Draft Strategic Plan for the Proposed Agreements to Support Healthy Rivers and Landscapes

Updated: September 9, 2023

Preface

Document Purpose

This document is a preliminary draft of the Strategic Plan which, in final form, will be content for Exhibit F to the Global Voluntary Agreement (VA). The VA Parties provide this draft to the State Water Board for information, as they prepare their Staff Report to update the Bay-Delta Plan. This Strategic Plan provides an overview of the proposed VA Program as well as additional details on the Flow and Non-flow Measures included in the March 29, 2022, Memorandum of Understanding to advance the Term Sheet for the Voluntary Agreements Program, including amendments (Appendix A). Appendix B and Appendix C provide a description of the Draft Governance Program and Draft Science Plan for the Voluntary Agreements Program. The primary purposes of VA governance and science activities are to maximize benefits of the Flow and Non-flow Measures for the narrative objectives and to provide accountability and transparency of the VA Program to regulatory agencies and the public.

Definitions

Applicable Law means: state or federal law, including a Constitution, statute, regulation, court decision, precedential adjudicative decision, or common law, that applies to obligations or activities of Parties contemplated by this Agreement.

Bay-Delta Plan means: Water Quality Control Plan for the San Francisco Bay/Sacramento/San Joaquin Delta Estuary (2018, as amended [date of Final Action]).

Bay-Delta Watershed means: the area extending nearly 500 miles from the Cascade Range in the north to the Tehachapi Mountains in the south, and is bounded by the Sierra Mountain Range to the east and the Coast Range to the west that drains through the Sacramento River, the San Joaquin River, and their tributaries through the Delta to the Pacific Ocean through the Golden Gate Strait.

California Native American Tribe means: a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the Native American Heritage Commission.

CDFW means: the California Department of Fish and Wildlife.

CDWR means: the California Department of Water Resources.

Central Valley Project or CVP means: the project authorized by 50 Stat. 850 (1937) and subsequent statutes, and operated by the U.S. Department of the Interior Bureau of Reclamation, for water supply, protection, restoration, and enhancement of fish and wildlife, power, flood control and other purposes.

Contributed Funds means: funds paid by Parties and deposited by the Systemwide Funding Entity in either the Structural Science and Habitat Fund or the Revolving Water Transfer Fund.

Delta means: the Sacramento-San Joaquin Delta (including Suisun Marsh) as defined in Water Code Sec. 85058.

Flow Measures means: VA flows as described in Appendix 1 of the March 29, 2022, Term Sheet and all associated amendments.

Enforcement Agreements means: the agreements signed by non-federal Parties pursuant to Government Code section 11415.60, or with respect to federal Parties, a Government Code section 11415.60 agreement to implement any VA-related modifications to water rights held by a federal entity and a memorandum of understanding to implement other federal VA commitments, and approved by the State

Water Board, to provide in part regulatory authority for Flow Measures and Non-flow Measures in the VA Program.

Final Action means: final action by the State Water Board to amend the Bay-Delta Plan.

Global Agreement means: the Global Agreement establishing the overall structure for the VA Program, and specifically providing the systemwide terms for the Science, Funding, and Governance Programs.

Governance Entities means: all institutional arrangements identified for the implementation of the VA.

Governance Program means: the governance procedures that the Parties will follow to implement the VA Program. A description of the Governance Program is provided in Appendix B to the Draft Strategic Plan.

Implementing Agreements means: the agreements to implement Flow and Non-flow Measures, specific to a Tributary or the Delta.

Implementing Entities means: Parties that sign an Implementing Agreement, and other entities specified therein, that have responsibilities to implement measures stated in the agreement.

Memorandum of Understanding or MOU means the "Memorandum of Understanding Advancing a Term Sheet for The Voluntary Agreements to Update and Implement the Bay-Delta Water Quality Control Plan, and Other Related Actions," dated March 29, 2022.

Narrative Viability Objective means: a new water quality objective that the Parties support in the Bay-Delta Plan, as stated below:

> "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 will 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."

Non-flow Measures means: habitat restoration measures and other non-flow measures as described in Appendix 2 of the March 29, 2022, Term Sheet and all associated amendments and other measures (e.g., funding for science).

Participants means: Representatives from VA Parties, California Native American tribes, non-governmental organizations, and other interested parties that are appointed consistent with the procedures in the Systemwide Governance Committee Charter and that together participate in the Governance Program.

Parties means: signatories to the MOU and amendments.

Program of Implementation means: the program of measures, schedule, and monitoring necessary to achieve the water quality objectives in the Bay-Delta Plan, as adopted pursuant to Water Code sections 13241 and 13242.

Public Water Agencies or water purveyors means: VA Parties that are water suppliers and distributors for agricultural, municipal, industrial, hydropower, recreational and environmental use.

Responsible Parties means: the Parties who are Implementing Entities and sign an Enforcement Agreement.

Revolving Water Transfer Fund means: an account created by the SWF Entity to compensate Parties for flow contributions pursuant to the applicable Implementing Agreements.

Science Program means: the procedures and other requirements that the Parties will use to evaluate the effects of the VA Program. The Science Plan is Appendix C to the Draft Strategic Plan.

State Water Board means: the State Water Resources Control Board.

State Water Project or SWP means: the project authorized by California Water Code sections 11000 et seq., and operated by CDWR, for water supply, power, flood control and other purposes.

Strategic Plan means: this document or the plan developed, maintained, and updated by the Systemwide Governance Committee to describe the schedule and other details of implementation of the VA measures.

Structural Science and Habitat Fund or SSHF means a fund created by the SWF Entity to support science and habitat programs within the VA Program in accordance with this Global Agreement and the applicable Implementing Agreements.

Substitute Environmental Document or SED means: the substitute environmental document that analyzes the effects of implementing the VA Program, as well as other issues as necessary for the update to the Bay-Delta Plan, in compliance with the California Environmental Quality Act. The SED is part of the State Water Board's Staff Report for the updated Bay-Delta Plan.

Supported Amendments means: amendments to the Bay-Delta Plan, including Table 3 and Program of Implementation, that incorporate the VA Program. The Parties sign the Global Agreement following the State Water Board's Final Action on the Supported Amendments.

System Operator means: the organizations that control their respective water operations.

Systemwide means: same scale as the Bay-Delta Watershed.

Systemwide Funding Entity or SWF Entity means: the funding entity established pursuant to Section 11. The Systemwide Funding Entity may be either an already existing entity or a new entity formed by one or more Parties with the written consent of the other Parties.

Systemwide Measures means: the Flow and Non-flow Measures that are not tightly constrained, and therefore can be deployed for the greatest overall benefit as assessed at the scale of the Bay-Delta Watershed by the Systemwide Governance Committee. Note that as of May 2023, Systemwide Measures have not yet been identified and this is expected to be a next step in the Summer and Fall of 2023.

Term Sheet means: the "Term Sheet for The Voluntary Agreements to Update and Implement the Bay-Delta Water Quality Control Plan, and Other Related Actions" (March 29, 2022) and associated amendments.

Tributary/Delta Measures means: the Flow and Non-flow Measures that can be implemented by the VA Party that committed the measures as long as that implementation is consistent with the Enforcement Agreements.

USBR means: the United States Bureau of Reclamation.

VA Program means the measures, rights and obligations stated in the Global Agreement and:

A. Supported Amendments to Bay-Delta Plan (Exhibit A);

B. Implementing Agreements (Exhibit B.1 – B.X);

C. Enforcement Agreements (Exhibit C.1 – C.X);

D. Governance Program (Exhibit D);

E. Science Plan (Exhibit E);

F. Strategic Plan (Exhibit F); and

G. Funding Plan (Exhibit G).

Voluntary Agreements or VAs means: the Global Agreement, the Implementing Agreements, and the Enforcement Agreements.

Year means: time starting on the Effective Date of the Global Agreement. Year 0 begins on that date.

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1 Overview

The proposed Voluntary Agreements Program (VA Program) will be a comprehensive, multi-year effort that brings together dozens of water agencies with the state and federal governments to pool resources and provide targeted river flows and expanded habitat in the Sacramento and San Joaquin River watersheds and Bay Delta. The VA Program, if approved by the State Water Resources Control Board (State Water Board) as an implementation pathway for an updated Bay-Delta Plan, could help meet requirements to protect beneficial uses in the Sacramento and San Joaquin watersheds.

Building on the Term Sheet to the March 29, 2022, Memorandum of Understanding (MOU) and amendments (Appendix A), this Draft Strategic Plan ("Plan") was produced by the Parties to the MOU[1] to provide additional detail on the proposed VA Program. The Parties that signed the MOU and amendments are "VA Parties" for the purpose of this Plan. Section 1 of this Plan provides background and an overview of the proposed VA Program. Sections 2 and 3 provide details on the Flow Measures and Non-flow Measures that are proposed for inclusion in the VA Program. Appendices to this Plan provide additional details on proposed governance, science and funding activities within the VA Program.

This draft Plan (inclusive of appendices) was produced for the purposes of informing the State Water Board's public review process on the updating of the Bay-Delta Plan. The VA Parties may update this Plan as necessary following the public review process, including to address comments received. The VA Parties will then request that the State Water Board approve this Plan as an element of the Program of Implementation.

Current MOU Signatories

State And Federal Agencies
California Natural Resources Agency
California Environmental Protection Agency
California Department of Water Resources
California Department of Fish and Wildlife
US Bureau of Reclamation

Upper Sacramento River
Garden Highway Mutual Water Company
Glenn-Colusa Irrigation District
River Garden Farms
Sutter Mutual Water Company

Feather River
Western Canal Water District

Yuba River
Yuba Water Agency

American River
Regional Water Authority

Mokelumne River
East Bay Municipal Utility District

Tuolumne River
San Francisco Public Utilities Commission
Modesto Irrigation District
Turlock Irrigation District

San Joaquin (Friant)
Friant Water Authority

Putah Creek
Solano County Water Agency

State and Federal Contractors
Metropolitan Water District of Southern California
State Water Contractors
Westlands Water District
Kern County Water Agency
San Luis and Delta-Mendota Water Authority
Tehama-Colusa Canal Authority
Contra Costa Water District

1.1 Background

The State Water Board and the nine regional water quality control boards administer the Porter-Cologne Water Quality Control Act (Wat. Code, § 13000 et seq.) (Porter-Cologne Act) to achieve an effective water quality control

[1] Current signatories are indicated in the accompanying text box. Additional parties may sign the MOU in the future.

program for the state and are responsible for the regulation of activities and factors that may affect the quality of the waters of the state. The State Water Board is authorized to adopt a water quality control plan in accordance with the provisions of Water Code sections 13240 through 13244, insofar as they are applicable (Wat. Code, § 13170). The State Water Board has adopted a Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan). It first adopted the plan in 1978, amending it in 1995, 2006, and 2018. In 2008, it initiated its periodic review and began proceedings to update the current Bay-Delta Plan. The Bay-Delta Plan designates beneficial uses of the waters of the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta watershed), establishes water quality objectives for the protection of those beneficial uses, and establishes a program of implementation to implement those objectives.

In May 2017, then-Governor Edmund G. Brown, Jr. issued "Principles for Voluntary Agreements" stating in relevant part: "The goal is to negotiate durable and enforceable Voluntary Agreements that will be approved by applicable regulatory agencies, will represent the program of implementation for the water quality objectives for the lower San Joaquin and Sacramento Rivers and Delta, will forego an adjudicatory proceeding related to water rights, and will resolve disputes among the parties regarding water management in the Sacramento-San Joaquin-Bay-Delta Watershed." Interested parties, including state and federal agencies, municipal and agricultural water suppliers, and others undertook extensive efforts beginning in 2017 to negotiate VAs. On December 12, 2018, the Directors of California Department of Fish and Wildlife (CDFW) and California Department of Water Resources (CDWR) appeared before the State Water Board and presented the results of the negotiation process to date. Specifically, the Directors presented a "Framework Proposal for Voluntary Agreements to Update and Implement the Bay-Delta Water Quality Control Plan" (Framework Proposal). On December 12, 2018, the State Water Board adopted Resolution No. 2018-0059 to update the 2006 Bay-Delta Plan. First, it amended the water quality objectives for the protection of fish and wildlife beneficial uses in the Lower San Joaquin River and its three eastside tributaries (the Stanislaus, Tuolumne, and Merced Rivers), and agricultural beneficial uses in the southern Delta. It also amended the program of implementation for those objectives. It approved and adopted the Substitute Environmental Document (SED) for the Lower San Joaquin River. Ordering paragraph 7 of Resolution No. 2018-0059 states:

> "The State Water Board directs staff to provide appropriate technical and regulatory information to assist the California Natural Resources Agency in completing a Delta watershed-wide agreement, including potential flow and non-flow measures for the Tuolumne River, and associated analyses no later than March 1, 2019. State Water Board staff shall incorporate the Delta watershed-wide agreement, including potential amendments to implement agreements related to the Tuolumne River, as an alternative for a future, comprehensive Bay-Delta Plan update that addresses the reasonable protection of beneficial uses across the Delta watershed, with the goal that comprehensive amendments to the Bay-Delta Plan across the Delta watershed may be presented to the State Water Board for consideration as early as possible after December 1, 2019."

In January 2019, Governor Gavin Newsom confirmed his intention to complete the efforts to reach VAs, providing commentary on February 4, 2020 that "California must get past differences on water. Voluntary agreements are the path forward." On March 1, 2019, the Directors of CDFW and CDWR entered into a "Planning Agreement Proposing Project Description and Procedures for the Finalization of the Voluntary Agreements to Update and Implement the Bay-Delta Water Quality Control Plan" (Planning Agreement). Over the course of 2019, the State, Reclamation, water agencies, and NGOs met to develop the Voluntary Agreement framework. A large plenary group consisting of representatives from several state and federal agencies, water agencies and NGOs was formed along with three primary subgroups: legal, governance and science, and assets (measures). Each group developed materials for a 15-year framework, which was then presented in February 2020 to the plenary as a complete framework. The State and Reclamation then continued conversations with water agencies through March 2022 to build upon the 2020

framework to include additional detail and secure additional assets (funding and water). Based on this updated framework, the VA Parties signed a Memorandum of Understanding to advance the "Term Sheet for the Voluntary Agreements Program to Update and Implement the Bay-Delta Water Quality Control Plan" (Term Sheet to the MOU; Appendix A).

1.2 Narrative Objectives

The Parties are committed to providing Flow and Non-flow Measures in the VA Program, that together with other measures in the Bay-Delta Plan, are necessary to implement water quality objectives in the Bay-Delta Plan related to the protection of native fishes. These objectives are: (1) the existing narrative objective that provides for water quality conditions, 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 (Narrative Salmon Objective); and (2) a new narrative objective to achieve the viability of native fish populations (Narrative Viability Objective).

The Parties propose that the State Water Board adopt the following Narrative Viability Objective for the Bay-Delta Watershed, including the Lower San Joaquin River:

> "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."

1.3 Proposed VA Program

In the Bay-Delta watershed, a comprehensive approach to managing and integrating habitat, flow, landscape, and other factors is required to protect native fish and wildlife species, while concurrently protecting water supply reliability, consistent with the legal requirement of providing reasonable protection for all beneficial uses. The Bay-Delta Plan requires flow measures, and while recommending other actions, the Bay-Delta Plan's program of implementation generally does not include actions that the State Water Board will take directly to address other non-flow measures to protect fish and wildlife, including physical habitat restoration of channels, wetlands and floodplains. The Parties seek to take a comprehensive approach to integrate flow and non-flow measures, including habitat restoration and landscape reactivation, subject to ongoing adaptive management based on a science program. This Plan, together with the appendices, describes a VA Program to effect this comprehensive approach. Flow and Non-flow Measures will be subject to regulatory oversight mechanisms as described in Section 1.4.

The Parties request that the Program of Implementation in the updated Bay-Delta Plan include the VA Program as a pathway to implement the Narrative Salmon Objective and proposed Narrative Viability Objective, on a finding that the VA pathway, in conjunction with other measures in the Bay-Delta Plan,

will provide reasonable protection of the associated beneficial uses as documented in the Substitute Environmental Document (SED).

Flow Measures

Commitments by participating water agencies will generate hundreds of thousands of acre-feet of water dedicated for environmental purposes that will be adaptively managed to benefit native fish populations and habitats and protected for Delta outflow. The amount of this environmental water varies depending on how dry or wet a year becomes, with up to 825,000 acre-feet in some years above flows resulting from the 2019 Biological Opinions and State Water Board Decision 1641.

The proposed Flow Measures for the VA Program can be flexibly managed based on timing and season to increase instream flows and Delta outflows and test biological hypotheses, consistent with regulatory requirements. The proposal focuses the deployment of Flow Measures in the Spring (March through May). Consistent with the State Water Board's Scientific Basis Report (SWRCB 2017), Flow Measures provided during March through May, are hypothesized to help to restore more natural flow patterns during a biologically important time period in an effort to improve conditions for native aquatic species.

Section 2 provides details on the proposed Flow Measures, including water quantities by water source and water year type, seasonal timing, and a narrative description of flow accounting.

Non-flow Measures

Through the VA Program, significant, coordinated investments will be made to improve fish and wildlife habitat conditions throughout the watershed. The agreements encompass more than 45,000 acres of instream habitat, new spawning and rearing habitat, floodplain habitat and fish food production. Section 3 provides more detail on the expected commitments of habitat restoration activities and other Non-flow Measures by geographic area, including their expected implementation timing and an overview of habitat accounting protocols.

Governance, Science and Adaptive Management

The primary purposes of VA governance and science activities are to maximize benefits of the Flow and Non-flow Measures for the narrative objectives and to provide accountability and transparency of the VA Program to regulatory agencies and the public. The Parties will coordinate efforts, engage other interested participants and report on activities at both a systemwide (Bay-Delta watershed) and local scale through the governance structures and processes described in Appendix B. One of these governance structures, the Systemwide Governance Committee, is in the initial stages of forming for the purposes of preparing for the implementation of the VA Program.

A VA Science Committee has also been established to coordinate science activities and recommend an adaptive management framework to assess outcomes of VA Flow and Non-flow Measures. A Draft Science Plan developed by the VA Science Committee is provided in Appendix C. The draft Science Plan describes the metrics that will be used to evaluate the benefits of Flow and Non-flow Measures towards the narrative objectives and to inform adaptive management.

Funding

Over $2.9 billion of funding commitments have been identified to support the VA Program. Funding to support the VA Program will be generated from multiple sources over the term of the agreement, including from DWR, Reclamation and other federal agencies, public water agencies, bond and other state funding, and other sources. Funding will support the acquisition of water and support science and habitat projects. For additional details on the expected revenues to support the VA Program, see Appendix 3 of the Term Sheet.

1.4 Regulatory Oversight

The VA Program is anticipated to have multiple mechanisms of regulatory oversight. Three key mechanisms described in the Term Sheet to the MOU are:

(1) **Government Code Section 11415.60 Agreements (or 'Enforcement Agreements')** that will state the specific obligations of those VA Parties responsible for implementation, along with related regulatory enforcement mechanisms, each to be signed by VA Parties and the State Water Board (see Section 2.2C of the Term Sheet).

(2) **Annual and Triennial Reports** that will be produced at the local and systemwide (Bay-Delta Watershed) scale for submittal to the State Water Board (see Section 9.4 of the Term Sheet for more detail).

(3) **The initiation of a process by the State Water Board at Year 6 of the VA Program** to evaluate and determine the implementation pathway for VA Parties after Year 8 (see Section 7.1 of the Term Sheet for more detail).

The Draft Governance Description (Appendix B) also includes additional information on proposed State Water Board oversight. The Draft Governance Description is expected to be further developed in coordination with State Water Board staff to ensure consistency with the above described Enforcement Agreements and State Water Board regulatory requirements.

1.5 VA Program Timeline

Figure 1 provides an overview of key activities and anticipated timeline with respect to the VA Program. In 2023 and 2024, VA Parties are working to develop necessary legal agreements and provide information to the State Water Board for regulatory review purposes. Early implementation of habitat projects is also ongoing and described further in Section 3. As defined in the Term Sheet, the VAs would become effective on the date the Enforcement Agreements are executed. The VAs would then remain in effect for a term of 8 years after the Effective Date, with the possibility of extension.

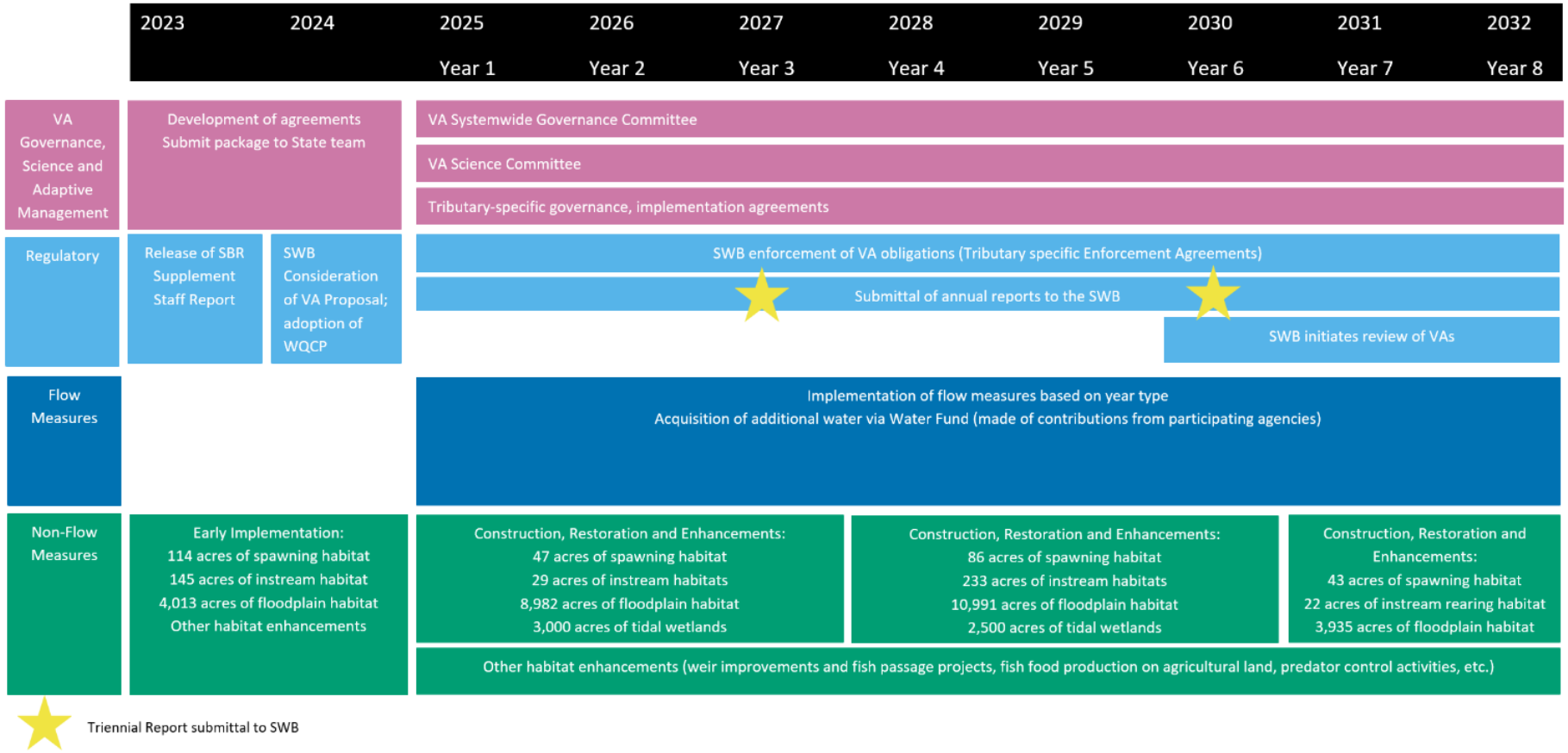

Figure 1: VA Program – Key Activities and Timeline

2 Flow Measures Description

This section provides details on the proposed Flow Measures for the VA Program including water quantities by water source and water year type (Section 2.1.1), a default plan and flexibility bracket for the seasonal timing of Flow Measures (Section 2.1.2), the flexibility of Flow Measures for systemwide coordination (Section 2.1.3), a narrative description of flow accounting (Section 2.1.4), and additional details for each water source, including decision-making processes for the deployment of Flow Measures that are subject to Implementing Agreements, Enforcement Agreements and applicable regulatory requirements (Sections 2.2 to 2.12).

