increase the area of spawning habitat, instream rearing habitat, and floodplain habitat for the benefit of native fish and other aquatic species. HRL habitat restoration projects must be designed and implemented consistent with the best available science regarding habitat needs of the species, defined further in the non-flow habitat restoration accounting section below. HRL habitat restoration projects must also be adaptively managed in response to new information provided by the HRL supplemental science and monitoring or other sources, including the effects of HRL non-flow habitat restoration actions on pesticide and methylmercury concentrations. All non-flow habitat must be completed and accounted for by year eight of the VA pathway.

HRL habitat restoration projects must include provisions for incorporating input from California Native American Tribes and other interested parties during the development, implementation, and assessment of non-flow habitat restoration measures, including input from tribes on Traditional Ecological Knowledge (TEK) and other relevant information.

In order to utilize the VA pathway for HRL water rights, HRL participants must restore the following amounts of habitat by the end of year eight of the VA pathway:

i. Sacramento River: 113.5 acres of spawning habitat and 137.5 acres of instream rearing habitat.

ii. Valley Floor: Floodplain rearing habitat in flood bypasses (Yolo Bypass, Tisdale Bypass, Sutter Bypass, Butte Sink, and Colusa Basin), the Sacramento River, and the Delta including 20,000 acres of laterally connected tributary and bypass floodplain habitat and 20,000 additional acres for fish food production (preferably located outside of the flood bypasses).

iii. American River: 25 acres of spawning habitat and 75 acres of instream rearing habitat.

iv. Yuba River: 50 acres of instream rearing habitat and 100 acres of floodplain rearing habitat.

v. Auburn Ravine: Installation of additional fish screens on private diversions in lower Auburn Ravine.

vi. Feather River: 15 acres of spawning habitat, 5.25 acres of instream rearing habitat, and 1,655 acres of floodplain rearing habitat.

vii. Putah Creek: 1.4 acres of spawning habitat.

viii. Mokelumne River: 1 acre of instream rearing habitat and 25 acres of floodplain rearing habitat.

ix. North Delta Arc and Suisun Marsh: 5,227.5 acres of tidal wetland and associated floodplain habitat.

4.4.9.6 Non-Flow Habitat Restoration Accounting

All HRL non-flow habitat restoration commitments are additive to existing physical habitat conditions and regulatory requirements existing as of December 2018 and must be completed within the eight-year term of the VA pathway. This may include restoration of habitat that had been previously restored prior to December 2018 and subsequently degraded in quality. HRL non-flow habitat restoration actions include the following project types: tributary spawning, tributary instream rearing, tributary floodplain rearing, bypass floodplain, and tidal wetland habitat projects. Accounting for HRL non-flow habitat restoration is required to account for the following three steps:

First, projects completed by HRL participants must fulfill all of the following conditions in order to count toward the HRL commitments:

i. The project must create new suitable habitat or restore existing habitat with limited suitability in a manner that provides significant additional benefits for the target species and life stages;

ii. The project must not be used to fulfill any regulatory requirements that existed as of December 2018 or earlier; and

iii. Project construction must be started after December 2018 and completed by the end of year eight of the VA pathway.

Second, the number of acres of qualifying projects that meet all applicable design criteria must be determined. Tributary spawning, instream rearing, and tributary floodplain rearing habitat restoration projects are subject to the design criteria in Table 15, Table 16, and Table 17 as applicable. Tributary floodplain restoration projects intended to be counted toward the valley floor floodplain habitat commitment are also subject to the design criteria in Table 15, Table 16, and Table 17. Design criteria must be met during seasonal time periods that would support the species and life stage that the project is intended to benefit. Bypass floodplain and tidal wetland habitat projects do not have pre-defined criteria and instead HRL participants are required to submit proposed design criteria for approval by the Executive Director and DFW.

Table 15. Design Criteria for HRL Non-Flow Habitat Restoration Projects: Tributary Spawning Habitat, Instream Rearing Habitat, and Tributary Floodplain Rearing Habitat

HABITAT TYPE	WATER DEPTH; FEET (FT)	WATER VELOCITY; FEET PER SECOND (FPS)	OTHER
Spawning Habitat	1.0–2.5	1.0–4.0	**Substrate:** Dominant substrate (particles that compose more than 50 percent of the surface area) size 2–10 centimeters (0.75–4.0 inches).
In-stream Rearing Habitat	0.5–4.0	0.0–3.0	**Cover:** Sufficient cover to provide suitable rearing habitat for juvenile salmonids, defined as a minimum of 20 percent areal coverage of cover features that have a Habitat Suitability Index (HSI) score ≥ 0.5 supported by the scientific literature (listed in Table 16). For 15 percent of the habitat area (75 percent of the cover area), the areal extent of cover features must be quantified as the actual extent of the feature itself with no buffer applied, although adjustments may be made to account for expected increases in the size of vegetation. Five percent of the habitat area (25 percent of the cover area), may constitute either cover features listed in Table 16, cobble 3-12 inches in diameter, or the area of a 2-foot buffer applied to the following cover features from Table 16: woody debris, boulders, undercut banks, root wads, logjam/submerged brush piles, and large wood.
Tributary Floodplain Rearing Habitat	0.5–4.0	0.0–3.0	**Cover:** Sufficient cover to provide suitable rearing habitat for juvenile salmonids, defined as a minimum of 20 percent areal coverage of cover features that have a Habitat Suitability Index (HSI) score ≥ 0.5 supported by the scientific literature (listed in Table 16). For 15 percent of the habitat area (75 percent of the cover area), the areal extent of cover features must be quantified as the actual extent of the feature itself with no buffer applied, although adjustments may be made to account for expected increases in the size of vegetation. Five percent of the habitat area (25 percent of the cover area), may constitute either cover features listed in Table 16, cobble 3-12 inches in diameter, or the area of a 2-foot buffer applied to the following cover features from Table 16: woody debris, boulders, undercut banks, root wads, logjam/submerged brush piles, and large wood. **Floodplain Function:** Sufficient frequency, magnitude, and duration of inundation to provide benefits for rearing salmonids, defined as suitable inundation events during times that provide benefit for rearing salmonids in two out of three years, based on a long-term average. Suitable

HABITAT TYPE	WATER DEPTH; FEET (FT)	WATER VELOCITY; FEET PER SECOND (FPS)	OTHER
			inundation events are defined by the duration credits in Table 17.

Table 16. Suitable Categories of Cover Features That Can Be Applied Toward the Cover Criterion for Rearing Habitat

COVER FEATURE TYPE	DESCRIPTION
Woody debris	Fine woody vegetation and overhead cover, branches (2.5–30.5 centimeters diameter) and logs (> 30.5 centimeters diameter)
Boulder	Small-medium (12–48 inches) and large (> 34 inches) boulders
Grass/herbaceous	Emergent rooted aquatic grass and sedges, and tall (> 3 feet) dense grass
Willow and other riparian vegetation	Trees, bushes, willow riparian, willow scrub, and other riparian vegetation, taller than 2 feet above the ground
Undercut bank	Undercut at least 0.5 feet
Aquatic vegetation	Non-emergent rooted aquatic vegetation
Overhanging vegetation	Near or touching water
Root wad, logjam/submerged brush pile and large wood	Logs and root wads greater than 9 inches in diameter

Table 17. Suitable Inundation Event Credits

DURATION (DAYS)	CREDIT
7	0.25
8	0.27
9	0.29
10	0.32
11	0.35
12	0.40
13	0.45
14	0.5
15	0.6
16	0.7
17	0.8

18	0.9
≥19	1.0

Within each modeled water year, inundation credits for each applicable inundation event of at least 7 days duration will be summed. A suitable inundation event is defined as a total credit of at least 1.0 during a water year. Partial acreage credit may be provided for inundation credits less than 1.0.

HRL participants may request project-specific modifications to design criteria for proposed tributary spawning habitat, instream rearing habitat, or tributary floodplain rearing habitat. Any modifications to the design criteria in Table 15, Table 16, or Table 17 will be subject to approval by the Executive Director and DFW. The Executive Director and DFW may approve the proposed design criteria, approve the proposed design criteria with modifications, or reject the proposed design criteria. This review process may be combined with review associated with other flexibilities in the non-flow habitat accounting process. Design criteria proposals should be submitted as early as possible to avoid delaying the restoration project. HRL participants requesting modifications to design criteria must submit the following materials to the Executive Director and DFW:

i. Scientific evidence that the proposed design criteria define suitable habitat for the species and life stage the restoration project is intended to benefit;

ii. A justification for why modifications to the design criteria are needed, and how the modified design criteria would provide comparable protections for the species and life stage the project is intended to benefit as those described in the Scientific Basis Report Supplement for the VA pathway; and

iii. Appropriate reference materials, such as scientific literature used to support the proposed project-specific modifications to the design criteria.

After the Executive Director certifies that an acceptable proposal with all necessary supporting documentation has been received, the Executive Director and DFW will render a decision within 30 days (unless the HRL participants agree to a longer deadline), excluding any days with follow-up communication with HRL participants about the proposal or while awaiting a response from HRL participants. Each decision will be accompanied by a justification.

