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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.

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
DWR	California Department of Water Resources
EC	electrical conductivity
FASS	Fully Appropriated Stream Systems
FERC	Federal Energy Regulatory Commission
HABs	harmful algal blooms
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
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
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 draft version of possible changes to the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Watershed (Bay-Delta) (Bay-Delta Plan) reflects changes the State Water Resources Control Board (State Water Board or Board) is considering to the Sacramento River and Delta provisions of the Bay-Delta Plan, including both possible regulatory provisions and provisions related to Voluntary Agreements (VAs) proposed by State and federal agencies and water users. The State Water Board has not made a decision regarding any of the changes identified in this draft and is seeking public input on the draft and other possible changes. Throughout this document, notes to reader like this note are provided in italics to explain options that are under consideration by the Board. In addition, where options for specific program of implementation text are provided, that text is provided in boxes below a note to reader explaining the option. The draft regulatory provisions and VA provisions are both included in this draft with notes to the reader where regulatory provisions under the VAs may be different under a regulatory only pathway and under a pathway in which the regulatory provisions are integrated with the VAs to apply to non-VA water right holders and possibly to VA water right holders if VAs are approved but are discontinued in the future.]

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). 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 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. Measures to implement this plan will consist of actions by water right holders, 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 specified in the plan. The program of implementation, including any approvals of voluntary agreements, describes actions necessary to achieve the water quality objectives in this plan and does not preclude the State Water Board from identifying or requiring other actions to achieve the objectives. 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, to: develop water resources in an orderly manner; prevent the waste and unreasonable use of water; and protect 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 §§ 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 completed once the specific changes to the Bay-Delta Plan are identified, including once a decision is made on the possible incorporation of VAs and other options described in this 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 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 Bay-Delta Plan. This plan also incorporates tribal and subsistence beneficial uses as they relate to the reasonable protection of fish and wildlife; however, these uses have not yet been designated for waterbodies covered under the Bay-Delta Plan.

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 that cultural, spiritual, ceremonial, or traditional rights or lifeways of California Native American Tribes.

- 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 Incorporation of Tribal 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). Together, these beneficial uses are generally referred to as Tribal Beneficial Uses (TBUs). This plan incorporates TBUs in the context of providing reasonable protection of fish and wildlife.

Aquatic life beneficial uses identified in the Bay-Delta Plan form the basis for implementation actions related to flow, water project operations, and physical habitat restoration for the reasonable protection of fish and wildlife. The State Water Board recognizes the centrality that vital fish populations and aquatic life have for cultural, spiritual, ceremonial, and traditional rights and lifeways. Activities within the CUL use may be directly supported by flow actions, including for example, navigation, gathering of natural resources, immersion ceremonies, and ceremonies that involve thriving fisheries. Similarly, 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.

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.

[Note to reader: In addition to incorporation of CUL, T-SUB, and SUB beneficial uses in the Bay-Delta Plan, the State Water Board is considering formal designation of CUL in the Bay-Delta watershed as part of the current update to the Bay-Delta Plan or through a subsequent appropriate process and is seeking public input on this matter. CUL is being contemplated for formal designation due to the cultural importance of water and native fish and wildlife, particularly salmon, to Tribes. The Bay-Delta Plan could incidentally protect other culturally significant aspects of the watershed consistent with providing for the reasonable protection of fish and wildlife. Individual stream segments could also be designated for T-SUB and SUB beneficial uses as appropriate by the Regional Water Quality Control Boards. The State Water Board will work with the Regional Water Quality Control Boards to consider these designations as efficiently and expeditiously as possible.]

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 which 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.

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.

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, RARE, and related CUL, T-SUB, and SUB uses. Protection of these fish and wildlife beneficial uses also provides protection for the beneficial uses of SHELL, COMM, and NAV.

Prior versions of Table 3 included numerous footnotes. To improve the readability of Table 3, this version of the plan incorporates applicable footnotes directly into Table 3 or into Chapter 4, *Program of Implementation*, with updates where appropriate.

[Note to reader: Consistent with Alternative 4a (Exclusion of Interior Delta Flow and Fall Delta Outflow Related Amendments) of the draft Staff Report, possible new objectives for Old and Middle River flows, expanded export constraints based on San Joaquin River flows, and fall Delta outflows described as part of the proposed Plan amendments in the draft Staff Report are not included in this draft plan.]

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

COMPLIANCE LOCATIONS	INTERAGENCY STATION NUMBER (RKI[1])	PARAMETER	DESCRIPTION (UNIT)	WATER YEAR TYPE[2]	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 Tracy Pumping Plant **-and-** Barker Slough at North Bay Aqueduct Intake **-and-** Cache Slough at City of Vallejo Intake[3]	C-5 (CHCCC06) C-9 (CHWST0) DMC-1 CHDMC004 --- (SLSAR3) C-19 (SLCCH16)	Chloride (Cl-)	Maximum mean daily (mg/L)	All	Oct-Sep	250

[1] River Kilometer Index station number.

[2] The Sacramento Valley 40-30-30 water year hydrologic classification index (see Figure 2) applies for determinations of water year type.

[3] Cache Slough objective to be effective only when water is being diverted from this location.

Table 2. Water Quality Objectives for Agricultural Beneficial Uses

COMPLIANCE LOCATIONS	INTERAGENCY STATION NUMBER (RKI[1])	PARAMETER	DESCRIPTION (UNIT)	WATER YEAR TYPE[2]	TIME PERIOD	VALUE
WESTERN DELTA						
Sacramento River at Emmaton	D-22 (RSAC092)	Electrical Conductivity (EC)	Maximum 14-day running average of mean daily EC (mmhos/cm)		0.45 EC April 1 to date shown	EC from date shown to Aug 15[3]
				W	Aug 15	----
				AN	Jul 1	0.63
				BN	Jun 20	1.14
				D	Jun 15	1.67
				C	----	2.78
San Joaquin River at Jersey Point	D-15 (RSAN018)	Electrical Conductivity (EC)	Maximum 14-day running average of mean daily EC (mmhos/cm)		0.45 EC April 1 to date shown	EC from date shown to Aug 15[3]
				W	Aug 15	----
				AN	Aug 15	----
				BN	Jun 20	0.74
				D	Jun 15	1.35
				C	----	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 (mmhos/cm)		0.45 EC April 1 to date shown	EC from date shown to Aug 15[3]
				W	Aug 15	----
				AN	Aug 15	----
				BN	Aug 15	----
				D	Aug 15	----
				C	----	0.54
San Joaquin River at San Andreas Landing	C-4 (RSAN032)	Electrical Conductivity (EC)	Maximum 14-day running average of mean daily EC (mmhos/cm)		0.45 EC April 1 to date shown	EC from date shown to Aug 15[3]
				W	Aug 15	----
				AN	Aug 15	----
				BN	Aug 15	----
				D	Jun 25	0.58
				C	----	0.87

COMPLIANCE LOCATIONS	INTERAGENCY STATION NUMBER (RKI[1])	PARAMETER	DESCRIPTION (UNIT)	WATER YEAR TYPE[2]	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[4] (RSAN112) C-6[4] (RSAN073) C-8[4] (ROLD69) P-12[4] (ROLD59)	Electrical Conductivity (EC)	Maximum 30-day running average of mean daily EC (dS/m/m)[5]	All	Year-round	1.0
EXPORT AREA						
West Canal at mouth of Clifton Court Forebay **-and-** Delta-Mendota Canal at Tracy Pumping Plant	C-9 (CHWST0) DMC-1 (CHDMC004)	Electrical Conductivity (EC)	Maximum monthly average of mean daily EC (mmhos/cm)	All	Oct-Sep	1.0

[1] River Kilometer Index station number.

[2] The Sacramento Valley 40-30-30 water year hydrologic classification index (see Figure 2) applies for determinations of water year type.

[3] When no date is shown, EC limit continues from April 1.

[4] The salinity 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.

[5] 1 mmhos/cm = 1 dS/m. The International System of Units for EC is dS/m. As other portions of Table 2 are updated in future amendments to the Bay-Delta Plan, the units of measurement for EC will be updated to the international system.

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 Stanislaus River at Koetitz	C-10 DWR Gage KOT	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.		
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 and cfs	All	Year round	Maintain inflow conditions from the Sacramento River/Delta tributaries sufficient to support and maintain the natural production of viable native fish populations and to contribute to Delta outflows. Inflow conditions that reasonably contribute toward maintaining viable native 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, quality and spatial extent of flows as they would naturally occur. Maintain inflows from the Sacramento/Delta tributaries at 55% of unimpaired flow, within an allowed adaptive range between 45 and 65% of

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
						unimpaired flow, except where specific exceptions apply. *[Note to reader: The percent of unimpaired flow range included in this objective reflects what was considered in the September 2023 draft Staff Report. The State Water Board is still in the process of determining specific changes to the Bay-Delta Plan and these numbers may change based on additional consideration and public input.]*
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
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 Delta outflows sufficient to support and maintain the natural production of viable native anadromous fish, estuarine fish, and aquatic species populations spawning, rearing in, or migrating through the Bay-Delta estuary. Delta outflows that reasonably contribute toward maintaining viable native fish and aquatic species populations include, but may not be limited to, flows that connect low salinity pelagic waters to productive tidal wetlands and flows that produce salinity distributions that more closely mimic the natural hydrographic conditions to which these species are adapted, including the relative magnitude, duration, timing, quality and spatial extent of flows as they would naturally occur. Indicators of viability include population abundance, spatial extent, distribution, productivity, and genetic and life history diversity. Viability is dependent on maintaining migratory pathways, sufficient quantities of high quality spawning and rearing habitat, and a productive food web.
Inflow-Based Delta Outflow		Flow rate	cfs	All	Year round	The inflows required above, including for the Sacramento/Delta tributaries and San Joaquin River, are required as outflows with adjustments for downstream natural depletions and accretions.

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
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
INTERIOR DELTA FLOWS						
Interior Delta		Flow and water project operations	Narrative	All	Year round	Maintain flow conditions in the interior Delta sufficient to support and maintain the natural production of viable native fish populations migrating through and rearing in the Delta. Interior Delta flow conditions that reasonably contribute toward maintaining viable native 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, quality, and spatial extent of flows as they would naturally occur. Indicators of native fish species viability include population abundance, spatial extent, distribution, productivity, and genetic and life history diversity. Viability is dependent on maintaining migratory pathways, sufficient quantities of high-quality spawning and rearing habitat, and a productive food web.

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
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 Tracy 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
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 (mmhos/cm)	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.

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
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 (mmhos/cm), 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 (mmhos/cm) 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*

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
					Dec–Mar	15.6*
					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.

[Note to reader: If the proposed 2022 Voluntary Agreements (VAs) proposal, referred to as the Healthy Rivers and Landscapes proposal, is incorporated into the Bay-Delta Plan, substantive provisions of the new Sacramento/Delta tributary inflow, inflow-based Delta outflow, cold water habitat, and narrative interior Delta flow objectives may either be incorporated in Chapter 4, Program of Implementation, or may remain as objectives in Table 3 but would not apply to VA parties during the term of the VAs. In addition, a new narrative objective (referred to as the narrative fish viability objective) would be added as identified in Box 1 below. Note that an addition (bolded) has been made to the text of the new narrative objective proposed by VA parties to recognize the VA commitment for additional Delta outflow.]

Box 1. Possible Alterations to Table 3 if Proposed VAs Are Adopted

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 mmhos/cm Must Be Maintained at Specified Location

Number of Days When Maximum Daily Average Electrical Conductivity of 2.64 mmhos/cm Must Be Maintained at Specified Location[a]																	
PMI[b] (TAF)	Chipps Island (Chipps Island Station D10)					PMI[b] (TAF)	Port Chicago (Port Chicago Station C14)[d]					PMI[b] (TAF)	Port Chicago (Port Chicago Station C14)[d]				
	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[c]	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

[a] The requirement for number of days the maximum daily average EC (EC) of 2.64 mmhos per centimeter (mmhos/cm) must be maintained at Chipps Island and Port Chicago can also be met with maximum 14-day running average EC of 2.64 mmhos/cm, 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, the excess days shall be applied to meeting the requirements for the following month. The number of days for values of the PMI between those specified in this table shall be determined by linear interpolation.

[b] PMI is the best available estimate of the previous month's Eight River Index.

[c] When the PMI is between 800 TAF and 1000 TAF, the number of days the maximum daily average EC of 2.64 mmhos/cm (or maximum 14-day running average EC of 2.64 mmhos/cm, 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.

[d] This 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 mmhos/cm.

Figure 2. Sacramento Valley Water Year Hydrologic Classification

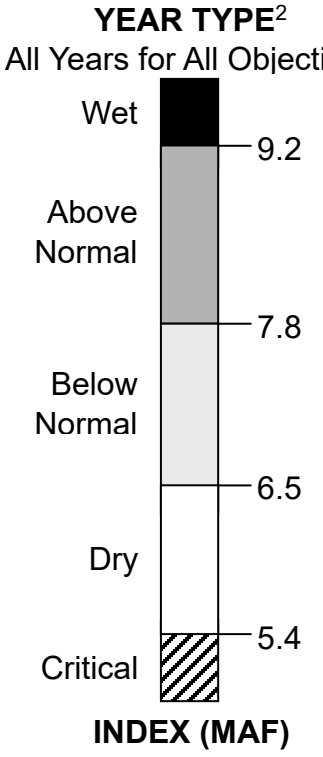
Year classification shall be determined by computation of the following equation:

$$\textbf{INDEX} = 0.4 * X + 0.3 * Y + 0.3 * Z$$

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

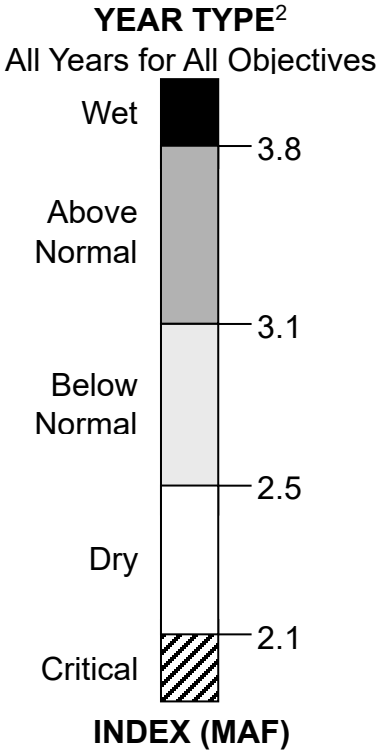
Year classification shall be determined by computation of the following equation:

$$\textbf{INDEX} = 0.6 * X + 0.2 * Y + 0.2 * Z$$

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.

Classification	**Index** **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 + TPP) ÷ 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 + TPP + CCC + NBA

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

TPP = Tracy 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

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[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 mmhos/cm from April through August and 1.0 mmhos/cm from September through March (units of mmhos/cm are equal to units of dS/m). 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 mmhos/cm from April through August and 1.0 mmhos/cm 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.

iv. 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 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.

v. 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.

vi. 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.

vii. 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).

viii. 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.

ix. 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.

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, 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 Narrative Objective for Salmon Protection. This program of implementation describes actions to implement these objectives. It 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.

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]

[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.

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.

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.