2.1 Overview of Flow Measures

2.1.1 Water Quantities by Water Source and Water Year Type

Table 1 describes the water quantities of the Flow Measures by water source and water year type. These Flow Measures will be additive to the Delta outflows required by Revised Water Rights Decision 1641 (Revised D-1641) and resulting from the 2019 Biological Opinions, although the 2019 Biological Opinions may be modified, including to resolve litigation concerning those opinions (Term Sheet, Section 4.1). Flow Measures described as “Water Purchase Program” or other water purchases will be obtained through a free-market program for single-year transfers, subject to applicable law (Term Sheet, Section 5.1). Flow contributions from all water sources will not impact water supplies for wildlife refuges nor impact health and safety water supplies. Additional details on Flow Measures are provided in Appendix 1 to the Term Sheet and associated amendments.

Table 1: New Contributions to Tributary Flow and Delta Outflows in Thousand Acre Feet by Sacramento River Index[1,2,3] (Adapted from Term Sheet, Appendix 1 and associated amendments)

Source Category	Specific Source	C (15%)[4]	D (22%)	BN (17%)	AN (14%)	W (32%)
San Joaquin River Basin	*Minimum Placeholder Contributions (Stanislaus and Merced)[5]*	*11*	*83*	*101*	*85*	*0*
San Joaquin River Basin	*San Joaquin Basin Portion of Gap[5]*	-	*11*	*2*	*10*	-
San Joaquin River Basin	Tuolumne[15]	37	62	78	27	0
Friant	-	0	50	50	50	0
Sacramento River Basin[6]	Sacramento[7]	2	102	100	100	0
Sacramento River Basin[6]	Feather	0	60	60	60	0
Sacramento River Basin[6]	Yuba	0	60	60	60	0
Sacramento River Basin[6]	American[8]	30	40	10	10	0
Sacramento River Basin[6]	Mokelumne[13]	0	5	5	7	0
Sacramento River Basin[6]	Putah[9]	7	6	6	6	0
CVP/SWP Export Reduction[10]	-	0	125	125	175	0
PWA Water Purchase Program	Fixed Price	3	63.5	84.5	99.5	27
PWA Water Purchase Program	Market Price[11, 14]	0	50	60	83	0
Permanent State Water Purchases[12]	-	65	108	9	52	123
Year 1 New Outflow Above Baseline (Low Target)	-	***155***	***825.5***	***750.5***	***824.5***	***150***

Footnotes to Table 1:

[1] This table reflects status of negotiations as of the date of this Framework. Prior "global gap" to meet adequacy are now reflected as Permanent State Water Purchases.

[2] Outflows additive to baseline and will be provided January through June. A portion of the VAs' flows can be flexibly shaped to other times of year to test biological hypotheses while reasonably protecting beneficial uses. Such shaping will be subject to VAs' governance program. Flows made available through reservoir reoperations will be subject to accounting procedures described in term sheet and all flows will be verified as a contribution above baseline using these accounting procedures.

[3] An assessment based on the accounting procedures to be developed pursuant to Term Sheet section 8.3 will be conducted prior to year 8 of VA to determine if the flows in this table have materialized on average above baseline by water year type. The VA parties acknowledge that, if this analysis does not demonstrate that flows have materialized as shown in this table, then the VAs will be subject to Term Sheet provisions of Section 7.4(B)(ii) or (iii).

[4] C year off-ramps subject to negotiation, but flows in this table must reflect average C year contributions over the term of the VA.

[5] As of the date of this document, discussions with these water sources are still ongoing. Table shows minimum placeholder contribution for the SJR tributaries (Stanislaus and Merced) equivalent to what would have been provided under the VA. Additional flows above minimum placeholder values will be required in certain year types to satisfy current water quality objectives.

[6] The new flow contributions from the Sacramento River Basin identified in this table, plus new flow contributions resulting from the below-referenced PWA Water Purchase Program, Permanent State Water Purchases, and PWA Fixed Price Water Purchase Program line items in Table 1, are not intended to result in idling more than 35,000 acres of rice land in the Sacramento River Basin.

[7] 2 TAF in Critical and Dry years is subject to ongoing discussions. VA parties agree that the Sacramento River flow contribution of 100 TAF will be provided during the January through June period, except when it is recommended through the VA governance process that shifting the timing of a portion of this contribution would be in the best interest of the fishery. Recommendations by the VA governance group require approval from the following agencies: National Marine Fisheries Service, California Department of Fish and Wildlife, and the State Water Board.

[8] Contingent on funding groundwater substitution infrastructure to be completed by a subsequent year. These flows are included in the Year 1 subtotal. 30 TAF of groundwater provided in 3 out of 8 D or C years; 10 TAF of upstream reservoir storage provided in 3 out of 8 AN or BN years; and an additional 10 TAF in D years provided from one or a combination of sources.

[9] Consistent with the safe yield of the Putah Creek Accord (2000).

[10] If, in any year, this level of Exporter contribution would reduce supplies that would otherwise be provided to Exporters to protect M&I Public Health and Safety, then the Exporter contribution will be reduced to avoid reduction of M&I Public Health and Safety water, consistent with operations contemplated in D-1641 and the biological opinions for the coordinated operations of the CVP and SWP to protect health and safety water supplies.

[11] The VA's governance program will be used to determine the use of available funding to provide additional outflow in AN, BN, or W years. If DWR is called upon to provide the water by foregoing SWP exports, such call will be handled through a separate agreement between DWR and its contractors.

[12] State to permanently acquire 65TAF of water in all water year types to contribute to meeting the flow targets specified in this table. After applying this 65TAF in all water years a gap of 43TAF will persist in D years and a gap of 58TAF will persist in W years; however, there will be a surplus of 56TAF in BN years and a surplus of 13TAF in AN years. D and W year gaps to filled by redistributing a portion of the PWA water purchase contribution from BN and AN years, and through additional State water purchases in W years.

[13] EBMUD will operate to the tributary flows proposed in Section 2.7.3 or Appendix A5 of the Memorandum of Understanding dated March 1, 2019 ("Mokelumne River Proposal" or "2019 MRP"). Modeled flows in the 2019 MRP were above the existing requirements in EBMUD's D-1641/Joint Settlement Agreement (JSA) year types. EBMUD will present modeling, consistent with the VA flow accounting procedures, to demonstrate average long-term contribution of new flows from the Mokelumne, and if a shortfall is determined relative to the flows stated in modified Table 1 above for a given Sacramento River index year type EBMUD will commit to funding the purchase of any remaining volume difference when that Sacramento year type occurs during the 8-year term of the agreement. The VA Parties will endeavor to achieve fair and equitable pricing for all VA water purchases.

[14] EBMUD commits to coordinating and prioritizing possible water purchases from the Mokelumne River system to the extent feasible and practical and acceptable to EBMUD. And, consistent with footnote 11 of Appendix 1 Flow Tables, Table 1a: The VA's governance program will be used to determine the use of available funding to provide additional outflow in AN, BN, or W years. If DWR is called upon to provide the water by foregoing SWP exports, such call will be handled through a separate agreement between DWR and its contractors.

[15] As measured at the Modesto flow gauge. Modeling done by the State predicts that with implementation of the Tuolumne VA that Tuolumne River flows as measured at the Modesto gauge, on average by water year type, will exceed the average January-June flows in the base case (flow resulting under current conditions with the 1995 FERC Settlement Agreement in effect). The modeling projects the following resultant flows at Modesto gauge that will be protected as Delta outflows.

2.1.2 Default Plan and Flexibility Bracket

A Default Plan and a Flexibility Bracket for VA Flow Measures is provided in Table 2 to Table 5. The Default Plan defines a long-run average timing for VA Flow Measures by water source and water year type which is based on hydrology and operations analysis and/or modeling of the deployment of VA Flow Measures.

The Flexibility Bracket is defined for each water source and is inclusive of:

- Flexibility for VA governance entities to time the VA Flow Measure for the benefit of native fish and to test hypotheses in consideration of hydrological opportunities;
- Flexibility for implementing organizations (operators) to work within operational and hydrological constraints and to ensure that VA Flow Measures are additive contributions.

In any given year within the 8-year VA Program, VA Flow Measures will be deployed within the Flexibility Bracket.

The Default Plan and Flexibility Bracket focus the deployment of VA Flow Measures in the Spring (March through May). Consistent with the State Water Board's Scientific Basis Report (SWRCB 2017), VA Flow Measures provided during March through May are hypothesized to help to restore more natural flow patterns during a biologically important time period in an effort to improve conditions for native aquatic species.

Table 2: Default Plan and Flexibility Bracket for VA Flow Measures in Above Normal water year. Bolded numbers represent the Default Plan and numbers in parentheses represent the Flexibility Bracket for any given year. Values are a proportion of the total flow contribution as stated in Table 1 (Appendix 1 of the MOU and all associated amendments). The summary row was calculated by multiplying each water source's water quantity contributions for the VA by the Default Plan proportion.

Source	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
Friant	**0%**	**0%**	**0%**	**0%**	**5%** (0-5%)	**20%** (15-30%)	**40%** (35-70%)	**35%** (0-35%)	**0%**	**0%**	**0%**	**0%**
Sacramento	**0%**	**0%**	**0%**	**0%** (0-25%)	**0%** (0-25%)	**0%** (0-25%)	**50%** (0-100%)	**50%** (0-100%)	**0%** (0-25%)	**0%**	**0%**	**0%**
Feather	**0%**	**0%**	**0%**	**0%**	**0%**	**75%** (50-90%)	**25%** (10-50%)	**0%**	**0%**	**0%**	**0%**	**0%**
Yuba (YWA)	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**50%** (33-66%)	**50%** (33-66%)	**0%** (0-33%)	**0%**	**0%**	**0%**
American	**0%**	**0%**	**0%**	**0%**	**0%**	**50%** (33-66%)	**50%** (33-66%)	**0%** (0-33%)	**0%**	**0%**	**0%**	**0%**
Mokelumne – N & Above[1]	**13%** (10-30%)	**0%**	**0%**	**0%**	**0%**	**8%**[2]	**43%**[2]	**36%**[2]	**0%**	**0%**	**0%**	**0%**
Tuolumne	**0%**	**0%**	**0%**	**0%**	**0%**	**63%**[3]	**18%**[3]	**19%**[3]	**0%** (0-40%)	**0%**	**0%**	**0%**
Putah	**0%**	**16.7%** (0-75%)	**16.7%** (0-75%)	**16.7%** (0-75%)	**16.7%** (0-84%)	**16.7%** (0-74%)	**8.3%** (0-54%)	**8.3%** (0-57%)	**0%**	**0%**	**0%**	**0%**
CVP/SWP Export Reduction	**0%**	**0%**	**0%**	**0%**	**0%**	**0%** (0-30%)	**50%** (30-70%)	**50%** (30-70%)	**0%** (0-30%)	**0%**	**0%**	**0%**
PWA Water Purchase Program	**0%**	**0%**	**0%**	**0%**	**0%**	**0%** (0-40%)	**50%**[4]	**50%**[4]	**0%** (0-40%)	**0%**	**0%**	**0%**
Permanent State Water Purchases	**0%**	**0%**	**0%**	**0%**	**0%** (0-40%)	**33.3%**[5]	**33.3%**[5]	**33.3%**[5]	**0%** (0-40%)	**0%**	**0%**	**0%**
Summary	**<1%**	**<1%**	**<1%**	**<1%**	**<1%**	**13%**	**44%**	**41%**	**0%**	**0%**	**0%**	**0%**

[1] Mokelumne year type determined as described in Section 2.7 based on D-1641 thresholds of projected unimpaired runoff. VA flow releases subject to offramp to protect cold water pool, described in Table 13, fn. 1.

[2] Flexibility Bracket for the March to May period is 70-90%.

[3] Flexibility Bracket for the March to May period is 60-100%.

[4] Flexibility Bracket for the April to May period is 60-100%.

[5] Flexibility Bracket for the March to May period is 60-100%.

Table 3: Default Plan and Flexibility Bracket for VA Flow Measures in Below Normal water year. Bolded numbers represent the Default Plan and numbers in parentheses represent the Flexibility Bracket for any given year. Values are a proportion of the total flow contribution as stated in Table 1 (Appendix 1 of the MOU and all associated amendments). The summary row was calculated by multiplying each water source's water quantity contributions for the VA by the Default Plan proportion.

Source	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
Friant	**0%**	**0%**	**0%**	**0%**	**5%** (0-5%)	**20%** (15-30%)	**40%** (35-70%)	**35%** (0-35%)	**0%**	**0%**	**0%**	**0%**
Sacramento	**5%** (0-25%)	**0%** (0-25%)	**0%** (0-25%)	**0%** (0-25%)	**0%** (0-25%)	**0%** (0-50%)	**10%** (0-25%)	**15%** (0-25%)	**20%** (0-25%)	**20%** (0-25%)	**20%** (0-25%)	**10%** (0-25%)
Feather	**0%**	**0%**	**0%**	**0%**	**0%**	**75%** (50-90%)	**25%** (10-50%)	**0%**	**0%**	**0%**	**0%**	**0%**
Yuba (YWA)	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**50%** (33-66%)	**50%** (33-66%)	**0%** (0-33%)	**0%**	**0%**	**0%**
American	**0%**	**0%**	**0%**	**0%**	**0%**	**50%** (33-66%)	**50%** (33-66%)	**0%** (0-33%)	**0%**	**0%**	**0%**	**0%**
Mokelumne[1]	**26%** (10-30%)	**0%**	**0%**	**0%**	**0%**	**17%**[2]	**32%**[2]	**25%**[2]	**0%**	**0%**	**0%**	**0%**
Tuolumne[3]	**0%**	**0%**	**0%**	**0%**	**0%**	**77%**[4]	**11%**[4]	**12%**[4]	**0%** (0-40%)	**0%**	**0%**	**0%**
Putah	**0%**	**16.7%** (0-75%)	**16.7%** (0-75%)	**16.7%** (0-75%)	**16.7%** (0-84%)	**16.7%** (0-74%)	**8.3%** (0-54%)	**8.3%** (0-57%)	**0%**	**0%**	**0%**	**0%**
CVP/SWP Export Reduction	**0%**	**0%**	**0%**	**0%**	**0%**	**33.3%** (20-80%)	**33.3%** (20-80%)	**33.3%** (0-50%)	**0%**	**0%**	**0%**	**0%**
PWA Water Purchase Program	**0%**	**0%**	**0%**	**0%**	**0%**	**0%** (0-40%)	**50%**[5]	**50%**[5]	**0%** (0-40%)	**0%**	**0%**	**0%**
Permanent State Water Purchases	**0%**	**0%**	**0%**	**0%**	**0%** (0-40%)	**33.3%**[4]	**33.3%**[4]	**33.3%**[4]	**0%** (0-40%)	**0%**	**0%**	**0%**
Summary	**1%**	**<1%**	**<1%**	**<1%**	**1%**	**26%**	**32%**	**29%**	**3%**	**3%**	**3%**	**2%**

[1] Mokelumne year type determined as described in Section 2.7 based on D-1641 thresholds of projected unimpaired runoff. VA flow releases subject to offramp to protect cold water pool, described in Table 13, fn. 1.

[2] Flexibility Bracket for the March to May period is 70-90%.

[3] See Table 16 for Default Plan in off-ramp conditions.

[4] Flexibility Bracket for the March to May period is 60-100%.

[5] Flexibility Bracket for the April to May period is 60-100%.

Table 4: Default Plan and Flexibility Bracket for VA Flow Measures in a Dry water year. Bolded numbers represent the Default Plan and numbers in parentheses represent the Flexibility Bracket for any given year. Values are a proportion of the total flow contribution as stated in Table 1 (Appendix 1 of the MOU and all associated amendments). The summary row was calculated by multiplying each water source's water quantity contributions for the VA by the Default Plan proportion.

Source	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
Friant	**0%**	**0%**	**0%**	**0%**	**0%**	**40%** (40-75%)	**30%** (25-30%)	**30%** (0-30%)	**0%**	**0%**	**0%**	**0%**
Sacramento	**5%** (0-25%)	**0%** (0-25%)	**0%** (0-25%)	**0%** (0-25%)	**0%** (0-25%)	**0%** (0-50%)	**10%** (0-25%)	**15%** (0-25%)	**20%** (0-25%)	**20%** (0-25%)	**20%** (0-25%)	**10%** (0-25%)
Feather	**0%**	**0%**	**0%**	**0%**	**0%**	**33.3%** (20-40%)	**33.3%** (20-40%)	**33.3%** (20-40%)	**0%**	**0%**	**0%**	**0%**
Yuba	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**50%** (33-66%)	**50%** (33-66%)	**0%** (0-33%)	**0%**	**0%**	**0%**
American	**0%**	**0%**	**0%**	**0%**	**0%**	**33.3%** (20-40%)	**33.3%** (20-40%)	**33.3%** (20-40%)	**0%**	**0%**	**0%**	**0%**
Mokelumne[1]	**25%** (10-30%)	**0%**	**0%**	**0%**	**0%**	**15%**[2]	**34%**[2]	**26%**[2]	**0%**	**0%**	**0%**	**0%**
Tuolumne[3]	**0%**	**0%**	**0%**	**2%**	**1%**	**60%**[4]	**19%**[4]	**16%**[4]	**2%** (2-37%)	**0%**	**0%**	**0%**
Putah	**0%**	**16.7%** (0-75%)	**16.7%** (0-75%)	**16.7%** (0-75%)	**16.7%** (0-84%)	**16.7%** (0-74%)	**8.3%** (0-54%)	**8.3%** (0-57%)	**0%**	**0%**	**0%**	**0%**
CVP/SWP Export Reduction	**0%**	**0%**	**0%**	**0%**	**0%**	**33.3%** (20-80%)	**33.3%** (20-80%)	**33.3%** (0-50%)	**0%**	**0%**	**0%**	**0%**
PWA Water Purchase Program	**0%**	**0%**	**0%**	**0%**	**0%**	**0%** (0-40%)	**50%**[5]	**50%**[5]	**0%** (0-40%)	**0%**	**0%**	**0%**
Permanent State Water Purchases	**0%**	**0%**	**0%**	**0%**	**0%** (0-40%)	**33.3%**[6]	**33.3%**[6]	**33.3%**[6]	**0%** (0-40%)	**0%**	**0%**	**0%**
Summary	**1%**	**<1%**	**<1%**	**<1%**	**<1%**	**23%**	**32%**	**33%**	**3%**	**3%**	**3%**	**1%**

[1] Mokelumne year type determined as described in Section 2.7 based on D-1641 thresholds of projected unimpaired runoff. VA flow releases subject to offramp to protect cold water pool, described in Table 13, fn. 1.

[2] Flexibility Bracket for the March to May period is 70-90%.

[3] See Table 16 for Default Plan in off-ramp conditions.

[4] Flexibility Bracket for the March to May period is 60-95%.

[5] Flexibility Bracket for the April to May period is 60-100%.

[6] Flexibility Bracket for the March to May period is 60-100%.

Table 5: Default Plan and Flexibility Bracket for VA Flow Measures in a Critical water year. Bolded numbers represent the Default Plan and numbers in parentheses represent the Flexibility Bracket for any given year. Values are a proportion of the total flow contribution as stated in Table 1 (Appendix 1 of the MOU and all associated amendments). Note that not all water sources are making contributions to VA Flow Measures in critical years – see Table 1 for details. The summary row was calculated by multiplying each water source's water quantity contributions for the VA by the Default Plan proportion.

Source	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
Sacramento	**5%** (0-25%)	**0%** (0-25%)	**0%** (0-25%)	**0%** (0-25%)	**0%** (0-25%)	**0%** (0-50%)	**10%** (0-25%)	**15%** (0-25%)	**20%** (0-25%)	**20%** (0-25%)	**20%** (0-25%)	**10%** (0-25%)
American	**0%**	**0%**	**0%**	**0%**	**0%**	**50%** (33-66%)	**50%** (33-66%)	**0%** (0-33%)	**0%**	**0%**	**0%**	**0%**
Tuolumne[1]	**0%**	**0%**	**0%**	**2%**	**2%**	**68%**[2]	**14%**[2]	**9%**[2]	**5%** (5-36%)	**0%**	**0%**	**0%**
Putah	**0%**	**16.7%** (0-75%)	**16.7%** (0-75%)	**16.7%** (0-75%)	**16.7%** (0-84%)	**16.7%** (0-74%)	**8.3%** (0-54%)	**8.3%** (0-57%)	**0%**	**0%**	**0%**	**0%**
PWA Water Purchase Program	**0%**	**0%**	**0%**	**0%**	**0%**	**0%** (0-40%)	**50%**[3]	**50%**[3]	**0%** (0-40%)	**0%**	**0%**	**0%**
Permanent State Water Purchases	**0%**	**0%**	**0%**	**0%**	**0%** (0-40%)	**33.3%**[4]	**33.3%**[4]	**33.3%**[4]	**0%** (0-40%)	**0%**	**0%**	**0%**
Summary	**<1%**	**1%**	**1%**	**1%**	**1%**	**44%**	**31%**	**19%**	**2%**	**<1%**	**<1%**	**<1%**

[1] See Table 16 for Default Plan in off-ramp conditions.
[2] Flexibility Bracket for the March to May period is 60-91%.
[3] Flexibility Bracket for the April to May period is 60-100%.
[4] Flexibility Bracket for the March to May period is 60-100%.