Third, for tributary spawning, instream rearing, and floodplain rearing, habitat verification must occur to confirm that the acreage of habitat meeting design criteria across a range of flows conforms with or provides equivalent benefits to the flow-habitat relationships provided by HRL participants for assessment of the benefits of the VA pathway (i.e., those used in the Scientific Basis Report Supplement in Support of Proposed Voluntary Agreements for the Sacramento River, Delta, and Tributaries Update to the San Francisco Bay/Sacramento-San Joaquin Delta Water Quality Control Plan (Scientific Basis Report Supplement)). This verification must be provided to the Executive Director and DFW for approval. If approved, the committed acres of habitat for the approved habitat category will be considered fulfilled. This verification is not required for tributary floodplain restoration projects intended to be counted toward the valley floor floodplain

habitat commitment. Instead, the number of acres meeting applicable design criteria may be counted toward the valley floor floodplain habitat commitment.

To request approval for bypass floodplain and tidal wetland design criteria, HRL participants must provide the State Water Board and DFW with a proposal including scientific evidence that the proposed design criteria constitute suitable habitat for the species and life stage the restoration project is intended to benefit. For bypass floodplain projects, design criteria must be proposed for approval alongside the proposed criteria for the amount of incremental improvement that would be necessary for an enhancement project acre to count toward the commitments. All bypass floodplain and tidal wetland habitat acres must constitute usable aquatic habitat and may not include non-habitat structures (e.g., roads, buildings, etc.). The proposed criteria may be approved, modified, or rejected by the Executive Director and DFW. Design criteria and project designs must align with the following requirements. Bypass floodplain and tidal wetland habitat projects must be designed to address aquatic ecosystem stressors described for those habitat types in the Scientific Basis Report Supplement. Projects must be designed to provide generally accepted habitat components for salmonid rearing habitat (as required for tributary floodplains), but also benefits for connectivity, fish passage (e.g., adult salmonids and sturgeon), spawning (e.g., splittail), and/or habitat for other native fishes such as longfin smelt. All bypass floodplain and tidal wetland projects must provide access and passage for fish following applicable guidelines. Bypass floodplain and tidal wetland habitat accounting will be based on modeled inundation with respect to physical aspects of the projects (e.g., water depth and velocity). Accounting for bypass floodplain and tidal wetland habitat will determine whether habitat area meeting all applicable design criteria of the quantity described in Table 9 is provided over a reasonable range of flows or tidal elevations.

Non-flow habitat restoration accounting is required to be conducted as described in Appendix B.2 to this plan. The non-flow accounting procedures included in Appendix B.2 may be refined by the Executive Director as part of the annual and periodic review processes described below after an opportunity for public review and comment in order to determine compliance with the HRL non-flow commitments approved in this plan.

For each restoration project that is proposed to apply toward the HRL commitments, the following information will be required to be provided to the State Water Board:

i. Lead implementing agency and any collaborating agencies and the roles of each agency;
ii. Final project design as constructed, including the actual areal extent of substrate and cover elements by type;
iii. Raster data providing spatial data of adequate resolution of the areas conforming to the depth, velocity, cover, and substrate criteria at each design flow, and shapefiles of the actual areal spatial extent of each cover and substrate type at each design flow; and

iv. Any other information necessary to conduct accounting assessments or as requested by the Executive Director.

For HRL habitat commitments without specific accounting provisions identified above, including diversion screening and fish food production, the HRL participants will be required to report annually on progress related to implementation of those actions. This reporting is required to account for each individual project and include the type of activity; lead implementing agency and any collaborating agencies and the roles of each agency; funding source; as applicable the dates when the project was initiated, permits obtained, construction or action started, and construction or action completed; and the identities of any other regulatory requirements, required mitigation, or other requirements that the project is fulfilling.

4.4.9.7 Supplemental Science and Monitoring

The HRL participants will be required to conduct supplemental science and monitoring, in addition to any general monitoring processes and activities described in section 4.5, to inform assessment of compliance and effectiveness of the VA pathway, including developing HRL hypotheses, metrics, targets, and associated monitoring for approval by the Executive Director. The HRL hypotheses must address the hypothesized outcomes from the VA pathway and scientific questions that will be evaluated by HRL participants related to those hypothesized outcomes, including the baseline for comparison where applicable and the scientific methods that will be used for the evaluations. The HRL metrics must define the quantitative measurable outcome(s) and associated variables that will be assessed for the hypotheses. The HRL targets must describe the expected value of the metrics resulting from implementation of the VA pathway. The HRL monitoring must describe the monitoring that will be conducted to assess all HRL hypotheses, metrics, and targets. The HRL supplemental science and monitoring is incorporated within the Bay-Delta Monitoring and Evaluation Program defined below and will be required to adhere to the requirements in section 4.5.1, including for review and revision of monitoring and special studies, data management and quality, and reporting. In conducting supplemental HRL monitoring, HRL participants should coordinate with any topically and geographically related monitoring surveys, including the Delta and San Francisco Bay Regional Monitoring Programs.

Within 60 days of State Water Board adoption of the current plan amendments, the HRL participants will be required to submit proposed HRL hypotheses, metrics, and monitoring for approval by the Executive Director. HRL participants will be required to submit proposed HRL targets for approval by the Executive Director within 6 months of adoption of the current plan amendments, with the possibility for extension to 9 months for good cause shown. HRL participants will be required to solicit input from California Native American Tribes, non-governmental organizations, and other interested parties in the development of the targets. The Executive Director will consider the conditional approval of the HRL hypotheses, metrics, targets, and monitoring after opportunity for public review and comment within a year of adoption of the current plan amendments.

The HRL monitoring as approved by the Executive Director will be required to begin within the first year of implementation of the VA pathway. The HRL hypotheses, metrics, targets, and monitoring elements may be updated with Executive Director approval through annual or periodic review processes after opportunity for public review and comment.

HRL hypotheses, metrics, targets, and monitoring are required to address the following topics at a minimum:

i. Actual and, as feasible, forecasted future changes in the abundance and condition of adult and juvenile Chinook salmon and steelhead in each tributary and the Delta, relative to the conditions before implementation of the VA pathway;

ii. Changes in the quantity of suitable Chinook salmon and steelhead spawning and rearing habitat, with suitability defined by the non-flow habitat accounting design criteria as well as the water quality conditions conducive for reproduction, survival, and growth, including temperatures;

iii. Changes in the quantity of suitable estuarine habitat for native estuarine fishes;

iv. Utilization of restored HRL habitat by Chinook salmon, steelhead, and other native and non-native tributary fishes, native and non-native estuarine fishes, and invertebrates, relative to the conditions before implementation of the VA pathway and to reference sites;

v. Actual and, as feasible, forecasted future effects of restored HRL habitat and HRL flows on the abundance and condition of Chinook salmon, steelhead, green and white sturgeon, and native estuarine fishes;

vi. Actual and, as feasible, forecasted future effects of the VA pathway on the food web;

vii. Effects of the HRL actions on concentrations of current-use pesticides in water, zooplankton, benthic invertebrate prey sources, and native fish species, across the geographic areas affected by the HRL habitat restoration actions that may be expected to affect pesticide concentrations, including the food production, and bypass floodplain habitat projects that are included in the HRL non-flow commitments;

viii. Effects of the HRL actions on methylmercury concentrations in water and native fish species across the geographic areas affected by the HRL habitat restoration actions that may be expected to affect methylmercury concentrations, including the food production, bypass floodplain habitat, tidal wetland habitat, and tributary floodplain habitat projects that are included in the HRL non-flow commitments; and

ix. Other relevant topics as identified by the Executive Director.

The HRL participants have identified an organizational structure for a science committee to guide their efforts that would include participation from HRL participants and the State

Water Board as well as environmental NGOs, California Native American Tribes, and any other interested parties.

Harmful Algal Bloom (HAB) Monitoring
The HRL hypotheses and monitoring must include HAB monitoring provisions and support for the Delta Cyanobacterial Harmful Algal Blooms (CHABs) Monitoring Strategy. These commitments must include support for implementation of a coordinated, Delta-wide HAB monitoring program and special studies that would ensure the necessary data are collected to understand HAB drivers, develop HAB mechanistic and predictive models, and identify possible management and mitigation measures that could be used to control HABs in the Delta.

The HRL monitoring plan must also include commitments to monitoring for HABs on the HRL tributaries during May through October following the tiered monitoring approach described in Table A-3 of Appendix A. HAB monitoring requirements are described further in section 4.5.1.

Habitat Suitability Assessments
The HRL participants will be required to conduct site specific assessments periodically following completion of construction of each habitat restoration project, for a minimum of eight years following completion of construction or for the term of the VA pathway, whichever is longer. The assessments will evaluate the suitability of non-flow habitat restoration projects and their conformance to depth, velocity, substrate, inundation, cover, and any other applicable design criteria; temperature and dissolved oxygen and their relationship to flow conditions; and conformance with the best available science. The HRL participants will assess any changes in the suitability of habitat restoration projects according to these criteria over the term of the VA pathway.

Habitat Utilization and Biological Effectiveness Assessments
The HRL participants will be required to assess HRL non-flow habitat restoration projects over time to evaluate whether each project is effective in achieving biological outcomes and the applicable narrative objectives in this plan. The utilization and biological effectiveness assessments will be based primarily on empirical data and observations obtained through monitoring. These assessments will evaluate whether and the extent to which constructed non-flow habitat restoration sites are being used by target native species populations and life stages. These assessments will also evaluate the effectiveness of HRL flow and non-flow habitat restoration in increasing populations of native fishes, including assessment of near-term ecosystem indicators that would be expected to change over eight years, such as invertebrate populations and communities. HRL non-flow habitat restoration projects will be required to be compared against adjacent, non-restored habitat areas, as well as the pre-restoration conditions at the project site. To the extent practicable, monitoring of habitat restoration projects will be required to follow comparable methods to other HRL projects in the same category and to ongoing and past monitoring of similar restoration projects. Habitat utilization and

biological effectiveness assessments will be conducted for a minimum of eight years following completion of construction or the length of the VA pathway, whichever is longer.