4.4.1.4 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.

4.4.1.5 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.

4.4.1.6 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.

4.4.1.7 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.

4.4.1.8 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

[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.

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.

4.4.1.9 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.

4.4.1.10 San Joaquin River Monitoring and Evaluation Program

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 December 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 this 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.

4.4.1.11 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 and Cold Water Habitat Objectives

[Note to reader: The Board is considering a regulatory pathway and a VA pathway that includes a regulatory pathway applicable to parties not covered under a VA. The regulatory pathway would serve as the regulatory pathway if the VAs are adopted. This regulatory pathway is described below and in the following sections on Delta outflow, and in the general provisions. Options for the regulatory pathway and VA related regulatory pathway are also described in each section. As described in Chapter 3, if the proposed VAs are adopted, the substantive provisions of the new inflow and cold water habitat objectives may either be incorporated into this section, or may remain as objectives in Table 3 that do not apply to VA parties during the term of the VAs. No changes are proposed to the existing inflow objective at Rio Vista.]

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 objective discussed below will also contribute to achieving the Sacramento River at Rio Vista flow objective.

4.4.2.2 Narrative and Numeric Inflow Objective for Sacramento/Delta Tributaries

[Note to reader: The 45 to 65 percent of unimpaired Sacramento/Delta tributary inflow range identified in this draft of the Bay-Delta Plan reflects the flow levels that were identified as the "proposed Plan amendments" in the September 2023 draft Staff Report. The State Water Board is still in the process of determining specific changes to

the Bay-Delta Plan, including the unimpaired flow levels for possible Sacramento/Delta tributary inflows. As such, these unimpaired flow levels may change based on additional consideration and public input.]

The narrative provisions of the inflow objective apply throughout the watershed and are implemented through the numeric provisions of the inflow objectives, as well as other complementary actions described in this program of implementation.

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 (Table 5). All water right holders on these tributaries are subject to the narrative provisions of the objective.

All water right holders on these tributaries are also subject to the numeric provisions of the objective, 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 after notice and opportunity for public comment, including as part of development of a regulation or water right requirements to implement the inflow objective.

The numeric provisions of the inflow objective will be implemented by requiring a year-round minimum flow level of 55 percent of unimpaired flow on a minimum 7-day running average from each of the Sacramento/Delta tributaries unless a different flow level applies or adaptive implementation provisions are being implemented as specified below.

Tributaries with reservoirs listed in Table 6 below may adjust within the range of percent of unimpaired flow in order to allow for improved reservoir storage conditions in dry periods for the benefit of cold water habitat protection and to minimize water supply impacts. During the period of October 1 through March 31, required tributary inflows are reduced during specified low reservoir storage levels as follows:

i. During the October 1 through March 31 period when collective reservoir storage in a tributary is less than 75 percent of the allowable flood control storage level as specified by the USACE or other appropriate flood control agency acceptable to the Executive Director, the required minimum inflow level is reduced to 45 percent of unimpaired flow.

ii. During the October 1 through March 31 period when collective reservoir storage in a tributary is less than 50 percent of the allowable flood control storage level as specified by the USACE or other appropriate flood control agency acceptable to the Executive Director, the required minimum inflow level is reduced to 35 percent of unimpaired flow.

The numeric provisions of the inflow objective for the Sacramento/Delta tributaries will be implemented by limiting water diversions to ensure that the applicable flow requirement remains instream. In order to implement the numeric provisions of the inflow objective 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 holder's priority of right that is bypassed to meet the plan objectives, or stored water released to meet the plan objectives, 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 4.4.4, an implementation methodology will be developed to determine when water is not available under specific water rights.

Implementation of the Sacramento/Delta inflow objective will begin within two years of adoption of the Sacramento/Delta Bay-Delta Plan amendments. 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 objective for good cause, such that the objective is fully implemented within five years of initial implementation.

Initial compliance points where the numeric provisions of the inflow objective will apply 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, where applicable, at upstream locations on Sacramento/Delta tributaries at the confluence with each major Sacramento/Delta tributary fork as identified in Table 5. Compliance points are the locations that will be used to define the percent of unimpaired flow, inform assessment of compliance with the instream flow requirement, and determine whether any refinements to implementation of the inflow objectives 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 5. Tributaries and Any Associated Forks or Branches That Are Initially Subject to the Sacramento/Delta Inflow Objective[1]

Tributary	Tributary Forks or Branches (Where Applicable)
Cow Creek	
Battle Creek	
Bear Creek	
Butte Creek	
Antelope Creek	
Deer Creek	
Mill Creek	
Paynes Creek	
Clear Creek	
Big Chico Creek	
Feather River	North Fork Feather River, Middle Fork Feather River, South Fork Feather River, West Branch Feather River
Yuba River	North Yuba River, Middle Yuba River, South Yuba River
Bear River	
American River	North Fork American River, Middle Fork American River, South Fork American River
Sacramento River	
Cosumnes River	
Mokelumne River	North Fork Mokelumne River
Calaveras River	
Stony Creek	
Cottonwood Creek	
Thomes Creek	
Elder Creek	
Cache Creek	
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.

If the State Water Board conducts a specific public regulatory instream flow setting process for a tributary that meets narrative provisions of the 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 provisions of the inflow objective 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 numeric provisions of the inflow objective 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 portion of the inflow objective are provided to optimize flows to benefit native fish and wildlife while also minimizing water supply impacts, and for the numeric provisions of the inflow objective to be implemented in a coordinated fashion with the cold water habitat and inflow-based Delta outflow objectives. 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. 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 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 provisions of the flow objective may be managed as a total volume of water on a seasonal basis and released on an adaptive schedule. Specifically, the numeric inflow requirements may be shaped for the benefit of native fish and wildlife, including for the purpose of providing: 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, floodplain inundation flows to support juvenile salmonid rearing, and other functions. The total volume of water must be no lower than the volume of water that would be provided by tracking the unimpaired flow percentage on a 7-day running average.

Unimpaired Flow Range

In addition to the adjustments to the unimpaired flow range due to low reservoir storage levels discussed above, the required percent of unimpaired flow may be adjusted at other times to any value between 45 and 65 percent of unimpaired flow, inclusive. 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 cold water habitat objective and narrative provisions of the inflow objective, 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 narrative provisions of 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 than 55 percent in the range based on best available science for the following reasons: 1) flows in a tributary are already higher than 55 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 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 for smaller streams in the Sacramento/Delta watershed in future updates to this plan, including as the result of periodic review of the plan.

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 inflow and cold water habitat objectives and other provisions of this plan, or provisions of any approved voluntary agreements, do 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 Sacramento/Delta 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.

Wildlife Refuge Provision
In implementing the numeric provisions of the inflow objective, 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 wildlife refuges. 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 provisions of the inflow objective and the inflow-based Delta outflow objective described below. Those provisions may be informed by other relevant regulatory efforts in order to provide for consistency as appropriate. In addition, the State Water Board may allow for incremental implementation of the objectives over a 5-year period after the required period for initial implementation in order to provide time for municipal and domestic water supplies to meet the objectives while continuing to provide for human health and safety water supplies.

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, and requires 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 are to be integrated with the inflow implementation actions, including the adaptive implementation actions described above. All water right holders who affect temperature management are subject to the cold water habitat objective and rim reservoir owners/operators identified in Table 6 will be required to undertake specific initial 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 the objective consistent with the Bay-Delta Plan. 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 objective after opportunity for public review and comment, including as a result of annual or periodic review described below.

Table 6. 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 6 to develop long-term temperature management strategies for operations of the rim reservoirs and associated facilities identifying how the reservoirs and related facilities will be operated to meet the cold water habitat objective based on the best available scientific and technical information. The long-term temperature management strategies must either meet the carryover storage levels identified below or alternate approved carryover storage levels, while meeting applicable inflow objectives 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 strategies must be submitted to the Executive Director for approval within one year of implementation of the numeric provisions of the inflow objective. The State Water Board will require implementation of the strategies, including any conditions of approval, to begin upon approval by the Board's 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 6 to develop and submit annual temperature management plans by March 31 each year for Executive Director approval, unless an alternate compliance date is approved as part of the long-term temperature management strategy. The annual 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 initial tributary-specific end of September carryover storage requirements, or alternative approved measures, will be implemented in combination with the inflow objective. The Board will require implementation of temperature management plans as approved by the Executive Director.

Carryover Storage Requirements

In the absence of an approved long-term temperature management strategy identifying alternative measures, including alternative carryover storage requirements, the water right holders and reservoir owners/operators identified in Table 6 (initially excluding Stony Creek and Cache Creek) must meet the initial end of September carryover

storage requirements identified below in Table 7, which are intended to provide for maintenance of cold water supplies during the fall months and into the subsequent water year. The State Water Board will require implementation of initial end of September carryover storage requirements upon implementation of the inflow objective for each tributary as applicable. Water year types are based on the Sacramento Valley Water Year Hydrologic Classification defined in Figure 2.

Table 7. Initial End of September Carryover Storage Requirements

Reservoir	Carryover Storage Requirement (TAF): D and C[1] Water Year Types	Carryover Storage Requirement (TAF): W, AN, and BN Water Year Types
Shasta Reservoir	2,000	2,400
Whiskeytown Reservoir	210	210
Oroville Reservoir	1,200[2]	1,600
New Bullards Bar Reservoir	400	600
Camp Far West Reservoir	20	20
Folsom Reservoir	400	500
Camanche Reservoir[3]	150	200
Pardee Reservoir	160	160
New Hogan Reservoir	50	100
Lake Berryessa	700	1,200

[1] Exceptions may be granted by the Executive Director during droughts of two or more years duration.

[2] Power bypass must be used as necessary to meet existing California Department of Fish and Wildlife temperature requirements on the low flow channel.

[3] Requirements based on Mokelumne River Joint Settlement Agreement April through September year type.

After opportunity for public review and comment, including as part of the periodic review process described below, the Executive Director may approve adjustments to the carryover storage requirements based on best available scientific and technical information. In addition, the water right holders and reservoir owners/operators subject to the initial carryover storage requirements may develop proposed modifications with appropriate supporting information and submit to the Executive Director for consideration as part of a long-term temperature management strategy.

Additional Sacramento/Delta Tributaries

The Executive Director of the State Water Board may require long-term temperature management strategies and annual operations plans on additional Sacramento/Delta tributaries 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 objectives. 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 and does not impact other legal users of water or have reduced benefits or 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 provisions of the inflow objective provided that the narrative provisions of the 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 narrative and numeric objectives as applicable. For local cooperative solutions that propose flows below 55 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 achieves 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.

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

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 55 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 55 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 than default implementation for achieving the water quality objectives.

4.4.3 Delta Outflow Objectives

[Note to reader: As described in Chapter 3, if the proposed VAs are adopted, the substantive provisions of the new Delta outflow objectives may either be incorporated into this section, or may remain as objectives in Table 3 that do not apply to VA parties during the term of the VAs. No changes are proposed to the existing base Delta outflow objectives described in the 2018 Bay-Delta Plan.]

4.4.3.1 Narrative Delta Outflow Objective

The narrative Delta outflow objective applies throughout the watershed and is to be implemented through implementation of the numeric Delta outflow objectives (sections 4.4.3.2 through 4.4.3.3), as well as other complementary actions described in this program of implementation.

4.4.3.2 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.

Implementation of the inflow-based Delta outflow objective will begin within two years of adoption of the Sacramento/Delta Bay-Delta Plan amendments and proceed in coordination with implementation of the Sacramento/Delta tributary numeric 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.

[Note to reader: Based on recent information since the 2021-2022 drought indicating that the net consumptive use of irrigated agriculture on subsided islands below sea level in the Delta may be equivalent to the amount of water that would be used by the vegetation that would grow absent irrigation and land management, the State Water Board is considering possible exemptions to the inflow-based Delta outflow for water rights in which the diversion and use of water is limited to irrigation of lands below sea

level in the Legal Delta. All water rights and claims associated with irrigated lands below sea level in the Delta would be considered initially exempted. The State Water Board, in coordination with other appropriate agencies and entities, would conduct additional analyses regarding water use on irrigated lands below sea level in the Delta and undertake a public process to further evaluate the effectiveness of curtailments of agricultural diversions on lands below sea level. Based on that process, the State Water Board could make refinements to this exemption, including requiring additional water right holders in the legal Delta to contribute to the inflow-based Delta outflow objective.]

4.4.3.3 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 mmhos/cm 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 mmhos/cm (Collinsville station C2).

ii. If the best available estimate of the Eight River Index[5] 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 mmhos/cm 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

[5] 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.

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.

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 refinements 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 one year from adoption of the plan 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.

4.4.4 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 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 water rights that may be part of an approved voluntary agreement, unless an approved exception to curtailment applies, as described further below.

ii. Water is not available based on water right priorities due to responsibility for meeting the tributary inflow and the inflow-based Delta outflow objectives. These curtailments would not apply to water rights part of an approved voluntary agreement.

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 adoption of the Sacramento/Delta updates to the Bay-Delta Plan. 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. 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 adoption of the Sacramento/Delta updates to the Bay-Delta Plan, the State Water Board will adopt curtailment regulations consistent with the above that will identify specific curtailment procedures and requirements. Those requirements will include required monitoring and reporting of diversions and related information needed to inform curtailment decisions, which may be in addition to other required monitoring and reporting.

4.4.4.1 Protection of Base Delta Outflows During Drought

[Note to reader: A possible provision to protect minimum flows during droughts in order to avoid the need for Temporary Urgency Change Petitions and cold water pool impacts described conceptually in the draft Staff Report as Alternative 5a. The Board has not decided to move forward with this alternative yet, but it is considering this option for inclusion in the Bay-Delta Plan. This provision would apply during critical water years and declared droughts, and would reduce the need for the SWP and CVP (collectively, Projects) to release previously stored water to meet the existing base Delta outflow objectives described in Table 3 (not including Table 4) of the Bay-Delta Plan. This in turn would be expected to reduce the need for Temporary Urgency Change Petitions and reductions in cold water storage in Project reservoirs. Instead, other diverters, in addition to the Projects, would need to bypass natural flows until the objectives are met. The Projects would still have initial responsibility for bypassing flows to meet the objectives, but if more water was needed, other water right holders would also need to bypass flows, reducing the need for the Projects to release previously stored water. This provision is also presented as an option if the proposed Voluntary Agreements are incorporated into the Bay-Delta Plan and could also apply to VA water rights.]

Box 2. Optional Provision to Protect Base Delta Outflows During Drought

During critical water year types and declared drought emergencies, all water rights would be subject to curtailment in order of water right priority to meet the base Delta outflow objectives described in Table 3 of the Bay-Delta Plan, not including Table 4.

Initially, this provision would only apply to Sacramento/Delta water rights but may also be extended to Lower San Joaquin River water rights as part of implementation of the Lower San Joaquin River flow objectives, periodic review, or another appropriate process. This provision would be put into effect using the implementation methodology. Procedures and requirements related to this provision would be formulated through the process to develop the methodology.

4.4.5 Interior Delta Flow Objectives

[Note to reader: The addition of the narrative interior Delta flow objective and changes to the Delta Cross Channel objective are proposed regardless of approval of VAs.]

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.