2.1.3 Systemwide Planning and Decision Making for VA Flow Measures

The Draft VA Governance Program (Appendix B to the Strategic Plan) describes the VA governance entities that will be engaged in planning and decision making related to Flow Measures, including a Systemwide Governance Committee and Tributary/Delta Governance Entities. Some Flow Measures are more flexible than others in terms of the degree to which their timing can be shaped by decisions or recommendations from the Systemwide Governance Committee. Note that Responsible Parties reserve final decision-making authority over the deployment of Flow Measures (subject to Implementing Agreements, Enforcement Agreements and applicable regulatory requirements). Table 6 summarizes which water sources have Flow Measures that may be possible to shape given a recommendation from the Systemwide Governance Committee. Sections 2.2 to 2.12 describe the governance and decision-making processes related to each water source.

Table 6: Summary of whether the Systemwide Governance Committee can make recommendations or decisions with respect to the VA Flow Measures for each water source.

Water Source	Can the Systemwide Governance Committee make recommendations or decisions with respect to the Flow Measures for this water source?
Friant	The flow is managed by a Restoration Administrator to achieve a specific Restoration Goal. It is uncertain if this Restoration Administrator can consider recommendations from the Systemwide Governance Committee.
Sacramento	Yes (recommendations), but there are many other regulations, constraints and considerations for this water source which will limit ability to implement recommendations.
Feather	Yes (recommendations), 50 TAF is under direct control of SWP and DWR can flexibly allocate that quantity of water over the March to May period based on recommendations from local system biologists and the VA Systemwide Governance Committee.
Yuba	Yes (recommendations) - The Yuba Water contribution can be flexibly allocated across April through June, including in response to recommendations from the Systemwide Governance Committee, at the discretion of Yuba Water and consistent with the Yuba River Development Project's regulatory and operational constraints.
American	Yes (recommendations) - the Systemwide Governance Committee can make recommendations within the March through May Flexibility Bracket. American River-specific tributary governance will consider the recommendations after assessing river conditions and integration of flows with the Modified Flow Management Standard.
Mokelumne	Yes (recommendations) – the Mokelumne governance entity for the VA is the Partnership established by a Joint Settlement Agreement. The Partnership will consider any recommendations from the Systemwide Governance Committee.
Tuolumne	Yes (recommendations) - The Tuolumne River Parties will consider recommendations from the Systemwide Governance Committee.
Putah	Yes (recommendations) – The flow to Lower Putah Creek is managed by the Solano County Water Agency. Monthly minimum and current seasonal pulse flow releases are governed by the Putah Creek Accord. The Systemwide Governance Committee can make recommendations within the Flexibility Brackets from November to May

Water Source	Can the Systemwide Governance Committee make recommendations or decisions with respect to the Flow Measures for this water source?
	subject to real-time conditions, and within the operational and systematic limitations discussed in Section 2.9 that are beyond the Agency's control.
CVP/SWP Export Reduction	Yes (recommendations) – The Systemwide Governance Committee may make recommendations to the Reclamation and DWR, however there is limited flexibility in the timing for this water source given the constraints that need to be met to ensure this is additional water.
PWA Water Purchase Program	Yes (decisions) – the Systemwide Governance Committee will make decisions related to timing of use and exercise of flexibility of the water made available by each water purchase within the program. These decisions will need to be made in coordination with the entities that are making the water available.
Permanent State Water Purchases	Yes (decisions) – the Systemwide Governance Committee will make decisions related to timing of use and exercise of flexibility of the water made available by each water purchase within the program. These decisions will need to be made in coordination with the State and will depend upon any constraints in how the water is being made available.

2.1.4 Flow Accounting

VA Flow Measures accounting involves confirming that the actions VA parties commit to take have in fact occurred. To assess this, evaluations may include evaluating the additional instream tributary flows, reservoir reoperations, and reductions in CVP/SWP Exports. Separately, the VA program will need to assess Delta inflows and outflows resulting from the combined VA Flow Measures, which may require actions from the State Water Board to protect flows made available. This section provides a narrative description of the flow accounting method describing how each VA water source contributes additional instream tributary flow or a reduction in CVP/SWP Exports.

This narrative description is the first step toward developing quantitative flow accounting methods that address VA accounting. The next step is to develop quantitative flow accounting methods to assess whether commitments for VA Flow Measures have been met and to evaluate how the combined VA Flow Measures contribute to both Delta inflow and outflow. Measuring the total additional contribution of VA Flow Measures to Delta inflow and outflow will require a modeling and monitoring approach. This integrated approach will consider the direct measurement of the additional flow contributions from tributaries, Delta operations, and water purchases, with the real-time hydrology conditions that occur within any particular year, and include other additional evaluation methods as appropriate (e.g., verification of fallowing actions). In coordination with the State Water Board, the VA Parties, Department of Water Resources, and US Bureau of Reclamation will develop accounting procedures to ensure that flows provided under the VAs are additional contributions, which are intended to result in increased Delta inflows and outflows. These procedures will be incorporated into the Implementation Agreements as appropriate, and will be subject to approval by the State Water Board.

The narrative description of flow accounting in Table 7 includes the following:

- Column 1: the source of water for the VA Flow Measure.
- Column 2: A description of the immediate action(s) taken to provide additional instream flows, which include (a) reservoir releases of flows in excess of what would otherwise be released, and (b) pumping and diversion rates below what would have otherwise been allowed.

- Column 3: The additional action(s) that are taken to make water available, such as through reducing consumptive uses or through reservoir releases or reductions in pumping/diversion. Water-source specific details are included in Table 7, but general definitions of these actions follow:
    - Fallowing: land is left unplanted (idled) that would have otherwise been planted, which avoids the need for irrigation from either groundwater or diversions from surface water. Surface water that would have typically been used to irrigate fallowed fields is released from upstream reservoirs to be protected as additional instream flows.
    - Groundwater substitution: forgoing the diversion of surface water supplies for consumptive use (irrigation, M&I) and instead relying on groundwater supplies (in compliance with applicable SGMA Basin Plans). Surface water that would have otherwise been used for consumptive use is released from upstream reservoirs to be protected as additional instream flows.
    - Reservoir reoperation: modifying the current/existing operations of upstream reservoirs to release additional instream flows during the January-June period that would be protected from other downstream diversions consistent with water right priorities.
    - Forgone exports: water that would otherwise be planned and allowed to be exported (consistent with other regulatory requirements and agreements) remains instream and protected from other downstream diversions.
- Column 4: a description of the reference operation and other conditions that Flow Measures are additive to, and against which the Flow Measures will be measured to demonstrate that they are in fact additional flows.
- Column 5: a description of the conceptual measurement approaches, including the station where flows are measured for each water source.

The descriptions in Table 7 rest on the following assumptions:

- The State Water Board, working together with the VA Parties, will use its legal authorities to protect all flows generated by the actions described in Table 7 against diversions for other purposes for the term of the Vas consistent with water right priorities.
- To ensure flows can be protected without redirecting impacts to other water users, the State Water Board will need to implement a mechanism to protect those flows consistent with water right priorities and in some cases, commitments or other agreements between water users resolving any impacts may be necessary and are not shown in the tabulations.

Table 7: Narrative description of VA flow accounting for each water source (quantitative flow accounting approach is under development)

Water Source	Immediate action(s) taken to provide additional instream flows	Additional action(s) taken to make water contributions available	Flow Measures will be additive to flows resulting from…	Conceptual Measurement Approaches
Sacramento River	Reclamation releases additional water into Sacramento River from Shasta Reservoir, which is paid back in arrears, in real time, or ahead of time based on the timing of the action	Fallowing & groundwater substitution, which results in reduced diversions based on a crop irrigation/ evapotranspiration schedule	Current Biological Opinions (2019) (which includes D-1641)	VA flows measured as increase in release measured at Keswick and would exclude those flows needed to meet Delta requirements. VA contribution measured using fallowing and groundwater substitution verification would follow the approach described in the Transfer White Paper, though future work will resolve differences between VA accounting and White Paper idling ET rates and groundwater substitution depletion factors.
Yuba River (YWA)	Yuba Water Agency releases additional water into Yuba River from New Bullards Bar Reservoir during Spring	Reservoir reoperation	Operations to comply with Yuba Accord required flows and end of September target storage in New Bullards Bar Reservoir	VA flows and contribution measured as an increase in Yuba flows measured at Marysville gauge, and end of September storage used to verify seasonal contribution.

Water Source	Immediate action(s) taken to provide additional instream flows	Additional action(s) taken to make water contributions available	Flow Measures will be additive to flows resulting from…	Conceptual Measurement Approaches
Feather River	DWR releases additional water into Feather River from Lake Oroville during Spring following with payback timing	• Fallowing & groundwater substitution through reduced diversions • Upstream Reservoir reoperation	Operative in-stream flow and Delta requirements (i.e., requirements in effect at the time of the operation)	VA deployment measured as increase in release at Oroville complex and would exclude those flows needed to meet Delta requirements. VA contribution measured using fallowing and groundwater substitution verification would preliminarily follow the Water Transfers White Paper framework. For reservoir reoperation, VA contribution measured at Ponderosa Dam where verification would preliminarily follow the approach described in the Water Transfer White Paper.
American River	Reclamation releases additional water into the Lower American River from Folsom Lake during Spring	Upstream reservoir reoperation	Operative in-stream flow and Delta requirements by Reclamation (i.e., requirements in effect at the time of the operation)	VA flows measured as increase in release at Folsom Reservoir outlets and would exclude those flows needed to meet Delta requirements.
	Reclamation releases additional water into the Lower American River from Folsom Lake during Spring	Groundwater substitution (using groundwater diversions instead of surface diversions, with accounting for groundwater/surface interaction)	Operative in-stream flow and Delta requirements by Reclamation (i.e., requirements in effect at the time of the operation)	VA flows measured as increase in release at Folsom Reservoir outlets and would exclude those flows needed to meet Delta requirements.

Water Source	Immediate action(s) taken to provide additional instream flows	Additional action(s) taken to make water contributions available	Flow Measures will be additive to flows resulting from…	Conceptual Measurement Approaches
Mokelumne River **See Section 2.7 for more detail.**	Operation of Camanche Dam to increase minimum releases into the Mokelumne River above existing minimum release requirements, by the volume equal to the VA target flow requirements (10/20/45 TAF in "Dry," "Below Normal" (BN), and "Normal and Above" (AN) years, as described in Section 2.7.3).	Contribute funding towards the purchase of water if modeled additional inflow to the Delta from the Mokelumne River is less than the minimum VA target flow commitment based on Sacramento River Index (Dry: 5 TAF; BN: 5 TAF; AN: 7 TAF).	Operation of Camanche Dam to meet existing minimum release requirements, including JSA, D-1641, and prior obligations.	VA flows measured as increased minimum volume of releases from Camanche Dam above releases needed to meet existing minimum instream requirements.
Putah Creek (SCWA)	SCWA releases additional water into Putah Creek from Lake Solano based on VA target flow requests.	Reservoir reoperation	Operations to comply with Putah Creek Accord	VA flows measured at the Putah Diversion Dam as flows above minimum instream requirements.
Delta Operations (SWP/CVP Forgone Exports)	Reduction in export of unstored flows during the spring	Forgone Exports at CVP & SWP facilities	Operative regulatory requirements (i.e., requirements in effect at the time of the operation) in the Delta	VA flows measured as a reduction in diversion at Jones Pumping Plant and Clifton Court Forebay.

Water Source	Immediate action(s) taken to provide additional instream flows	Additional action(s) taken to make water contributions available	Flow Measures will be additive to flows resulting from…	Conceptual Measurement Approaches
Tuolumne River	Operation of Don Pedro Reservoir to meet an increased in-stream flow requirement at the La Grange gauge. The VA in-stream flow schedule and pulse flow volumes are greater than the current in-stream flow schedule and pulse flow volumes (1995 FERC Settlement Agreement) by the volumes shown in the VA MOU (top row of table in Tuolumne section, labeled "Tuolumne River downstream of La Grange Dam").	Operation of Don Pedro Reservoir to make increased in-stream flow releases consistent with the Tuolumne VA.	Operation of Don Pedro Reservoir to meet the in-stream flow requirements at the La Grange gauge included in the 1995 FERC Settlement Agreement for the Don Pedro Project. This operation will be estimated so that it incorporates the hydrology experienced during the implementation of the Tuolumne VA and reflects operational decisions that would have been made while operating to the 1995 FERC Settlement Agreement.	Tuolumne VA compliance will be determined by confirming that the Tuolumne VA flow obligations are met at the La Grange gauge, accounting for diversion at the Infiltration Galleries (if any). Flow will be measured at the La Grange gauge and compared to an estimate of flow that would have occurred at the La Grange gauge if Don Pedro Reservoir were operated to meet the in-stream flow requirements of the 1995 FERC Settlement Agreement. This comparison will account for diversion at the Infiltration Galleries (if any).
Friant	Continued implementation of the San Joaquin River Restoration Program	Forgone recapture	San Joaquin River flows without releases from Friant Dam	Flows from Friant Dam as measured at downstream recapture locations

Water Source	Immediate action(s) taken to provide additional instream flows	Additional action(s) taken to make water contributions available	Flow Measures will be additive to flows resulting from…	Conceptual Measurement Approaches
Water Purchases	Varies based upon method of actions taken to make water available (primarily includes additional reservoir releases, and/or diversion reductions)	Through export/diversion reductions or upstream contributions (e.g., fallowing, reservoir reoperations, etc.)	Operative regulatory requirements (i.e., requirements in effect at the time of the operation)	For upstream releases, fallowing, or ground water substitution, VA contribution measured based on methods that follow the Transfer White Paper. For export reductions, see Delta Operations.

2.2 Friant Flow Measures

2.2.1 Default Plan and Flexibility Bracket

Table 8 presents the Default Plan and Flexibility Bracket for VA Flow Measures from the Friant water source. Note that the Default Plan may need further refinement based on additional modeling. The Default Plan presented here is based on cursory post-processing of DWR's CalSim 3 results to account for one iteration of potential San Joaquin River Restoration Flows, accounting for flexibilities provided to the Restoration Administrator.

Table 8: Timing of VA Flow Measures from the Friant water source. Bolded numbers represent the Default Plan for VA Flow Measures and numbers in parentheses represent the Flexibility Bracket for any given year. Friant does not have VA Flow Measures in wet and critical water years.

Water Year	Feb	Mar	Apr	May
Above Normal and Below Normal	**5%** (0-5%)	**20%** (15-30%)	**40%** (35-70%)	**35%** (0-35%)
Dry	**0%**	**40%** (40-75%)	**30%** (25-30%)	**30%** (0-30%)

The Default Plan for Friant's VA Flow Measures assumes that in all years, except for those determined to be Wet, Critical-High, and Critical-Low under the Stipulation of Settlement in NRDC, et al. v. Kirk Rodgers, et al. (San Joaquin River Restoration Settlement [Settlement]), that Reclamation will reduce the recapture of Restoration Flows to achieve a goal of total Delta outflows derived from any San Joaquin River flows released below Friant Dam of 50,000 acre-feet during the period of February through May (Delta Outflow Goal). The maximum amount of reduced recapture in any month during the period of February through May would be up to 50% of the total recapturable Restoration Flows for such month. All flows released below Friant Dam, including those flows released and/or bypassed by Friant Dam necessary to address flood conditions, would contribute towards satisfying the 50,000 acre-foot Delta Outflow Goal. It is understood and allowed that in some years there would not be sufficient Restoration Flows to meet the Delta Outflow Goal, and Reclamation would not be required to take other actions or make other releases of water.

2.2.2 Governance and decision-making for Friant VA Flow Measures

On the Friant, the Restoration Flow Guidelines describe the process to quantify, release, and monitor Restoration Flows to comply with the Settlement. The Unimpaired Runoff on the San Joaquin River at Friant Dam over the course of the Water Year (October through September) sets the allocation of water volume available to the Restoration Administrator and the default Restoration Flow releases for each Restoration Year (March through February). When Reclamation sets the Initial Restoration Allocation, the issuance will be accompanied by a Default Flow Schedule. The Default Flow Schedule is derived from the Settlement Exhibit B Base Flow Hydrographs adjusted for the precise Unimpaired Runoff. Default Flow Schedules prepared by Reclamation provide an initial daily distribution of the annual Restoration Allocation and a starting point for the Restoration Administrator to develop a specific flow schedule. An approved Restoration Administrator's Restoration Flow Schedule Recommendation supersedes any Default Flow Schedule for the purposes of scheduling and releasing Restoration Flows.

Reclamation will discuss forecasts and operations with the Restoration Administrator before issuance of a Restoration Allocation and Default Flow Schedule. Reclamation will indicate the likely allocation for planning purposes, whether a new allocation is warranted, discuss the forecasts being used to generate

the allocation, discuss Unreleased Restoration Flow management, discuss channel conveyance capacity constraints, and provide updates to flow operations and flow accounting.

Restoration Administrator
The Restoration Administrator (RA) is an individual selected by the non-Federal Settling Parties to help administer and implement the Restoration Goal of the Settlement, including annual and seasonal development of Restoration Flow Recommendations. The Restoration Administrator makes recommendations to the Secretary concerning the manner in which the hydrographs shall be implemented and when the Buffer Flows are needed to help in meeting the Restoration Goal. The Restoration Administrator's general duties are set forth in Paragraphs 9 and Paragraphs 11 through 19 of the Settlement.

The Technical Advisory Committee (TAC) contains six members selected by the Friant Water Authority and the Natural Resources Defense Council that advise the Restoration Administrator regarding technical topic areas outlined in the Settlement Exhibit D, including information needed to inform Flow Recommendations. There are two State of California members of the TAC (DWR and DFW) and three Federal agency liaisons (Reclamation, NMFS, USFWS) to the RA and TAC to ensure coordination and information-sharing with the Implementing Agencies.

Restoration Flow Schedule
The Restoration Administrator will provide an initial flow recommendation to Reclamation by January 31 of each year following the receipt of Reclamation's initial Restoration Allocation and Default Flow Schedule. When Reclamation provides a subsequently updated allocation, the Restoration Administrator will provide an updated recommendation. In addition, the Restoration Administrator may submit a new Restoration Flow Schedule or revise an existing schedule at any time or Reclamation may request an updated recommendation to help manage operational issues or rapidly changing hydrologic conditions.

Reclamation will release the Restoration Flow Schedule at Friant Dam or otherwise make releases from Friant Dam to meet the Restoration Administrator's flow targets at Gravelly Ford, Friant Dam, or other specified locations. It is recognized that fluctuations in Holding Contract demand in Reach 1, and any channel losses for Restoration Flows, may necessitate that Reclamation adjust releases at Friant Dam in order to meet the recommended flow targets at Gravelly Ford and other specified locations. Reclamation will also coordinate with San Joaquin River facility operators downstream of Gravelly Ford to meet the Restoration Administrator's recommended flow targets at downstream locations.

Flexible Flow Provisions
The Settlement outlines specific flexibilities that are always available to the Restoration Administrator, including ability to:

- Flexibly schedule Restoration Flows within the Spring Flexible Flow Period and Fall Flexible Flow Period, so long as the total volume of flows during that period of the year is not changed. The volume of flows depicted in the Exhibit B Base Flow Hydrograph during the Spring Period (March 1– April 30) and Fall Period (October 1–November 30) may be shifted up to four weeks earlier or later. This includes shifting Spring Flows into the winter of the proceeding Restoration Year. Flushing Flows also fall within this flexibility. These Flexible Flow Periods are depicted in figure below.

- Schedule Buffer Flows needed to meet the Restoration Goal based on daily flow rates or within the flexible provisions.

- Release Riparian Recruitment Flows to promote the establishment of riparian vegetation at appropriate elevations in the channel.

The Settlement outlines additional flexibilities that are only available to the Restoration Administrator with a determination of no increase in water delivery reduction to Friant Division Long–term Contractors as compared to the hydrographs and provisions of Settlement Exhibit B. These include:

- Shifts within the summer or winter flow accounts pursuant to Exhibit B 4(d). The volume within the summer or winter flow period remains the same, but the distribution of that volume across the flow period is different on a monthly or daily basis as compared to the Default Flow Schedule. This is referred to as "shifting flows".
- Transfers between flow accounts pursuant to Exhibit B 4(d). This is referred to as "transferring flows."

Given all the uncertainties described above in the Restoration Flow Schedule compared to the Default Flow Schedule, the Flexibility Bracket in Table 8 represents the potential range of when Restoration Flows would be anticipated to contribute to the Delta.

2.3 Sacramento Flow Measures

2.3.1 Default Plan and Flexibility Bracket

Table 9 presents the Default Plan and Flexibility Bracket for VA Flow Measures from the Sacramento water source.

Table 9: Timing of VA Flow Measures from the Sacramento water source. Bolded numbers represent the Default Plan for VA Flow Measures and numbers in parentheses represent the Flexibility Bracket for any given year. Sacramento does not have VA Flow Measures in wet water years.

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Above Normal[1]	**0%**	**0%**	**0%**	**0%** (0-25%)	**0%** (0-25%)	**0%** (0-25%)	**50%** (0-100%)	**50%** (0-100%)	**0%** (0-25%)	**0%**	**0%**	**0%**
Below Normal, Dry and Critical[2]	**5%** (0-25%)	**0%** (0-25%)	**0%** (0-25%)	**0%** (0-25%)	**0%** (0-25%)	**0%** (0-50%)	**10%** (0-25%)	**15%** (0-25%)	**20%** (0-25%)	**20%** (0-25%)	**20%** (0-25%)	**10%** (0-25%)

[1] VA parties agree that the Sacramento River flow contribution of 100 TAF will be provided during the January through June period, except when it is recommended through the VA governance process that shifting the timing of a portion of this contribution would be in the best interest of the fishery. Recommendations by the VA governance process require approval from at least 2 of the following agencies: National Marine Fisheries Service, California Department of Fish and Wildlife, and the State Water Board. A process will need to be developed which describes this decision-making process for each of the three agencies as well as a summary of why one of the agencies chose not to approve the action.