4.4.9.8 Annual Reports, Periodic Reports, and Ecological Outcomes Analysis Report

To inform implementation of the VA pathway and other activities, the HRL participants will be required to submit: (1) an annual report to the State Water Board by March 1 each year following the first year of implementation of the VA pathway for the prior year's implementation of the VA pathway; (2) periodic reports to the State Water Board by March 1 following every three years of implementation of the VA pathway; and (3) an ecological outcomes analysis report by January 31 following year six of implementation of the VA pathway. The annual reports, periodic reports, and ecological outcomes analysis report will be required to contain the information described below.

Annual reports will be required to include:

i. A report of all HRL flows provided within the previous water year with associated HRL flow accounting data, including information on the source and timing of HRL flows provided through water purchases;

ii. A summary of all HRL non-flow habitat restoration projects completed or in development within the previous water year with associated HRL non-flow accounting data;

iii. Ecological monitoring data, including status and trends of native fishes compared to prior years;

iv. A summary of scientific data, information, and findings generated by the HRL science and monitoring;

v. A summary of tribal outreach and engagement that occurred during the previous water year, including how tribal input, including TEK, is being incorporated into VA pathway implementation;

vi. A summary of expected HRL activities for the next water year, including projected HRL flows that would be provided under each of the possible water year types identified in the 10% through 90% exceedance forecasts of the February preliminary water year index, anticipated non-flow habitat restoration project milestones and implementation progress, and upcoming science and monitoring activities to be completed;

vii. Analysis demonstrating that VA pathway implementation did not result in redirected impacts to native fish and wildlife resources in the Trinity River watershed, including any deleterious effects on temperature and instream flows; and

viii. An assessment of water temperature management in each HRL tributary in conformance with section 4.4.9.2 and any improvements to be implemented in future years as a result of the assessment.

The HRL participants will participate in annual meetings before the State Water Board to discuss the report consistent with the annual review processes described in section 4.6.

The periodic reports will be required to provide an analysis of HRL progress to date on contributing toward the applicable narrative objectives, including progress related to HRL hypotheses, metrics, and targets informed by required monitoring. The HRL participants will participate in meetings before the State Water Board every three years to discuss the report consistent with the periodic review processes described in section 4.6. The periodic review reports will also be required to include all items required to be included in the annual reports summarized over the prior three years.

The ecological outcomes analysis report will be required to synthesize the scientific data and information generated by the HRL science and monitoring, based on information provided in the periodic reports and other relevant information. The ecological outcomes analysis report will be required to document the hypotheses tested and associated monitoring, evaluation, and results. The ecological outcomes report will also be required to evaluate the scientific basis and rationale for continuing the VA pathway as is, or continuing the VA pathway with modifications, beyond year eight if HRL participants intend to seek an extension of the VA pathway beyond the initial eight-year term, as well as possible termination of the VA pathway for HRL water rights. The scientific basis and rationale for possibly continuing the VA pathway will be required to include a synthesis of outcomes from the HRL hypothesis testing to inform the expected ecological outcomes from continuing the VA pathway, including quantifying how the continuation of the VA pathway would be expected to affect species abundance, ecosystem conditions, and contribute to meeting the applicable narrative objectives in this plan. The report will be required to contain methods and presentation of the results equivalent to those in the Scientific Basis Report Supplement for the initial VA pathway in order to evaluate whether the expected benefits occurred. The State Water Board will solicit a Delta Independent Science Board review of the ecological outcomes report to receive input and recommendations on the scientific rationale for continuing or modifying the VA pathway.

The HRL participants have developed a detailed Science Plan that provides a framework and approach intended to guide implementation and assess the flow and non-flow measures required pursuant to the approved VA pathway implementation provisions of this plan. The State Water Board anticipates that information and data generated under this HRL Science Plan will inform the annual reports, periodic reports, and ecological outcome analysis reports required pursuant to section 4.4.9.8, and could inform development of a comprehensive Water Quality Control Plan science plan.

Science and monitoring activities that inform management of the Bay-Delta system are currently distributed across multiple programs and entities. A unified science plan has potential for increased efficiency and effectiveness and may also reduce management uncertainty by ensuring all interested parties are working from a common set of facts.

The State Water Board anticipates working with the HRL participants and other interested parties to produce a hypothesis-based Science Plan for the full Water Quality Control Plan that could evaluate progress toward meeting the narrative objectives in Chapter 3. The State Water Board will consider such information as part of annual and periodic reviews, as well as any decisions to continue, modify, or terminate the VA pathway for HRL water rights.

4.4.9.9 HRL Governance

HRL actions, including implementation of flow and non-flow commitments, will be governed to meet the applicable provisions of the Bay-Delta Plan. State Water Board staff will provide advice and oversight on compliance and participate in decision-making as described in this plan.

The HRL participants will be required to engage with California Native American Tribes and consider their input in decision-making affecting HRL Governance, including but not limited to tribal participation in the HRL science committee. HRL participants will be required to develop a tribal engagement plan in coordination with tribes, describing specific tribal engagement opportunities related to VA pathway milestones that must be approved by the Executive Director prior to year one of the initial eight-year term of the VA pathway. The tribal engagement plan must include the designation of a tribal coordinator responsible for engaging with tribes and liaising between the HRL participants and the State Water Board on tribal matters relevant to the VA pathway. The tribal engagement plan must also include regular tribal engagement meetings to inform tribal leaders of progress toward achieving the VA pathway objectives and opportunities for tribal representatives to contribute feedback on implementation and adaptive management of the VA pathway.

The Executive Director will consider feedback received from tribes on the HRL tribal outreach and engagement processes and may require improvements to those processes after opportunity for public comment.

4.4.9.10 Continuation, Modification, or Termination of the VA Pathway

The VA pathway will remain in effect for a term of eight years after the effective date, unless the VA pathway is terminated before eight years or extended beyond eight years as discussed below. The State Water Board may also require modifications to the VA pathway as discussed below. Prior to a decision to extend, modify, or terminate the VA pathway, State Water Board staff will produce a draft recommendation with supporting rationale that will be subject to a minimum 45-day public review and comment period. Based on public comments, the draft recommendation will be updated, provided to the Delta Independent Science Board for review and input, and then a final staff recommendation, along with any recommendations from the Delta Independent Science Board, will be brought to the State Water Board for consideration at a public Board meeting. The following default and annual and periodic review processes apply to extension, modification, or termination of the VA pathway for HRL water rights.

Default Processes for Continuation, Modification, or Termination of the VA Pathway

At year six of the VA pathway, the HRL participants may submit a request to the State Water Board to extend the VA pathway, including any requested modifications, beyond the initial eight-year term. Upon receipt of the request, the State Water Board will initiate a process to evaluate the VA pathway for consideration of extending them beyond the initial eight-year term, including with possible modifications. Following receipt of any request for extension of the VA pathway, the State Water Board will solicit public comments and hold a public workshop to discuss the possible extension and modification of the VA pathway, including information regarding the effectiveness of the VA pathway at achieving the applicable narrative objectives. Following the public workshop, the State Water Board will act on the request for extension or modification to determine whether to extend the VA pathway after year eight. The State Water Board will consider the green, yellow, and red light criteria described below to determine the continuation of the VA pathway (green light), modification of the VA pathway (yellow light), or termination of the VA pathway (red light).

In determining whether to continue, modify, or terminate the VA pathway under the default process, the State Water Board will consider the following:

i. Whether HRL participants timely and fully provided HRL flow and non-flow commitments consistent with State Water Board approved accounting protocols;

ii. Whether the monitoring, science, and reporting requirements and other requirements were met;

iii. The HRL participants' synthesis of the most current science and analyses of the effects of the HRL implementation, including evaluation of the HRL hypotheses, the habitat suitability assessments, the habitat utilization and biological effectiveness assessments, and the ecological outcomes analysis;

iv. Public comments and analyses on the effectiveness of the VA pathway;

v. The status and trends of native fishes and other aquatic organisms;

vi. Whether the periodic reports or other sources of reliable information indicate that factors outside of the VA pathway are impairing the ability to achieve the narrative ecosystem protection objective and narrative salmon protection objective by 2050;

vii. Whether HRL flows have been adequately protected;

viii. Whether funding has been available for the HRL commitments and additional funds are available to continue the HRL commitments;

ix. The past, present, and probable future beneficial uses of water;

x. The environmental characteristics of the Bay-Delta watershed, including the quality of water available thereto;

xi. Water quality conditions that could reasonably be achieved through the coordinated control of all factors that affect water quality in the Bay-Delta watershed; and

xii. Economic considerations.

In addition to the factors set forth in i through xii above, if the draft recommendation is to terminate the VA pathway, the State Water Board staff will include an addendum to the Scientific Basis Report Supplement that synthesizes the then-current scientific information concerning flows for the protection of fish and wildlife beneficial uses. The addendum will be publicly circulated for comment with the draft recommendation for continuation, modification, or termination of the VA pathway and provided to the Delta Independent Science Board for review and input. The State Water Board will consider that addendum as part of its Board Meeting on the staff recommendation for continuation, modification, or termination of the VA pathway. If the State Water Board concludes that it is appropriate to terminate the VA pathway under the red light scenario discussed below, it will also decide whether any modifications to the regulatory provisions in sections 4.4.2.2, 4.4.2.3, and 4.4.2.6 of the Bay-Delta Plan are necessary in recognition of updated scientific information in the addendum or other legal or policy reasons and take one of the following actions:

(a) If the Board determines modifications to the regulatory provisions in sections 4.4.2.2, 4.4.2.3, and 4.4.2.6 are necessary, it will immediately commence an update to the Bay-Delta Plan or its implementing regulation to incorporate the necessary changes.