4.4.5.1 Narrative Objective for Interior Delta Flows

The narrative objective for interior Delta flows is implemented through compliance by SWP and CVP with the numeric interior Delta flow objectives 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.

4.4.5.2 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.

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

The April 15 to May 15 export limits based on the San Joaquin River flows objective are 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.

4.4.5.4 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.

4.4.6 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, 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.

4.4.7 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.

4.4.8 Suisun Marsh Salinity Objectives

4.4.8.1 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.

4.4.8.2 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.

4.4.9 Narrative Objective for Salmon Protection

The narrative objective for salmon protection is 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 Quality Control 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 objective, 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 objective.

4.4.10 Implementation of Narrative Native Fish Viability Objective and Narrative Salmon Protection Objective Through Sacramento/Delta Voluntary Agreements (VAs)

[Note to reader: This section includes possible implementation provisions for proposed Voluntary Agreements (VAs), also referred to as the Healthy Rivers and Landscape Proposal, provided for public review and input. The State Water Board has not made a decision on the VAs or other provisions of the Bay-Delta Plan and continues to seek public input on the possible incorporation of VAs, including if the VAs are included, and the specific program of implementation text described below. The VAs include flow and habitat restoration measures proposed by State and federal agencies, local water agencies, private companies, and a non-profit mutual benefit corporation in a 2022 Memorandum of Understanding (MOU) as a method to update the Bay-Delta Plan in lieu of applying the new regulatory requirements described above to VA parties. Subsequent to the development of the MOU, a number of other documents were developed by VA parties describing proposed VA governance, science, strategic planning, and implementation provisions. Those documents also include limited

proposed program of implementation text. The specific proposed text provided by VA parties is identified in Box 3 below. Following that text is program of implementation text developed by Board staff for the VAs based on the 2022 MOU and informed by the subsequent VA documents. Where appropriate, provisions of the subsequent VA documents are incorporated into the draft program of implementation text. Otherwise, the VA documents would not be proposed to be approved in their entirety if the State Water Board moves forward with VAs.]

[Note to reader: The text included in Box 3 below contains the VA parties' proposal for specific Bay-Delta Plan program of implementation provisions included in a March 29, 2024, draft Global Agreement prepared by VA parties. In the Global Agreement, the VA parties state the following to introduce the proposed program of implementation provisions: "The Parties support Final Action that amends the Bay-Delta Plan Chapter IV, Program of Implementation, to include the following procedures related to renewal, modification, and extension of the Healthy Rivers and Landscapes Program." However, the VA parties did not submit a complete program of implementation. These provisions could be incorporated into the program of implementation in Chapter 4 and section 4.4 addressing "Implementation of Water Quality Objectives for Fish and Wildlife Beneficial Uses" in whole or in part. Parts of this proposal have also been integrated into the staff version of the program of implementation with edits. The "New Water Quality Objective" in Box 3 is addressed in Chapter 3.]

Box 3. Proposed Program of Implementation Provisions from the VA Parties

SUPPORTED AMENDMENTS TO THE BAY-DELTA PLAN

March 29, 2024 Draft

1. **New Water Quality Objective**. The Parties support Final Action that adds the following to Bay-Delta Plan Chapter III, as a new water quality objective:

   "Maintain water quality conditions, including flow conditions in and from tributaries and into 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.

   * The actions the State Water Board and other agencies expect to take to implement this objective are described in section [insert number] of this Plan's Program of Implementation."

2. <u>Procedures for Renewal, Modification, and Extension</u>.

2.1. Information. The State Water Board will consider the following information with respect to the Healthy Rivers and Landscapes Program:

A. Science Program's synthesis of the most current science and analyses of the effects of the implementation of the Healthy Rivers and Landscapes Program;

B. Past, present, and probable future beneficial uses of water;

C. Environmental characteristics of the Bay-Delta watershed, including the quality of water available thereto;

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

E. Economic considerations.

2.2. Procedures. In Year 6, the State Water Board will initiate the process to evaluate and determine the implementation pathway for Parties to the Healthy Rivers and Landscapes Program after Year 8. At Year 8, the State Water Board will consider potential amendments to the Program of Implementation under the green - yellow - red structure described below, which will be informed by the consideration of the scientific analysis and information submitted pursuant to [this Exhibit A Section 2.2]. If under the "red" option below, the Parties may present new agreements to fulfill the purpose stated in Section 1, or the State Water Board will begin implementing the Bay Delta Plan through the additional pathway described in Global Agreement Section 5.3.

A. In Year 6, the State Water Board will issue a notice to initiate the process. It will hold a public informational workshop, at which time the Parties will present on their second Triennial Reports and Strategic Plan for Years 6-9. Based on these reports and the information gathered by the Science and Technical Committee, the Parties, through the Systemwide Governance Committee, will recommend to the State Water Board whether the Healthy Rivers and Landscapes Program should continue for another term with limited modification or if more significant changes to the VA terms are needed. The State Water Board will consider the Systemwide Governance Committee's recommendation and all public comments on the progress of implementation of the Healthy Rivers and

Landscapes Program, technical information, and the implementation pathway in Year 8.

B. Following the workshop and after consideration of all comments, the State Water Board will distribute a draft proposed pathway to be implemented for the Parties to the Healthy Rivers and Landscapes Program after Year 8. In summary form, it will select from three options:

(i). **Green** – The Healthy Rivers and Landscapes Program is substantially achieving the required metrics as described in the Science Plan; and the ecological outcomes analysis described there supports the conclusion that continuing the agreements, together with other actions in the Bay-Delta Plan, will result in attainment of the narrative objectives. If so, the Parties will continue implementation of the Healthy Rivers and Landscapes Program without any substantial modification in terms, except for necessary changes to provide for funding and other measures necessary to continue the Global, Implementation, and Enforcement Agreements. Necessary updates to the terms of the agreements (if any) will be determined and the process to renew the agreements will be initiated so that renewed agreements are in place at Year 9.

(ii). **Yellow** – The Healthy Rivers and Landscapes Program is meeting a significant number of metrics as described in the Science Plan; and the ecological outcomes analysis as described there supports the conclusion that continuing the agreements, together with other actions in the Bay-Delta Plan, will result in attainment of the narrative objectives, but some modifications are needed. If so, the Parties will continue implementation with substantive modification in terms. The process to modify the terms of the agreements to address deficiencies will be initiated. Concurrently, the State Water Board will consider alternative means to address deficiencies in achieving the metrics as described in the Science Plan.

(iii). **Red** – A new pathway is required because the Healthy Rivers and Landscapes Program is not achieving required metrics as described in the

Science Plan; and the ecological outcomes analysis as described there does not support the conclusion that continuing the agreements, together with other actions in the Bay-Delta Plan, will result in attainment of the narrative objectives. New agreements will be negotiated, or the Bay- Delta Plan's Program of Implementation will be implemented through the State Water Board's regulatory authorities and the Parties reserve all rights to fully participate in the related regulatory processes, and potential remedies related thereto.

C. Factors the State Water Board will consider in selecting one of the three options from subsection (B), will include, but not necessarily be limited to:

(i). Whether permits required for implementation were pursued and available within a reasonable timeframe.

(ii). Whether Parties timely and fully performed flow asset commitments in the Healthy Rivers and Landscapes Program.

(iii). Whether the Triennial Reports analyze progress across the Delta watershed, provide considerations for updating the Strategic Plan, include considerations for updating the VA flow and non-flow measures, and are timely submitted to the State Water Board to inform its triennial review process.

(iv). Whether the guidance as set forth in the Strategic Plan for the initiation and construction of habitat projects has been achieved.

(v). Whether the Healthy Rivers and Landscapes Program was fully funded through Year 8.

(vi). Whether the Triennial Reports or other sources of reliable information indicate that factors outside of the Healthy Rivers and Landscapes Program are impairing the relevant fish species;

(vii). Whether flows have been adequately protected pursuant to Global Agreement Section 6.3; and

(viii). Whether additional funds are available to continue the Healthy Rivers and Landscapes Program.

D. Prior to selecting one of the three options from subsection (B), the State Water Board will:

(i). Hold appropriate hearings to review and receive input on the scientific reports, analysis, information, and data generated by the Science Program and other sources and receive recommendations on the anticipated effectiveness of continuing or modifying the agreements or implementing the regulatory pathway described in Global Agreement Section 5.3; and

(ii). Conduct a Delta Independent Science Board review to receive input and recommendations on the scientific rationale for continuing or modifying the Healthy Rivers and Landscapes Program.

E. In Year 8, the Parties will submit their final Annual Report. The State Water Board will distribute any proposed amendments to the Bay-Delta Plan's Program of Implementation, which will be informed by the consideration of factors in Global Agreement Section 12.6(C), to be implemented after Year 8.

F. If, by the end of Year 8, no new agreements have been adopted or State Water Board has not yet assigned responsibility for implementing the Bay-Delta Plan through a regulatory pathway described in amendments to that Bay-Delta Plan's Program of Implementation, the original agreements (and their terms concerning water- user funding for flow contributions) will continue, but unless otherwise negotiated, those obligations will not extend beyond 15 years.

G. In the Enforcement Agreements, the Parties and the State Water Board have established a procedure for timely and effective referral of disputes that arise during any update to the Bay-Delta Plan's Program of Implementation described herein. The procedure will promptly involve executive leadership (across the Parties) in resolution of disputes that, if unresolved, would involve significant risk of delay in final action.

H. The Enforcement Agreements authorize an extension of the agreements beyond Year 8 to continue until new

agreements are adopted or the State Water Board adopts a pathway as described in [this Exhibit A section 2.2(B)]. Parties that are water agencies will reserve remedies specified in these agreements.

3. **Procedures for Protection of Flows**. The Parties support Final Action that amends the Bay-Delta Plan Chapter IV, Program of Implementation, to include procedures for protection of flows that are Additional Contributions (as described in Global Agreement section 4.4(A)), incorporating the following considerations.

    A. The State Water Board will rely on various authorities to protect flows generated by the 2024 update to the Bay-Delta Plan. Specific protections, whether arising from regulatory actions of the State Water Board or as part of Government Code section 11415.60 agreements will include provisions specifying that water contributed under the Healthy Rivers and Landscapes Program:

        (i). constitutes beneficial use of that water, consistent with Water Code section 1243;

        (ii). does not constitute non-use of the water;

        (iii). is not abandoned water available for appropriation; and

        (iv). will be protected from unauthorized diversions without being backstopped by the SWP, CVP, or both.

    B. Consistent with Global Agreement Exhibit A, the Parties prepared and submitted to the State Water Board procedures to assure that such flows are Additional Contributions, including methods for identifying when and where the flows are in the system. As part of that submission, the Parties identified methods for protecting flows that are Additional Contributions, to the furthest downstream location that can be supported by the methodology.

    C. Before final action on the 2024 Bay-Delta Plan Update, the State Water Board consulted with the Parties to incorporate flow protection measures into this Program of Implementation. The enforcement mechanisms against unauthorized diversion of flows that are Additional Contributions, depend on the protection methods identified, and include, but are not limited to:

(i). new permit conditions on junior water rights;

(ii). enforcement against Parties pursuant to Enforcement Agreements including where applicable Government Code section 11415.60 agreements or memoranda of understanding;

(iii). new regulations, and

(iv). the exercise of other, existing State Water Board enforcement authorities.

4. **Procedures to Address Redirected Impacts**. The Parties support Final Action that amends the Bay-Delta Plan, Chapter IV, Program of Implementation to include the procedures to address redirected impacts of flow measures as stated in Implementation Agreements.

5. **Procedures to Assure that Flows are Additional Contributions**. The Parties support Final Action that amends the Bay-Delta Plan Chapter IV, Program of Implementation, to include the procedures stated in Implementation Agreements to assure that flows are Additional Contributions.

6. **Procedures to Assure Implementation of Commitments by Federal and State Agencies (To the Extent Not Addressed in Enforcement Agreements**). The Parties support Final Action that amends the Bay-Delta Plan Chapter IV, Program of Implementation, to include the following procedures related to enforcement of VA obligations.

   "The State Board will consider approval of Government Code section 11415.60 agreements, in lieu of an adjudicative water right proceeding, to implement flow, habitat, and other commitments of parties to the Healthy Rivers and Landscapes Program. To the extent that USBR water right permits or licenses are modified to implement measures therein, the State Water Board will use its ordinary enforcement procedures under the California Water Code, consistent with Section 8 of the Reclamation Act. To the extent commitments of other federal or state agency Parties are not otherwise memorialized in a Government Code section 11415.60 agreement, the State Water Board will incorporate such commitments in memoranda of understanding."

[Note to reader: The following sections contain draft program of implementation text developed by Board staff that incorporates the VA proposal into the Bay-Delta Plan with staff edits. Options for possible program of implementation text are also identified. These options are depicted in boxes with associated reader notes.]

This section describes flow and habitat restoration provisions, as well as associated monitoring and evaluation provisions, for implementation of the narrative native fish viability objective and narrative salmon protection objective by water right holders who are part of approved Sacramento/Delta Voluntary Agreements (VAs) (referred to as VA parties).

The water rights and right holders/parties that are subject to the Sacramento/Delta VA provisions of the Bay-Delta Plan are identified in Table 8.

Table 8. VA Parties and Water Rights by Tributary

Tributary	**VA Parties**	**Water Rights Subject to VA Provisions** ***(to be provided by VA Parties)***
Sacramento River	Glenn-Colusa Irrigation District, Regional Water Authority, Tehama-Colusa Canal Authority, Sutter Mutual Water District, River Garden Farms	
Feather River	Western Canal Water District	
Yuba River	Yuba Water Agency	
American River	Regional Water Authority	
Putah Creek	Solano County Water Agency	
Mokelumne River	East Bay Municipal Utility District, San Francisco Public Utilities Commission	
Friant	Friant Water Authority, Kern County Water Agency	
Sacramento-San Joaquin Delta	Contra Costa Water District, San Luis and Delta-Mendota Water Authority, Modesto Irrigation District, Kern County Water Agency, Metropolitan Water District of Southern California, Westlands Water District, State Water Contractors	

The VA parties may implement the provisions described in this section in lieu of the new Sacramento/Delta inflow and cold water habitat provisions and inflow-based Delta outflow provisions described above in sections 4.4.2 through 4.4.5 for up to eight years, with the possibility of extension. The VAs will become effective upon approval of these plan amendments by the Office of Administrative Law. For the water rights that are part of the VAs, the State Water Board may issue Government Code section 11415.60 decisions by settlement or other decisions, orders, or regulations to implement and enforce VA commitments in accordance with the below provisions. Provisions for possible extension of the VAs beyond eight years or modification or termination of the VAs are described below.

Water rights not included in Table 8 are subject to the Sacramento/Delta inflow and cold water habitat provisions and inflow-based Delta outflow provisions, unless an exception applies. Water rights identified in Table 8 may also be subject to these provisions upon termination of the VAs as specified below.