[2] Assumes an April-October fallowing pattern. For November – February, assumes water from the action year would be held in storage to be used in the fall or into the winter, assuming Reclamation approves the extension of the VA water into the next water year and operations. For March, assumes a dry year pulse in March.

The Sacramento River Settlement Contractors (SRSC), water right holders on the Sacramento River that precede the Central Valley Project who also have a Settlement Contract with the Bureau of Reclamation, will contribute 100,000 acre-feet in Dry, Below Normal, and Above Normal years through annual land fallowing and up to 20% groundwater substitution pumping. This water would be available to the system under a land idling monthly allocation from April through October as shown in Table 9.

During initial VA discussions with DWR and CDFW, State representatives requested that SRSC make supply available in a Spring Pulse focused in April-May to benefit delta outflow and in river spring run salmon outmigration. As the SWRCB developed its Phase II UIF, subsequent to the VA conversations, it directed flows be made available from January through June. The Default Plan shown in Table 9 is to focus supply in April and May for Above Normal water years. In Below Normal and Dry water years, it is anticipated

that supply will be spread between the months of April to October to provide benefits in the season that provides the most benefits for fish (as explained more below).

2.3.2 Governance and decision-making for Sacramento VA Flow Measures

Water provided by the SRSC will require the reoperation of Shasta Reservoir, which is owned and operated by the Bureau of Reclamation. This reoperation will involve the following actions and order:

1. A water year designation needs to be determined, if Dry, Below Normal, or Above Normal, the SRSC would implement actions to make water available, or would take actions to reduce demand by 100,000 AF.
2. VA governance entities (Sacramento River Governance and Systemwide Governance Committee) would decide on a recommended Spring Action based on the framework in the Strategic Plan. An evaluation of Shasta Cold Water Pool would be completed to ensure any spring action would not impact Winter Run salmon cold water temperature requirements that align with the applicable Biological Opinions and State Water Board water right requirements.
3. Recommendations by the VA governance entities require approval from at least 2 of the following agencies: National Marine Fisheries Service, California Department of Fish and Wildlife, and the State Water Board.
4. If a spring pulse is not possible (for example, because of winter-run salmon cold water temperature requirements) or needed, the VA governance entities would discuss other options for the block of water made available subject to Reclamation approval, which could include:
    a. Making the water available instream per the fallowing schedule
    b. Holding the water in storage in Shasta Reservoir until the fall to help meet fall flow and temperature requirements for fall-run salmon
    c. Carrying the water over into the next water year for a spring action while ensuring decision making is clear and accounting is done through an approved methodology (subject to any additional necessary regulatory approvals still under development).

For the options listed above, if any option falls outside of the Flexibility Bracket as defined in Table 9, the VA Parties providing Flow Measures for the Sacramento water source would seek prior approval from the State Water Board to make these adjustments.

For science informing governance, the Sacramento River Science Partnership can be used to develop a science and monitoring plan to inform the Strategic Plan and decision making.

Currently, the Sacramento River Temperature Task Group (SRTTG) provides feedback to Reclamation as it relates to Shasta cold water pool operations and winter-run salmon actions. Since the Sacramento River VA actions are more extensive and multi-species, a new governance structure will need to be formed from the VA parties focused on Sacramento River mainstem operations, actions, projects, and monitoring. The role and participants of the SRTTG may need to be adjusted to meet the VA, Biological Opinion and Temperature Management Planning processes.

2.4 Feather Flow Measures

2.4.1 Default Plan and Flexibility Bracket

Table 10 presents the Default Plan and Flexibility Bracket for VA Flow Measures from the Feather River.

Table 10. Timing of VA Flow Measures from the Feather water source. Bolded numbers represent the Default Plan for VA Flow Measures and numbers in parentheses represent the Flexibility Bracket for any given year. The Feather River does not have VA Flow Measures in wet and critical water years.

Water Year	Mar	Apr	May
Above Normal and Below Normal	**75%** (50-90%)	**25%** (10-50%)	**0%**
Dry	**33.3%** (20-40%)	**33.3%** (20-40%)	**33.3%** (20-40%)

The Feather will contribute 60,000 acre-feet in Dry, Below Normal, and Above Normal years between March and May, depending on water year type and with the monthly breakdown shown in Table 10. A pulse flow for two to three weeks in March and/or April will likely increase survival of emigrating juvenile salmonids by providing increased cover from predators, reduced pathogen transmission, faster migration speed, and increased rearing habitat. Specifically:

- By March/April, most juveniles will be rearing lower in the Feather River or in the Delta. Targeting March allows juveniles rearing or migrating at any location in the watershed (upper Feather River or Delta) the opportunity to benefit from increased flows.
- A March/April pulse flow is late enough to benefit nearly all recently emerged juvenile salmonids (spring-run and fall-run) while not waiting too long in their life cycle to provide the expected survival benefit (i.e., smaller, actively moving juveniles are most vulnerable).
- A March/April pulse could also correspond well with natural runoff events in the lower Feather River (e.g., Yuba River or Bear River) or the lower Sacramento River, heightening the potential value of an action due to increased turbidity or flow.
- In March/April, the first half of juvenile spring-run are released from the Feather River Fish Hatchery, so improved survival of this group would be expected.
- By stimulating or accelerating movement in March/April juveniles may emigrate through the lower Feather River before Striped Bass (*Morone saxatilis)* enter the system in large numbers, reducing the effect of predation.
- March/April is a key time for pathogen transmission in the lower Feather River. Utilizing a pulse flow would dilute pathogens and speed migration through pathogen dense portions of the river.
- Depending on timing of adult migration, a March/April pulse could improve adult passage over Sunset Pumps.

Dry year types would see a shift in focus to maintaining suitable habitat conditions and emigration period conditions by increasing flows over several weeks. Specifically:

- In dry years having the flexibility between March, April, and May to distribute water over several weeks or months (when flows are predicted to be lowest) to maintain basic habitat conditions (rearing habitat, ideal temperatures, etc.) could be critical for juvenile salmonid survival as they emigrate and rear in the lower Feather River.

- Maintaining slightly higher flows over Sunset Pumps would facilitate upstream passage of spring-run Chinook adults into the upper Feather River where conditions are most suitable.
- Even small increases spread out over many days between March and April would likely benefit both releases of juvenile spring-run Chinook from the Feather River Fish Hatchery (into the lower Feather River) by providing better rearing habitat, faster migration speeds, and reduced pathogen transmission.
- A March/April increase could also correspond well with natural runoff events in the lower Feather River (e.g., Yuba River or Bear River) or the lower Sacramento River, heightening the potential value of an action due to increased turbidity or flow.

2.4.2 Governance and decision-making for Feather VA Flow Measures

50,000 acre-feet of the total contribution of 60,000 is under the direct control of the SWP. As such, DWR is in the position to flexibly allocate that quantity of water over the March to May period, based on recommendations from local system biologists and the VA Systemwide Governance Committee.

2.5 Yuba Flow Measures

2.5.1 Default Plan and Flexibility Bracket

Table 11 presents the Default Plan and Flexibility Bracket for VA Flow Measures from the Yuba water source.

Table 11: Timing of VA Flow Measures from the Yuba water source. Bolded numbers represent the Default Plan for VA Flow Measures and numbers in parentheses represent the Flexibility Bracket for any given year. Yuba does not have VA Flow Measures in wet and critical water years.

Water Year	Apr	May	Jun
Above Normal and Below Normal	**50%** (33-66%)	**50%** (33-66%)	**0%** (0-33%)
Dry	**50%** (33-66%)	**50%** (33-66%)	**0%** (0-33%)

Yuba Water Agency's contribution, through measures described in Yuba Water's Implementing Agreement, will provide up to 50,000 acre-feet per year during Above Normal, Below Normal and Dry water years, as measured at the Marysville Gage. These flows will be available April through June.

2.5.2 Governance and decision-making for Yuba VA Flow Measures

The Yuba Water contribution can be flexibly allocated across April through June, including in response to recommendations from the Systemwide Governance Committee, at the discretion of Yuba Water and consistent with the Yuba River Development Project's regulatory and operational constraints.

When planning releases of the Yuba Water VA contribution, Yuba Water Agency will seek input from the Department of Fish and Wildlife on local and Delta conditions. The Yuba Water VA contribution will then be managed using the Yuba Accord's existing framework for coordination of operations with the Department of Water Resources and the Bureau of Reclamation.

In some years the flexibility shown in the table may be available (i.e., 33-66% in April, 33-66% in May, and 0-33% in June), while in other years the flexibility may be significantly limited by the Yuba River Development Project's regulatory and operational constraints.

2.6 American Flow Measures

2.6.1 Default Plan and Flexibility Bracket

Table 12 presents the Default Plan and Flexibility Bracket for VA Flow Measures from the American water source.

Table 12: Timing of VA Flow Measures from the American water source. Bolded numbers represent the Default Plan for VA Flow Measures and numbers in parentheses represent the Flexibility Bracket for any given year. The American does not have VA Flow Measures in wet years.

Water Year	Mar	Apr	May
Above Normal and Below Normal	**50%** (33-66%)	**50%** (33-66%)	**0%** (0-33%)
Dry	**33.3%** (20-40%)	**33.3%** (20-40%)	**33.3%** (20-40%)
Critical	**50%** (33-66%)	**50%** (33-66%)	**0%** (0-33%)

The Default Plan for the American water source is to deploy water in March through May in three out of eight years of the VA in above normal, below normal, dry, and critical years. In critical years, a concentrated pulse is biologically beneficial for juvenile outmigration, focusing on the months of March and April. For dry years, spreading VA contributions evenly over the months of March, April, and May are the most biologically beneficial. For above normal and below normal years, spreading VA contributions through the months of March and April are preferable. Reclamation would make these flows available from Folsom Reservoir and water providers in the American River region would back these flows up later in the year either through groundwater substitution above the Folsom outlets or downstream, or through releases from upstream storage. Flow pulses for the VA would potentially compliment flows made consistent with the Modified Flow Management Standard (MFMS), which provides protections for redd dewatering via a minimum release requirement. Additionally, VA flows could compliment the MFMS's spring pulse flows from March 15 to April 15 to help provide an emigration cue before lower flow conditions and thermal warming later in the spring.

The Default Plan and Flexibility Bracket provided here are consistent with science gathered on the American River and knowledge of suitable flow for outmigrating fish.

In dry and critical years, there may be advantages to fish in shifting the deployment of VA Flow Measures from Spring to other seasons, such as:

- Hold water in Folsom for cold water pool formation and maintenance and deploy water in fall for adult migration; or,
- Hold water in Folsom through the following winter for temperature control. Keeping water in the reservoir over the winter will build a larger pool of cold water for the spring and following summer, particularly if there are consecutive dry years.

Any deployment of VA Flow Measures outside of the Flexibility Bracket defined in Table 12 would be subject to State Water Board approval and would be considered on a case-by-case basis in coordination with the Operations Review Group (ORG, membership provided below) and in consideration of flows made through the MFMS. Deployment of VA Flow Measures outside of the Flexibility Bracket is applicable for groundwater substitution.

2.6.2 Governance and decision-making for American VA Flow Measures

Any releases of VA contributions from the American River would require the reoperation of Folsom Reservoir, which is owned and operated by the Bureau of Reclamation. The American River VA Parties, the Sacramento Water Forum, and Reclamation, through the ORG, will convene by February 1 of each year to review potential operational scenarios and water year types for the water year. An evaluation will occur, and a determination will be made whether releases will be made for VA contributions and whether the current year provides appropriate conditions to release water from Folsom Reservoir for the American River's flow contributions from upstream surface storage and/or groundwater substitution.

Reclamation would begin releasing VA contributions from Folsom as early as March 1 of a designated VA outflow year according to the schedule provided below, with replenishment[2] to occur after reservoir releases. For the Default Plan, Reclamation would release flows on the following schedule:

- **In Above Normal, Below Normal years:** 5 TAF released in March and 5 TAF released in April. These releases will be replenished from upstream storage.
- **In Dry years:** 10 TAF released in March, 10 TAF released in April, and 10 TAF in May. These releases will be replenished from groundwater substitution.
- **In Dry years:** An additional 3.3 TAF released in March, 3.3 TAF released in April, and 3.3 TAF in May. These releases will be replenished from upstream storage, groundwater substitution, or a combination of sources. If a D year is predicted by the ORG, a determination of the source of replenishment water will be determined by February 28 of the VA outflow year.
- **In Critical years:** 15 TAF released in March and 15 TAF released in April. These releases will be replenished from groundwater substitution.

The American River will also continue to be managed according to the MFMS, which is reflected in the 2019 Biological Opinions, and through a Memorandum of Understanding between the Sacramento Water Forum and Reclamation. The MFMS and VA for the American River will be treated as complimentary actions and will require local watershed-specific governance, with ongoing systemwide governance coordination.

2.7 Mokelumne Flow Measures

2.7.1 Default Plan and Flexibility Bracket

The Default Plan and Flexibility Bracket for VA Flow Measures from the Mokelumne water source are presented in Table 13 and Table 14, respectively. The numbers in Table 13 and Table 14 represent percent of the annual block of flow released from Camanche Dam in a given month or season. The Default Plan values are based on modeling completed for the Mokelumne River proposal and they are not operating criteria. Actual operations will be determined by the tributary governance in conformance with the seasonal Flexibility Bracket.

Mokelumne VA flow assets are available in three Water Year types ("Dry", "Below Normal", and "Normal and Above"). These Water Year types are specific to the Mokelumne River and have been used since the 1990s to make minimum flow release decisions on the tributary. For purposes of implementing the VA flow requirement, the tributary governance body will determine the Water Year type in the manner set forth in Section 2.7.2 below. In years when there is a year-type mismatch between the Sacramento River

[2] Replenishment is the water made available by American River Parties, either through upstream surface storage releases or groundwater substitution, to fill the VA volumes released by Reclamation out of Folsom Reservoir.

Index and the Mokelumne-specific year type, the Mokelumne-specific year type is controlling for Mokelumne VA flow assets.

Table 13: Default Plan for timing of VA Flow Measures from the Mokelumne water source[1]. Year types are based on Mokelumne-specific index. Mokelumne does not have VA Flow Measures in water years designated "Critically Dry" under the Mokelumne-specific index.

Mokelumne specific Water Year Type	Oct	Mar	Apr	May
Normal & Above	**13%**	**8%**	**43%**	**36%**
Below Normal	**26%**	**17%**	**32%**	**25%**
Dry	**25%**	**15%**	**34%**	**26%**

[1] In years when EBMUD's March 1st median forecast of Total Combined Pardee and Camanche (P+C) storage by End-of-September is projected to be less than 350 thousand acre-feet, then no VA flow requirement applies, but JSA-required flows would be provided.

Table 14. Flexibility Bracket for VA Flow Measures from the Mokelumne water source. Year types are based on Mokelumne-specific index. Mokelumne does not have VA Flow Measures in water years designated "Critically Dry" under the Mokelumne-specific index.

Mokelumne specific Water Year Type	Oct	Mar to May
Normal & Above	10-30%	70-90%
Below Normal	10-30%	70-90%
Dry	10-30%	70-90%

The Mokelumne proposal for VA Flow Measures was developed to provide biologically beneficial flow regimes below Camanche Dam based on ambient conditions and when those flows are most beneficial to Mokelumne River fisheries. The proposal contains an offramp (Table 13, footnote 1) which applies when combined Pardee and Camanche storage is projected to be below a certain threshold. The purpose of the offramp is to minimize water temperature impacts and preserve cold water resources and achieve downstream temperatures to support the doubling goal of salmonid populations. The proposal provides no assurances that any flow will be released in any one month, but it assures the entirety of the obligated block flow (except in off ramp years) will be released during the designated water year. The Mokelumne River Proposal anticipates 70-90% of full annual volume released in the March-May period and 10-30% in October as reflected by the Flexibility Brackets stated in Table 14.

2.7.2 Governance and decision-making for Mokelumne VA Flow Measures

Tributary governance decisions which concern pre-existing flow obligations on the Mokelumne River are made by the Partnership established by the Lower Mokelumne River Joint Settlement Agreement (JSA). The Partnership will also provide tributary governance with respect to Mokelumne VA flow release obligations. The Partnership's VA-related governance obligations will include (1) making a Mokelumne VA year type determination in the manner described in this section, which will govern Mokelumne River VA flow obligations for each given water year, and (2) making decisions regarding the timing of Mokelumne River flow assets based on considerations described below and consistent with VA agreements.

Mokelumne VA Year Type Determination

For many years, Mokelumne River governance has been based on a tributary-specific year-type index developed for the JSA and incorporated into it. Attachment 1 of the JSA defines four year types: "Normal & Above", "Below Normal", "Dry", and "Critically Dry". The JSA imposes minimum release obligations in each year type. The year-types are determined based on Mokelumne-specific indicators as stated in JSA Attachment 1. Therefore, in any given year, the Mokelumne year-type may differ from the "equivalent" year-type of other year-typing systems like the Sacramento River Index. In general, for purposes of the JSA, year types are determined by a combination of projected storage and projected runoff indicators. The State Water Board incorporated the Mokelumne JSA year-type index and its associated thresholds into D-1641 (p.175). The year-type methodology described in those documents will continue to be used for the purpose of determining the JSA's applicable flow obligations.

To determine the applicable VA flow obligations, the Mokelumne VA proposes to employ a slightly modified version of the year-type methodology described in the JSA and D-1641. The modified JSA year types and their application to determining the VA release requirement at a given time *w*ill be fully described in the Mokelumne River Implementation Agreement. In general, for VA purposes, Mokelumne year-type would be determined based on projected unimpaired runoff using the runoff thresholds specified in the JSA and D-1641, without regard to projected storage, as shown in Table 15.

Table 15: Mokelumne VA Year Types and Thresholds

Mokelumne VA Year Type	Normal & Above	Below Normal	Dry
Unimpaired runoff	890 TAF or More	889 TAF to 500 TAF	499 TAF to 300 TAF

In order to protect cold water pool, EBMUD will not be obligated to release water above existing release requirements in years when EBMUD's March 1st median forecast of Total Combined Pardee and Camanche (P+C) storage by End-of-September is projected to be less than 350 thousand acre-feet, but in those circumstances the JSA/D-1641 required flows would continue to be provided. The Partnership would make an initial Mokelumne VA year-type determination each year before March based on available runoff projections. Following the release of DWR Bulletin 120, which typically occurs in April, the Partnership would update the Mokelumne River year-type designation based on the Bulletin's unimpaired runoff projection, and that final designation would govern Mokelumne VA release obligations through October.

Flow Asset Decision-making

To meet the potential desire to release flows in March, the JSA Partnership Coordinating Committee (PCC) has a proposed schedule of decision making as follows:

- By mid-February each year, the JSA PCC will design and develop a daily flow schedule for the Spring Block flow to apply in the months of March through May based on EBMUD's most recent median projection of Mokelumne Watershed unimpaired runoff for the Water Year.
- By mid-June each year, the JSA PCC will design and develop a daily flow schedule for the Fall Block flow to apply in September and October based on EBMUD's most recent median projection of Mokelumne Watershed unimpaired runoff for the Water Year.
- The block flow will be distributed on a daily schedule, subject to ramping rates in place and approved by the JSA PCC. It is anticipated that contingency plans may also be included with the flow schedule, subject to periodic adjustments in median projections, to provide guidance on revising and/or adapting the schedule based on a change in conditions.

- If flood control releases on a given day are greater than the daily schedule of proposed VA releases provided by the JSA PCC, then no additional VA release is required on that day, as the portion of the flood releases that is equivalent to the proposed VA release will be credited as meeting the VA release obligation.
- Controlled releases are capped at 2,000 cubic feet per second (CFS) to protect downstream landowners.

Each year's flexibility will be based on real-time conditions, and decision making by the local tributary governance for the Mokelumne River (the Partnership) established by the Joint Settlement Agreement within the following boundary guidelines:

- The flow proposal is for up to 90% of committed Camanche Release flows to occur in the March-May period.
- The remaining flow after establishing releases in the March-May period to occur in October, not to exceed 30% of the annual releases.
- The Partnership considers a number of parameters annually to determine the correct distribution of flows to allow for optimizing fisheries benefit. Those parameters include, but are not limited to:
    - Delta entry timing of adult chinook for timing of fall attraction pulses,
    - Coordination with Reclamation on Delta Cross Channel operations to improve attraction pulse effectiveness;
    - Redd emergence timing so that floodplain benefits will be available for when most juvenile salmonids are able to use them;
    - Water year type (the dry year contribution is not intended to fill floodplains to beneficial growth criteria and so spring water would be used to encourage juvenile outmigration or introduce food into the main channel– likely in May); and
    - Ambient air and water temperatures (not attracting adults upstream when temperatures are limiting or not inundating floodplain when water temperatures are too low to produce good growth inducing opportunities).

Due to these variable parameters, March will generally get very little if any of the spring flows based on ambient and river water temperatures not supporting floodplain growth opportunities and may only see floodplain inundation in warmer climatological years where growth would be supported. In dry years, spring flow may only be in May to implement an outmigration peak pulse to move fish out of the system before temperatures become critical, or to provide instream food delivery. The fall flows will be released in October, based on salmon migration timing, Delta Cross Channel coordination, and ambient conditions.

The Partnership will review and consider any requests from the Systemwide Governance Committee but retain final decision-making authority on Mokelumne VA flow asset release schedules.

2.7.3 Additional Details on Flow Accounting for Mokelumne VA Flow Measures

The Mokelumne River VA flow assets are a volume of minimum Mokelumne flows to be released by EBMUD from Camanche Dam in excess of the volume of water that EBMUD is presently obligated to release from Camanche Dam to meet existing release requirements. Existing release requirements are comprised of (1) releases needed to satisfy demands of senior downstream water users and (2) releases required to meet instream flow requirements imposed by the *1998* Lower Mokelumne River Joint

Settlement Agreement (JSA).[3] The State Water Board incorporated the minimum release requirements of the JSA into D-1641 and thereby also into EBMUD's applicable water rights.

EBMUD would operate to provide VA releases from Camanche Dam, above existing minimum release flow requirements, of 10 thousand acre-feet (TAF), 20 TAF, and 45 TAF in "Dry," "Below Normal" (BN), and "Normal and Above" (AN) modified Joint Settlement Agreement (JSA) year types, respectively. The VA flow assets will be provided in two ways: (1) reservoir reoperation as needed to ensure a sufficient volume of releases above existing release requirements are provided to meet the VA obligation on the schedule required by the VA, and (2) if and to the extent necessary, also from forgoing diversions to storage or direct diversion EBMUD could otherwise lawfully make under its water rights.