(b) If the Board determines modifications to the regulatory provisions in sections 4.4.2.2, 4.4.2.3, and 4.4.2.6 are not necessary, it will provide a new determination, that is judicially reviewable under Code of Civil Procedure section 1085, that the regulatory provisions in sections 4.4.2.2, 4.4.2.3, and 4.4.2.6 of the Bay-Delta Plan are legally and scientifically appropriate under the provisions of Water Code section 13241.

Green Light

A green light determination could occur if the State Water Board concludes that the HRL participants provided flow and non-flow commitments, including in a manner substantially consistent with Board-approved accounting protocols, and the monitoring, science, reporting, and other requirements of the Bay-Delta Plan have been fulfilled. The State Water Board must also determine that the VA pathway is substantially achieving the HRL metrics and targets, including biological effectiveness, habitat suitability, and habitat utilization criteria; and that the ecological outcomes analysis and other relevant information support the conclusion that continuing the VA pathway will contribute the HRL participants' responsibility toward attainment of the narrative ecosystem protection and salmon protection objectives by 2050. If the above green light

criteria are met, the State Water Board may approve continuation of the VA pathway without any substantial modification, except for changes necessary to continue the VA pathway.

Yellow Light

A yellow light determination could occur if the State Water Board concludes that the HRL participants provided flow and non-flow commitments, including in a manner substantially consistent with Board-approved accounting protocols, and the monitoring, science, reporting, and other requirements of the Bay-Delta Plan have been fulfilled. The State Water Board must also determine that the VA pathway is meeting a significant number of HRL metrics and targets, including biological effectiveness, habitat suitability, and habitat utilization criteria; and the ecological outcomes analysis and other relevant information support the conclusion that continuing the VA pathway, with modifications, will contribute the HRL participants' responsibility toward attainment of the narrative ecosystem protection and salmon protection objectives by 2050. If the above yellow light criteria are met, the State Water Board may approve continuation of the VA pathway with modification.

Red Light

A red light determination could occur if the State Water Board concludes that the VA pathway and HRL participants are not achieving the conditions above for green or yellow light determinations. Under a red light determination, the State Water Board may determine that the HRL water rights are subject to the regulatory provisions described above, including the new Sacramento/Delta inflow and cold water habitat and inflow-based Delta outflow provisions described in sections 4.4.2.2, 4.4.2.3, and 4.4.2.6. The State Water Board may also determine that modifications to the regulatory provisions are needed and pursue appropriate processes to update the Bay-Delta Plan.

Possible Modification or Termination of the VA Pathway as Part of Annual and Periodic Review Processes

The State Water Board will use the default processes described above to consider extension, modification, or termination of the VA pathway at year eight unless, consistent with the State Water Board's periodic review obligations, there is a need to consider modification or termination of the VA pathway and associated components of the Bay-Delta Plan and its implementation at any time, including before year eight, due to: 1) the HRL participants' failure or inability to implement HRL commitments as described for the VA pathway in the Bay-Delta Plan; or 2) significant evidence that continuing implementation of the VA pathway will not provide reasonable protection of beneficial uses or will jeopardize the continued survival of native fishes.

HRL participants' Failure to or Inability to Implement HRL Commitments

The State Water Board may consider modification or termination of the VA pathway, including components of the VA pathway or the VA pathway as a whole, at any time,

including before year eight, due to a lack of compliance as described in this section. The State Water Board will first conduct a public workshop and solicit public comments, including as part of annual or periodic review processes, to assess whether the HRL participants have fulfilled the commitments described for the VA pathway in the Bay-Delta Plan. The State Water Board may allow additional time for the HRL participants to come into compliance before considering the need for modifications to or termination of the VA pathway under this section. Modification or termination of the VA pathway for compliance issues include any of the following reasons:

i. Failure to implement the HRL flow, habitat, funding, monitoring, science, or other provisions consistent with this program of implementation; or

ii. Withdrawal of a party or parties from the VA pathway if the withdrawal materially affects the ability of any remaining HRL participants to fulfill their HRL commitments included in the program of implementation.

In considering whether to modify or terminate under this section, the State Water Board will endeavor to preserve the VA pathway for those HRL participants who have met their commitments. The Board may modify or terminate the VA pathway without a Bay-Delta Plan amendment for the compliance issues stated above consistent with the annual and periodic review processes in section 4.6.

Significant Evidence that Continuing Implementation of the VA Pathway Will Not Provide Reasonable Protection of Beneficial Uses or Will Jeopardize the Continued Survival of Native Fishes

As part of the periodic review processes, the State Water Board may consider modifying or terminating the VA pathway, including components of the VA pathway or the VA pathway as a whole, at any time, including before year eight, based on significant evidence that continuing implementation of the VA pathway will not provide reasonable protection of beneficial uses or will jeopardize the continued survival of native fishes. Any such consideration of modification or termination of the VA pathway will be informed by an assessment prepared by State Water Board staff that is subject to a minimum 45-day public review and comment period. Based on public comments, the draft assessment will be updated, provided to the Delta Independent Science Board for review and input, and then a final staff recommendation, along with any recommendations from the Delta Independent Science Board, will be brought to the State Water Board for consideration at a public Board meeting. If, after consideration of public input and Delta Independent Science review, the State Water Board determines that significant evidence supports the conclusion that continuing implementation of the VA pathway will not provide reasonable protection of beneficial uses or will jeopardize the continued survival of native fishes, the Board may modify or terminate the Bay-Delta Plan's VA pathway through a Bay-Delta Plan amendment.

4.4.10 General Provisions

4.4.10.1 Trinity River

Reclamation currently operates the CVP Trinity River Division, comprised of Trinity Dam, Lewiston Dam, and the Clear Creek Tunnel, which transports water from Lewiston Dam into Whiskeytown Lake on Clear Creek. As the operator of the CVP Trinity River Division, Reclamation is required to ensure that implementation of the Bay-Delta Plan, including the VA pathway, does not result in redirected impacts to native fish and wildlife resources in the Trinity River watershed, including temperature and instream flow impacts. Reclamation will be required to report at least annually to confirm there are no redirected impacts to the Trinity River from implementation of the current updates to the Bay-Delta Plan. As part of the annual and periodic review processes, and more often if needed, the State Water Board will evaluate whether any additional actions are needed to address any redirected impacts to the Trinity River or to ensure that beneficial uses are protected on the Trinity River, in consultation with the North Coast Regional Water Quality Control Board.

4.4.10.2 Fully Appropriated Stream Systems

The State Water Board will update its Fully Appropriated Stream Systems (FASS) Declaration pursuant to Water Code sections 1205 through 1207 to include additional FASS determinations for the Sacramento/Delta tributaries. This may include expanding the season in which the Sacramento-San Joaquin Delta is listed as fully appropriated, adding additional tributary-specific determinations, and considering other updates to assist with implementation of the Bay-Delta Plan. In addition, the State Water Board will consider updates to the FASS Declaration to allow for the diversion of flood flows that are not needed to protect fish and wildlife for the purpose of groundwater recharge.

The State Water Board will also consider updates to the FASS Declaration for tributaries in the Sacramento/Delta watershed where existing flows greater than the numeric inflow requirements are needed for the protection of fish and wildlife.

4.4.10.3 Instream Flow Dedications

The State Water Board encourages instream flow dedications in accordance with Water Code section 1707 that enhance instream flows in the Bay-Delta watershed. The State Water Board will include provisions in any implementation methodology used to implement the Bay-Delta Plan that account for any existing or future instream flow dedications pursuant to Water Code section 1707.

4.4.10.4 Groundwater Management and Groundwater Recharge

The State Water Board will take actions as necessary pursuant to its authorities, including its authorities to prevent the waste, unreasonable use, unreasonable method of use, and unreasonable method of diversion of water, and to enforce SGMA. The Board will take actions needed to ensure that reductions in surface water diversions do

not result in groundwater pumping that reduces required instream flows or otherwise impacts aquatic biological resources, including special-status fish species.

In addition, the State Water Board will continue efforts to encourage and promote environmentally sound groundwater recharge projects that use surplus surface water, including prioritizing the processing of temporary and long-term water right permits for projects that enhance the ability of a local or state agency to capture high runoff events for local storage or recharge. In processing water right applications that involve groundwater storage, the State Water Board will consider the need to preserve ecological functions of high-flow events and other relevant factors in accordance with the Water Code to ensure that enough flow remains instream to protect ecological benefits, including for terrestrial species and wetland and riparian habitat.

4.4.10.5 Water Use Efficiency, Water Conservation, and Water Recycling

The State Water Board will support efforts to diversify water supply portfolios to the extent possible, in an environmentally responsible manner and in accordance with the law. This includes sustainable conjunctive use of groundwater and surface water, water transfers, water conservation and efficiency upgrades, and increased use of recycled water, to the extent feasible. The State Water Board will continue efforts to encourage and promote water recycling projects, including projects that involve use of recycled water for groundwater recharge, through expediting permit processes and funding efforts. In addition, the State Water Board will continue to pursue various efforts that increase water use efficiency and conservation to maximize the beneficial use of surface water supplies.