4.4.10.1 Flow Commitments

Flow commitments are specified below for each VA water source and water year type. In order to utilize the VA pathway to meet water right holders' responsibilities for contributing to Delta inflows and outflows in the Bay-Delta Plan, these flows must be provided consistent with the accounting procedures described below and further specified in Appendix B to this plan for each water source. *[Note to reader: VA parties have developed proposed draft flow accounting procedures, but those procedures require further development and approval before incorporation into the Bay-Delta Plan in Appendix B following a planned workshop and public comments on this draft of updates to the Bay-Delta Plan].* The purpose of the flow accounting procedures is to ensure that VA commitments are met consistent with water right priorities, including to ensure that VA flow commitments are provided in addition to flows needed to meet senior water right demands; 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 VAs; and in addition to flows resulting from flows provided by non-VA water right holders 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 VA flows must be additive Delta outflow above defined base Delta outflows as approved by the State Water Board. Unless otherwise specified below, VA flows are to be provided according to the Sacramento Valley Water Year Hydrologic Classification defined in Figure 2. In addition, the water rights under which VA flow commitments are to be provided for instream flow and Delta outflow purposes must be identified at least 90 days in advance in order to confirm that water is available under the right without impacting other legal users of water. VA flow commitments must not be provided from a water right that is duplicative of another right still being used for consumptive purposes and the VA instream flow dedication must not otherwise injure other legal users of water

or unreasonably impact fish and wildlife. Water Code section 1707 petitions are not required to protect this water from subsequent diversions.

Implementation of VA 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 VA flow commitments to be provided in each month on a default basis. Each VA 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 VA flow commitment over the eight-year term of the VAs is consistent with the default schedule for January through June. The VA parties will determine the proposed schedule for release of VA flow commitments on a tributary/water source basis each year in consultation with the State Water Board.

Any proposal to release VA flows outside the flexibility brackets or outside January through June, regardless of flexibility brackets, is subject to approval by the Executive Director and must be requested with appropriate supporting information at least 90 calendar days in advance of any proposed operations. Any such proposal must include an analysis demonstrating that the release of VA flow 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 supplemental 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 VA parties of the decision at least 10 working days before the start of the proposed schedule.

Avoiding Redirected Impacts

The VA flows must be implemented in a manner consistent with water right priorities avoiding injury to other legal users of water and native aquatic species, including the following specific provisions.

In order to protect VA flows from diversion by other water right holders and to ensure that implementation of VAs does not impact other legal users of water, VA water rights are subject to curtailment when water is not available at that priority of right, as described further in section 4.4.4. VA 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-VA parties. The water rights that are being dedicated to instream flow purposes under the VAs will be required to be identified and any necessary supporting information 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 Executive Director may require specific information to support instream flow dedications of VA flows. The

VA parties must identify which rights are being dedicated each year at least 90 days in advance of the instream flow dedication.

The VAs must be implemented in a manner consistent with SGMA and must not result in redirected impacts to fish and wildlife from groundwater substitution, including reductions in streamflow. The State Water Board will require VA parties to account for groundwater substitution effects to ensure no reduction in streamflow or other impacts to fish and wildlife from groundwater substitution.

The VAs are not authorized to be implemented in a manner that results in any redirected impacts to the Trinity River watershed. Reclamation is required to submit an annual report to the State Water Board that demonstrates implementation of the VA does not result in redirected impacts to native fish and wildlife resources in the Trinity River watershed, including temperature and instream flows.

Cold Water Habitat
The VAs 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 VA parties will be required to report on measures they have undertaken to address temperature impairments in their stream systems in coordination with VA implementation measures.

Protection of the VA Flows Base Applicable to New Water Supply Projects
[Note to reader: Box 4 below describes possible alternatives for protecting the VA flow base from being substantially reduced by new water supply projects, specifically new water right applications and water right change petitions that result in increased diversions and reduced VA base flows. Two alternatives are described below: a scenario described in the draft Staff Report for this plan update and a new scenario that would subject new projects to the regulatory pathway, including the new tributary inflow, cold water habitat, and inflow-based Delta outflow requirements, rather than allowing those projects' responsibilities for complying with the Bay-Delta Plan to be covered by the VAs. Additionally, the State Water Board is expecting to receive a proposal from DWR for consideration.]

Box 4. Possible Alternatives for Protecting the VA Flow Base

Option 1 (concept based on Alternative 6a described in the draft Staff Report):

With the exception of de minimis diversions with a face value of less than 10 acre-feet per annum, any water right application or water right change petition approved by the State Water Board after January 1, 2025 involving new or expanded diversions of water (including new points of diversion) would not be authorized to divert water in a manner that changes the magnitude or timing of inflows or outflow to the Bay-Delta watershed during the January through June time period unless Delta outflows are at

least 42,800 cubic feet per second, measured as a daily Net Daily Outflow Index value.

Option 2:

Any water right application or water right change petition approved by the State Water Board after January 1, 2025, involving new or expanded diversions of water (including new points of diversion) would be subject to the tributary inflow, cold water habitat, and inflow-based Delta outflow provisions in the same manner as non-VA water rights.

Option 3: Placeholder for option developed by DWR.

4.4.10.2 Additive Flows Above the Base

[Note to reader: The VA commitments identified in Table 9 below are based on the 2022 VA MOU (excluding commitments without a committed VA signatory) that identified volumes of additive Delta outflows above Delta outflows required by D-1641 and resulting from the 2019 Biological Opinions. Subsequent VA documents, including the hydrologic modeling assumptions provided by VA parties, the VA strategic plan, and VA flow accounting documents may affect these values once applied to VA flow commitments described in the VA MOU. Flow accounting issues will be discussed during a flow accounting workshop and resolved following that workshop and the public comment process. Upon resolution of these issues, the flow accounting measures would be specified in Appendix B to the Bay-Delta Plan (draft Appendix B includes draft accounting provisions for VA habitat but does not yet contain flow accounting). The non-flow accounting measures will also be discussed as part of this workshop, including the detailed non-flow accounting measures that are identified in the draft for Appendix B.]

Table 9. VA Flow and Non-Flow Commitments

	Additive Delta Outflows (TAF) by Water Year Type					Restoration (acres)		
Location	C	D	BN	AN	W	Spawning	Instream Rearing	Floodplain
Sacramento		100	100	100		113.5	137.5	40,000[2]
American	30	40	10	10		25	75	
Yuba		60	60	60			50	100
Feather		60	60	60		15	5.25	1,655
Putah	7	6	6	6		1.4		
Mokelumne		5	5	7			1	25
Delta foregone exports		125	125	175				5,227.5[1]

Friant (by San Joaquin Water Year Type)		50	50	50				
PWA Water Purchases	3	113.5	144.5	182.5	27			
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, PWA = Public Water Agency.

[1] Includes tidal wetland habitat.

[2] 20,000 acres of floodplain habitat will be restored, and 20,000 additional acres will be used for fish food production.

Sacramento River

In order for water right holders on the Sacramento River to utilize the VA pathway, the Sacramento River VA parties must provide 100 TAF of additional Sacramento River inflow and associated Delta outflows above approved base conditions defined in Appendix B in dry, below normal, and above normal years. These flows must be provided in January through June unless the Executive Director approves deployment of the VA flows outside of this period consistent with the provisions of section 4.4.10.1. No more than 20 TAF of water each year may be provided through groundwater substitution sources and may only be provided in a manner that does not impact stream flows and is consistent with SGMA as specified in section 4.4.10.1. Any proposal to maintain Sacramento River flow volumes in storage for cold water purposes may only occur in dry years and must be approved by the Executive Director consistent with section 4.4.10.1 and must be supported by NMFS and DFW. 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 4.4.10.1 and approved accounting procedures, and must result in additional Delta outflow at a time with benefits to fishes.

American River

In order for water right holders on the American River to utilize the VA pathway, the American River VA parties must provide 30, 40, 10, and 10 TAF of additive inflow and associated Delta outflows above approved base conditions defined in Appendix B in critical, dry, below normal, and above normal years, respectively. These flows must be provided in January through June unless the Executive Director approves deployment of the VA flows outside of this period consistent with the provisions of section 4.4.10.1. A portion of American River VA flows may be provided through groundwater substitution upon demonstration that such groundwater substitution will not impact stream flows and is consistent with the SGMA.

Yuba River
In order for water right holders on the Yuba River to utilize the VA pathway, the Yuba River VA parties must provide 60 TAF of additive inflow and associated Delta outflows above approved base conditions defined in Appendix B in dry, below normal, and above normal years. These flows must be provided in January through June unless the Executive Director approves deployment of the VA flows outside of this period consistent with the provisions of section 4.4.10.1.

Feather River
In order for water right holders on the Feather River to utilize the VA pathway, the Feather River VA parties must provide 60 TAF of additive inflow and associated Delta outflows above approved base conditions defined in Appendix B in dry, below normal, and above normal years. These flows must be provided in January through June unless the Executive Director approves deployment of the VA flows outside of this period consistent with the provisions of section 4.4.10.1. A portion of Feather River VA flow commitments may be provided through groundwater substitution upon demonstration that such groundwater substitution will not impact stream flows and is consistent with SGMA.

Putah Creek
In order for water right holders on Putah Creek to utilize the VA pathway, the Putah Creek VA parties must provide 7, 6, 6, and 6 TAF of additional Putah Creek inflow and associated Delta outflows above approved base conditions defined in Appendix B in critical, dry, below normal, and above normal years, respectively. These flows must be provided in January through June unless the Executive Director approves deployment of the VA flows outside of this period consistent with the provisions of section 4.4.10.1.

Friant Contributions to Delta Outflows
In order for water right holders associated with the Friant VA to utilize the VA pathway, those parties must provide 50 TAF of additional Delta outflow above approved base conditions defined in Appendix B in dry, below normal, and above normal years, as determined by San Joaquin water year types. These flows must be provided in January through June unless the Executive Director approves deployment of the VA flows outside of this period consistent with the provisions of section 4.4.10.1.

Mokelumne River
In order for water right holders on the Mokelumne River to utilize the VA pathway, the Mokelumne River VA parties must provide 5, 5, and 7 TAF of additional inflow and associated Delta outflows above approved base conditions defined in Appendix B in dry, below normal, and above normal years, respectively. These flows must be provided in January through June unless the Executive Director approves deployment of the VA flows outside of this period consistent with the provisions of section 4.4.10.1.

SWP and CVP Export Provisions

In order for VA parties responsible for providing SWP and CVP export contributions, including DWR and Reclamation, to utilize the VA pathway, those VA parties 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 outflow above approved base conditions defined in Appendix B. The SWP and CVP must also bypass other VA flow commitments to achieve the additive VA Delta outflow commitments above base conditions, as well as other flows provided by non-VA parties to meet Bay-Delta Plan regulatory requirements and other instream flow dedications as specified in approved accounting provisions included in Appendix B *[to be developed]*.

Water Purchases

[Note to reader: To date, limited information is available on VA water purchases. Draft generalized flow accounting measures have been developed for Public Water Agency water purchases but no accounting has yet been provided for permanent state water purchases. The sources of permanent state water purchases and specific sources for fixed price water purchases and specific accounting for those purchases has not been identified. Before the State Water Board considers incorporation of VAs into the Bay-Delta Plan, the Board expects the VA parties to identify specific sources (including water rights and streams) and volumes of permanent state water purchases and fixed price water purchases, identify specific proposed flow accounting provisions, and make this information available for public review and comment. These issues will be discussed during the flow accounting workshop.]

In order for VA parties responsible for providing water purchases, including water purchases under the Public Water Agency Water Purchase Program (PWA purchases) comprised of fixed price and market price purchases, and permanent state water purchases, to utilize the VA pathway, those VA parties 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. Fixed price purchases will be provided from the following sources: *[Note to reader: Once additional information regarding the fixed price water purchases is developed, this section will be updated to include that information.]*

   (b) Market price purchases of 45 TAF in dry, below normal, and above normal water year types. The sources, including water rights and water sources, and other pertinent information that may be requested by the State Water Board, in order to provide for the protection of instream flows provided as

part of market price water purchases in a manner that does not impact other legal users of water and provides benefits to native fish and wildlife consistent with the narrative native fish viability and salmon protection objectives, must be provided to the State Water Board to provide public notice at least 90 days in advance of providing the flows to meet VA flow commitments. The Executive Director may condition the provision of market price water purchases to avoid impacts to other legal users of water, to ensure consistency with the narrative objectives, and other provisions of this plan and the Water Code.

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. Permanent state water purchases will be provided from the following sources: *[to be developed]*. *[Note to reader: Once additional information regarding the permanent state water purchases is developed, this section will be updated to include that information.]*

These flows must be provided in January through June above approved base conditions unless the Executive Director approves deployment of the VA flows outside of this period consistent with the provisions of section 4.4.10.1.

New Water Projects Water Purchases

[Note to reader: The VA MOU identifies flow volumes to be provided from "New Water Projects (Before Year 8)" including Chino Basin, Kern Fan, and Willow Springs Conjunctive Use. Chino Basin would provide 50 TAF in dry and below normal years, Kern Fan would provide 18 TAF in dry and below normal years, and Willow Springs Conjunctive Use would provide 19 TAF in dry years and 29 TAF in below normal years. The MOU identifies that "State funding to be secured, and projects to be phased-in, by Year 8." However, no further information has been provided related to these sources. These issues will be discussed during the accounting workshop and, as appropriate, possible program of implementation text and accounting for these flows will be developed.]

Table 10. Default Schedule and Flexibility Bracket for VA 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 VA 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 (SJ year type)	**0%**	**0%**	**0%**	**0%**	**0%**	**40%**	**30%**	**30%**	**0%**	**0%**	**0%**	**0%**
						40-75%	25-30%	0-30%				

Source	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
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%
Feather	**0%**	**0%**	**0%**	**0%**	**0%**	**33.3%**	**33.3%**	**33.3%**	**0%**	**0%**	**0%**	**0%**
						20-40%	20-40%	20-40%				
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%						
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%				
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 VA 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 (SJ 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%
Feather	**0%**	**0%**	**0%**	**0%**	**0%**	**75%**	**25%**	**0%**	**0%**	**0%**	**0%**	**0%**
						50-90%	10-50%					
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%						
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%				
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%				

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%			

Table 13. Default Schedule and Flexibility Bracket for VA 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 (SJ 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%**	**75%**	**25%**	**0%**	**0%**	**0%**	**0%**	**0%**
						50-90%	10-50%					
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%				

Source	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
Mokelumne	**13%**	**0%**	**0%**	**0%**	**0%**	**8%**	**43%**	**36%**	**0%**	**0%**	**0%**	**0%**
	10-30%					70-90%						
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%				
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 VA 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%			

4.4.10.3 Flow Accounting

Flows provided to meet the VA flow commitments must be provided consistent with the specific flow accounting protocols included Appendix B *[to be developed],* as approved by the State Water Board, including any appropriate conditions to ensure that full VA flow commitments are met consistent with water right priorities. VA 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, 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 VAs). VA flow accounting must demonstrate that all VA 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 (e.g., groundwater substitution); 2) a reduction in consumptive water use of water relative to base conditions (e.g., land fallowing, an overall reduction in exports that would have occurred relative to base conditions); or 3) a reoperation of a reservoir that increases net releases from January through June in all years except wet water year types.