EBMUD will work with DWR to refine modeling used to develop the modeled average long-term contributions of VA flows as inflow to the Delta from the Mokelumne River based on Sacramento River Index year type. If the modeling indicates the long-term average contribution will not meet an agreed quantity in any of three Sacramento River Index year types (specifically: Dry: 5 TAF; BN: 5 TAF; AN: 7 TAF), then EBMUD would contribute funding towards the purchase of the remaining volume difference when that Sacramento River Index year type occurs during the 8-year term of the agreement at an agreed price (or pricing method) to be specified in the VA. EBMUD could also receive credit toward backstop payments in years where modeled long term averages result in flows greater than zero during critical Sacramento River Index year types, or result in flows greater than 5 TAF in dry Sacramento River Index year types.

The Mokelumne River Governance Program will consider deployment requests made by the Systemwide Governance Committee and, when feasible, accommodate reasonable requests within real-time systematic constraints or emergency conditions. EBMUD will account aggregate VA flow contributions on a water year basis; any VA water that is not used during each water year will not carry-over to the following year.

[3] These two components of existing release requirements are not necessarily additive in all circumstances. Under certain circumstances, a given amount of flow may properly be accounted for as simultaneously satisfying JSA minimum instream flow requirements and the rights of downstream water users.

2.8 Tuolumne Flow Measures

2.8.1 Default Plan and Flexibility Bracket

The Default Plan and Flexibility Bracket for VA Flow Measures from the Tuolumne water source are presented in Table 16 and Table 17, respectively.

Table 16: Default Plan for timing of VA Flow Measures from the Tuolumne water source. VA flows are new and additive flows.

Water Year	Jan	Feb	Mar	Apr	May	Jun
Wet	**0%**	**0%**	**63%**	**18%**	**19%**	**0%**
Above Normal	**0%**	**0%**	**63%**	**18%**	**19%**	**0%**
Below Normal	**0%**	**0%**	**77%**	**11%**	**12%**	**0%**
Below Normal with off-ramp	**0%**	**0%**	**70%**	**14%**	**16%**	**0%**
Dry	**2%**	**1%**	**60%**	**19%**	**16%**	**2%**
Dry with off-ramp	**5%**	**5%**	**35%**	**28%**	**20%**	**7%**
Critical	**2%**	**2%**	**68%**	**14%**	**9%**	**5%**
Critical with off-ramp	**7%**	**7%**	**63%**	**2%**	**0%**	**21%**

Table 17. Flexibility Bracket for timing of VA Flow Measures from the Tuolumne water source. VA flows are new and additive flows.

Water Year	Jan	Feb	Mar to May	Jun
Wet	**0%**	**0%**	**60% to 100%**	**0% to 40%**
Above Normal	**0%**	**0%**	**60% to 100%**	**0% to 40%**
Below Normal	**0%**	**0%**	**60% to 100%**	**0% to 40%**
Below Normal with off-ramp	**0%**	**0%**	**60% to 100%**	**0% to 40%**
Dry	**2%**	**1%**	**60% to 95%**	**2% to 37%**
Dry with off-ramp	**5%**	**5%**	**60% to 83%**	**7% to 30%**
Critical	**2%**	**2%**	**60% to 91%**	**5% to 36%**
Critical with off-ramp	**7%**	**7%**	**60% to 65%**	**21% to 26%**

Timing of VA flow measures from the Tuolumne River

The Tuolumne River VA instream flow requirement includes base flows that are set according to water year type and calendar date, and it also includes two pulse volumes for which the timing is somewhat variable within the March-June period. The tables above only pertain to the additive volume committed to in the Tuolumne VA. These additive flows are above current FERC 1995 requirements which include minimum daily flows in all months in all water year types. In the default schedule presented here, it is assumed that one pulse volume is released in March, and the second is released in April and May. In the flexibility ranges presented here in brackets, it is assumed that the March pulse volume can be released in any month from March through June, and it is also assumed that the April-May pulse volume could be

released entirely in April, entirely in May, or could be released across both April and May. However, at least 60% of the additive flow will be released March through May. The biological basis for the flow flexibility is provided below.

Biological rationale: pulse flows and flexibility

There are two pulse flow volumes included in the Tuolumne VA: (1) floodplain inundation pulse, and (2) spring outmigration pulse.

1. Floodplain pulse
    - To maximize the benefit of the floodplain rearing pulse flow, each year's pulse will be timed with Chinook salmon rearing timing, which shall be determined via monitoring. Default timing will be March, but year-to-year decisions on timing will be determined on an annual basis relying upon such information as date of egg deposition, date of emergence, water temperatures, visual observations, RST data and other relevant information.

2. Spring outmigration pulse
    - Generally, the time period for release of spring outmigration pulse flows falls within the period of April 16 through May 31. The Tuolumne River VA includes the active monitoring of spawning timing and river temperatures, supplemented by snorkel surveys and/or seining, to calibrate degree days and juvenile size for the purpose of timing the spring outmigration pulse flows to coincide with the smoltification of large numbers of juveniles.
    - Adaptive management principles will be applied to optimizing over time the timing, duration, and flow rate of the pulse flows as data is collected on the resulting outmigration survival as a ratio to the number of female spawners (e.g., exiting smolts per female spawner) as measured at the Districts' RSTs.

2.8.2 Governance and decision-making for Tuolumne VA Flow Measures

The Tuolumne River Parties (Modesto Irrigation District, Turlock Irrigation District, and San Francisco Public Utilities Commission) may flexibly allocate the flow contribution across January through June as provided by the Flexibility Brackets in the table above, including in response to recommendations from the Systemwide Governance Committee, real-time conditions on the Lower Tuolumne River, and consistent with regulatory and operational constraints. Additionally, the Tuolumne River Parties may allocate some or all of the flexible volumes of water outside of the January through June period as recommended by the Systemwide Governance Committee and approved by the State Water Board subject to real-time conditions on the Lower Tuolumne River and consistent with regulatory and operational constraints.

2.9 Putah Flow Measures

2.9.1 Default Plan and Flexibility Bracket

Table 18 presents the Default Plan and Flexibility Bracket for VA Flow Measures from the Putah water source.

Table 18: Timing of VA Flow Measures from the Putah water source. Bolded numbers represent the Default Plan for VA Flow Measures and numbers in parentheses represent the Flexibility Bracket for any given year. Putah does not have VA Flow Measures in wet water years.

Water Year	Nov	Dec	Jan	Feb	Mar	Apr	May
Above Normal, Below Normal	**16.7%** (0-75%)	**16.7%** (0-75%)	**16.7%** (0-75%)	**16.7%** (0-84%)	**16.7%** (0-74%)	**8.3%** (0-54%)	**8.3%** (0-57%)

Water Year	Nov	Dec	Jan	Feb	Mar	Apr	May
Dry & Critical	**16.7%** (0-75%)	**16.7%** (0-75%)	**16.7%** (0-75%)	**16.7%** (0-84%)	**16.7%** (0-74%)	**8.3%** (0-54%)	**8.3%** (0-57%)

Hydrology

The Putah Creek watershed has a unique hydrology compared to most other Sacramento valley streams. Lake Berryessa is purely a rainfall fed reservoir, snow melt is negligible. The watershed lies under a corridor that channels frequent atmospheric river events over it, these conditions commonly occur in most years even when most of the state is experiencing "dry" conditions. Over the last decade, dry conditions have become more prevalent during the late fall/early winters (NOV-JAN) period. The late winter/early spring (JAN-MAR) is typically the most productive run-off period.

Operations

Monticello Dam (MD) impounds Putah Creek to form Lake Berryessa. Lake Berryessa does not have active flood management responsibilities or capabilities and only two relatively small controlled release point, a hollow jets valve and power house. The maximum controlled flow release from MD is less than 1,000 cfs. The Lake has a "Glory Hole" spillway that passively manages the lake level to prevent overtopping the MD. Regulated water released from the MD is re-impounded at the Putah Diversion Dam (PDD), a low-head check dam located 7 miles downstream to form Lake Solano, a small shallow regulating pool to check-up the water elevation for diversion to the Putah South Canal. This 7-mile reach is known as the Inter-dam Reach (IDR). There are five unregulated tributaries to the IDR and two downstream of the PDD. Minimum releases to Lower Putah Creek (LPC), downstream of PDD, are made through a venturi valve. The venturi provides fine tuning of releases and is accurately measured up to 100 cfs for most compliance needs. Lake Solano has very little storage capacity, so the PDD is operated to pass all unregulated flood water downstream to lower Putah Creek (LPC) through a series of twelve sluice gates where flow measurement is considerably less accurate.

The unregulated tributaries produce flows during most rainfall events. The rainfall-runoff response is flashy with considerable flow that typically lasts days to a couple weeks depending on the cadence of subsequent rain events. Once Lake Berryessa is filled the spillway can provide sustained flood flow for weeks to months depending on the hydrologic conditions. Flow releases for VA are not practical when the PDD is operating to pass unregulated flood water, or the Yolo Bypass is operating to pass unregulated flood flow from the Sacramento River. During periods of sustained flood flow the flexibility to VA release could be zero for the month.

Following the default implementation plan schedule, the annual voluntary volume translated to daily average operational releases are:

- 6 TAF: 100 cfs/d (30-Days); 17 CFS/d (NOV-MAR), 9 cfs/d (APR-MAY)
- 7 TAF: 117 cfs/d (30-Days); 20 CFS/d (NOV-MAR), 10 cfs/d (APR-MAY)

This range of flows are within the operating range of the venturi valve. The implementation can be satisfied by releasing 100 cfs for 30 days or spread out across the months in accordance with the Default Plan.

Instream Flow Requirements

Instream flow releases to LPC downstream of the PDD are governed by a local settlement agreement, the Lower Putah Creek Flow Accord (Putah Creek Accord or "Accord"). There is a minimum release schedule from PDD and a downstream compliance point at the Interstate 80 crossing (I-80). The Accord also has

two pulse flow provisions: 1) a fall pulse flow for salmon spawning attraction, and 2) a spring pulse flow for trout spawning and salmon outmigration. Table 19 is a simplified summary of relevant Accord provisions.

Table 19. Instream Flow Requirements for Putah Creek Accord.

-	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Minimum Diversion Dam Release: "Normal" Year	20	25	25	25	16	26[a]	46	43	43	43	34	20
Minimum Diversion Dam Release: "Dry" Year[b]	15	25	25	25	16	26	46	33	33	33	26	15
Downstream Compliance Station (I-80): "Normal" Year	5	19[c]	19	19	19	25	50[d]	20	15	15	10	5
Downstream Compliance Station (I-80): "Dry" Year	2	2	2	2	2	2	2	2	2	2	2	2

[a] Sometime between February 15 and March 31, the following Diversion Dam three-day pulse release must be made: 150 cfs for the first 24 hours, 100 cfs for the second 24 hours, and 80 cfs for the third 24 hours. Immediately following this three-day release, must maintain a minimum flow of 50 cfs at I-80 bridge for the next 30 days (see "d" below)

[b] For the purposes of the Putah Creek Accord, a "dry year" release schedule is triggered when the total storage in Lake Berryessa is less than 750,000 acre-feet on April 1. "Normal-year" releases will be reinstated in the event that total Lake storage equals or exceeds 750,000 acre-feet prior to the following April 1. Additional rules apply when consecutive dry years occur.

[c] Between November 15 and December 15, must release enough water to maintain a 50 cfs flow, for five consecutive days, at the "Confluence with Toe Drain". Immediately following that five-day period, a minimum flow of 19 cfs must be maintained at the I-80 bridge. The 19 cfs criterion remains in effect through February.

[d] Immediately following the three-day pulse described in (a), must maintain a minimum flow of 50 cfs at I-80 Bridge for the next 30 days. Immediately following the 30-day period, stream flow releases are to be "gradually" ramped down over a seven-day period to match the prevailing stream flow release requirement (assuming there are no concurrent flood flow releases).

Riparian Agriculture Diversions

LPC flows along the Solano/Yolo County line from the PDD to I-80 and across the Yolo Bypass through the Yolo Basin Wildlife Area (YBWA) ultimately terminating in the "Toe Drain" (Figure 2).

Figure 2: Putah Creek and Yolo Bypass Map

Each agriculture season two water impoundments are installed on LPC in the YBWA to manage water, initially for riparian agriculture diverters, and then for preparation of the Refuge by CDFW for hunting season. One impoundment is a temporary earthen crossing with culverts and the other is flashboard dam known locally as the "Los Rios" Dam. Once these structures are in-place and operational two conditions occur: 1) the structure impede the flow preventing any substantive flow increases from PDD without damaging them, and 2) riparian water use dominates the water management upstream of the toe-drain. Very little water makes it past the Los Rios Dam due to excessive diversions. These structures are typically in place from May through mid-November but could occur earlier in April under dry spring conditions. SCWA has no control of the installation or operation of these facilities and cannot deploy flows releases for VA while they are in place. This a considerable constraint to the viability of April-May releases.

VA Functional Flow Benefits

LPC terminates in the Toe Drain and Putah water ultimately finds its way to the Cache Slough Complex (CSC). The CSC is part of the North Delta Arc and is coveted as a prime location for tidal wetland habitat restoration that benefits many native species. The abiotic condition in the CSC habitat can be hostile to biotic needs of native species during extreme dry periods in the late-fall and winter as we have seen more regularly. Adverse conditions such as poor circulation, high water temperatures, low dissolved oxygen, low turbidity, and concentrated contaminants may be improved by deployment of VA flow assets.

LPC hydraulic connectivity to the Delta is a very circuitous route and the tidal flux into Cache Slough can be a formidable force to downstream progression of VA water. The LPC provides very little water to the Delta except during flood events[4]. LPC contribution would be most beneficial to CSC and salmon spawning in the LPC in the fall. VA contributions in the spring through March during extended dry conditions would

[4] Draft Hydrological and Operations Modeling Considerations for the Phase II Update of the 2006 Bay-Delta Plan (SWRCB 2016)

most benefit salmon smolts for emigration out of LPC before the irrigation dam is installed. VA contributions released in April through May have a low guarantee of benefit due to many constraints as discussed below but may be able to occur opportunistically.

In summary, the deployment of LPC VA contributions would have the greatest benefit regionally for:

- Augment Accord minimum release compliance conditions in LPC when they are controlling. (See Table 20 below).
- Extend/enhance the Accord pulse flow conditions. (See Table 21 below)
- Improve food transport akin to the North Delta Flow Action pilot program.
- Improve late-fall abiotic conditions in the CSC that favor biotic responses of native species during excessive dry periods.
- Adaptive management for habitat restoration in the CSC.

Table 20. Voluntary Agreement Flow Plan (cfs/d) for Putah Creek

Month	LPC Accord (Normal year)	VA Default (Normal Year)	LPC Minimum (LPC Accord + VA Default, Normal Year)	LPC Accord (Dry Year)	VA Default (Dry Year)	LPC Minimum (LPC Accord + VA Default, Dry Year)	Operational Constraints
Oct	20	0	20	15	0	15	Los Rios Dam, Ag Div
Nov	25	17	42	25	20	45	Pulse, Tribs, Spill
Dec	25	17	42	25	20	45	Pulse, Tribs, Spill
Jan	25	17	42	25	20	45	Tribs, Spill
Feb	16	17	33	16	20	36	Pulse, Tribs, Spill
Mar	26	17	43	26	20	46	Pulse, Tribs, Spill
Apr	46	9	55	46	10	56	Los Rios Dam, Ag Div
May	43	9	52	33	10	43	Los Rios Dam, Ag Div
Jun	43	0	43	33	0	33	Los Rios Dam, Ag Div
Jul	43	0	43	33	0	33	Los Rios Dam, Ag Div
Aug	34	0	34	26	0	26	Los Rios Dam, Ag Div
Sep	20	0	20	15	0	15	Los Rios Dam, Ag Div

Table 21. Description of operational actions

Operational Action	Modeled	Water Year Type	Monthly Distribution	Instream Flow	Constraints on Asset	Notes
2.5 TAF (Pulse Flow)	Yes	All but Wet	Nov to Dec	To be determined	Removal of Los Rios Dam	See "SWCA Notes" below
2.5 TAF (Ramp Down Flow)	Yes	All but Wet	Following Pulse Flow and through March	To be determined	n/a	See "SWCA Notes" below
1.0 TAF (Flushing Flow)	Yes	All but Wet	April to May	To be determined	Prior to installation of Los Rios Dam	See "SWCA Notes" below

SWCA Notes:

1) Proposed Pulse, Ramp Down, and Flushing Flows are in addition to streamflows required pursuant to the 2000 Putah Creek Accord

2) Proposed Pulse Flow will augment existing pulse flow releases and is for the purposes of attracting adult Chinook Salmon. Timing of the Pulse Flow must coincide with the annual removal of the seasonal Los Rios Dam in the Yolo Bypass (typically removed by mid-November). Magnitude and duration of Pulse Flow – other than total quantity of water committed for pulse flows – to be determined and cannot exceed 1,000 cfs due to Solano Project infrastructure constraints.
3) Proposed Ramp Down Flow will augment existing ramp down releases and enhance habitats for native fish assemblage. Magnitude of Ramp Down Flow – other than total quantity of water committed to ramp down flows – to be determined and cannot exceed 1,000 cfs due to Solano Project infrastructure constraints.
4) Proposed Flushing Flow will augment existing Flushing flows and is intended to encourage downstream migration of juvenile salmon. Timing of flushing flows must precede reinstallation of the Los Rios Dam (typically between mid and late May). Magnitude and duration of Flushing Flow – other than total quantity of water committed for Flushing Flows – to be determined and cannot exceed 1,000 cfs due to Solano Project infrastructure constraints.

2.9.2 Governance and decision-making for Putah VA Flow Measures

The flow to LPC is managed by the Solano County Water Agency. Monthly minimum and current seasonal pulse flow releases are governed by the Putah Creek Accord. Releases above the minimum requirements are required to pass flood water in the fall though spring, higher carriage water in dry spring through fall to meet monthly compliance targets further downstream, or to accommodate VA flow requests. The Systemwide Governance Committee can make recommendations within the Flexibility Brackets from November to May subject to real-time conditions, and within the operational and systematic limitations discussed above that are beyond the Agency's control. However, there are considerable constraints to the viability of April-May releases.

2.9.3 Additional Details on Flow Accounting for Putah VA Flow Measures

The Putah Creek VA flow assets are a volume of Putah Creek water to be released by SCWA from Putah Diversion Dam in excess of the controlled water releases that SCWA is presently obligated meet existing release requirements. Existing minimum release requirements are governed by the Putah Creek Accord.

SCWA would operate to provide LPC VA contributions from Putah Diversion Dam, above existing minimum instream flow requirements, up to the volumes specified under the hydrologic condition stipulated in Table 1.

The VA contributions will be made available each water year on October 1 as a dedicated volume (block) of water in storage for deployment within that corresponding water year. SCWA will consider deployment requests made by the Systemwide Governance Committee and accommodate reasonable requests within real-time systematic constraints or emergency conditions that may arise. SCWA will account aggregate VA contributions on a water year basis, any VA portion of LPC VA flow asset that is not able to be released due to conditions and constraints beyond SCWA control during each water year, such as specified below, will not carry-over to the following year.

SCWA will not be obligated to release VA contributions while uncontrolled releases are occurring at the Putah Diversion Dam (i.e., flood flows- inflow from tributaries downstream of Monticello Dam or the Glory Hole is spilling) or when the Yolo Bypass is passing uncontrolled flood water from the Sacramento River. Additionally, SCWA will not be obligated to provide VA contributions during the seasonal period (typically Apr-Nov) while the Los Rios Check Dam is installed in the YBWA by others for irrigation operations.

2.10 CVP/SWP Export Reduction Flow Measures

2.10.1 Default Plan and Flexibility Bracket

The VA Flow Measure for CVP/SWP Export Reduction is to contribute 175 TAF in Above Normal water years and 125 TAF in Below Normal and Dry water years. Table 22 presents the Default Plan and Flexibility Bracket for VA Flow Measures from CVP/SWP Export Reduction.

Table 22. Timing of VA Flow Measures from the CVP/SWP Export Reduction water source. Bolded numbers represent the Default Plan for VA Flow Measures and numbers in parentheses represent the Flexibility Bracket for any given year. There are no VA Flow Measures in wet and critical water years.

Water Year	Mar	Apr	May	Jun
Above Normal	**0%** (0-30%)	**50%** (30-70%)	**50%** (30-70%)	**0%** (0-30%)
Below Normal and Dry	**33%** (20-80%)	**33%** (20-80%)	**33%** (0-50%)	**0%**

2.10.2 Governance and decision-making for CVP/SWP Export Reduction VA Flow Measures

Reclamation and DWR are the implementing organizations and decision makers for the deployment of the CVP/SWP export reduction water source within the proposed Flexibility Bracket as described in Table 22. The main purpose of this Flexibility Bracket is to ensure that there is enough time to reduce exports and achieve the required additive water quantity for the VA. The Systemwide Governance Committee may make recommendations to Reclamation and DWR, however there is limited flexibility in the timing for this water source given the constraints that need to be met to ensure this is additional water.

2.11 PWA Water Purchase Program Flow Measures

2.11.1 Default Plan and Flexibility Bracket

Table 23 presents the Default Plan and Flexibility Bracket for VA Flow Measures from the PWA Water Purchase Program.

Table 23. Timing of VA Flow Measures from the PWA Water Purchase Program water source. Bolded numbers represent the Default Plan for VA Flow Measures and numbers in parentheses represent the Flexibility Bracket for any given year.

Water Year	Mar	Apr	May	Jun
Wet, Above Normal, Below Normal, Dry and Critical	**0%**[1]	**50%**[2]	**50%**[2]	**0%**[1]

[1] The flexibility bracket for these months is 0-40%
[2] The flexibility bracket for April to May is 60-100%

The Default Plan for the PWA Fixed Price Water Purchase Program would make water available in April and May; similar to the CVP/SWP Export Reduction measure (84-90% of the purchases, depending on year type, are planned in the CVP/SWP service area). The Default Plan for the PWA Market Price Purchase Program will depend on the amount, location, and mechanism for making water available.

In any given year, the timing of the Flow Measure will depend on the needs as determined by the Systemwide Governance Committee. The Purchase Program will have significant flexibility. The individual purchases will have similar characteristics to other measures in the VA Flow Program; i.e., purchases in

the CVP/SWP service area will have similar flexibility to the CVP/SWP Export Reduction measure; purchases from land being fallowed in the Sacramento Valley will have similar flexibility to the Sacramento measure; and purchases that make water available through reservoir reoperation with refill criteria will have flexibility similar to the Yuba measure.