4.4.10.6 State Water Board and Regional Water Board Water Quality Actions

The State Water Board and Regional Water Boards will continue efforts to preserve, enhance, and restore the quality of California's water resources and drinking water for the protection of the environment, public health, and all beneficial uses. The State Water Board and Regional Water Boards will continue to take specific actions that support the Water Boards' Mission Statement, including but not limited to the following:

i. The State Water Board and Regional Water Boards will continue regulation of waste discharges through a variety of programs, including but not limited to: storm water regulatory programs and the Strategy to Optimize Resource Management of Storm Water; Irrigated Lands Regulatory Program; and individual NPDES and WDR permits.

ii. The State Water Boards and Regional Water Boards will implement existing TMDLs for contaminants and continue to update the 303(d) list of water quality-impaired waterbodies.

iii. The State Water Board will continue to implement funding programs that provide loans and grants for capital improvements to wastewater treatment plants (WWTPs).

4.4.10.7 Habitat Restoration and Other Ecosystem Projects

In addition to the flow-dependent water quality objectives for fish and wildlife beneficial uses identified in Table 3 and Table 4, there are numerous actions that state, federal, and local agencies and other entities should take to contribute toward achieving the overall goal of improving conditions for fish and wildlife in the Bay-Delta watershed. These complementary measures include actions to protect and restore habitat; reduce impacts from recreational, commercial, and illegal harvest; identify and reduce the negative impacts of introduced species on native species, including predation and competition; improve hatchery management; and address barriers to fish passage, among others. Other complementary ecosystem measures should be informed by monitoring and best available science and appropriate adaptive management.

Habitat restoration projects should be designed and implemented to work with existing and augmented flows (e.g., reestablish connections between tidal and stream floodplains, restore fluvial processes along streams, connect riparian areas to fluvial processes), and consider the multiple interactions of physical, chemical, and biological processes over a wide variety of spatial and temporal scales to confirm that the project will be effective and appropriate given the physical setting. As appropriate, biological goals should inform management actions, adaptive methods, and assessment of the effectiveness of physical habitat restoration and other ecosystem projects.

Habitat restoration and other ecosystem benefit actions taken by state, federal, local agencies and other entities should, where appropriate, consider and incorporate input from California Native American Tribes and other interested parties during the development, implementation, and assessment of habitat restoration actions, including input from tribes on TEK and other relevant information.

Habitat Restoration Actions

DFW, USFWS, NMFS, DWR, Reclamation, and other appropriate agencies and entities should continue to take action to protect and restore habitat, including as part of EcoRestore and other efforts for the benefit of native aquatic and terrestrial species. The State Water Board will support these efforts to the extent possible, including through expediting permitting related to habitat restoration activities and other actions within the State Water Board's authorities.

Terrestrial Species Management

DFW, USFWS, and other appropriate entities should continue and expand terrestrial species management efforts, particularly for special-status species. DFW, USFWS, and other agencies and entities should continue to develop, refine, and implement species recovery plans to support the recovery of special-status terrestrial species.

The State Water Board will support species management efforts and federal and state species recovery actions as appropriate and will exercise its discretionary authorities to minimize and avoid possible redirected impacts on special-status terrestrial species

from actions to implement the Bay-Delta Plan and other actions within the State Water Board's purview, to the extent possible. These decision-making processes include, but are not limited to, the following: acting on applications to appropriate water, water right change petitions, temporary and long-term transfer petitions, water quality certifications, water right registrations, wastewater change petitions, and other water right and water quality actions. In addition, the State Water Board will investigate options for ensuring that refuge water supplies are prioritized and that water supplies are delivered as necessary to provide for optimal wetland habitat development, including actions to improve CVPIA refuge water supplies.

Floodplain Management Activities
Federal, state, and local agencies and other appropriate entities should continue and expand efforts to restore floodplain habitat for the benefit of native fish and wildlife in the Bay-Delta watershed. Those efforts should include appropriate monitoring, evaluation, and adaptive management provisions.

Commercial and Sport Fishing Regulations
DFW, the California Fish and Game Commission, the Pacific Fisheries Management Council, and NMFS should take the following actions within their respective authorities: (1) develop and implement a fisheries management program to provide short-term protection for aquatic species of concern through seasonal and area closures, gear restrictions to reduce capture and mortality of sub-legal fish, and other appropriate means; and (2) review at least every two years, and modify, if necessary, existing harvest regulations to ensure that they adequately protect aquatic species.

Reduce Illegal Harvesting
DFW should continue to develop and implement educational programs to curb poaching of fishery resources, and evaluate the need for increased enforcement.

Reduce the Impacts of Introduced Species on Native Species
DFW, USFWS, NMFS, DWR, the California Coastal Commission, and California State Parks Division of Boating and Waterways should continue to pursue programs to determine the impacts of introduced species, including striped bass, bivalves, aquatic weeds, and other non-native fishes or other species on the native aquatic resources of the Bay-Delta, and the potential benefits of control measures. DFW should also continue its efforts under Fish and Game Code sections 6430 through 6439 concerning introduced species. Additionally, the California Fish and Game Commission should deny all requests for the introduction of new aquatic species into the Bay-Delta watershed unless it finds, based on strong, reliable evidence, that an introduction will not have deleterious effects on native species.

Improve Hatchery Programs for Species of Concern
To assist in the management of natural fish stocks, salmon and steelhead hatcheries should continue to implement a marking program on the fish they release to distinguish

between hatchery and natural stock. In addition, DFW, NMFS, and USFWS should continue to undertake appropriate actions to improve hatchery programs for species of concern, such as: (1) carefully examining and periodically re-examining the role and contribution of existing hatchery production for various fish species (e.g., Chinook salmon, steelhead trout), including a consideration of the need for genetic diversity and maintaining the integrity of different salmon runs; and (2) evaluating strategies for improving the survival of hatchery fish, before and after release, including diet and pre-release conditioning, selection of the life stage and size of fish to be released, timing releases relative to the presence or absence of other species, using multiple release locations, and other appropriate measures.

Expand the Gravel Replacement and Maintenance Programs for Salmonid Spawning Habitat

Under the Anadromous Fish Restoration Program, and other gravel replacement and maintenance programs, DWR, Reclamation, and other agencies that currently conduct gravel replacement and spawning habitat improvement programs in the Bay-Delta watershed should continue and, where possible, increase their efforts in the reaches where salmonids are likely to spawn.

Restore and Preserve Marsh, Riparian, and Upland Habitat in the Delta

State, federal, and local agencies and other entities should continue and expand efforts to restore and preserve marsh, riparian, and upland habitat in the Bay-Delta watershed including through permitting and other efforts in order to provide additional high quality habitat, including through levee setbacks, restoration of shallows and shoal habitats, conversion of lands to habitat areas, and other habitat enhancement measures.

Fish Passage Improvement Projects

Water right holders (including Reclamation and DWR), DFW, NMFS, USFWS, and other appropriate entities should continue and expand fish passage improvement projects throughout the Bay-Delta watershed. These efforts include, but are not limited to:

i. Fish Screening: DFW, NMFS, USFWS, water right holders, local landowners, and other appropriate entities should evaluate unscreened diversions for their potential to cause mortality or other impacts to migrating salmonids or other native fish species and prioritize screening of unscreened diversions that may impact native fish species.

ii. Passage: DFW, NMFS, USFWS, reservoir owners and operators, including Reclamation and DWR, and other appropriate entities should continue to evaluate and implement priority fish passage improvement projects to provide salmonids, and possibly other native species, access to high quality habitat upstream of passage impediments.

San Joaquin River Non-Flow Actions

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

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

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

   (a) Obtain easements or acquire land for riparian and floodplain habitat restoration;

   (b) Reduce salmon stranding events in ponds, pits, and other unnatural features by physically modifying problem areas within river corridors;

   (c) Facilitate the establishment and maintenance of self-sustaining native riparian and floodplain vegetation;

   (d) Restore, enhance, and protect secondary/side-channel habitats to increase habitat diversity and function within the Stanislaus, Tuolumne, and Merced Rivers;

   (e) Import silt or fine sediment onto floodplain restoration projects to improve soil moisture properties and encourage riparian vegetation success; and

   (f) Identify locations in the LSJR and its tributaries that are appropriate for levee modification (e.g., rip-rap removal and levee set back or removal) for the purpose of improving native fish and wildlife habitat.

ii. Reduce Vegetation Disturbing Activities in Floodplains and Floodways, Where Safe and Appropriate: The NMFS, DFW, USFWS, Central Valley Flood Protection Board, USACE, local landowners, county governments, local agricultural

commissions, and other land management agencies in the LSJR, Stanislaus, Tuolumne, and Merced River watersheds should reduce grazing, mowing, cutting, spraying, discing, and other vegetation disturbing activities in floodplains and floodways, where safe and appropriate, to promote and restore these areas with riparian vegetation. Actions include but are not limited to the following:

(a) Develop grazing strategies that protect and improve streamside vegetation, and that minimize bank disturbance;

(b) Conduct outreach to inform landowners of state and federal laws and regulations that protect riparian, wetland, and Endangered Species Act (state and federal) protected vegetation;

(c) Review and potentially modify existing floodplain, floodway, and riparian vegetation management plans, or develop new ones using the best available science, to balance the needs of the ecosystem and the needs of public safety and other considerations; and

(d) Compile data, conduct studies, and review literature to determine the influence that large trees and other vegetation types have on levee and floodway safety, and use this information to make science-based management decisions.