The following general independently verifiable VA accounting requirements apply:

i. Transparent reporting of base conditions and additive VA flows posted on a common user-friendly website for the VAs 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 operations as compared to operations with VAs;

iii. Documentation that VAs do not and have not affected base operations, 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 VA flow base described above in section 4.4.10.1;

v. Verification that implementation of the VAs has not resulted in another VA party or water user reducing the amount of flow they bypass or release from storage, including to meet other regulatory obligations, due to the provision of VA flow commitments;

vi. Demonstration that flows provided by non-VA parties that are subject to regulatory provisions of the Bay-Delta Plan (including the Lower San Joaquin River flow requirements) are additive to VA flows;

vii. Documentation of the specific methods used to determine export limits in order to bypass other VA flows, VA 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 VA flows to approved base conditions on a near real-time basis and annually.

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

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

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

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

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

ii. Reservoir refill provisions that avoid reductions in flows during the January through June time period in all years except wet water year types.

Additional flow accounting procedures are identified in Appendix B to this plan *[to be developed]*. The flow accounting procedures included in Appendix B 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 ensure compliance with the VA flow commitments approved in this plan.

4.4.10.4 VA 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 VA parties within the eight-year VA term in order to utilize the VA pathway. VA 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. VA habitat restoration projects must be designed and implemented consistent with the best available science regarding habitat needs of the species, defined further in the VA non-flow habitat restoration accounting section below. All non-flow habitat must be completed and accounted for by year eight of the VAs.

VA 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, VA parties must restore the following amounts of habitat:

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

ii. Sutter Bypass, Butte Sink, and Colusa Basin: 20,000 acres of floodplain habitat and 20,000 additional acres for fish food production.

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

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

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

vi. Putah Creek: 1.4 acres of spawning habitat.

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

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

4.4.10.5 VA Non-Flow Habitat Restoration Accounting

All VA 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 VAs. VA 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 VA non-flow habitat restoration is required to account for the following three steps:

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

i. The project must restore habitat in an area that is unsuitable under pre-project conditions;

ii. The project must not be used to fulfill any other regulatory requirements, required mitigation, or other 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 VAs.

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 and Table 16 as applicable. Bypass floodplain and tidal wetland habitat projects do not have pre-defined criteria and instead VA parties are required to submit proposed design criteria for approval by the Executive Director and DFW.

Table 15. Design Criteria for VA 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). 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.
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). 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.

Habitat Type	Water Depth; feet (ft)	Water Velocity; feet per second (fps)	Other
			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 every three years. Suitable inundation events are defined as two inundation periods of at least 21 days' duration or another period providing equivalent or greater benefits according to the science summarized in the Scientific Basis Report Supplement or updated scientific information as approved by the Executive Director.

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

VA parties 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 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. Design criteria proposals should be submitted as early as possible to avoid delaying the restoration project. VA parties 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 are needed to the design criteria, and how the modified design criteria would provide equivalent or greater protections for the species and life stage the project is intended to benefit; and

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

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 VA parties for assessment of the benefits of the VAs (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.

To request approval for bypass floodplain and tidal wetland design criteria, VA parties 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 ensure that 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 to this plan. The non-flow accounting procedures included in Appendix B 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 ensure compliance with the VA non-flow commitments approved in this plan.

For each restoration project that is proposed to apply toward the VA 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.

4.4.10.6 Supplemental Science and Monitoring

The VA parties 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 VAs, including developing VA hypotheses, metrics, targets, and associated monitoring for approval by the Executive Director. The VA hypotheses must address the hypothesized outcomes from the VAs and scientific questions that will be evaluated by VA parties related to those hypothesized outcomes, including the baseline for comparison where applicable and the scientific methods that will be used for the evaluations. The VA metrics must define the quantitative measurable outcome(s) and associated variables that will be assessed for the hypotheses. The VA targets must describe the expected value of the metrics

resulting from implementation of the VAs. The VA monitoring must describe the monitoring that will be conducted to assess all VA hypotheses, metrics, and targets.

Within 60 days of State Water Board approval of the Bay-Delta Plan, the VA parties will be required to submit proposed VA hypotheses, metrics, targets, and monitoring for approval by the Executive Director . The Executive Director will consider the conditional approval of the VA hypotheses, metrics, targets, and monitoring after opportunity for public review and comment within a year of adoption of the amendments to the Bay-Delta Plan. The VA monitoring as approved by the Executive Director will be required to begin within the first year of implementation of the VAs. The VA hypotheses, metrics, targets, and monitoring elements may be updated through annual or periodic review processes after opportunity for public review and comment.

VA 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 pre-VA conditions;

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 VA habitat by Chinook Salmon, Steelhead, and other native and non-native tributary fishes, native and non-native estuarine fishes, and invertebrates, relative to the pre-VA conditions and reference sites;

v. Actual and, as feasible, forecasted future effects of restored VA habitat and VA 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 VAs on the food web;

vii. Effects of the VAs on pesticide concentrations in water, zooplankton and benthic invertebrate prey sources, and native fish species across the geographic area affected by the VA food production project and in bypass floodplain habitats that are included in the VA non-flow commitments; and

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

Harmful Algal Bloom (HAB) Monitoring
The VA 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 VA monitoring plan must also include commitments to monitoring for HABs on the VA tributaries by implementing HAB monitoring requirements for visual indices, cyanotoxins, phytoplankton identification and enumeration, and drivers, as described in section 4.5.1.

Habitat Suitability Assessments
The VA parties 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 VAs, 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 VA parties will assess any changes in the suitability of habitat restoration projects according to these criteria over the term of the VAs.

Habitat Utilization and Biological Effectiveness Assessments
The VA parties will be required to assess VA non-flow habitat restoration projects over time to evaluate whether each project is effective in achieving biological outcomes and the narrative native fish viability and salmon protection objectives. 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 VA 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. VA 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. Habitat utilization and biological effectiveness assessments will be conducted for a minimum of eight years following completion of construction or the length of the VAs, whichever is longer.

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

To inform implementation of the VAs and other activities, the VA parties will be required to submit: (1) an annual report to the State Water Board by January 31 each year following the first year of implementation of the VAs for the prior year's implementation of the VAs; (2) periodic reports to the State Water Board by January 31 following every three years of implementation of the VAs; and (3) an ecological outcomes analysis report by January 31 following year six of implementation of the VAs. 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 VA flows provided within the previous water year with associated VA flow accounting data, including information on the source and timing of VA flows provided through water purchases;

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

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 implementation;

vi. A summary of expected VA activities for the next water year, including projected VA flows to be provided, anticipated non-flow habitat restoration project milestones and implementation progress, and upcoming science and monitoring activities to be completed;

vii. Analysis demonstrating that VA 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 VA tributary in conformance with section 4.4.10.1 and any improvements to be implemented in future years as a result of the assessment.

The VA parties 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 VA progress to date on contributing toward the narrative native fish viability and salmon protection objectives, including progress related to VA hypotheses, metrics, and targets informed by required monitoring. The VA parties 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 VAs, 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 VAs as is, or continuing the VAs with modifications, beyond year eight if VA parties intend to seek an extension of the VAs beyond the initial eight-year term, as well as possible termination of the VAs. The scientific basis and rationale for possibly continuing the VAs will be required to include a synthesis of outcomes from the VA hypothesis testing to inform the expected ecological outcomes from continuing the VAs, including quantifying how the continuation of the VAs would be expected to affect species abundance, ecosystem conditions, and contribute to meeting the narrative native fish viability objective and salmon protection objective by 2050. 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 VAs 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 VAs.

4.4.10.8 VA Governance

VA 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 above.

The VA parties will be required to develop a tribal engagement plan in coordination with California Native American Tribes, describing specific tribal engagement opportunities related to VA milestones that must be approved by the Executive Director prior to year one of the initial eight-year term of the VAs. The tribal engagement plan must include designation of a tribal coordinator responsible for engaging with Tribes and liaising between the VA parties and the State Water Board on tribal matters relevant to the VAs. The tribal engagement plan must also include regular tribal engagement meetings to inform tribal leaders of progress toward achieving the VA objectives; and opportunities for tribal representatives to contribute feedback on implementation and adaptive

management of the VAs. The VA parties must also provide for the creation of a TEK subcommittee of the VA Science Committee, with seats for tribal members, to ensure that tribal knowledge and perspectives are considered in the VA Science Committee's activities.

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

4.4.10.9 Continuation, Modification, or Termination of the VAs

The VAs will remain in effect for a term of eight years after the effective date, unless the VAs are terminated before eight years or extended beyond eight years as discussed below. The State Water Board may also require modifications to the VAs as discussed below. Prior to a decision to extend, modify, or terminate the VAs, 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 VAs.

Default Processes for Continuation, Modification, or Termination of the VAs

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

In determining whether to continue, modify, or terminate the VAs, the State Water Board will consider the following:

i. Whether VA parties timely and fully provided VA 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 VA parties' synthesis of the most current science and analyses of the effects of the VAs' implementation, including evaluation of the VA 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 VAs;

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 VAs are impairing the ability to achieve the narrative ecosystem protection objective and narrative salmon protection objective by 2050;

vii. Whether VA flows have been adequately protected;

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

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.

Green Light

A green light determination could occur if the State Water Board concludes that the VAs provided flow and non-flow commitments 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 VAs are substantially achieving the VA 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 VAs will contribute the VA parties' 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 VAs without any substantial modification, except for changes necessary to continue the VAs.

Yellow Light

A yellow light determination could occur if the State Water Board concludes that the VAs provided flow and non-flow commitments 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 VAs are meeting a significant number of VA 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 VAs, with modifications, will contribute the VA parties' 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 VAs with modification.

Red Light

The red light determination could occur if the State Water Board concludes that the VAs are not achieving the conditions above for the green or yellow light determinations. Under a red light determination, the State Water Board may determine that the VA 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. 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 VAs 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 VAs 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 VAs and associated components of the Bay-Delta Plan and its implementation before year eight due to: 1) the VA parties' failure or inability to implement VA commitments as described in the VAs and associated Bay-Delta Plan provisions; or 2) significant evidence that continuing implementation of the VAs will not provide reasonable protection of beneficial uses or will jeopardize the continued survival of native fishes.

VA Parties' Failure to or Inability to Implement VA Commitments

The State Water Board may consider modification or termination of the VAs, including components of the VAs or the VAs as a whole, 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 VA parties have fulfilled the commitments described in the VAs. The State Water Board may allow additional time for the VAs to

come into compliance before considering the need for modifications to or termination of the VAs under this section. Modification or termination of the VAs for compliance issues include any of the following reasons:

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

ii. Withdrawal of a party or parties from the VAs.

In considering whether to modify or terminate under this section, the State Water Board will endeavor to preserve the VA pathway for those VA parties who have met their commitments.

Significant Evidence that Continuing Implementation of the VAs 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 VAs, including components of the VAs or the VAs as a whole, before year 8 based on significant evidence that continuing implementation of the VAs will not provide reasonable protection of beneficial uses or will jeopardize the continued survival of native fishes. Any consideration of modification or termination of the VAs before year eight 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 VAs 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.

4.4.11 General Provisions

[Note to reader: Prior to finalization of the current efforts to update the Bay-Delta Plan, the general provisions associated with the Sacramento/Delta updates to the Bay-Delta Plan described below will be integrated with the provisions for the Lower San Joaquin River flow and southern Delta salinity updates to the Bay-Delta Plan adopted in 2018.]

4.4.11.1 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.

4.4.11.2 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.

4.4.11.3 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.

4.4.11.4 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. When processing wastewater change petitions pursuant to Water Code section 1211, the State Water Board will ensure that the change in wastewater discharge does

not diminish ecological benefits of instream flows, especially in dry seasons and in low-flow conditions where the stream is dependent on wastewater discharges. 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.

4.4.11.5 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).

4.4.11.6 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 to assess effectiveness of physical habitat restoration and other ecosystem projects.

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 Efforts
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, and NMFS should continue to pursue programs to determine the impacts of introduced species, including striped bass, 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 course 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 which 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 which 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 main stem 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: Prior to finalization of the current efforts to update the Bay-Delta Plan, the monitoring, evaluation, reporting, and special studies provisions associated with the Sacramento/Delta updates to the Bay-Delta Plan described below will be integrated with the provisions for the Lower San Joaquin River flow and southern Delta salinity updates to the Bay-Delta Plan adopted in 2018.]

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

[Note to reader: Existing monitoring activities for the Bay-Delta Plan are described and clarified in Appendix A which includes the initial 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 (currently 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 (with the exception of the SJRMEP); 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

The initial BDMEP incorporates the specific requirements from Table 5 “Water Quality Compliance and Baseline Monitoring”, a table contained 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 also 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 also 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).

New monitoring and measurement requirements applicable to the SWP and CVP are added to Table 5 “Water Quality Compliance and Baseline Monitoring” for phytoplankton measurements, 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; and also contribute to fulfilling condition 11 of D-1641 requiring water quality and ecological monitoring.

The BDMEP also 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).

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.

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 the implementation of Bay-Delta Plan and to consider possible needed updates to the plan for the reasonable protection of beneficial uses. Proposed changes to monitoring requirements or activities will be subject to public review and comment and must be supported by 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.

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 is 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 and regularly reviewed and updated. All records associated with maintenance, calibration, malfunction, or other topics associated with data collection 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 data quality management protocols to address any needed 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. 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 January 15 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, included 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, referred to collectively as the San Francisco Estuary) 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. 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 shall 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 these 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, HABs.

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, HABs, contaminants, nutrients, and organic matter.

iii. Lower food webs: year-round monitoring of plankton, neuston, benthic and littoral macroinvertebrates, drift invertebrates, and other lower foodweb 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.

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 ensure responsibility of data holders to engage respectfully to ensure 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 Quality Control Boards and other appropriate entities to develop and implement a long-term, Delta-wide HAB monitoring program. This program should include monitoring of phytoplankton communities and benthic algal mats, including cyanobacterial and other planktonic and benthic species known to produce toxins; assessment of cyanobacterial HAB visual indices (e.g., *Microcystis* visual index); and testing for concentrations of cyanotoxins (e.g., microcystins), and other appropriate parameters. Monitoring for cyanobacterial toxins should occur during May through November of each year, and year-round during drought conditions, when drought salinity barriers are installed, during other times when HAB visual indices or satellite remote-sensing data suggest HABs are forming, and at other appropriate times. Monitoring activities shall include a combination of remote-sensing with high resolution satellite imagery and field-based surveys using continuous and discrete monitoring methods; monitoring at known HABs "hotspots" and other regions of the Delta; and monitoring during the bloom season as well as year-round monitoring.

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 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 these 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. 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.

4.5.3 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 and 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 inform the development of HAB mechanistic and predictive models and HAB management and mitigation measures are also discussed above in section 4.5.1.

4.6 Annual and Periodic Review

The Bay-Delta Plan and its implementation measures 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 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; 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 minimum 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. Initial Bay-Delta Monitoring and Evaluation Program (BDMEP)

A.1 Introduction

The Bay-Delta Monitoring and Evaluation Program (BDMEP) identifies the monitoring, reporting, evaluation, and special studies (collectively referred to as monitoring activities) needed to implement the Bay-Delta Plan, assess compliance with the Bay-Delta Plan, evaluate the effectiveness of the Bay-Delta Plan, and inform potential updates to the plan. As a starting point, this initial BDMEP is defined by existing monitoring and reporting activities pursuant to water right conditions of the Department of Water Resources' (DWR) State Water Project (SWP) and the U.S. Bureau of Reclamation's (Reclamation) Central Valley Project (CVP).