2.11.2 Governance and decision-making for PWA Water Purchase Program

Within the Flexibility Bracket defined in Table 23, the Systemwide Governance Committee will make decisions related to timing of use and exercise of flexibility of the water made available by each water purchase within the program. These decisions will need to be made in coordination with the entities that are making the water available.

2.12 State Water Purchases Flow Measures

2.12.1 Default Plan and Flexibility Bracket

Table 24 presents the Default Plan and Flexibility Bracket for VA Flow Measures from the PWA Water Purchase Program.

Table 24. Timing of VA Flow Measures from Permanent State Water Purchases. Bolded numbers represent the Default Plan for VA Flow Measures and numbers in parentheses represent the Flexibility Bracket for any given year.

Water Year	Jan	Feb	Mar	Apr	May	Jun
Wet, Above Normal, Below Normal, Dry and Critical	**0%**	**0%**[1]	**33.3%**[2]	**33.3%**[2]	**33.3%**[2]	**0%**[1]

[1] The flexibility bracket for these months is 0-40%

[2] The flexibility bracket for March to May is 60-100%

The Default Plan for the Permanent State Water Purchases is to target deployment of these Flow Measures in March, April, and May. This Default Plan will depend on the amount, location, and mechanism for making water available. The Flexibility Brackets are defined to be responsive to real-time hydrology and providing enhanced aquatic species benefits given variances in hydrology and species needs between years.

In any given year, the timing of the Flow Measure will depend on the needs as determined by the Systemwide Governance Committee. The State purchases will have similar characteristics to other measures in the VA Flow Program depending upon the location and mechanisms for making water available (e.g., purchases from land being fallowed will have similar flexibility to the Sacramento measure; and purchases that make water available through reservation reoperation with refill criteria will have flexibility similar to the Yuba measure, etc.).

2.12.2 Governance and decision-making for State Water Purchase Program

Within the Flexibility Bracket defined in Table 24, the Systemwide Governance Committee will make decisions related to timing of use and exercise of flexibility of the water made available by each water purchase within the program. These decisions will need to be made in coordination with the State and will depend upon any constraints in how the water is being made available.

3 Non-flow Measures Description

This section provides details on the proposed Non-flow Measures for the VA Program including the minimum additive contributions to habitat enhancement or restoration and other Non-flow Measures by geographic area (Section 3.1.1), an outline of the expected implementation timing of Non-flow Measures (Section 3.1.2), an approach for habitat accounting (Sections 3.1.3 and 3.1.3), and area-specific descriptions of Non-flow Measures, including a description of the relevant governance arrangements and/or Responsible Entities that will guide implementation, subject to Implementing Agreements, Enforcement Agreements and applicable regulatory requirements (Sections 3.1.3 to 3.10).

3.1 Overview of Non-flow Measures

3.1.1 Minimum Additive Contributions to Habitat Restoration

Table 25 describes the minimum additive contributions to habitat enhancement or restoration and other Non-flow Measures proposed for the VA Program by geographic area. These Non-flow Measures will be additive to physical conditions and regulatory requirements existing as of December 2018, when the State Water Board adopted Resolution 2018-0059. Implementation of such measures by Parties after that date, but prior to execution of the VAs, will be considered as contributing towards implementation of the Narrative Salmon Objective and Narrative Viability Objective (Term Sheet, Section 4.2).

Table 25: Minimum Additive Contributions to Habitat Restoration and other Non-flow Measures (Source: Appendix 2 of Term Sheet and associated amendments)*

Area	Total Acres[1]
San Joaquin Basin – Tuolumne[2]	77 (rearing/floodplain), >21.35 (spawning gravel)
Sacramento Basin – Sacramento	137.5 (instream), 113.5 (spawning)
Sacramento Basin – Sutter Bypass, Butte Sink, and Colusa Basin	20,000 (floodplain)[3], 20,000 (fish food production)[4] *Initial Targets per funding and permitting*
Sacramento Basin – Feather	15 (spawning), 5.25 (instream), 1,655 (floodplain)[5]
Sacramento Basin – Yuba[6]	50 (instream), 100 (floodplain)
Sacramento Basin – American	25 (spawning), 75 (rearing)
Sacramento Basin – Mokelumne	1 (instream), 25 (floodplain)
Sacramento Basin – Putah	1.4 (spawning)
North Delta Arc and Suisun Marsh	5,227.5[7]

* To expedite the completion of these projects, the State will commit to establish a new, multi-disciplinary restoration unit, with authority to coordinate and work collaboratively to obtain all permits required to implement the restoration activities. The unit will track and permit these projects and seek to: (1) encourage coordination between and among state and federal agencies, (2) avoid repetitive steps in the permitting process, (3) avoid conflicting conditions of approval and permit terms, and (4) provide an expedited path to elevate and resolve permitting challenges.

[1] This column represents the sum of habitat restoration commitments proposed in the Planning Agreement and habitat restoration acres identified in the State's VA Framework from February 2020 (modified to reflect the 8-yr VA term, State Team's discussion with participants, and modeling analysis).

[2] Tuolumne Parties will work to define habitat projects in collaboration with CDFW, drawing from the prior 15-year VA habitat list. Projects will be funded by the Tuolumne Parties and implemented, subject to and depending on obtaining applicable requirements for project-specific environmental review or regulatory approval, within the 8-year term of the agreement.

[3] Floodplain habitat will be generated via Tisdale Weir and other modifications. Subject to analysis showing that acreage meets suitability criteria.

[4] Subject to analysis of effectiveness. Water will be pumped onto rice fields, held for a period of time to allow fish food production (e.g., zooplankton), and then discharged to the river for the benefit of native fishes downstream.

[5] This consists of added instream habitat complexity and side-channel improvements.
[6] This constructed floodplain will be activated at 2,000 cfs.
[7] This will be tidal wetland and associated floodplain habitats.

3.1.2 Systemwide Implementation Schedule

Table 26 provides a system-wide overview of the implementation schedule for VA Non-flow Measures, drawing on the detailed area-by-area descriptions in the sections that follow. The numbers in Table 26 provide an indication of the general pace of implementation of the habitat restoration and other Non-flow Measures, and are provided with the following points of clarification:

- Acreages and numbers of projects planned for implementation during the Term of the VA (2025-2033) are approximate and intended to demonstrate the magnitude of anticipated habitat restoration and other Non-flow Measures.
- Acreages represented under the Early Implementation heading in Table 26 are approximate, and will be updated for consistency with the accounting approach for Non-flow Measures described in Section 3.1.4 upon finalization of the accounting methods.
- Where the anticipated acreages and numbers of projects identified in Table 26 and the area-specific tables exceed the commitments in Table 25 (Appendix 2 of the MOU and Term Sheet and associated amendments), these are not intended to constitute additional commitments, but instead to demonstrate that sufficient opportunity and flexibility exists to meet the requirements of the VA.
- All planned projects are subject to the availability of funding at the time of implementation and to the granting of required permits.

Table 26. Systemwide Summary of VA Non-flow Measures

Description of Measures	Early Implementation (Dec 2018 – 2024)	Years 1-3 (2025 – 2027)	Years 4-6 (2028 – 2031)	Years 7-8 (2032-2033)	Total
Spawning Habitat Construction, Restoration, & Enhancements (total acres)	114	47	86	43	291
Instream Rearing Habitat Construction, Restoration, & Enhancements (total acres)	144	29	233	28	434
Floodplain Rearing Habitat Construction, Restoration, & Enhancements (total acres)	4011	8982	10,991	3942	27,926
Tidal Wetlands Construction, Restoration, & Enhancements (total acres)	500	2500	2350	-	5350
Weir Improvements & Fish Passage Projects (# of projects)	8	5	1	-	14
Fish Food Production on Agricultural Land (annual acres)	30,000	20,000	20,000	20,000	20,000
Predator Control Activities (# of projects)	-	1	2	-	3
Other Salmonid Habitat Enhancements (# of projects)	-	4	3	1	8

3.1.3 Non-flow Measure Accounting and Assessments

The VAs will result in new Non-flow Measures, including habitat restoration and enhancements, that are intended to contribute to the achievement of the Narrative Objectives, and which will be implemented in specific geographic locations overseen by Tributary/Delta Governance Entities (Tributary/Delta GEs). Coordinated by the VA Science Committee, the Tributary/Delta GEs will conduct accounting and assessments of Non-flow Measures as follows:

- **Accounting for Non-flow Measures** will be conducted to inform the Systemwide Governance Committee and State Water Board on progress relative to the VA Parties' Non-flow Measure commitments as described in the March 2022 VA Term Sheet and applicable amendments, summarized in Table 25 above. The Non-flow Measure accounting process is described further in Section 3.1.4.

- **Habitat suitability assessments**, described in the VA Science Plan, consider habitat suitability design criteria, as well as additional factors (covariates) that may affect species utilization and their ability to feed, grow, avoid predators, and reproduce in the new or enhanced habitat. These covariate suitability metrics are additional to the metrics informing the habitat accounting procedures and often regard water quality (e.g., water temperature). For example, covariate suitability metrics for spawning habitat, in-channel rearing habitat, tributary floodplain habitat, bypass floodplain habitat, and tidal wetland habitat are described in VA Science Plan Hypotheses H_{S1}, H_{R1}, $H_{TribFP1}$, $H_{BypassFP4}$, and H_{TW1}, respectively. The habitat suitability assessment is separate from the habitat accounting method described in this document (Section 3.1.3) because it considers suitability metrics that may not be possible to control through project design but may affect utilization and biological effectiveness. The results of the habitat suitability assessments will be provided in VA Program reports as described in Section 9.4 of the VA Term Sheet as well as the ecological outcomes analysis to be provided prior to Year 7 of the VA Program, as described in Appendix 4 of the VA Term Sheet. The assessment methods for habitat suitability are described further in the VA Science Plan, Section 4.1.1.

- **Habitat utilization and biological effectiveness assessments**, described in the VA Science Plan, will be conducted to determine whether target species are using the new or enhanced habitat areas, are exhibiting expected near-term benefits (e.g., improved fish passage, increased growth rate) that can be attributed to the completed habitat action, and whether these measures are achieving or are likely to achieve the anticipated ecological outcomes by creating, restoring, or enhancing the habitat of one or more target species and lifestages. For example, Hypothesis H_{R4} in the VA Science Plan tests whether the new or enhanced rearing habitat for Chinook salmon has higher juvenile salmon densities compared to areas outside of the new or enhanced habitat project locations. The results of the habitat utilization and biological effectiveness assessments will be provided in VA Program reports as described in Section 9.4 of the VA Term Sheet as well as the ecological outcomes analysis to be provided prior to Year 7 of the VA Program, as described in Appendix 4 of the VA Term Sheet. The assessment methods for habitat utilization and biological effectiveness are described further in the VA Science Plan, Section 4.1.2.

3.1.4 Methods for VA Non-flow Measure Accounting

For VA implementation projects, Non-flow Measure accounting will occur according to the following steps:

1. Any project that implements all applicable design criteria in Table 27 will be counted toward the VA Non-flow Measure commitments identified in Table 25. If any project element deviates from the applicable design criteria identified in Table 27 or is a Tidal Wetland or Bypass Floodplain project, the project moves to Step 2. Otherwise, the project moves to step 3.

2. During the project planning stage, any variances from the design criteria in Table 27 will be proposed to the VA Science Committee and finalized according to the **design criteria review process** described below.

3. After construction is completed, the VA Non-flow Measure accounting procedure will count the new or enhanced non-flow habitat consistent with the approved project design criteria toward the appropriate VA Non-flow Measure commitments (identified in Table 25). Detailed scientific protocols for determining that constructed projects conform to approved design criteria will be coordinated by the VA Science Committee.

Note that early implementation projects will follow a different accounting process described in Section 3.1.5. Consistent with Section 4.2 of the VA Term Sheet, Non-flow Measures will only be counted if they are additive to physical conditions and regulatory requirements existing as of December 2018. In addition, enhancement projects will only be counted for the Bypass floodplain habitat projects included in VA Non-Flow Measure Commitments and their acreages will only be counted to the extent that areas of enhanced habitat meeting the design criteria are additive to the physical conditions and regulatory requirements existing in that habitat area as of December 2018.

Design Criteria Review Process - the design criteria review process will ensure all Non-flow Measures address the necessary design elements to contribute toward the VA objectives and have a design that is based on best available science and information. To facilitate a timely review, the project proponent will prepare a justification of the proposed design criteria with appropriate supporting rationale, including any applicable citations to the scientific literature and PDFs of all citations. This justification document will explain why variances are needed from the design criteria outlined in Table 27 and why alternative criteria would provide equivalent or similar benefits for the target species. The justification may include other benefits or constraints (e.g., traditional ecological knowledge, health and safety limitations) that inform the proposed alternative design criteria. For Tidal Wetland and Bypass floodplain projects, which have no established criteria, the justification will explain how the design criteria will result in benefits for the target species and how they align with the general guidelines outlined in Sections 3.1.4.4 and 3.1.4.5. The design criteria review process will follow the following steps:

1. The design criteria review process will rely on existing venues for early consultation used for permitting procedures to the maximum extent possible (e.g., Water Forum Habitat Team on the American River, Lower Yuba River Management Team on the Yuba River, Mokelumne River Technical Advisory Committee on the Mokelumne River, CVPIA Project Work Teams and Technical Advisory Committees for CVPIA funded projects). If a venue does not exist, the Tributary/Delta GE will establish a project work team or technical advisory committee for the project design criteria review process. These venues will allow for active participation by CDFW, USFWS, NMFS, SWB, and VA Science Committee members and the intent is to have a collaborative process to provide a timely review of the proposed design criteria. If consensus is reached on the design criteria at this step by the Tributary/Delta GE, CDFW, and SWB then the design criteria are approved for VA Non-flow Measure accounting purposes. If any of the Tributary/Delta GE, CDFW, or SWB do not approve of the proposed design criteria, then the design criteria review process moves to Step 2.

2. If consensus is not reached in step 1 within 30 days, the Tributary/Delta GE overseeing the project will bring the proposed design criteria to the Systemwide Governance Committee, who may refer questions to the VA Science Committee as necessary. If the Systemwide Governance Committee and SWB reach consensus on the proposed design criteria, then the design criteria are approved for VA Non-flow Measure accounting purposes.

3. If consensus is not reached at the Systemwide Governance Committee within 30 days, CDFW and SWB, in consultation with USFWS and NMFS, will seek agreement on the design criteria that the project would need to achieve for the purposes of VA Non-flow Measure accounting. As part of this process, SWB and CDFW may bring design criteria for peer review by an independent group

appropriate for the project in question. CDFW and SWB will have 30 days to agree to the project's design criteria for VA accounting purposes.

The above design criteria review process will also need to consider project constraints from other regulatory processes (e.g., Flood Board, USACE). Adaptive management will be necessary, and as the knowledge base evolves, there will be opportunities to incorporate Traditional Ecological Knowledge and other considerations (e.g., environmental justice) that may inform the design criteria review process for VA Non-flow Measure accounting. All projects are expected to engage in early consultation with CDFW on project design.

Triennial synthesis reports, as described in Term Sheet Section 9.4.B, will provide an opportunity to assess tributary-scale changes in acreage conforming to the Non-flow Measure accounting process within each geographic area (consistent with the analyses and scientific principles in the Final Draft Scientific Basis Report Supplement [SWB in preparation]), and confirm whether the changes described in this Strategic Plan and in the SBRS, in fact, materialize as anticipated. The results of this Non-flow Measure accounting will be one factor, in addition to the habitat suitability, and the utilization and biological effectiveness assessments described above, considered in the Year 8 Red/Yellow/Green assessment of the VA Program as a whole (as described in Term Sheet Section 7.4.C (iv)). Some VA parties remain concerned that this process has the potential to slow implementation of Non-flow Measures, and this will also be assessed as part of the Annual Reports and Triennial synthesis reports to ensure that the review process is working to both achieve expedited implementation and intended habitat outcomes.

The intention of the VA Parties is to align the benefits resulting from implementation of the committed Non-flow Measures with those anticipated in the Final Draft Scientific Basis Report Supplement (SWB in preparation). To achieve this, the VA Parties intend to plan, design, and construct new Non-flow Measures that reflect the best available science about the habitat needs of the species and lifestages the projects are intended to benefit. Table 27 provides quantitative and narrative design criteria for non-flow habitat measures for Sacramento Valley tributaries and floodplains and is based on the VA Parties' understanding of best available science at the time of writing. The acreage of each VA non-flow habitat project on Sacramento Valley tributaries that conforms to all applicable design criteria (either in Table 27 or approved through the design criteria review process described above) will be counted toward the VA Non-flow Measure commitments identified in Table 25. As demonstrated by tributary-specific flow-habitat relationships meeting VA design criteria, suitability of certain habitat acreages varies over a range of flows. Thus, in many cases habitat accounting does not assume 100% suitability for all constructed acres (per project or tributary) across all flows. Design criteria for the Tuolumne River are pending development and will target consistency with the Tuolumne River Scientific Basis Report that is being prepared by the State Water Board. For all aspects of habitat design, VA parties should also refer to established manuals for habitat restoration, such as the California Salmonid Stream Habitat Restoration Manual, 4th Edition, among other manuals approved by the CDFW Fish Restoration Grant Program[5], and the Conservation Planning Foundation for Restoring Chinook Salmon (*Oncorhynchus tshawytscha*) and *O. mykiss* in the Stanislaus River (Anchor QEA, LLC 2019).

Guidance for the design of other Non-flow Measure habitat enhancements (e.g., fish passage, fish food production, as listed in Table 26) is provided in the Science Plan. These include NMFS guidelines for fish passage facilities (NMFS 2023) and guidance for zooplankton production in shallow water areas for duration and water temperature conditions (e.g., as described in Corline et al. 2017).

[5] https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=183423&inline

Table 27. Design criteria for the accounting of habitat measures included in VA Non-flow Measure commitments on Sacramento Valley tributaries and floodplains.

Habitat Type	Water Depth (ft)[1]	Water Velocity (fps)[1]	Other
Spawning Habitat	1.0 – 2.5	1.0 – 4.0	**Substrate[2]:** Dominant substrate size 2 cm-10 cm (0.75 in – 4.0 in)
In-stream Rearing Habitat	0.5 – 4.0	0.0 – 3.0	**Cover[3]:** Sufficient cover to provide suitable rearing habitat for juvenile salmonids, defined as a minimum of 20% coverage of cover features that have a Habitat Suitability Index (HSI) score ≥ 0.5 supported by the scientific literature (listed in Table 27) (further discussed below in Section 3.1.4.2).
Tributary Floodplain Rearing Habitat	0.5 – 4.0	0.0 – 3.0	**Cover[3]:** Sufficient cover to provide suitable rearing habitat for juvenile salmonids defined as a minimum of 20% coverage of cover features that have a Habitat Suitability Index (HSI) score ≥ 0.5 supported by the scientific literature (listed in Table 27) (further discussed below in Section 3.1.4.3). **Floodplain Function:** Sufficient frequency, magnitude, and duration of inundation to provide benefits for rearing salmonids (further discussed below in Section 3.1.4.3)[4].

[1] Water depth and velocity criteria for each habitat type are consistent with SWB in preparation and identified by the Conservation Planning Foundation for Restoring Chinook Salmon and O. mykiss in the Stanislaus River (Anchor QEA, LLC 2019). Proposed variances from these specific values will be reviewed in the design criteria review process outlined above.

[2] Dominant substrate is defined by the particles which compose more than fifty percent of the surface area (Gard 1998, 2006, 2009). Substrates in Gard 2006 with HSI Score ≥ 0.5 ranged between 2.5 cm and 10 cm (fall run Chinook salmon in the Merced River and Clear Creek). This range was reduced to 2 cm (0.75 in) to accommodate smaller sized spawning fish (i.e., including *O. mykiss*) using the equation developed in Riebe et al. 2014 and Merz et al. 2018. Proposed variances from these specific values will be reviewed in the design criteria review process outlined above.

[3] Table 28 synthesizes cover habitat categories with a habitat suitability index (HSI) Score ≥ 0.5. Cover will be evaluated at project completion in accordance with final phases and/or full implementation of the project design (e.g., vegetation at maturity).

[4] For instances where daily data or tributary-specific high-resolution models are available, a range of combined duration and frequency targets may adhere to the rationale of the MFE and provide opportunities for adaptive management.

3.1.4.1 Design criteria for tributary salmonid spawning habitat actions

Given the widely accepted premise that water depth, water velocity, and substrate size strongly influence choice of spawning location by salmonids, those characteristics will be used to account for implementation of spawning habitat enhancement projects included in VA Non-flow Measure commitments identified in Table 25. Dominant substrate is defined by the particles that compose more than fifty percent of the surface area (Gard 1998, 2006, 2009). Substrates in Gard 2006 with HSI Score ≥

0.5 ranged between 2.5 cm and 10 cm (approximately 1-4 inches, fall run Chinook salmon in the Merced River and Clear Creek). This range was reduced to 2 cm (0.75 inches) to accommodate smaller sized spawning fish (i.e., including *O. mykiss*) using the equation developed in Riebe et al. 2014 and Merz et al. 2018.

The specific accounting protocol for spawning habitat actions will be described in the VA Science Plan, and it will involve evaluating the acreage of habitat conforming to the approved design criteria at a range of flows compared to the pre-project condition. For accounting purposes, the VA Science Plan will also include the methodology for comparing the acreage of suitable habitat of non-flow habitat measures conforming to the design criteria against the flow-habitat relationships provided by VA parties for the Final Draft Scientific Basis Report Supplement (SWB in preparation).

3.1.4.2 Design criteria for in-stream salmonid rearing habitat actions

Cover has been identified as a key element of freshwater rearing sites within designated critical habitat for ESA-listed salmonids (NMFS 2005) and is therefore included as a narrative design criterion along with quantitative design criteria water depth and water velocity for both in-stream and floodplain rearing habitat enhancement projects intended to meet VA Non-flow Measure commitments (Table 25). Cover will be evaluated at project completion in accordance with final phases and/or full implementation of the project design (e.g., vegetation at maturity) by the Tributary GE, as coordinated by the VA Science Committee. Table 28 describes a range of cover habitat types with a habitat suitability index (HSI) Score ≥ 0.5. For in-stream and floodplain rearing habitat acreage to conform to the narrative criterion for cover, a minimum of 20% of the habitat acreage (i.e., cover features will constitute 20% of the habitat area) that meets the water depth and water velocity ranges in Table 27 will have combinations of features described in Table 28 (Raleigh 1986). Juvenile salmonids are often found within 1m of a cover element (Moniz and Pasternack 2019, Hardy et al. 2006), which represents the burst distance for juvenile salmonids (Hardin et al. 2005). Methods for quantifying change in habitat acreage will be substantiated by peer-reviewed literature and best available science. Detailed protocols and approaches for accounting for cover will be specified in the Science Plan, and in Tributary GE-specific science plans, as appropriate and drawing from existing methodologies (e.g., USEPA 1999, San Joaquin River Restoration Program 2012, YCWA 2013, Beakes et al. 2014). Other designs consistent with the intent of providing suitable and adequate cover for juvenile rearing can be considered through the design criteria review process described above. Cover is further addressed in the VA Science Plan through Hypothesis H_{R3}.