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

(a) Develop and maintain coarse sediment management plans for the major LSJR tributaries that consist of two temporal stages: (1) short-term restoration and gravel augmentation to re-build spawning habitat and to restore functional processes important to native fish and wildlife; and (2) long-term coarse sediment augmentation program to maintain the functioning of the restored habitat and to compensate for the blockage, by dams, of the natural gravel supply;

(b) Develop and implement erosion control measures including the construction of sediment retention basins within the Stanislaus, Tuolumne, and Merced River watersheds; and

(c) Identify and remediate unpaved roads or other disturbed areas that may be contributing to fine sediment input.

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

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

(a) Add boulders, large woody debris, or other structures where appropriate in river channels, taking human safety into consideration; and

(b) If large woody debris or coarse sediment is removed from upstream reservoirs, it should be transported downstream and placed into the Stanislaus, Tuolumne, and Merced Rivers due to that reservoir's contribution to deficits of large woody debris and coarse sediment supply in these rivers.

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

(a) Cold water pool management; and

(b) Installation or modification of selective withdrawal structures (e.g., temperature control curtains or shutters).

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

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

(a) Near-term actions assessing habitat suitability upstream of dams, investigating fish passage options, and developing plans for long-term reintroductions of salmonids upstream of existing dams; and

(b) Provide fish passage at existing dams which block or impede native fish movements.

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

(a) Research, monitor, and report the effects of physical and non-physical barriers within the Delta on water quality and fish; and

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

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

(a) Study and report the effects that predators and non-native fish have on native fish;

(b) Identify gravel pits, scour pools, ponds, weirs, diversion dams, and other structures or areas that harbor significant numbers of non-native fish and predatory fish that may currently reduce native fish survival;

(c) Modify priority structures and areas to reduce predation and non-native fish effects and to improve native fish success; and

(d) Evaluate and implement changes to fishing regulations to reduce the impact that non-native competitor and predator fish have on native fish.

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

(a) Fund and launch prevention, early detection, and rapid response actions, including efforts to coordinate various aquatic invasive species monitoring programs and expand monitoring of freshwater systems;

(b) Evaluate and implement appropriate actions to minimize the effects of aquatic invasive species on native fishes in the Bay-Delta watershed;

(c) Monitor and regulate the importation of aquatic invasive species to minimize the effects of such species on native fishes in the Bay-Delta watershed;

(d) Conduct a statewide assessment of the risk from various aquatic invasive species vectors; and

(e) Support public education preventing the introduction of aquatic invasive species, including promoting the use of native and noninvasive alternatives.

San Joaquin River Restoration Program

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

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

4.5 Monitoring, Evaluation, Reporting, and Special Studies

[Note to reader: The provisions for the Lower San Joaquin River flow and southern Delta salinity updates to the Bay-Delta Plan adopted in 2018 have been integrated into the Bay-Delta Monitoring and Evaluation Program.]

A comprehensive monitoring, evaluation, reporting, and special studies program is needed for the Bay-Delta watershed to assess compliance with water quality objectives, investigate the technical factors involved in water quality control, inform implementation of the Bay-Delta Plan (including adaptive management), and inform possible future changes to the plan. The State Water Board will require monitoring, evaluation, reporting, and special studies through water right and water quality actions. Pursuant to its authorities, including but not limited to Water Code section 13165, monitoring, evaluation, reporting, and special studies (collectively referred to as monitoring activities) will address both the individual and cumulative impacts of diversions and discharges on beneficial uses of water, including fish and wildlife, recreation, tribal, municipal, industrial, and agricultural uses.

4.5.1 Bay-Delta Monitoring and Evaluation Program

The State Water Board is establishing the Bay-Delta Monitoring and Evaluation Program (BDMEP) comprised of monitoring activities needed to implement the Bay-Delta Plan, including to assess compliance, evaluate effectiveness, and inform potential future updates. The BDMEP is an appendix (Appendix A) to the Bay-Delta Plan that may be regularly updated without plan amendments, as appropriate, including through the annual and periodic review processes described in section 4.6. Development and implementation of the BDMEP will be done incrementally. As a starting point, the BDMEP includes the following: monitoring and reporting requirements pursuant to conditions in the water rights for the operations of the SWP and CVP, including the addition of specific requirements for monitoring pursuant to general water right conditions; monitoring and reporting identified in the 2018 Bay-Delta Plan; and additional monitoring needed to address HABs. The BDMEP also further defines the processes that will be used for modifying monitoring activities and includes data quality requirements to produce accessible, high-quality, reliable data. The elements of the BDMEP are further described below.

4.5.1.1 Initial BDMEP

Water Quality Compliance and Baseline Monitoring

The initial BDMEP incorporates the specific requirements from the “Water Quality Compliance and Baseline Monitoring” table, which is identified as Table 5 in both D-1641 and the 2018 Bay-Delta Plan. The initial BDMEP incorporates the associated map of monitoring stations identified in that table, as well as other specific monitoring requirements applicable to SWP and CVP water rights included in other water right decisions. The initial BDMEP includes specific requirements for water quality, hydrologic, and biological monitoring and special studies pursuant to general requirements of D-1641 and State Water Board Decision 1485 (D-1485) applicable to the SWP and CVP, including monitoring to fill current information gaps and clarification of other monitoring requirements pursuant to D-1641 and D-1485. The initial BDMEP includes hydrology and water quality monitoring needed to assess compliance with flow and water quality objectives that are the responsibility of the SWP and CVP pursuant to D-1641 and State Water Board Decision 1422 (D-1422). Initial BDMEP monitoring activities will be guided by the monitoring purposes in State Water Board Decisions 1641, 1485, and 1422.

New monitoring and measurement requirements applicable to the SWP and CVP are added to the “Water Quality Compliance and Baseline Monitoring” table for HABs, including HAB visual indices and cyanobacterial toxins. These requirements are added pursuant to the requirements of condition 10 of D-1485 requiring intensive phytoplankton studies and developing and improving water quality predictive tools with an emphasis on the understanding of flow, salinity, and phytoplankton relationships. These requirements also contribute to fulfilling condition 11 of D-1641 requiring water quality and ecological monitoring.

HRL Supplemental Monitoring and Science
The initial BDMEP incorporates the HRL supplemental monitoring and science activities defined above in section 4.4.9.7, which are the collective responsibility of HRL participants. HRL supplemental monitoring and science activities will be required to adhere to the requirements in this section, including for review and revision of monitoring and special studies, data management and quality, and reporting.

Special Studies for Fish and Wildlife
The BDMEP includes special studies requirements pursuant to condition 10 of D-1485, including special studies currently identified in the annual workplan of the Interagency Ecological Program. The following additional special studies are also included in the BDMEP:

i. Special Study Relating to HABs: The BDMEP includes special studies to inform the development of mechanistic and predictive modeling of HABs and to test the efficacy of HABs management and mitigation measures (consistent with condition 10 of D-1485). In addition, a special study investigating the exposure of native estuarine fish species (e.g., sturgeon) to cyanobacterial toxins will be required to be completed within five years of approval of the current plan amendments by OAL.

ii. Special Study Relating to LSJR Barriers, Salmonid Survival, and Life History Diversity: The BDMEP includes a special study to assess the possible use of barriers at the Head of Old River to protect outmigrating LSJR salmonids from impacts of SWP and CVP export operations. Specifically, the special study is required to investigate the effects and causal mechanisms of different possible barrier designs and operations on the survival of LSJR salmonids migrating through the Delta.

Special Studies and Monitoring for Southern Delta Salinity
The initial BDMEP includes the special study and monitoring requirements approved in 2018 as part of the revisions to the southern Delta salinity objective. These monitoring requirements are the collective responsibility of the SWP and CVP water rights.

[Note to reader: The text below was previously located in section 4.3.2.1 State Regulatory Actions to implement changes to the southern Delta salinity objective that were approved in 2018. The text was relocated without substantive edits.]

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

(a) Monitoring Special Study: Prior to development of the long-term Monitoring and Reporting Plan, described below, DWR and Reclamation shall work with

State Water Board staff and solicit input from interested parties to develop and implement a special study to characterize the spatial and temporal distribution and associated dynamics of water level, flow, and salinity conditions in the southern Delta waterways. The study shall identify the extent of low or null flow conditions and any associated concentration of local salt discharges. The State Water Board will request local agricultural water users and municipal dischargers to provide data regarding local diversions and return flows or discharges. DWR and Reclamation shall submit a plan for this special study to the Executive Director for approval within six months from the date of OAL's approval of the 2018 amendments to the Bay-Delta Plan. Once approved, the monitoring contained in this plan shall be conducted until superseded by the long-term Monitoring and Reporting Plan, described below, is approved.

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

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

The southern Delta salinity Monitoring and Reporting Plan will be required to be integrated and coordinated with existing monitoring and special studies programs in the Delta. DWR and Reclamation shall submit the Monitoring and Reporting Plan to the Executive Director for approval within 18 months from the date of OAL's approval of the 2018 amendments to the Bay-Delta Plan.

Review and Revision of Monitoring and Special Studies

Possible changes to the BDMEP monitoring and special studies requirements and activities, including monitoring designs, will be evaluated during the annual and periodic review processes for the Bay-Delta Plan and its implementation to ensure the monitoring and special studies are providing necessary information to support

implementation of the Bay-Delta Plan and to consider possible needed updates to the plan for the reasonable protection of beneficial uses. Through the periodic review process, the State Water Board will establish and conduct a regular cycle of reviews that rotate through each monitoring activity in Table A-2, with the goal of reviewing each activity at least every 10 years. The State Water Board will conduct the reviews in coordination with the Delta Stewardship Council's Delta Science Program. Proposed changes to monitoring requirements or activities will be subject to public review and comment and must be supported by the best available scientific evidence, including consideration of the need to preserve the integrity of the long-term data record. Proposed changes to monitoring requirements or activities may proceed if approved by the Executive Director. Footnote 2 of Table A-2 identifies studies that may be modified due to ESA/CESA requirements. If studies are modified pursuant to ESA/CESA requirements, the Executive Director will consider what, if any, supplemental monitoring or special studies may be needed to meet the informational needs for the Bay-Delta Plan.