This initial BDMEP will then be expanded as part of the periodic review and implementation process for the Bay-Delta Plan to develop a comprehensive BDMEP to cover monitoring activities needed for the entire Bay-Delta Plan. 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 (for example USEPA 2003[6]; Reynolds et al. 2016[7]; WRAMP[8]). The comprehensive BDMEP will incorporate existing monitoring activities in the Bay-Delta watershed, to the extent possible and as relevant, to avoid undue duplication.

A.2 Required Monitoring Activities

The monitoring activities described in Table A-1 and Table A-2 are required to be conducted pursuant to water right requirements of the SWP and CVP included in State Water Board Decisions 1641, 1485, and 1422 (D-1641, D-1485, D-1422). The monitoring activities described in Table A-1 and Table A-2 are subject to review and update pursuant to the annual and periodic review processes in order to ensure that monitoring activities continue to meet applicable water right requirements. All monitoring activities are required to be conducted consistent with the processes described in section A.3. and are required to be conducted consistent with monitoring designs as of the date the Bay-Delta Plan amendments are adopted, unless revisions are approved. Revisions to monitoring activities may be proposed to the State Water Board for approval following the process described in section A.3.1.

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[6] U.S. Environmental Protection Agency (USEPA). 2003. *Elements of a State Water Monitoring and Assessment Program*. EPA 841-B-03-003. Prepared by USEPA, Washington, DC.

[7] Reynolds, J. H., M. G. Knutson, K. B. Newman, E. D. Silverman, and W. L. Thompson. 2016. A road map for designing and implementing a biological monitoring program. *Environmental Monitoring and Assessment* 188(7):399. https://doi.org/10.1007/s10661-016-5397-x

[8] https://www.mywaterquality.ca.gov/monitoring_council/wetland_workgroup/wramp/

Surveys identified with an asterisk in Table A-2 have been discontinued. DWR and Reclamation are directed to resume these surveys or submit a plan for an appropriate substitute to the Executive Director for consideration of approval, including any appropriate conditions, within six months of approval of the plan amendments by the Office of Administrative Law.

Table A-1. Specific Water Quality and Food Web Monitoring Requirements.

[Note to reader: This is a modified version of Table 5 in the current (2018) Bay-Delta Plan titled "Water Quality Compliance and Baseline Monitoring." Proposed additions to the Water Quality Compliance and Baseline Monitoring requirements are identified by bold and underline. A map of the monitoring survey locations, including the new locations, will be provided with the next version of the BDMEP.

New monitoring for harmful algal blooms in the modified version of Table 5 (2018 Bay-Delta Plan) are initially proposed to be the responsibility of Reclamation *and DWR consistent with conditions 10(a) and 10(b) of D-1485 and condition 11 of D-1641 that require intensive phytoplankton studies; the development of water quality predictive tools with an emphasis on the understanding of flow, salinity, and phytoplankton relationships; and monitoring of water quality and ecological changes.]*

Station Number	Station Description	Latitude[1]	Longitude[1]	Continuous recording[2]	Continuous Multi-parameter[3]	Discrete Physical Chemical[4]	Discrete Phytoplankton[5]	Discrete Zooplankton[6]	Discrete Benthos[7]
C2	Sacramento River @ Collinsville	38.07395	-121.85010	*					
C3A	Sacramento River @ Hood	38.36772	-121.52051		*	*	*	*	
C4	San Joaquin River @ San Andreas Landing	38.10319	-121.59128	*					
C5	Contra Costa Canal @ Pumping #1	37.99520	-121.70244	*					
C6	San Joaquin River @ Brandt Bridge site	37.86454	-121.32270	*					
C7	San Joaquin River @ Mossdale Bridge	37.78604	-121.30666		*				
C8	Old River near Middle River	37.82208	-121.37517	*					

Station Number	Station Description	Latitude[1]	Longitude[1]	Continuous recording[2]	Continuous Multi-parameter[3]	Discrete Physical Chemical[4]	Discrete Phytoplankton[5]	Discrete Zooplankton[6]	Discrete Benthos[7]
C9	West Canal at mouth of Clifton Court Forebay Intake	37.8218	-121.55275						*
		37.83075	-121.55703		*	*	*	*	
C10	San Joaquin River near Vernalis	37.69734	-121.26472		*	*	*	*	
C13	Mokelumne River @ Terminous	38.11691	-121.49888	*		*	*		
C14	Sacramento River @ Port Chicago	38.05881	-122.02607	*					
C19	Cache Slough @ City of Vallejo Intake	38.29687	-121.74784	*					
D4	Sacramento River above Point Sacramento	38.06214	-121.81792			*	*	*	*
D6	Suisun Bay @ Bulls Head Point near Martinez	38.04427	-122.11764			*	*	*	*
D6A	Suisun Bay @ Martinez	38.02762	-122.14052		*				
D7	Grizzly Bay @ Dolphin near Suisun Slough	38.11708	-122.03972	*		*	*	*	*
D8	Suisun Bay off Middle Point near Nichols	38.05992	-121.98996			*	*	*	
D9	Honker Bay near Wheeler Point	38.07245	-121.93923	*		*	*		
D10	Sacramento River @ Chipps Island	38.04288	-121.92011		*	*			
		38.04631	-121.91829					*	

Station Number	Station Description	Latitude[1]	Longitude[1]	Continuous recording[2]	Continuous Multi-parameter[3]	Discrete Physical Chemical[4]	Discrete Phytoplankton[5]	Discrete Zooplankton[6]	Discrete Benthos[7]
D11	Sherman Island near Antioch	38.04228	-121.79951	*		*	*		
D12	San Joaquin River @ Antioch Ship Canal	38.01770	-121.80273		*	*	*		
		38.02162	-121.80638					*	
D15	San Joaquin River @ Jersey Point	38.05190	-121.68927	*					
D16	San Joaquin River @ Twitchell Island	38.09690	-121.66912			*	*	*	*
D19	Frank's Tract near Russo's Landing	38.04376	-121.61477	*		*	*	*	
D22	Sacramento River @ Emmaton	38.08406	-121.73912	*					
		38.08453	-121.73914					*	
D24	Sacramento River below Rio Vista Bridge	38.15891	-121.68721		*	*	*		
		38.15550	-121.68113						*
D26	San Joaquin River @ Potato Point	38.07667	-121.56696			*	*	*	
D28A	Old River near Rancho Del Rio	37.97038	-121.57271			*	*	*	*
		37.96980	-121.57210	*					
D29	San Joaquin River @ Prisoners Point	38.05793	-121.55736	*		*	*	*	
D41	San Pablo Bay near Pinole Point	38.03016	122.37287			*	*	*	*
D41A	San Pablo Bay near mouth of Petaluma River	38.08472	-122.39067			*	*	*	*
DMC1	Delta-Mendota Canal at Tracy Pumping Plant	37.78165	-121.59050		*				

Station Number	Station Description	Latitude[1]	Longitude[1]	Continuous recording[2]	Continuous Multi-parameter[3]	Discrete Physical Chemical[4]	Discrete Phytoplankton[5]	Discrete Zooplankton[6]	Discrete Benthos[7]
P8	San Joaquin River @ Buckley Cove	37.97815	-121.38242			*	*	*	*
P8A	San Joaquin River @ Rough and Ready Island	37.96277	-121.36587		*				
P12	Old River @ Tracy Road Bridge	37.80493	-121.44929	*					
MD10	Disappointment Slough near Bishop Cut	38.04229	-121.41935			*	*	*	
S21	Chadbourne Slough @ Sunrise Duck Club	38.18476	-122.08315	*					
S35	Goodyear Slough @Morrow Island Clubhouse	38.1181	-112.09580	*					
S42	Suisun Slough 300' south of Volanti Slough	38.18053	-122.04696	*		*	*		
		38.18027	-122.04779					*	
S49	Montezuma Slough near Beldon Landing	38.18686	-121.97080	*					
S64	Montezuma Slough @ National Steel	38.12223	-121.88800	*					
S97	Cordelia Slough @ Ibis Club	38.15703	-122.11378	*					
NZ032	Montezuma Slough, 2nd bend from mouth	38.16990	-122.02112					*	

Station Number	Station Description	Latitude[1]	Longitude[1]	Continuous recording[2]	Continuous Multi-parameter[3]	Discrete Physical Chemical[4]	Discrete Phytoplankton[5]	Discrete Zooplankton[6]	Discrete Benthos[7]
SLBAR 3	Barker Slough at North Bay Aqueduct (SLBAR3)	38.27474	-121.79499	*					
---	Sacramento River (I St. Bridge to Freeport) (RSAC155)	38.589 to 38.45585	-121.504 to -121.50302	*					
---	San Joaquin River (Turner Cut to Stockton) (RSAN050-RSAN061)	37.99746 to 37.95242	-121.44435 to -121.31750	*		*	*		
---	Water supply intakes for waterfowl management areas on Van Sickle Island and Chipps Island			*					
	Frank's Tract eastern/southern side	**38.057587 to 38.032837**	**-121.584754 to -121.588393**			*	*		
	McLeod Lake at Stockton Waterfront	**37.95372**	**-121.2967**			*	*		
	Victoria Canal near Byron	**37.8717**	**-121.5283**			*	*		
	Big Break Regional Shoreline at San Joaquin River	**38.0146**	**-121.728952**			*	*		

Station Number	Station Description	Latitude[1]	Longitude[1]	Continuous recording[2]	Continuous Multi-parameter[3]	Discrete Physical Chemical[4]	Discrete Phytoplankton[5]	Discrete Zooplankton[6]	Discrete Benthos[7]
	Middle River at Ski Beach	**37.915609**	**-121.51416**			*	*		
	Mildred Island	**37.9828**	**-121.519797**			*	*		

[1] Coordinates are geographic North American Datum 1983, accurate for 1:24,000 scale mapping.

[2] Continuous recording (every 15 minutes) of water temperature, electrical conductivity (EC), and/or dissolved oxygen. For municipal and industrial intake chloride objectives, EC can be monitored and converted to chloride concentration.

[3] Continuous, multi-parameter monitoring (recording every 1 to 15 minutes with telemetry capabilities) includes the following variables: water temperature, EC, pH, dissolved oxygen, turbidity, chlorophyll a fluorescence, tidal elevation, and meteorological data (air temperature, wind speed and direction, solar radiation).

[4] Discrete physical/chemical monitoring is conducted on a year-round, near-monthly basis that alternates between spring and neap tides and includes the following variables: macronutrients (inorganic forms of nitrogen, phosphorus and silicon), total suspended solids, total dissolved solids, total particulate and dissolved organic nitrogen and carbon, chlorophyll a, **HAB visual indices, cyanobacterial toxins**, pH, dissolved DO, EC (specific conductance), turbidity, secchi depth, and water temperature. In addition, on-board continuous recording is conducted intermittently for the following variables: water temperature, dissolved oxygen, electrical conductivity, turbidity, and chlorophyll a fluorescence.

[5] Discrete sampling for phytoplankton enumeration **and** algal pigment analysis is conducted on a year-round, near-monthly basis that alternates between spring and neap tides.

[6] Tow or pump sampling for zooplankton, mysids, and amphipods is conducted on a year-round, near-monthly basis that alternates between spring and neap tides.

[7] Collection of discrete benthos and sediment grab samples and enumeration of the collected organisms is conducted on a year-round, near-monthly basis that alternates between spring and neap tides.

Table A-2. Required Monitoring Activities

Monitoring Activity	Water Right Conditions That Are Fulfilled, in Part, by the Monitoring Activity	Short Description
Environmental Monitoring Program (phytoplankton, zooplankton, benthos, water quality)	D-1641 terms 3, 11(a), Table 5, and Figure 4.	Sampling for phytoplankton, zooplankton, benthos, and water quality is conducted monthly year-round. Phytoplankton are sampled with a pump. Zooplankton are sampled with a mysid net (505 µm mesh), a Clarke-Bumpus net (160 µm mesh), and a pump (43 µm mesh). Benthic samples are collected with Ponar grabs. Water quality measurements include discrete water quality, chlorophyll, and nutrient measurements.
San Francisco Bay Study	D-1485 terms 10(a) and (c) D-1641 term 11(b)	Sampling for water quality, fishes, and invertebrates is conducted monthly year-round. Fishes and invertebrates are sampled with an otter trawl and a midwater trawl.
Fall Midwater Trawl	D-1485 terms 10(a), (b), and (c) D-1641 term 11(b)	Sampling for zooplankton, water quality, fishes, and invertebrates is conducted monthly from September through December. Zooplankton are sampled with a mysid net (505 µm mesh) and a Clark-Bumpus net (160 µm mesh). Fishes and invertebrates are sampled with a midwater trawl net.
20mm Survey	D-1485 terms 10(a), (b), and (c) D-1641 term 11(b)	Sampling for zooplankton, water quality, and fishes is conducted every two weeks from March through July. Fishes are sampled with a rigid-mouthed net constructed of 1,600 µm mesh and zooplankton are sampled with a 160 µm mesh Clark-Bumpus net attached directly above the fish net.
Smelt Larva Survey	D-1485 terms 10(a), (b), and (c) D-1641 term 11(b)	Sampling for water quality and fishes is conducted every two weeks from January through March. Fishes are sampled with an egg and larval net (500 µm mesh).
Adult Sturgeon Study*	D-1485 terms 10(a), (b), and (c) D-1641 term 11(b)	Sampling for Adult Sturgeon is conducted to calculate abundance estimates. Samples are collected from commercial passenger fishing vessels, creel surveys, drifted trammel nets, and a mark recapture program.

Monitoring Activity	Water Right Conditions That Are Fulfilled, in Part, by the Monitoring Activity	Short Description
Adult Striped Bass Study*	D-1485 terms 10(a), (b), and (c) D-1641 term 11(b)	Sampling for adult Striped Bass is conducted to calculate abundance estimates. Samples are collected from commercial passenger fishing vessels, creel surveys, fyke traps, drifted gillnets, and a mark-recapture program.
Spring Kodiak Trawl*	D-1485 terms 10(a), (b), and (c) D-1641 term 11(b)	Sampling for water quality, fishes, and invertebrates is conducted monthly from December through May. Fishes and invertebrates are sampled with a Kodiak trawl.
Central Valley Juvenile Salmon and Steelhead Monitoring (Knights Landing)	D-1485 terms 10(a), (b), and (c) D-1641 term 11(b)	Sampling for water quality and fishes is conducted from September through June. Fishes are sampled with a rotary screw trap.
Summer Townet	D-1485 terms 10(a), (b), and (c) D-1641 term 11(b)	Sampling for zooplankton, water quality, and fishes is conducted every two weeks from June through August. Fishes are sampled with a conical fixed-frame net. Zooplankton are sampled with a Clark-Bumpus net (160 µm mesh) fixed to the top of the fish net.
Delta Juvenile Fish Monitoring Program Trawls, Beach Seining, & Electrofishing	D-1485 terms 10(a), (b), and (c) D-1641 term 11(b)	Sampling for water quality and fishes is conducted year-round up to three times weekly. This is a collection of several monitoring projects with different sampling designs. Fishes are sampled with midwater trawls, kodiak trawls, and beach seines.
Enhanced Delta Smelt Monitoring	D-1485 terms 10(a), (b), and (c) D-1641 term 11(b)	Sampling for water quality and fishes is conducted weekly from July through March. Fishes are sampled with a Kodiak trawl and a 1600 µm mesh net.
Suisun Marsh Fish Study	D-1485 terms 10(a), (b), and (c) D-1641 term 11(b)	Sampling for water quality, fishes, and invertebrates is conducted monthly year-round. Fishes and invertebrates are sampled with beach seines and otter trawls.
Fish Salvage Monitoring	D-1485 terms 10(a), (b), and (c) D-1641 term 11(b)	Sampling for fishes is conducted continuously year-round. Fishes that are entrained into diversions during State Water Project and Central Valley Project water exports are salvaged and counted.