The specific accounting protocol for rearing habitat actions will be described in the VA Science Plan, and it will involve evaluating the acreage of habitat conforming to the approved design criteria at a range of flows compared to pre-project condition. For accounting purposes, the VA Science Plan will also include the methodology for comparing the acreage of suitable habitat for Non-flow Measures conforming to the design criteria against the flow-habitat relationships provided by VA parties for the Final Draft Scientific Basis Report Supplement (SWB in preparation).

Table 28. Cover feature categories with HSI Score ≥ 0.5, reviewed in San Joaquin River Restoration Program's "Minimum Floodplain Habitat Report for spring and fall-run Chinook salmon" November 2012. Additional references with HSI values were included if they presented empirical results or were the outcome of a clearly articulated collaborative process. The intent of a HSI score ≥ 0.5 is to identify highly suitable cover features for inclusion in rearing habitat actions.

Cover feature type	HSI Reference	Description
Woody debris	Raleigh 1986, Sutton et al. 2006, Gard 2006	Fine woody vegetation + overhead cover, branches (2.5-30.5 cm diameter) and logs (> 30.5 cm diameter, Gard 2006)
Boulder	Sutton et al. 2006	Small-medium (12-48 inches) and large (>34 inches) boulder (Sutton et al. 2006)
Cobble	WDFW 2004[1]	Small (3-6 inches) and large (6-12 inches, WDFW 2004)
Grass/ Herbaceous	Sutton et al. 2006, WDFW 2004	Emergent rooted aquatic grass and sedges (Sutton 2006), and tall (>3 feet) dense grass (WDFW 2004)
Willow and other riparian vegetation	Moniz and Pasternack 2019, YCWA 2013, Sutton et al. 2006	Trees, bushes, willow riparian, willow scrub and other riparian vegetation, Sutton et al. 2006) taller than 2 feet above the ground (YCWA 2013).
Undercut bank	Raleigh 1986, Sutton et al. 2006, WDFW 2004, Hampton 1988	Undercut at least 0.5 ft (Hampton 1988)
Aquatic vegetation	Sutton et al. 2006, WDFW 2004	Non-emergent rooted aquatic
Overhanging vegetation	Sutton et al. 2006, WDFW 2004	Near or touching water (WDFW 2004)
Root wad, logjam/submerged brush pile and large wood	Sutton et al. 2006, WDFW 2004, Hampton 1988	Logs and root wads greater than 9 inches in diameter (Hampton 1988)

[1] . The reference for cobble as a cover element is based on Recommended Preference (WDFW 2004). The San Joaquin River Restoration Program's "Minimum Floodplain Habitat Report for spring and fall-run Chinook salmon" November 2012 does not conclude that cobble has an HSI value > 0.5, however, cobble is included as an acceptable cover feature because the WDFW 2004 Recommended Preference values were developed from empirical observations from multiple habitat suitability studies, and were intended to be applied to instream flow and habitat modeling.

3.1.4.3 Design criteria for tributary floodplain salmonid rearing habitat actions

Intermittently or seasonally wetted areas that support floodplain processes are an important element of rearing habitat for salmonids. Therefore, in addition to the water depth, water velocity, and cover criteria for in-stream rearing habitat (Table 27, Section 3.1.4.2), tributary floodplain habitats will be designed with targets for inundation frequency and duration that are consistent with the intention of the Meaningful Floodplain Event (MFE) described in the Final Draft Scientific Basis Report Supplement (SWB in preparation). In addition, tributary floodplain inundation regimes may also be designed in a project-specific manner and in accordance with tributary-specific flow provisions.

Floodplain rearing habitat projects are intended to provide sufficient frequency, magnitude, and duration of inundation as described in Table 27 as well as the water depth, water velocity, and cover criteria. Habitat accounting for floodplain rearing habitat commitments will be based on modeled inundation frequency and duration, using modeling assumptions and hydrological time series consistent with those described in the Final Draft Scientific Basis Report Supplement (SWB in preparation).

For instances where daily data or tributary-specific high-resolution models are available, a range of combined duration and frequency targets may adhere to the rationale of the MFE and provide opportunities for adaptive management. For example:

- Inter-annual frequency: Inundation 2 out of every 3 years on average and within a range of 50% to 80% of years.
- If modeled duration of inundation is between seven and 18 days, floodplain projects should target at least two distinct inundation events in the February through June rearing period. Grosholz and Gallo (2006) recommend repeated flood pulses at intervals of 2- to 3-weeks to best support native fish.
- If floodplain projects are designed for duration of inundation greater than 18 days, a single inundation occurrence during the February through June rearing period will satisfy the intention of the MFE criteria. The inundation habitat criteria in the Chinook Salmon Habitat Quantification Tool (HQT) for the CVPIA Science Integration Team assert that floodplain suitability is highest at 18-24 days (suitability weight of 1.0).
- Other inundation designs which target floodplain function consistent with the intention of providing suitable rearing habitat will also be considered by the design criteria review process described above. Tributary floodplain inundation regime may also be designed in a project-specific manner and in accordance with tributary-specific flow provisions.

The specific accounting protocol for tributary floodplain rearing habitat will be described in the VA Science Plan, and it will involve evaluating the acreage of habitat conforming to the approved design criteria at a range of flows compared to the pre-project condition. For accounting purposes, the VA Science Plan will also include the methodology for comparing the acreage of suitable habitat of non-flow measures conforming to the design criteria against the flow-habitat relationships provided by VA parties for the Final Draft Scientific Basis Report Supplement (SWB in preparation). The observed inundation area, frequency, and duration will be tracked and reported as part of the habitat suitability assessment described in Section 4.1.1 of the VA Science Plan.

3.1.4.4 Design criteria for Bypass floodplain rearing habitat actions

Table 27Table 28Table 28As described in Final Draft Scientific Basis Report Supplement (SWB in preparation), the bypasses contain a unique set of challenges compared to floodplain restoration projects on the tributaries and the bypasses are also occupied seasonally by a broader range of native fish species. Quantified design criteria for bypass projects are not provided here due to the variety of fish species and life stages that are present in the bypasses. Consideration should be given to generally accepted habitat components for salmonid rearing habitat (as described for tributary floodplains) for actions promoting salmonid rearing, but also to connectivity, fish passage (e.g., adult salmonids and *ascipenserids*) and spawning (e.g., splittail). Project planning should give consideration to whether and to what extent, a project will address the aquatic ecosystem stressors that are described for the bypasses in the Final Draft Scientific Basis Report Supplement (SWB in preparation). Design consideration for bypass habitat enhancements (e.g., fish passage as listed in Table 26) is provided in the Science Plan. These include NMFS guidelines for fish passage facilities (NMFS 2023) as well as metrics for evaluating for zooplankton production in shallow water areas for duration and water temperature conditions during suitability and utilization and biological effectiveness assessments (e.g., as described in Corline et al. 2017).

To evaluate whether VA Non-flow Measures are implemented according to project specifications and design, the implementation metrics will be measured once project construction is completed, and the post-construction measured values of the implementation metrics will be compared to approved project design criteria. The project design criteria will reflect the best available science on the habitat requirements of the species and life stage the project is intended to benefit and will follow the **design** criteria **review process**. For enhancement projects, accounting will be based on the incremental change

from baseline (physical conditions and regulatory requirements as of December 2018), with specific protocols for assessing this change proposed alongside the proposed design criteria. Habitat accounting will be based on modeled inundation with respect to physical aspects of the projects (e.g., water velocity). Observed inundation levels and aspects of habitat suitability (including appropriate ranges of water quality parameters such as temperature) will be tracked and reported as part of the habitat suitability assessment described in Section 4.1.1 of the VA Science Plan.

3.1.4.5 Design criteria for Tidal Wetland Restoration Actions

Design criteria for tidal wetland habitat measures will be site-specific and will include inundation levels of constructed channels and marsh plains in response to the daily tidal regime, among other metrics specific to the individual project goals and objectives. The reason that design criteria for these habitat actions will be project specific is that the intended benefits of tidal wetland projects will vary with location and target native fish species.

For example, tidal wetland structure (including structural attributes described in Sherman et al., 2017) is a driver of the capacity of tidal rearing habitats to support juvenile salmon and opportunity for juvenile salmon to access that capacity. Simenstad and Cordell (2000) list four suggestions for incorporating landscape structure in tidal marsh restoration for supporting Pacific salmon populations:

1. "Use natural landscape templates that are specific to the estuary and local region to guide restoration;
2. Emphasize corridors and other linkages among marshes and other tidal landscape elements that facilitate physiological, foraging, and refuge requirements of different fish species and life history stages;
3. Incorporate landscape elements and a mosaic that maintain a natural diversity of primary producers and detritus sources; and,
4. Promote landscape structure that accommodates fish responses to climatic variability and natural disturbance regimes."

Furthermore, Simenstad and Cordell (2000) propose additional landscape metrics, such as heterogeneity of topography, vegetation patch structure, channel system order, the number of channels, average sinuous length of channels, length of channel edge, drainage density, and the occurrence, distribution, and size of pans on the marsh plain. It has also been shown that bifurcation ratios can indicate opportunities for foraging interactions between prey being transported off the marsh and fish in larger channels (Coats et al. 1995; Simenstad et al. 2000). These are examples of design elements that may be considered to provide habitat opportunities for juvenile salmon; other design elements may be considered for goals of food production and export to pelagic areas or spawning or rearing habitat for other native fishes, such as Longfin Smelt.

Hydrologic connectivity to migration corridors and pelagic habitats should also be considered. Established marshes and migration corridors act as source populations for vegetation, detritus, nekton, and invertebrates for the restoration site, and will also influence marsh evolution, habitat function, and access to the restoration site. Particularly for salmonids, which are migratory species, the proximity of a restoration site to established marshes and migration corridors may affect juvenile salmon access to the wetland and the strength of cues that might attract them to the restored wetland (i.e., opportunity). Additionally, their available paths to the ocean by way of migration corridors will affect their survival, life history, and migration timing. Connectivity between marshes also provides refuge for juvenile salmon (Simenstad et al. 2000; Hering et al. 2010; Hanson et al. 2012). Considering both connectivity and structural complexity when evaluating restoration projects requires a landscape approach. However, urbanized estuaries can be constrained by the industries they support. For this reason, site selection provides important context, such as the influence of contaminants, invasions by non-native species, and alterations to flow (Sherman et al., 2017).

Quantified design criteria for tidal habitat restoration are not provided here due to the wide variety of target species, life-stages, and types of habitat goals associated with tidal wetland restoration actions. Values (as provided for tributary habitat actions in Table 27) would need to be generalized to a point that they would not provide meaningful targets. Therefore, to evaluate whether VA Non-flow habitat measures are implemented according to project specifications and design, the implementation metrics will be measured once project construction is completed, and the post-construction measured values of the implementation metrics will be compared to approved project design criteria. The project design criteria will reflect the best available science on the habitat requirements of the species the project is intended to benefit and will follow the **design criteria review process**. The area of the project conforming to the approved design criteria will count towards the Tidal Wetland Non-flow habitat measures in Table 25. Similar to tributary and bypass floodplain habitat actions, habitat accounting for tidal wetlands will be based on modeled inundation with respect to physical aspects of the projects (e.g., water velocity). Observed inundation levels and aspects of habitat suitability (including appropriate ranges of water quality parameters such as temperature, salinity, and turbidity) will be tracked and reported as part of the habitat suitability assessment described in Section 4.1.1 of the VA Science Plan.

As described above, project specific design criteria for tidal wetlands is subject to the **design criteria review process** outlined above in this document.

3.1.5 Early Implementation

As of Jan. 1, 2024, projects that have been completed since December 2018 or that are in more advanced stages of the project lifecycle (i.e., permitting, in-progress/implementation, or construction, see Table 29) will be considered as part of Early Implementation[6]. VA Parties request that CDFW and SWB staff are available to test the application of this accounting process for early implementation projects within 90 days after Jan. 1, 2024. Assuming that design criteria in this document are adopted by the SWB, then early implementation spawning, instream rearing, and tributary floodplain habitat Measures will count towards the Non-flow commitments in Appendix 2 of the VA Term Sheet as long as those projects meet the design and permitting requirements of the permitting agencies and the depth and velocity criteria in Table 27 at the time of post-construction habitat accounting or meet the criteria as approved through the design criteria review process. Early implementation projects for tributary rearing habitats will be expected to provide an explanation that is acceptable to State Water Board and CDFW that the projects provide suitable cover and inundation regimes for the intended benefits. The explanation may include other benefits or constraints (e.g., traditional ecological knowledge, health and safety limitations) that informed the project design and/or construction. Tidal Wetland and bypass floodplain projects will propose design criteria for accounting and undergo the design criteria review process specified above, with consideration for the advanced stages of many of those projects. The expectation for tributary spawning, instream rearing, and tributary floodplain habitat measures is that the area of suitable habitat conforms to the design criteria at a range of flows. For accounting purposes, the VA Science Plan will also include the methodology for comparing the acreage of suitable habitat of Non-flow Measures conforming to the design criteria against the flow-habitat relationships provided by VA parties for the Final Draft Scientific Basis Report Supplement (SWB in preparation). Detailed protocols for this evaluation will be provided in the VA Science Plan. As demonstrated by tributary-specific flow-habitat relationships meeting VA design criteria, suitability of certain habitat acreages varies over a range of flows. Thus, in many cases habitat accounting does not assume 100% suitability for all constructed acres (per project or tributary) across all flows.

Accounting for early implementation projects will be provided in the first Annual Report. All Non-flow Measures (including that completed under Early Implementation) will be subject to the same habitat

[6] Acreage represented under the Early Implementation heading in Table **26** may differ slightly from the Early Implementation acreage estimated through the accounting procedure described in this section.

suitability and habitat utilization and biological effectiveness assessments noted in Section 3.1.3 of this Strategic Plan.

Projects early in the planning and implementation lifecycle (i.e., proposed, or planning/scoping phases, see Table 29) as of Jan. 1, 2024, will not be considered as part of early implementation and will be subject to the accounting procedures described in Section 3.1.4.

Appendix D provides a non-exhaustive list of Non-flow Measures that may potentially be credited under Early Implementation, pending testing and refinement of the Non-flow Measure Accounting description provided above.

Table 29. An adaptation of EcoAtlas "Site Status" definitions, used to identify projects under Early Implementation.

Phase	Description	Project status as of Jan. 1, 2024…
Proposed	Project has been proposed. Only displayed if marked as public.	VA Implementation
Planning/Scoping	Project is in the planning/scoping phase.	VA Implementation
Permitting	Permit has been submitted.	Early Implementation
In-progress/Implementation	Project is in-progress or is being implemented.	Early Implementation
Construction planned	Construction is planned but has not started.	Early Implementation
Construction in-progress	Construction has started at the site.	Early Implementation
Construction completed	Construction has been completed.	Early Implementation
Completed	Project has been completed.	Early Implementation

3.2 Sacramento Mainstem

3.2.1 Non-flow Measure Descriptions

Consistent with the MOU Advancing a Term Sheet for VAs (March 2022), the Sacramento River VA physical improvements (habitat) action is for the restoration of 137.5 acres of instream habitat for juvenile Chinook salmon rearing and 113.5 acres of spawning habitat. Each individual VA habitat measure could consist of a mixture of habitat features, including both instream and spawning habitats.

Salmonid habitat improvements within the Sacramento Mainstem have been planned and implemented by Federal and Non-Federal partnerships, with the support of financial contributions from Federal, State and local agencies, in addition to non-governmental organizations contributions. Habitat planned or proposed for implementation during the VA term is part of an ongoing and robust salmonid habitat improvement program informed by science through the multi-State, Federal, and Non-Federal participants of the CVPIA Science Integration Team (SIT). These actions are implementing both the National Marine Fisheries Service's Recovery Plan for the Sacramento River and the California Natural Resources Agency's Sacramento Valley Salmon Resiliency Strategy. They continue the work of Sacramento Valley Salmon Recovery Program, a collaborative partnership of local water management entities, conservation organizations and state and federal fisheries and water management agencies formed to complete projects and improve science to promote recovery of salmon and other species of fish in the region. Since December 2018, 12 spawning/rearing combination projects contributing to the VA environmental targets have been implemented in the Sacramento mainstem.

For the Sacramento River Mainstem, early implementation projects are contributing 71.85 acres of spawning habitat and 105.65 acres of instream habitat (in-channel rearing habitat) towards the habitat restoration targets established in the MOU. Additional early implementation projects are contributing 138.2 acres of tributary floodplain rearing habitat, 3.5 acres of fish passage improvement habitat and 31.9 acres of predation reduction and other salmon recovery projects. During the term of the agreements, additional acres of habitat will be constructed to meet, and potentially exceed, the targets established in the MOU.

Program habitat planned to be implemented or maintained during the VA term includes spawning habitat, perennially inundated rearing habitat (side channels), and seasonally inundated rearing habitat (floodplain grading/planting).

3.2.2 Default Implementation Schedule

Table 30. Default implementation schedule for Non-flow Measures on the Sacramento Mainstem.

Description of Measures	Early Implementation (Dec 2018 -2024)	Years 1-3 (2025 – 2027)	Years 4-6[1] (2028 – 2031)	Years 7-8[1] (2032-2033)	Total[2]
Spawning (acres)[3]	71.85	45.37	73.20	42.20	232.62
Rearing: In-Channel (Instream) (acres)[4]	105.65	8.07	121.70	3.00	238.42
Rearing: Tributary Floodplain (acres)[4]	138.20	328.20	5,476.00	0	5,942.40
Fish passage improvements (# of acres)[4]	3.50	0	0	0	3.50
Other (predation reduction/combination of acres and number of clusters)	31.9 acres predation / 2,085 clusters	0 acres predation / 50 clusters	2 acres predation / 193.3 clusters	0 acres predation / 50 clusters	33.9 acres predation / 2,378.30 clusters

[1]Assumes adequate funding exists at the time of implementation.

[2] Table includes all likely feasible acreage planned for implementation and/or maintenance under existing and ongoing habitat program, based on the current implementation schedules. More habitat may be constructed during the VA timeframe above than required. The VA commitment includes 135.5 acres of rearing and 113.5 acres of spawning habitat. Any acreages created during the VA term above those obligations will not be subject to VA governance or Board oversight.

[3] Includes implementation of current programmatically permitted and designed spawning/rearing combination sites and ongoing maintenance of spawning sites, to ensure continued habitat function at early implementation program (EIP) funded sites through the period of performance for the Voluntary Agreements.

[4] Includes implementation of current programmatically permitted rearing and spawning combination habitat sites and implementation of new rearing-only sites that have not yet been permitted and for which designs are currently at the conceptual level.

3.2.3 Implementation Details

Lead implementation of Non-flow Measures will continue to be Reclamation, DWR, and working with Water Districts and other non-governmental agencies under existing habitat programs.

Acreages presented in Table 30 include a mix of projects along the Sacramento River: 1) currently designed (65% level) and programmatic permitted combination spawning/rearing habitat sites, which are generally implemented in the following manner - material excavated from existing gravel bars is sorted to specified sizes and placed in the river for spawning gravel, and the subject excavated area is reworked to provided adjacent paired rearing habitat, 2) rearing-only sites of varying sizes and complexity which are currently at the conceptual design level and do not yet have regulatory coverage but would be constructed through localized grading and the addition of willow/riparian plantings and/or large woody material, and 3) maintenance of early implementation program sites using gravel from designated borrow sites (for spawning habitat) and targeted grading (for rearing habitat) to ensure continued habitat function at previously implemented project sites through the period of performance for the Voluntary Agreements.

The acreage totals provided in the table reflects what is prescribed for VA non-flow actions on the Sacramento River. However, proposing a mix of potential projects, of varying sizes along the river continuum, offers the existing program flexibility in support of the following objectives: continued annual implementation and maintenance of salmonid habitat, maintaining vital landowner and stakeholder support, operating mindfully within the constraints of available funding, coordinating schedules with other entities planned work in the river corridor, and allowing for adaptive management while fully meeting VA habitat acreage requirements during the term.

3.3 Sutter Bypass, Yolo Bypass, Butte Sink, and Colusa Basin

3.3.1 Non-flow Measure Descriptions

Consistent with the Sutter Bypass, Butte Sink and Colusa Basin section in the MOU Advancing a Term Sheet for VAs (March 2022), the Sutter Bypass, Butte Sink, and Colusa Basin non-flow (habitat) action is for the restoration of 20,000 acres of floodplain habitat and 20,000 of fish food production (initial targets per funding and permitting). Additional habitat measures are planned to provide weir improvements and fish passage projects.

Floodplain Habitat

New floodplain habitat enhancement areas totaling at least 20,000 acres will be developed in the Sutter and Yolo Bypasses, Butte Sink and the Colusa Basin. This enhanced floodplain habitat will provide rearing habitat and food production for resident and migratory fish species. Spreading out and slowing down water moving across this landscape is a nature-based, natural infrastructure solution that mimics natural floodplain processes and provides multiple benefits year-round by allowing farmers to cultivate rice and other crops for humans during the spring and summer, provide food and habitat for a diversity of migratory birds and other wetland-dependent wildlife in the fall and winter, and food for juvenile native fish species in the winter. These innovative habitat restoration and floodplain reactivation concepts are intended to quickly improve and enhance fish and wildlife habitat by increasing opportunities for juvenile salmonid rearing and additional water onto the floodplains to stimulate fish food production and to support the millions of migratory and resident birds that rely on the Sacramento Valley.

Fish Food Production

This out-of-stream floodplain reactivation will support recovery of endangered species by producing needed food resources. Fish species benefiting from this habitat acreage include resident and migratory species. In fall after rice harvest, farmers re-flood their rice fields using the same irrigation canals that were used to irrigate the fields in summer. This water is being used to mimic the natural floodplain conditions needed to reactivate the floodplain's explosively productive aquatic food web. In the shallow water, bacteria and fungi break down the plant matter that grew on the floodplain during summer, these microbes are then eaten by billions of small crustaceans and insects called zooplankton. This food-rich

water is returned to the river using existing water management infrastructure, where it feeds young fish. The annual 20,000 acreage target for fish food production is expected to be met and likely exceeded during the term of the VAs.