Data Management and Quality

All data collected and calculated for the BDMEP is required to meet applicable data quality standards conforming to established standards for each field of study. All monitoring stations and measurement equipment are required to be regularly maintained and calibrated according to established standards. Quality assurance and instrument maintenance protocols are required to be submitted to the Executive Director for review and consideration of approval within 6 months of approval of the current plan amendments by OAL and reviewed, updated, and submitted to the Executive Director every 5 years thereafter. All records associated with maintenance, calibration, malfunction, or other topics associated with data collection, including records generated by organizations hired by responsible water right holders, are required to be made available to the State Water Board in a timely manner (not to exceed 60 days) upon request. The Executive Director may require changes to instrument maintenance, data quality management protocols, and data availability protocols to address any data quality issues as appropriate.

Reporting

All data collected or calculated for the BDMEP must be posted to a public website in a timely manner. This includes publication of provisional data, any corrected data after application of data quality control measures, and archiving of provisional data. For continuously collected data, provisional data are required to be posted in real time and corrected data are required to be posted within 3 months of data collection. For discrete data, corrected data are required to be posted within 6 months of data collection. Methods (equations and data sources) used for producing calculated metrics are required to be published with the reported data.

Annual reports evaluating and summarizing results of all monitoring and special study activities from the prior water year are required to be submitted to the Executive Director

by May 31 of each year, or an alternative date acceptable to the Executive Director. Annual Reports are required to include, at minimum, the following components:

i. Data quality review including, but not limited to, assessments of data quality, documentation of instrument operation and malfunction, maintenance records, and other relevant data quality information;

ii. Web addresses (URLs) to the public locations of the provisional and quality-controlled data and calculated metrics;

iii. Assessments of trends in measured and calculated parameters for the water year compared to the available historical record;

iv. Assessment of compliance with flow and water quality objectives and associated water right requirements; and

v. Any other relevant information as requested by the Executive Director.

4.5.1.2 Comprehensive BDMEP

The initial BDMEP will be further developed to include monitoring, special study, and reporting activities needed to implement the current amendments to the Bay-Delta Plan, including needed monitoring, special study, and reporting that should be conducted by other water holders in addition to DWR and Reclamation. The initial BDMEP monitoring requirements are largely located in the Bay-Delta estuary. The geographic scope of the Bay-Delta Plan amendments covers the Bay-Delta estuary (waters of the San Francisco Bay, Suisun Bay, Suisun Marsh, and the legal Sacramento-San Joaquin Delta) and tributary watersheds (salmon bearing tributary watersheds to the Bay-Delta including the Sacramento River, Delta East side tributaries, and San Joaquin River). Additional monitoring requirements will be identified for the tributary watersheds and the Bay-Delta estuary to fill monitoring and information gaps and produce information needed to inform implementation of the Bay-Delta Plan and potential future updates to the Bay-Delta Plan. The State Water Board will identify the specific implementation authority if needed and any procedures as appropriate for additional monitoring and reporting requirements.

A comprehensive BDMEP will be developed by State Water Board staff in coordination with partner agencies, California Native American Tribes, and other interested participants. The structure, governance, and content of the comprehensive BDMEP will be informed by available monitoring and assessment models, frameworks, reviews, guidance, and regional monitoring programs. The comprehensive BDMEP will identify management and monitoring questions to guide monitoring, assessment, and reporting activities and to ensure the purposes of the BDMEP are achieved.

The BDMEP will be built on the initial BDMEP and incorporate existing monitoring activities, to the extent possible. The SJRMEP will be an incremental development of the BDMEP as part of the implementing regulation for the Lower San Joaquin River flow objectives and requirements in section 4.4.1. Data management and quality

requirements and reporting requirements will be reviewed and revised as needed to support the estuary, tributary, and special studies monitoring activities. The integrity of the long-term data record will be preserved to the maximum extent possible in the consideration of any proposed revisions. The Executive Director will consider approval of the comprehensive BDMEP within two years of approval of the current plan amendments by OAL. The BDMEP will be regularly reviewed and may be further revised in the future subject to Executive Director approval.

The comprehensive BDMEP will, at minimum, include the following types of monitoring activities to the extent that they are not already addressed by continuation of existing monitoring activities in the initial BDMEP.

Estuary Monitoring

i. Hydrology: Continuous flow monitoring at locations associated with compliance or implementation of the objectives.

ii. Water Quality: Year-round monitoring of key environmental variables including salinity, temperature, turbidity, nutrients, organic matter, chlorophyll, and monitoring for HABs during the bloom season (May to October).

iii. Lower Food Webs: Year-round monitoring of the abundance, biomass, and distribution of phytoplankton, zooplankton, other plankton, and benthic invertebrate communities, including differentiation of life stages where appropriate.

iv. Fishes: Year-round monitoring of the abundance, distribution, diets, migration routes, salvage of fish communities, including larval, juvenile, and adult life stages of fishes, and any other elements required to assess biological goals.

v. Aquatic Weeds: At least annual surveys of species-specific aquatic weed coverage in the Bay-Delta using consistent methods. This could include a combination of remote sensing and field-based surveys.

Tributary Monitoring

i. Hydrology: Continuous flow monitoring at locations associated with compliance or implementation of the objectives.

ii. Water Quality: Year-round monitoring of key environmental variables including temperature, turbidity, contaminants, nutrients, organic matter, and monitoring for HABs during the bloom season (May to October).

iii. Lower Food Webs: Year-round monitoring of plankton, neuston, benthic and littoral macroinvertebrates, drift invertebrates, and other lower food web components important for fish diets.

iv. Fishes: Year-round monitoring of salmonid and sturgeon spawning and rearing population abundance and distribution, escapement and juvenile passage estimates and migration routes, and any other elements required to assess biological goals.

San Joaquin River Monitoring and Evaluation Program (SJRMEP)
[Note to reader: The SJRMEP has been moved from its previous location (section 4.4.1.10) to this location to be included in the BDMEP. One edit was made to this section that changes the due date for the Annual Report from December 31 to May 31 to be consistent with other reporting dates in the BDMEP.]

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

(a) Monitoring, special studies, and evaluations of the effects of flow and other factors on the viability of native LSJR watershed fish populations throughout the year, including assessment of abundance, spatial extent (or distribution), diversity (both genetic and life history), and productivity;

(b) Consideration of recommendations from entities with relevant Central Valley monitoring plans to improve standardization of methods, including the quantification of bias and precision of population estimates; and

(c) Regular external scientific review of monitoring, evaluation, and reporting.

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

Annual Reporting

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

from the annual adaptive operations plan and describe future special studies. The State Water Board will hold public meetings to receive and discuss the annual report.

Comprehensive Reporting

Additionally, every three to five years following implementation of the 2018 update to the Bay-Delta Plan, the State Water Board will require preparation and submittal of a comprehensive report that, in addition to the requirements of annual reporting, reviews the progress toward meeting the biological goals and identifies any recommended changes to the implementation of the flow objectives. The comprehensive report and any recommendations shall be peer-reviewed by an appropriate independent science panel, which will make its own conclusions and recommendations. The State Water Board will hold public meetings to consider the comprehensive report, technical information, and conclusions or recommendations developed through the peer review process. This information will be used to inform potential adaptive changes to the implementation of the flow objectives and, as appropriate, future potential changes to the Bay-Delta Plan.

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

Traditional Ecological Knowledge

The State Water Board will work with California Native American Tribes to incorporate TEK in the BDMEP to the extent practicable. Partner monitoring with California Native American Tribes may help fulfill monitoring requirements and fill geographic gaps (e.g., on tributaries) or gaps in monitoring elements. Any component of monitoring and assessment incorporating TEK will follow the Collective benefit, Authority to control, Responsibility, Ethics Principles for Indigenous Data Governance (CARE principles). The CARE principles help ensure Indigenous People the collective benefit of their own data, authority to control their data, and that data holders engage respectfully so that the use of Indigenous data helps strengthen tribal communities. Indigenous Peoples' ethics will inform the use of Indigenous data.

Harmful Algal Blooms

The State Water Board will work with the Regional Water Boards and other appropriate entities to develop and implement a long-term, Delta-wide HAB monitoring program. Monitoring activities for HABs shall include a combination of remote-sensing with high resolution satellite imagery and field-based surveys using continuous and discrete monitoring methods at known HABs "hotspots" and other regions of the Delta.

This program will include monitoring during the bloom season from May to October following the tiered approach for HAB monitoring described in Table A-3. This will include discrete physical/chemical monitoring, sampling for phytoplankton communities and benthic algal mats, including cyanobacterial and other planktonic and benthic species known to produce toxins, algal pigment analysis, HAB visual indices, and monitoring for concentrations of cyanobacterial toxins (e.g., microcystins) when HABs are forming. A monitoring workplan describing the detailed protocols for HAB monitoring must be submitted by DWR and Reclamation for approval to the Executive Director of the State Water Board within one year of approval of the current plan amendments by OAL.