Monitoring Activity	Water Right Conditions That Are Fulfilled, in Part, by the Monitoring Activity	Short Description
Fish Diet and Condition Study	D-1485 terms 10(a), (b), and (c) D-1641 term 11(b)	Fishes captured by other monitoring activities are processed to identify digested zooplankton and aquatic invertebrates from the digestive tracts.
Fish Restoration Program Monitoring	D-1485 terms 10(a) and (b) D-1641 term 11(b)	Sampling for water quality, phytoplankton, zooplankton, invertebrates, benthos, fishes, and submersed aquatic vegetation is conducted. Zooplankton are sampled with a microzooplankton net (150 µm mesh) and a macrozooplankton net (500 µm mesh). Invertebrates are sampled with a sweep net (500 µm mesh) and a neuston net (500 µm mesh). Benthic samples are collected with a ponar grab or sediment core. Fishes are sampled with a beach seine, otter trawl, sand lampara net.
Bay-Delta continuous monitoring stations for flow and other physical, chemical, and biological parameters	D-1641 Terms 3, 11 (a) and (b), Table 5, and Figure 4	Network of continuous flow and multi-parameter monitoring stations throughout the Bay-Delta as specified in Table A-1 and including all other monitoring necessary to calculate or determine compliance with the water quality objectives
Stanislaus River Dissolved Oxygen	D-1422, Condition 8 (p. 32)	Daily record of minimum dissolved oxygen level for the day at Ripon or at an alternate location approved by the Board
New Melones Storage	D-1422, Condition 8 (p. 32)	Daily storage level in New Melones Reservoir

* These surveys have been discontinued. DWR and Reclamation are required to resume these surveys or submit a proposal for an appropriate substitute to the Executive Director for consideration of approval within six months of approval of the plan amendments by the Office of Administrative Law.

A.3 Processes for Complying with Monitoring, Reporting and Special Studies Requirements

A.3.1 Process for Changing Monitoring Survey Designs

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 the implementation of Bay-Delta Plan and to consider possible needed updates to the plan for the reasonable protection of beneficial uses. Proposed changes to monitoring requirements or activities will be subject to public review and comment and must be supported by 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.

Refinements to monitoring protocols may be made to the extent they do not unreasonably interfere with the long-term data record. Where proposed changes would interfere with or disrupt long-term data records, special studies are required to calibrate the past methods with proposed future methods to maintain validity in analyzing long-term data collected with different methods.

A.3.2 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 is 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 and regularly reviewed and updated. All records associated with maintenance, calibration, malfunction, or other topics associated with data collection 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 data quality management protocols to address any needed data quality issues as appropriate.

A.3.3 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. 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 January 15 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.

Appendix B. Voluntary Agreements Accounting Protocols

B.1 Flow Accounting

[Note to reader: This section is intentionally left blank. As described in the draft revised Bay-Delta Plan, a public comment and workshop process is planned before flow accounting procedures are further developed and incorporated into this appendix.]

B.2 Non-flow Habitat Accounting

[Note to reader: This protocol was adapted from the non-flow habitat accounting protocol provided by VA parties in advance of the April 2024 State Water Board workshop on the VAs. The basic steps from the VA document were carried forward with some modifications to improve clarity, retain only the operable provisions, add steps to ensure all design criteria are evaluated, and to be consistent with the non-flow habitat accounting provisions in the program of implementation. The State Water Board is seeking public input on any needed changes to this draft protocol needed to account for the completion of VA non-flow habitat commitments.]

B.2.1 Tributary Non-flow Measure Accounting Protocols

The following Voluntary Agreement (VA) habitat accounting protocols pertain to tributary spawning, in-channel rearing, and tributary floodplain rearing habitat restoration projects. Habitat accounting procedures for bypass floodplain and tidal wetland projects will follow similar protocols to those described in this section, modified from the most related habitat type as needed to account for any differences in bypass or tidal wetland habitat compared to tributary habitat.

Assessment of site-specific habitat implementation requires spatially explicit quantification of those areas within a project boundary (i.e., “footprint”) that conform with specified design criteria at design flows. The term “design flows” refers to the range of flows over which a habitat project is designed to create habitat. Design flows should include at a minimum the design flows in the flow-habitat relationships provided by VA parties for assessment of the benefits of the VAs (i.e., those used in the final Scientific Basis Report Supplement) and represent the full range of flows expected to occur with the addition of the VA flow commitments. For the methodological steps identified below, the flows at which the pre-project and post-project conditions are evaluated must be the same to provide for comparable results.

B.2.1.1 Protocol to Produce the Constructed Flow-Habitat Relationship

Habitat accounting will be finalized after the completion of project construction to evaluate the incremental improvement in habitat area meeting design criteria compared

to pre-project conditions. Thus, habitat conditions must first be assessed before the project is started (pre-project), assessed again after the completion of construction (post-project), and the two conditions will then be compared in the habitat accounting assessment to produce the constructed flow-habitat relationship representing the additive contribution of the post-project condition over the pre-project condition.

The protocol to produce the constructed flow-habitat relationship consists of two major phases: an assessment of habitat conditions pre-project and post-project in steps (i) through (vi), and the comparison of pre-project to post-project habitat in steps (vii) through (viii). The third and final phase with steps (ix) through (xi) is described in section B.2.1.5.

First, follow steps (i) through (vi) to determine the area of habitat meeting design criteria pre-project and post-project:

i. Accurately characterize physical conditions within specific habitat boundaries ("footprint"). The footprint must be the same pre-project and post-project. Characterization of physical conditions[9] includes topography, substrate, and cover.

ii. Create a digital elevation model (DEM) based on the topographical characterization and create substrate and cover rasters (see discussion of raster development below) for the project footprint.

iii. Apply available two-dimensional ("2D") hydraulic models to calculate water depths and velocities within each computational pixel[10] within the project footprint at each design flow.

iv. Determine where depth, velocity, and substrate (for spawning habitat) design criteria (as defined in the program of implementation) are met at each design flow for each computational pixel within the project footprint (Figure B-1).

v. For rearing habitat, determine the areal extent of cover features within the pixels that meet depth and velocity design criteria at each design flow. If the areal extent of cover features is less than 20 percent (i.e., the design criterion in the program of implementation) at any design flow, discount the area meeting design

[9] Topographical characterization can be developed through traditional surveying techniques, multibeam echo sounding bathymetry, and/or LiDAR data acquisition. Substrate and cover characterization can be developed through field survey mapping, geo-referenced aerial imagery (e.g., fixed-wing aircraft, unmanned aerial vehicles, satellite), and/or LiDAR data acquisition.

[10] Several factors contribute to the size of DEM and 2D model output mesh size, including the quality/density ofLiDAR or other topographic data, computational ability, and desired accuracy of output. For high resolution results, a 3 ft. by 3 ft. DEM and 2D hydraulic model output mesh size is generally appropriate for the suite of habitat evaluations for the VA process.

criteria at those design flows until the areal extent of cover features within the area meeting depth and velocity design criteria reaches 20 percent (Figure B-2).

vi. For floodplain rearing habitat, determine the habitat area meeting the inundation criterion. To start, sum the area of pixels meeting depth, velocity, and cover design criteria at each design flow to create a flow-habitat function. Apply a timeseries of modeled flows expected to result from the VAs to the flow-habitat function to create a corresponding timeseries of the amount of habitat meeting depth, velocity, and cover criteria. Apply the inundation criterion (see section B.2.1.4) to this timeseries to determine the area of habitat meeting the inundation criterion. If the area of habitat meeting the inundation criterion is smaller than the value of the flow-habitat function in any individual design flow, reduce the area of habitat meeting design criteria until the maximum habitat area meeting design criteria at any design flow is no greater than the area of habitat meeting the inundation criterion (Figure B-3).

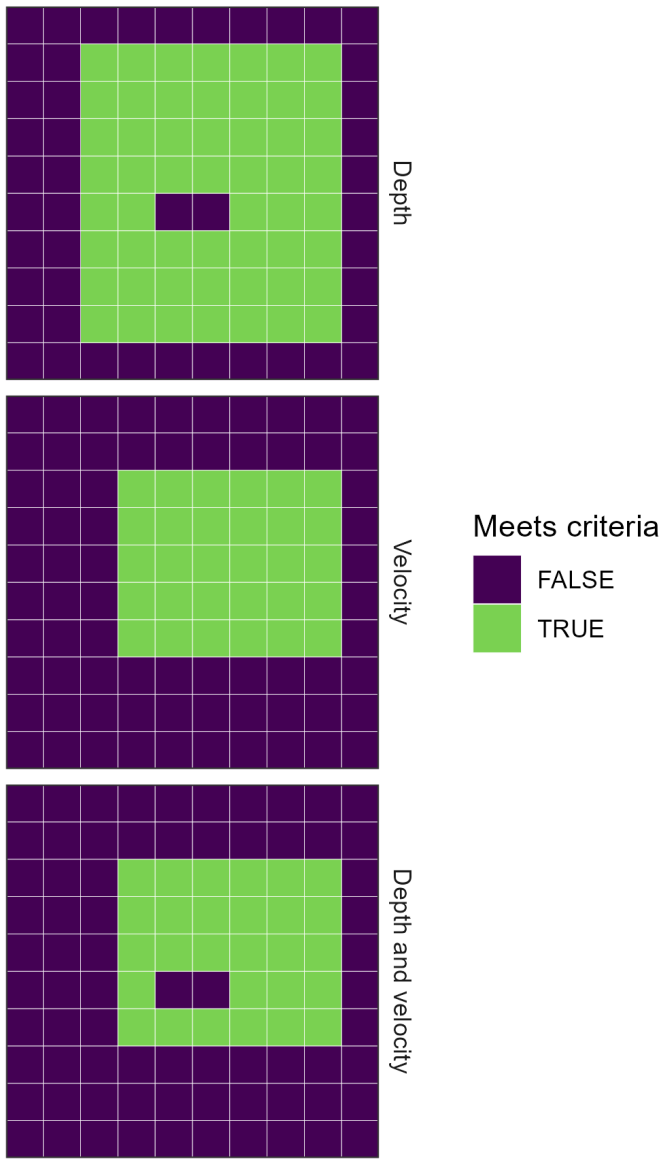


Figure B-1. Conceptual representation of the determination of the habitat area meeting depth and velocity criteria at a single design flow, as described in step (iv). The same process will be used for both “pre-project” and “post-project” conditions. Rearing habitat is used as an example, but the same process is applied to spawning habitat for the applicable design criteria, which would add an additional step for substrate design criteria.

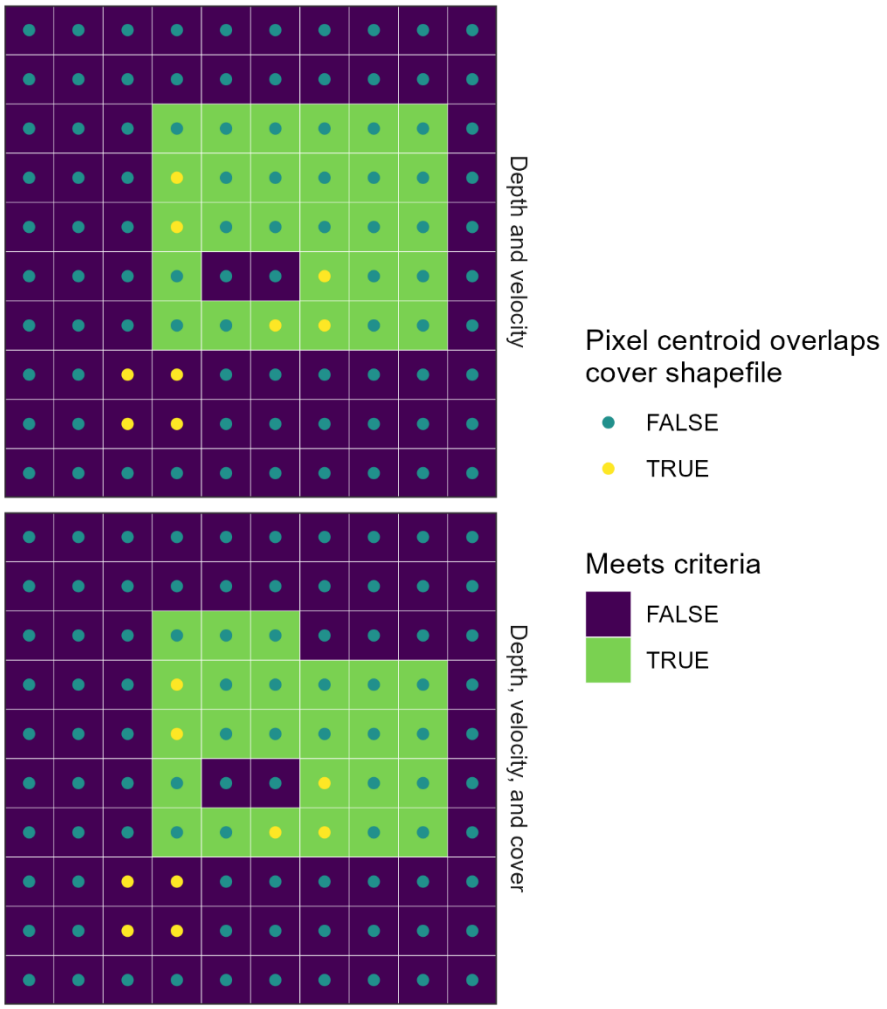


Figure B-2. Conceptual representation of the application of cover design criteria to rearing habitat at a single design flow, as described in step (v) and section B.2.1.3. In the top image, green pixels meet the depth and velocity criteria and in the bottom image green pixels meet the depth, velocity, and cover criteria. As described in the program of implementation, the areal coverage of cover features within the areas that meet depth and velocity design criteria must be at least 20 percent at each design flow. In this example, 28 pixels meet the depth and velocity criteria (from Figure B-1). Of those 28 pixels, 5 have centroids that fall within the suitable cover shapefile (see section B.2.1.3). To meet the 20 percent coverage requirement for cover features, only 25 total pixels may be classified as meeting design criteria, so three pixels are reclassified as not meeting criteria to develop the quantification of the habitat area meeting depth, velocity, and cover design criteria. The same process will be used for both “pre-project” and “post-project” conditions.