Special Studies
The BDMEP will identify any special studies needed to implement, inform review of, and potentially update the Bay-Delta Plan. Responsibility for conducting special studies will be determined through water right and water quality actions, while guidance on the types of special studies, design details, coordination, and review will be identified in the BDMEP, including any future revisions.

4.5.2 Bay-Delta Biological Goals

4.5.2.1 Sacramento/Delta Biological Goals

Biological goals will be used to inform the continued update and implementation of the Bay-Delta Plan, including adaptive implementation, the effectiveness of Bay-Delta Plan and its implementation; the BDMEP (described in section 4.5.1), and future changes to the Bay-Delta Plan and its implementation. Through a public process, with the opportunity for public comment, State Water Board staff will develop biological goals for the Sacramento/Delta watershed for approval by the State Water Board within two years of approval of the current plan amendments by OAL. These biological goals will be used to assess the health of the ecosystem for representative anadromous and estuarine fish species, including measures to assess the abundance, productivity, genetic and life history diversity; and the population spatial extent, distribution, and structure for native species. The biological goals will include tributary goals that contribute to meeting the overall goals for each population, including the narrative salmon protection objective, and goals for the Delta. The biological goals will be consistent with the best available scientific information, including information regarding viable populations, recovery plans for listed species, and other appropriate information. The State Water Board will also consider the metrics identified in the HRL Science Plan in the development of these biological goals. These biological goals, however, are not intended to serve as regulatory targets or requirements.

Biological goals for the Sacramento/Delta will use scientific information to establish a numeric value or range of values for biological goals, will be expressed in terms that are SMART (specific, measurable, achievable, relevant, and time-bound), and for

anadromous salmonids will be based on viable salmonid population (VSP) parameters including abundance, life history and genetic diversity, productivity, and spatial structure.

Biological goals may be updated based on monitoring activities and new scientific information and understanding of the Bay-Delta watershed. Biological goals may also be expanded to additional species as appropriate through a public process subject to approval by the State Water Board. The development and update of the Sacramento/Delta biological goals will be coordinated with the Lower San Joaquin River biological goals processes to the extent possible.

4.5.2.2 Lower San Joaquin River Biological Goals

Biological goals will be used to inform the adaptive methods, evaluate the effectiveness of this program of implementation, the SJRMEP, and future changes to the Bay-Delta Plan. The State Water Board sought recommendations on the biological goals from the STM Working Group, State Water Board staff, and other interested persons, in consultation with the Delta Science Program. The State Water Board may modify the biological goals based on new information developed through the monitoring and evaluation activities described below or other pertinent sources of scientific information. Biological goals must, at a minimum, provide metrics that help evaluate reasonable protection for LSJR salmonids, as salmonids are among the fish species most sensitive to LSJR flow modifications. The State Water Board may seek recommendations on biological goals for other LSJR species as appropriate.

Biological goals for salmonids must address, at a minimum:

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

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

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

4.5.3 Tribal Engagement and Traditional Ecological Knowledge

The State Water Board will develop and regularly update a tribal engagement plan in coordination with California Native American Tribes for consultation, outreach, and engagement to incorporate tribal knowledge and perspectives into its Bay-Delta Plan update, and implementation efforts. The State Water Board will hold tribal listening sessions with interested California Native American Tribes at least once per year in conjunction with annual and periodic reviews to hear feedback from tribes on the Bay-Delta Plan, its implementation, and any needed updates. In advance of those meetings, State Water Board staff will meet with tribes to provide updates on Bay-Delta Plan processes. In addition, staff will meet more frequently with tribes on a frequency agreeable to interested tribal representatives outside of formal meetings to share updates and hear feedback. The State Water Board will form, in conjunction with tribes, a Bay-Delta Tribal Advisory Group to provide input to the State Water Board on Bay-Delta Plan update and implementation issues and related matters. The composition, structure, and meeting frequency will be determined by members.

Where appropriate, the State Water Board will consider and incorporate TEK, tribal feedback, and perspectives shared by California Native American Tribes to inform the State Water Board's efforts to update and implement the Bay-Delta Plan. If the State Water Board develops specific policies and guidelines regarding incorporation of TEK, those policies and guidelines will be adhered to. In addition, the State Water Board's consideration and incorporation of TEK and tribal feedback and perspectives will follow CARE principles. To ensure adherence to the CARE principles, the State Water Board will request tribal review by the Bay-Delta Tribal Advisory Group of any Bay-Delta Plan related documents incorporating TEK and will revise documentation of TEK based on that feedback, as appropriate.

The State Water Board will continue working to improve its tribal engagement processes using existing resources and will devote additional resources toward this process as they become available. The State Water Board will continue to offer California Native American Tribes the opportunity to engage in formal Government-to-Government Consultation on Board actions, policies, and processes that may affect tribes and will continue to engage with Tribes outside of formal consultation. The State Water Board will utilize available contracting mechanisms to support outreach and engagement with tribes on Bay-Delta planning efforts. The State Water Board will also identify opportunities for collaboration with other State agencies, academia, and Non-Governmental Organizations to augment tribal outreach efforts and to provide specific outreach and engagement training for State Water Board staff to bolster current engagement processes.

4.5.4 Harmful Algal Blooms

The State Water Board will take actions to implement the Freshwater Harmful Algal Bloom Monitoring Strategy produced pursuant to Assembly Bill 834 (Freshwater and

Estuarine Harmful Algal Bloom Program) within the Bay-Delta watershed. In addition, the State Water Board will coordinate with the Central Valley Regional Water Board, San Francisco Bay Regional Water Board, other agencies, California Native American Tribes, and other interested parties including environmental justice communities on efforts to implement the Delta CHABs Monitoring Strategy to improve HAB science, research, and monitoring, develop HAB mechanistic and predictive models, and identify possible management and mitigation measures that could be used to control HABs in the Delta. This information will be considered during the periodic review process to determine whether there are any needed changes to the Bay-Delta Plan or its implementation to address HABs.

Specific HAB monitoring provisions that are needed to understand status and trends, environmental drivers, inform the development of HAB mechanistic and predictive models, and identify possible HAB management and mitigation measures are also included above in section 4.5.1.

4.6 Annual and Periodic Review

The Bay-Delta Plan and its implementation measures, including reporting requirements associated with the SJRMEP described in section 4.5.1.2, will undergo annual and periodic reviews to assess and report on progress on implementation of the Bay-Delta Plan and any needed changes to the plan or its implementation to provide for the reasonable protection of beneficial uses.

The State Water Board will hold annual public meetings to discuss progress on implementing the Bay-Delta Plan by the State Water Board and other entities with responsibility for implementation actions. Annual reviews may include, but are not limited to, updates on relevant compliance activities, ecological monitoring and assessment, and implementation activities, as well as an opportunity for public comment. The State Water Board may also act on various approvals or adjustments provided for in the program of implementation and will receive updates and public input and may provide direction on any delegated approvals or adjustments provided in the program of implementation. The Board may also discuss and approve refinements to various implementation procedures.

For periodic reviews, the Board will conduct a hearing consistent with applicable legal requirements every three years to discuss progress to date on implementation of the Bay-Delta Plan, effectiveness at providing for the reasonable protection of beneficial uses, and possible needed changes to the Bay-Delta Plan and its implementation, including the opportunity for public input. Topics for the public hearing may include, but are not limited to: efforts by the State Water Board and other entities to implement the Bay-Delta Plan; the effectiveness of the water quality objectives and implementation measures at protecting beneficial uses of water; possible needed changes to the objectives or implementation measures to provide for the reasonable protection of

beneficial uses; progress on achieving biological goals once developed and other fish and wildlife conditions; monitoring and special study activities and any needed changes; climate change effects (as discussed further below) and any needed adjustments to the Bay-Delta Plan or its implementation; methods to reduce the incidence of temporary urgency change petitions related to Bay-Delta Plan requirements; and other relevant topics.

Topics will be prioritized and addressed through successive periodic reviews. Staff will identify any recommendations for any proposed amendments to the Bay-Delta Plan or its implementation that may be needed and prepare a report describing proposed changes. The report will undergo a 45-day minimum public comment period and associated procedures including any needed environmental documentation as appropriate and be presented to the Board for consideration. Individual periodic review cycles may extend longer than three years and updates to the Bay-Delta Plan and its implementation will be carried out continually as needed.

4.6.1 Climate Change

The State Water Board will continue to assess current science as it relates to climate change in the Bay-Delta watershed including: changes in hydrology resulting from changes to snowmelt, runoff, and stream losses; seawater intrusion issues; frequency and severity of droughts; changes in air and water temperatures and other water quality conditions; changes in ecological conditions driven by climate change; and other appropriate issues. Based on these assessments, the State Water Board will consider the need for updates to the plan or its implementation based on the latest scientific information.

Appendix A. Bay-Delta Monitoring and Evaluation Program (BDMEP)

Appendix A can be found at:
https://www.waterboards.ca.gov/bay_delta/bay_delta_plan/docs/dec2025-rev-draft-sacdelta-bdplan-app-a.pdf

Appendix B. Voluntary Agreement Pathway Accounting Protocols

Appendix B.1 (flow accounting) can be found at:
https://www.waterboards.ca.gov/bay_delta/bay_delta_plan/docs/dec2025-rev-draft-sacdelta-bdplan-app-b1.pdf

Appendix B.2 (non-flow habitat accounting) can be found at:
https://www.waterboards.ca.gov/bay_delta/bay_delta_plan/docs/dec2025-rev-draft-sacdelta-bdplan-app-b2.pdf