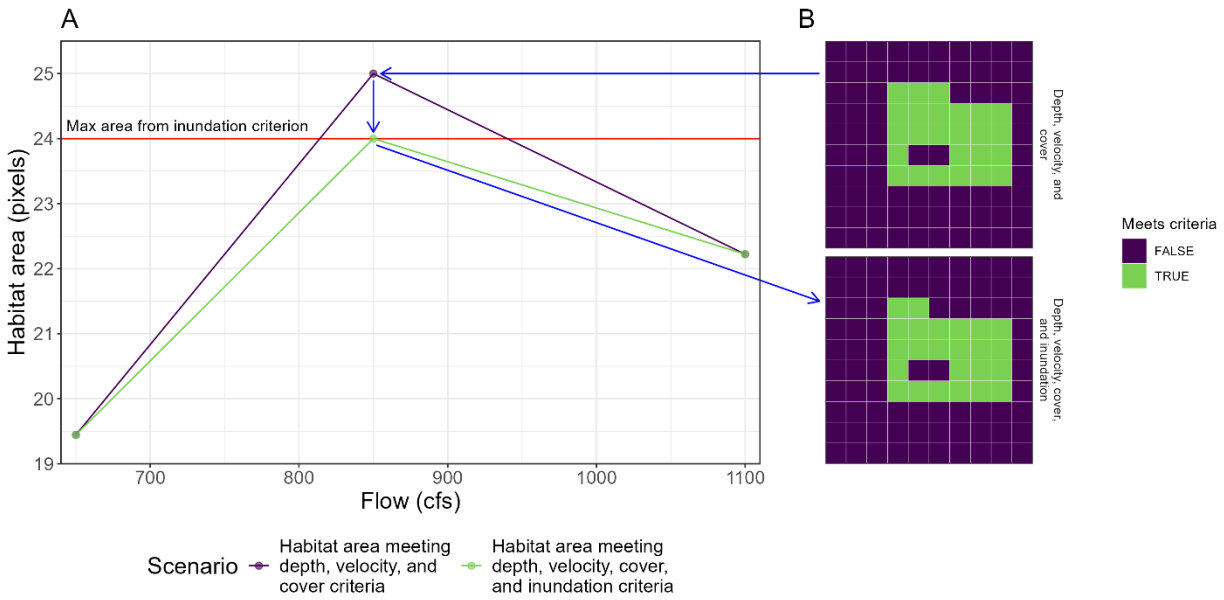


Figure B-3. Conceptual representation of the application of inundation design criteria to an area of floodplain rearing habitat, as described in step (vi) and section B.2.1.4. (A) represents a flow-habitat function before (purple) and after (green) application of the inundation criterion with design flows represented by points. In this example, application of the inundation criterion resulted in a maximum of 24 pixels (represented by the red horizontal line). Since the habitat area meeting the depth, velocity, and cover criteria exceeds 24 pixels at one design flow, that area is reduced to 24 pixels maximum in application of the inundation criterion to develop the final flow-habitat curve for this habitat. (B) displays the area meeting the design criteria at the 850 cfs design flow before (top) and after (bottom) adjustments to meet the inundation criterion. The connection between (A) and (B) are represented with blue arrows. The same process will be used for both “pre-project” and “post-project” conditions.

In the next two steps (vii) and (viii), the difference between the pre-project and constructed condition are evaluated to determine the additional area of suitable habitat contributed by the habitat restoration action:

vii. At each design flow, identify pixels that meet design criteria in the post-project condition that did not meet design criteria in the pre-project condition (i.e., “gains”), as well as the pixels that do not meet the design criteria under the post-project condition but met design criteria under the pre-project condition (i.e., “losses”) (Figure B-4).

viii. Sum the gains and losses to calculate the net habitat gain (or loss) at each design flow. Across all design flows, these net habitat gains (or losses) constitute the constructed flow-habitat relationship.

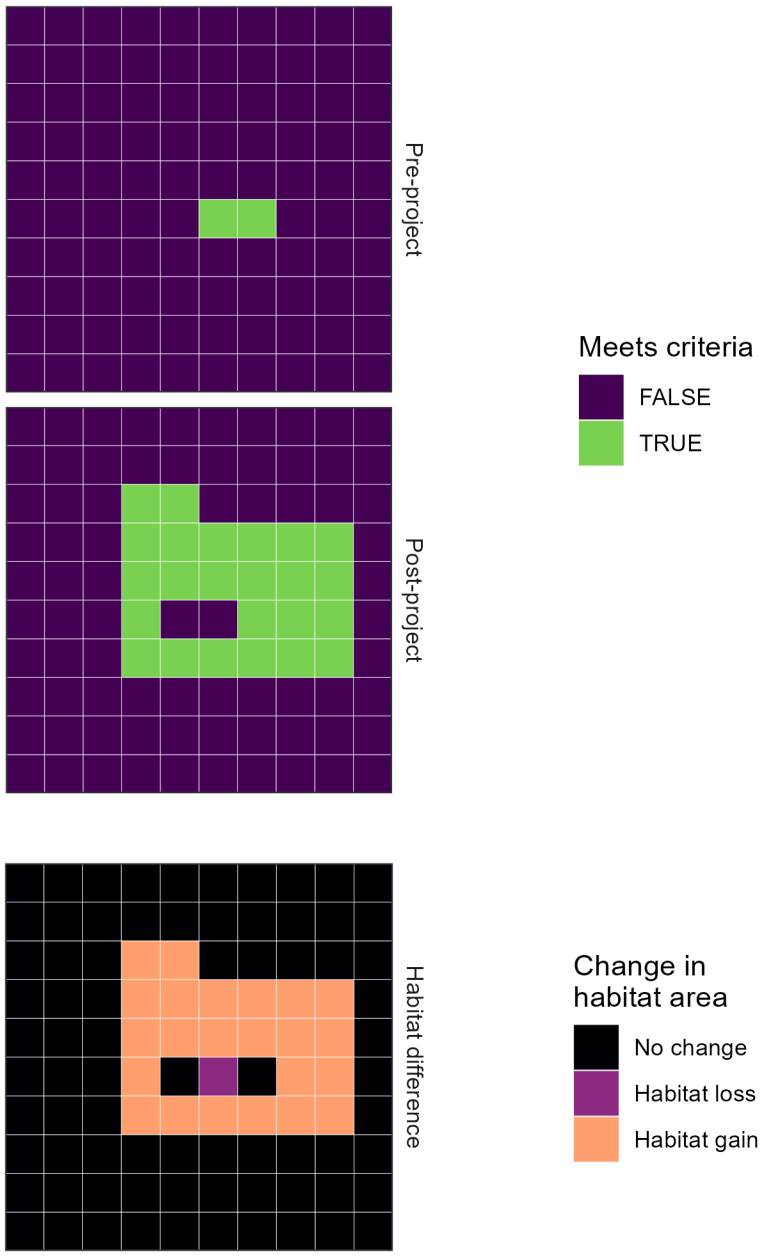


Figure B-4. Conceptual representation of the calculation of VA additional habitat as the difference between the pre-project (top image) and post-project (middle image) condition at a single design flow. Using the habitat difference (bottom image), the gains and losses would be summed to calculate the net habitat gain (or loss) at each design flow. Across all design flows, these net habitat gains (or losses) constitute the constructed flow-habitat relationship. In this example, the net gain in this design flow is 22 pixels.

B.2.1.2 Substrate Raster Development

Substrate within the project footprint will be mapped as polygon features where each polygon contains an area of substrate with a unique percent composition of grain size classes. Substrate polygons that meet the substrate criterion described in the program of implementation will be identified and converted into a unified spawning substrate shapefile. For building the spawning substrate raster, each raster pixel with a centroid that falls within the spawning substrate shapefile is identified as meeting the substrate criterion for spawning.

B.2.1.3 Cover Raster Development

Cover features within the project footprint will be mapped and a polygon shapefile generated containing the actual outlines of each cover feature. This shapefile will be filtered to only retain cover elements within suitable categories defined in the program of implementation. To convert the cover polygon into a raster, each raster pixel with a centroid that falls within the cover shapefile is assigned cover. The areal coverage of cover features as calculated from the resulting raster should be approximately equivalent (±10 percent) to that from the shapefile. If not, a higher raster resolution should be used, or alternative methods acceptable to the Executive Director should be used to convert the shapefile into a raster.

In developing the cover shapefile, vegetative cover features may be assigned their expected size at maturity or at the final date of committed funding for site maintenance necessary to maintain suitable habitat, whichever is sooner. The expected resultant area of riparian vegetation in the mature condition should be a species-specific estimate of canopy size using best available science, for example literature-based data or models for riparian vegetation growth and size-at-maturation.

B.2.1.4 Application of Inundation Criterion

As defined in the program of implementation, the inundation criterion is based on the expected frequency and duration of floodplain inundation events. The inundation criterion will be applied to floodplain rearing habitat to calculate the maximum amount of habitat meeting the inundation criterion. The habitat areas meeting all design criteria at each design flow will then be adjusted to be no greater than this maximum value. To calculate the maximum area meeting the inundation criterion, modeled hydrology of VA flow commitments as indicated in analyses supporting VA adoption (i.e., from the final Scientific Basis Report Supplement) will be used unless another method is approved by the Executive Director. Application of the hydrology model to the area of habitat meeting depth, velocity, and cover criteria at each design flow will create a timeseries of habitat area. The inundation criterion described in the program of implementation will then be applied to the timeseries of habitat area to calculate the maximum area of habitat meeting the inundation criterion.

B.2.1.5 Final Habitat Accounting Assessment

The procedures described above in steps (i) through (viii) will produce a flow-habitat relationship for the newly constructed habitat (i.e., the amount of additional suitable habitat at each design flow). To complete the final habitat accounting assessment, compare the constructed flow-habitat relationship to the flow-habitat relationships provided by VA parties for assessment of the benefits of the VAs (i.e., those used in the final Scientific Basis Report Supplement; hereafter referred to as the assumed flow-habitat relationships) as described in steps (ix) through (xi) below:

ix. Within each design flow, add the constructed flow-habitat relationships across projects to create an overall constructed flow-habitat relationship for each tributary/reach and habitat type (matching the spatial scale of the assumed flow habitat relationships).

    (a) This can be applied incrementally project-by-project to track progress toward the goal.

x. Compare this constructed flow-habitat relationship to the assumed flow-habitat relationships to quantify a metric of overlap. The overlap metric is calculated by comparing the integral of the flow-habitat relationships separately within different flow ranges. The flow ranges are defined by either the 0-25th, 26-50th, 51-75th, and 76-100th percentiles of flows predicted under the VAs or by four evenly spaced flow ranges encompassing the full range of flows predicted under the VAs (Figure B-5).

xi. Each integral from the constructed flow-habitat relationship should be at least 95 percent of the value of the integral from the assumed flow-habitat relationship. If overlap is not at least 95 percent at each set of flow ranges, one of the following two options is required:

    (a) VA parties could restore additional habitat or improve the suitability of constructed VA habitat (e.g., through more cover features) to reach at least 95 percent overlap at each set of flow ranges

    (b) The implementing agency may provide an analysis demonstrating equivalent or better benefits than those resulting from the assumed flow-habitat relationships for Executive Director approval. The analysis must reproduce the tributary habitat analysis from the benefit analyses supporting VA adoption (i.e., from the final Scientific Basis Report Supplement) using the constructed flow-habitat curve, without applying the temperature filter, and evaluate whether the resulting benefits are equivalent or greater than those from the same analysis using the assumed flow-habitat relationships. Alternative analyses demonstrating equivalent or greater benefits than those from the benefit analyses

supporting VA adoption (i.e., from the final Scientific Basis Report Supplement) may be considered at the discretion of the Executive Director with input from DFW.

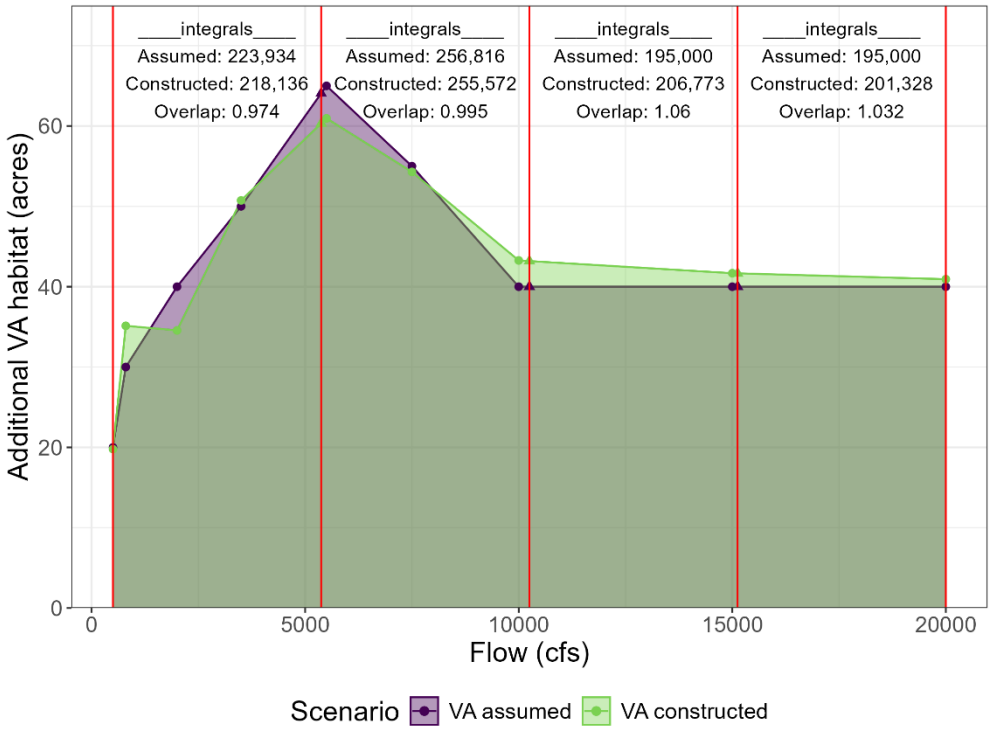


Figure B-5. Illustration of the final habitat accounting assessment for tributary spawning and rearing habitat. An example plot is provided of the additional VA habitat provided over baseline at each design flow (circle points) for the assumed flow-habitat relationship (purple) and the constructed flow-habitat relationship (green). Vertical red lines delineate the four flow ranges used for the evaluation of integral overlap between assumed and constructed habitat. Triangle points represent points that were interpolated when design flows did not exactly correspond to the flow range boundaries. Each curve was integrated separately within each flow range and then the proportional overall was calculated as Constructed/Assumed. In this example, all proportional overlaps are equal to or greater than 0.95 so this tributary would be considered as meeting their commitment for this habitat type.

B.2.1.6 Accounting for Multiple Habitat Types within a Single Project Footprint

For instances where a single habitat restoration project contains more than one habitat type (i.e., tributary spawning, in-channel rearing, tributary floodplain rearing) within the overall project footprint, habitat accounting must quantify each habitat type separately and the same project footprint may not be used for multiple habitat categories. In the case of a project that includes multiple habitat types within the same footprint (e.g., tributary spawning and rearing habitat, or in-channel rearing habitat and tributary floodplain rearing habitat), they will be divided by a feature-specific geospatial boundary associated with distinct topographical delineation, or by the project-specific elevation associated with the flow that activates off-channel inundation, such that there is no spatial overlap between these habitats for the habitat accounting assessment.