Weir Improvements and Fish Passage Projects

In addition to the targets identified in the Term Sheet, these areas will also be the location for several weir improvements and fish passage projects within the weirs and bypasses. These projects will enhance passage success for migrating juvenile and adult fish through weir structures and within bypasses.

3.3.2 Default Implementation Schedule

Table 31. Default implementation schedule for Non-flow Measures in Sutter and Yolo Bypasses, Butte Sink, and Colusa Basin.

Description of Measures	Early Implementation (Dec 2018 – 2024)	Years 1-3 (2025 – 2027)	Years 4-6[1] (2028 – 2031)	Years 7-8[1] (2032-2033)	Total
Floodplain Habitat (Includes Upstream and Tidal Floodplain acres)	3,600	8,600	[Additional acres will be constructed in these years to achieve, and potentially exceed, VA requirements]	[Additional acres will be constructed in these years to achieve, and potentially exceed, VA requirements]	20,000
Fish Food Production on Agricultural Land (annual acres) [2]	30,000[3]	20,000	20,000	20,000	20,000
Weir Improvements & Fish Passage Projects (# of projects) [4]	4[5]	3[6]	-	-	7

[1]Assumes adequate funding exists at the time of implementation.

[2] Table includes acreage planned for implementation and/or maintenance under existing and ongoing habitat program, based on the current implementation schedules. More habitat may be constructed during the VA timeframe above that required

[3] Represents acreage implemented in 2022-2023 season.

[4] These salmon recovery projects are in addition to targets contained in the Sutter Bypass, Butte Sink and Colusa Basin section in the MOU Advancing a Term Sheet for VAs

[5] Illustrative projects include: Tisdale Weir Improvements and Fish Passage; Sutter Bypass Weir 2; Los Rios Check Dam Fish Passage Project; County Road 106a Fish Passage Project

[6] Illustrative projects include: Butte Slough Outfall Gates; Sutter Bypass Weir 2; Lisbon Weir

3.3.3 Implementation Details

Projects will be implemented through collaborative partnerships organized from a group of water management entities, local governments, landowners, conservation organizations, universities and state

and federal water management and fisheries organizations. The implementation schedule will be dependent on funding availability and permitting support from the regulatory agencies.

3.4 Feather

3.4.1 Non-flow Measure Descriptions

Non-flow measures in the Feather River include restoring salmonid spawning habitat and creating additional side-channels and access to floodplain habitat to improve rearing conditions for juvenile salmonids. There are also measures to improve fish passage and reduce the impacts of predators. Collectively, these measures should increase the number of juvenile fish produced, their survival to the ocean, and ultimately the number of spawning adults returning to the Feather River.

In the early implementation phase of the VA, DWR is restoring 9 acres of spawning habitat in the upper reaches of the Feather River with the addition of approximately 13,000 cubic yards of gravel. Within this phase, Sutter Butte Flood Control Agency (SBFCA) has also restored 100 acres of floodplain habitat in the Oroville Wildlife Area improving rearing conditions for juvenile Chinook salmon in the lower Feather River.

In subsequent phases of the VA, DWR proposes projects that will improve spawning conditions of an additional 6 acres of habitat in the upper reaches of the Feather River, as well as the creation of approximately 1,300 linear feet of side-channel habitat. DWR is also developing plans for several levee set-back levee projects in the Feather River corridor that would create approximately 1,000 acres of additional floodplain habitat.

CDFW continues to develop a floodplain project at Nelson Slough that would lower and widen an existing slough within the existing levees of the lower Feather River corridor downstream of Highway 99 and connecting it with Nelson Slough in the Sutter Bypass. This would allow Feather River basin water to flow into the Sutter Bypass with much greater frequency than the current condition connecting a remnant floodplain in the lower Feather River corridor with existing floodplain in the Sutter Bypass. The project could increase floodplain habitat available to Feather, Yuba, and Bear River salmonids by approximately 3,000 acres. Additional floodplain inundation resulting from this project could provide rearing benefits to Sacramento River origin juvenile winter and spring-run Chinook salmon, juvenile Butte Creek spring-run Chinook salmon in the Sutter Bypass as well as to Feather River basin spring-run Chinook salmon. This project has an approved CVPIA charter.

SBFCA continues to develop planned restoration projects including the addition of side-channel and floodplain habitat in the Robinson's Riffle complex of the Feather River — a prime rearing area for salmonids. Filling in Robinson's Pond (a gravel borrow pond) will create additional floodplain and in-river rearing habitat, as well as eliminate predator refugia.

3.4.2 Default Implementation Schedule

Table 32. Default implementation schedule for Non-flow Measures on the Feather River.

Description of Measures	Early Implementation (Dec 2018 -2024)	Years 1-3 (2025 – 2027)	Years 4-6[1] (2028 – 2031)	Years 7-8[1] (2032-2033)	Total
Spawning (acres)	9	-	6[2]	-	15[2]
Rearing: In-Channel (acres)	-	-	1	4.25	5.25
Rearing: Tributary Floodplain (acres)	100	-	1555[2]	-	1655[2]
Fish passage improvements (number of projects)	-	-	1	-	1
Other Predation reduction	-	-	1	-	1

[1]Assumes adequate funding exists at the time of implementation.
[2]More habitat is planned for the program during this timeframe than is required under the VA Agreement. Additional acres above VA requirements and are not included in the total quantities here.

3.4.3 Implementation Details

The primary implementing entities include the following:

- Department of Water Resources
- Sutter Butte Flood Control Agency
- Department of Fish and Wildlife

Measures to be implemented before 2031 assume permits and funding will be granted.

3.5 Yuba

3.5.1 Non-flow Measure Descriptions

Consistent with the MOU Advancing a Term Sheet for VAs (March 2022), the Yuba River VA non-flow (habitat) action is for the restoration of 50 acres of instream habitat and 100 acres of floodplain habitat for juvenile Chinook salmon rearing. Each individual VA habitat measure will consist of a mixture of habitat features, including both instream and floodplain habitats.

Instream (In-Channel) Habitat

Instream (i.e., in-channel) habitat is defined as certain components (i.e., "features") of the habitat portfolio that occur within the bankfull boundaries of the lower Yuba River. The bankfull channel has been delineated by the wetted channel boundary corresponding with a flow of approximately 5,000 cfs[7]. Importantly, instream habitat is not defined by a specific flow threshold. Rather, instream habitat occurs within the bankfull channel geospatial boundary generally associated with 5,000 cfs. Instream habitat associated with VA habitat measures can be comprised of various features including perennial side-channels, ephemeral side-channels, backwater and alcoves, and channel edge habitats.

The Draft Scientific Basis Report Supplement in Support of Proposed Voluntary Agreements for the Sacramento River, Delta, and Tributaries Update to the Bay-Delta Water Quality Control Plan (Draft SBRS) (p. 5-6) suggests that an appropriate representation would characterize proposed VA instream juvenile Chinook salmon rearing habitat corresponding with the State Team's suitability criteria[8] at different flow levels, which would include minimum, maximum, and target or other intermediate flows. In general conformance with this representation scheme, lower Yuba River juvenile Chinook salmon VA instream rearing habitat will be characterized as being constructed and suitable as follows.

- Yuba River proposed VA instream juvenile Chinook salmon rearing habitat would be constructed such that it would be at least 50% suitable (i.e., conforming to the State Team's depth and velocity suitability criteria from the Draft SBRS) on an areal extent basis at baseflow (730 cfs above Daguerre Point Dam, and 560 cfs below Daguerre Point Dam), and be at least 80% suitable at 2,000 cfs, measured at Smartsville for above Daguerre Point Dam and Marysville for below Daguerre Point Dam locations.

Yuba River proposed VA instream juvenile Chinook salmon rearing habitat would not be designed to be constructed within the river bankfull channel at elevations exceeding those associated with a flow of 2,000 cfs. Rearing habitat would be designed and constructed such that it would remain at least 70% suitable up to bankfull flows (for assessment purposes, 5,000 cfs), while recognizing that proposed VA instream rearing habitat would continue to exhibit suitability (albeit at reduced levels) at flows exceeding bankfull.

Floodplain Habitat

The Draft SBRS apparently differentiated lower Yuba River instream versus floodplain rearing habitats by equating instream habitats as those occurring at flows less than or equal to 5,000 cfs, and floodplain habitats as those occurring at flows greater than 5,000 cfs. While Yuba Water recognizes the State Team's need to simplify habitat characterization for the purpose of distinguishing in-channel versus floodplain habitat, habitat features in the lower Yuba River occurring in the bankfull channel at flows up to 5,000 cfs can serve a variety of ecological functions, including some functionality as floodplain habitat. Floodplain habitat associated with VA habitat measures consists of broad areas that may be flat or have a gentle

[7] Wyrick, J. and G. Pasternack. 2012. Landforms of the Lower Yuba River. Prepared for the Lower Yuba River Accord Planning Team. Lower Yuba River Accord Monitoring and Evaluation Program. April 2012.

[8] As specified in the Draft SBRS (p. 5-6, Table 5-3), the instream rearing habitat depth suitability range is 0.5 – 4.0 ft, and the velocity suitability range is 0.0 – 3.0 fps.

slope and tend to be characterized by relatively low velocities with little to no concentrated flow paths. Consistent with the March 2022 MOU, floodplain habitat activates at 2,000 cfs. Floodplain habitat suitability will conform with the State Team's depth and velocity criteria[9]. However, because floodplain habitats are intended to increase aquatic habitat productivity (primary and secondary) and food availability to encourage juvenile Chinook salmon growth, floodplain habitats will be designed and constructed to be functional at the lower end of the suitable depth and velocity ranges over a range of flows.

As specified in the March 2022 MOU, the Yuba River proposed VA floodplain habitats would be constructed to be inundated at 2,000 cfs and, in accord with the Draft SBRS (p. 5-10, Table 5-6), would be assumed to be suitable (i.e., meeting the State Team's depth and velocity criteria) when inundated (i.e., above flows of 2,000 cfs in the lower Yuba River).

3.5.2 Default Implementation Schedule

Table 33. Default implementation schedule for Non-flow Measures on the Yuba River.

Description of Measures	Early Implementation (Dec 2018 -2024)	Years 1-3 (2025 – 2027)	Years 4-6[1] (2028 – 2031)	Years 7-8[1] (2032-2033)	Total
Hallwood Side Channel and Floodplain Restoration Project (Constructed in 4 phases)	Total Floodplain habitat: ~138 ac Total Instream habitats: ~6 ac Total Other habitats: ~13 ac	-	-	-	Approximate 157-acre project footprint
Long Bar Salmonid Habitat Restoration Project (Lower Long Bar)	Floodplain habitat: ~ 18 acres Instream habitat: ~12 ac Other habitats: ~13 ac	-	-	-	Approximate 43-acre project footprint
Upper Rose Bar Restoration Project[2]	Spawning habitat[3]: ~5 acres Instream habitat: ~1.2 acres Other habitats and construction areas: ~37 ac	-	-	-	Approximate 43-acre project footprint

[9] As specified in the Draft SBRS (p. 5-6, Table 5-3), the floodplain rearing habitat depth suitability range is 0.5 – 4.0 ft, and the velocity suitability range is 0.0 – 3.0 fps.

Description of Measures	Early Implementation (Dec 2018 -2024)	Years 1-3 (2025 – 2027)	Years 4-6[1] (2028 – 2031)	Years 7-8[1] (2032-2033)	Total
Upper Long Bar Habitat Enhancement Project	-	Preliminary concept is to create a diversity of seasonal off-channel juvenile salmonid rearing habitat types (e.g., floodplain, side channel, alcove). Project contingent upon funding and permitting, timeline for implementation is TBD[4], but could occur with the term of the VA.			Approximate 100 acres[5] of floodplain and instream rearing habitat
Rose Bar Comprehensive Restoration Plan	-	Preliminary concept includes creating instream/rearing, spawning, floodplain, and fish food production habitat functionalities. Project contingent upon funding and permitting, timeline for implementation is TBD, but could occur with the term of the VA.			Approximate 50 acres[5] of floodplain and instream rearing habitat

[1]Assumes adequate funding exists at the time of implementation.

[2]Permits have been drafted, ESA consultation initiated, and funding application submitted to CDFW Fisheries Restoration Grant Program during April 2022.

[3] Yuba River VA does not include spawning habitat restoration actions.

[4]Funding for project planning has been secured from Yuba Water and the Wildlife Conservation Board. Implementation funding sources have not yet been identified but may potentially include Yuba Water and other grant funds (e.g., Prop 68), among others.

[5]Proportionate amount of instream and floodplain habitats that will be created under this habitat enhancement project will be determined through further design development.

3.5.3 Implementation Details

Consistent with the March 2022 MOU, Yuba Water would contribute $10 million[10] together with additional state funds as needed to meet the 50 acres of instream and 100 acres of floodplain juvenile Chinook salmon rearing habitat enhancement component of the Yuba River VA over the term of the Yuba River VA[11].

The primary objectives of the habitat enhancement component of the Yuba River VA proposal are to improve the productivity, complexity and diversity of anadromous salmonid juvenile rearing habitat in the lower Yuba River, and therefore provide greater opportunities for a more diverse portfolio of rearing and outmigration life history strategies. The anticipated outcomes include increased growth and survivability

[10] Table 4 (Funding for VAs' Framework) of Appendix 3 to the March 2022 MOU references the December 2018 Framework for overall VA funding commitments. In the December 2018 Framework, Yuba Water's proposal included contribution of $10 million for habitat enhancement measures over the 15-year term of the VA. However, pursuant to the March 2022 Term Sheet, the VAs will remain in effect for a term of 8 years after the Effective Date (i.e., on the date the Government Code section 11415.60 Agreements are executed). As such, the Yuba Water funding amount specified in the December 2018 Framework would be prorated over the actual term of the VA.

[11] Implementation of the habitat enhancement component of the Yuba River VA proposal would be subject to and dependent upon the availability of, and access to, appropriate land, legal constraints and other external factors. The habitat enhancement conceptual design regarding inundation elevations and associated flows are not yet at the stage of final project designs. Although work is in progress, specific habitat enhancement measures have not all been identified and are subject to requisite evaluations including, but not limited to, hydrologic sustainability analyses, land ownership and purchase or lease potential, site access, mineral rights, hazardous materials remediation, state lands commission lease requirements, future liability, and replacement requirements.

of juvenile anadromous salmonids, and subsequent contribution to spawning stock escapement. The Yuba River VA proposed habitat enhancement measures are intended to provide physical habitat conditions that would support broad temporal and spatial distributions of juvenile anadromous salmonid rearing, and larger individuals in better condition with higher survivorship by providing: (1) physical habitat structure (i.e., complexity, sinuosity, diversity, instream object and over-hanging cover); (2) improved food availability, quality and diversity; (3) refugia from predators; and (4) refugia from high flows.

The Yuba River proposed VA habitat enhancement strategy originates from biological and ecological functionality, not strict geomorphology or hydrological statistical characterization of flow exceedance probabilities. In other words, adherence to a simplistic definition of flow levels or suitability criteria does not reflect the holistic definition of ecological diversity that contributes to the viability of native fish populations. Rather, each habitat enhancement measure reflects ecological diversity through variation in ecological functionality resulting, in part, from variable flow regimes and their interaction with the physical habitat structure associated with each habitat enhancement measure.

The habitat acreages provided in Section 3.5.2 (above) are beyond what is proposed for the Yuba River VA non-flow (habitat) actions. Each habitat enhancement project consists of up to several different habitat types, including instream rearing (e.g., perennial side-channels, ephemeral side-channels, backwater and alcoves, and channel edge habitats), floodplain rearing, and in some instances, spawning habitat components. The areal extent (or project footprint) of each habit enhancement project is a composite of the areal extent of all the habitat types, and potentially includes other habitats and construction areas. The preliminarily identified habitat enhancement projects could contribute towards meeting the Yuba River proposed VA habitat acreages during the term of the VA.

Additional details regarding each of the projects identified in Section 3.5.2 are available and are summarized below. The early implementation (2018-2024) projects are ongoing efforts to which Yuba Water has committed resources and funding for design, permitting, and construction. The longer-term implementation (2024 and beyond) projects are specific examples of potential Yuba River VA projects for which preliminary conceptual outlines, designs or other planning efforts already been initiated, and which, if completed within the term of the VA, could contribute to the Yuba River VA non-flow (habitat) actions of 50 acres of instream habitat and 100 acres of floodplain habitat for juvenile Chinook salmon rearing.

3.5.4 Early Implementation (2018 – 2024) Projects

The following habitat enhancement projects are identified as “early implementation” (2018 – 2024) projects for which Yuba Water has committed resources and funding for the design, permitting, and construction of these projects. These projects will contribute toward the 50 acres of instream and 100 acres of floodplain juvenile Chinook salmon rearing habitat Yuba River VA commitments, and include Hallwood Side Channel and Floodplain Restoration Project, Long Bar Salmonid Habitat Restoration Project (Lower Long Bar), and Upper Rose Bar Restoration Project.

Hallwood Side Channel and Floodplain Restoration Project

The Hallwood Side Channel and Floodplain Restoration Project (Hallwood Project), located in the lower Yuba River downstream of Daguerre Point Dam, is a floodplain rearing habitat enhancement project developed by the U.S. Fish and Wildlife Service (USFWS), Yuba County, and the South Yuba River Citizens League (SYRCL). Yuba Water joined the project through funding implementation and construction during the summer of 2019. The project would increase the extent and duration during which juvenile salmonids are able to access the floodplain over a range of flows, as well as create and enhance perennial and seasonal side channel habitat.

The Hallwood Project consists of 4 phases, enhancing approximately 157 acres of seasonally inundated riparian floodplain, perennial side channels, and seasonally inundated side channels, alcoves, and swales.

- Phase 1 represents an enhancement of floodplain rearing habitat within a grading footprint of 89 acres and includes instream habitat of approximately 1.7 miles of perennial side channels and 6.1 miles of seasonally inundated side-channels, alcoves, and swales. Phase 1 of the Hallwood Project was completed during 2020.
- Phase 2, which involved removal of about 800,000 yards^3 of sediment from the Middle Training Wall and surrounding floodplains in the upper reach and enhancing 34 acres of floodplain and seasonally inundated side channel habitat was completed during 2021.
- Phase 3 removed approximately 825,000 yards^3 of mainly Middle Training Wall material, with an overall footprint of 13 acres of created floodplain habitat. Phase 3 was completed in 2022.
- The remaining phase (Phase 4) of the Hallwood Project will remove a total of about 400,000 yards^3 of sediment from portions of the Middle Training Wall and enhance an additional 21 acres of floodplain and seasonally inundated side channel habitat. Construction of Phase 4 is expected to be completed in 2024 (Yuba Water Agency 2022).

For planning purposes, the design for all 4 phases of the Hallwood Project represents the creation of approximately 138 acres of floodplain, and about 6 acres of instream juvenile rearing Chinook salmon habitat, and 13 acres of other habitats (e.g., high terrace).

Long Bar Salmonid Habitat Restoration Project (Lower Long Bar)

Located upstream of Daguerre Point Dam, the Lower Long Bar Salmonid Habitat Restoration Project was designed to enhance approximately 43 acres along the lower Yuba River in an area referred to as Long Bar (USFWS and Yuba County 2021). This is a collaborative project developed and funded by Yuba Water, USFWS, SYRCL, the Long Bar Mine LLC, Western Aggregates, and Silica Resources Inc. The project involves removing about 350,000 yards^3 of hydraulic mining debris to lower the floodplain and create juvenile anadromous salmonid rearing habitat. In addition to riparian plantings adjacent to re-graded areas, other habitat features will include enhanced floodplain areas (17.9 acres), perennial backwater channels (5.4 acres), riparian terraces (2.9 acres), side channels (4 acres), secondary and low flow channels (2.4 acres), and terraces (6.4 acres), among others (USFWS and Yuba County 2021). Construction began in 2020 and was completed in 2022, and about 80,000 yards^3 of material was removed as of July 2022 (SYRCL 2022).

For planning purposes, the Long Bar Salmonid Habitat Restoration Project represents the creation of approximately 18 acres of floodplain, and 12 acres of instream juvenile rearing Chinook salmon habitat, in addition to other habitat features (described above).

Upper Rose Bar Restoration Project

The Upper Rose Bar Restoration Project is located on private property owned by Yuba Water along the lower Yuba River near the community of Smartsville in Yuba County, California. The project, including design, permitting, construction, and monitoring, is funded and directed by CDFW through the Proposition 1 grant program, and designed by SYRCL. The project footprint is approximately 43 acres and will provide approximately 5 acres of Chinook salmon spawning habitat. The project also includes placement of large wood, and other measures that provide refugia and suitable rearing habitat for juvenile salmonids, resulting in approximately 1.2 acres of juvenile Chinook salmon instream rearing habitat. Construction is anticipated to occur in 2023 and require only one year to complete (Cramer Fish Sciences 2022).

3.5.5 Longer-term Implementation (2024 and beyond) Projects

Preliminary conceptual outlines, designs or other progress for potential longer-term (2024 and beyond) habitat enhancement projects that may contribute to the Yuba River VA non-flow (habitat) actions of 50 acres of instream habitat and 100 acres of floodplain habitat for juvenile Chinook salmon rearing include

the Upper Long Bar Habitat Enhancement Project (Upper Long Bar) and Rose Bar Comprehensive Restoration Plan (preliminary details available upon request). Timing for permitting, funding, and construction of these projects will need to be assessed by project proponents, but could be completed within the term of the VA.

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Cramer Fish Sciences. 2022. Upper Rose Bar Salmonid Spawning Habitat Restoration Project Biological Assessment. May 2022. West Sacramento, CA.

South Yuba River Citizen's League (SYRCL). 2022. Lower Long Bar Restoration Project. Available online at: https://yubariver.org/our-work/lower-yuba-restoration/active-lower-yuba-projects/long-bar-restoration-project/. Accessed on October 26, 2022.

USFWS and Yuba County. 2021. Long Bar Salmonid Habitat Restoration Project on the Lower Yuba River. Environmental Assessment and Initial Study/Mitigated Negative Declaration. February 2021.

Yuba Water Agency (Yuba Water). 2022. Hallwood Side Channel and Restoration Project website and fact sheet. Available online at: https://www.hallwoodproject.org/. Accessed on February 23, 2023.

3.6 American

3.6.1 Non-flow Measure Descriptions

Salmonid habitat improvements along the Lower American River have been planned and implemented by the Water Forum since 2008, with the support of Federal and State funding. As members of the Sacramento Water Forum, American River signatories have also provided significant support to this effort. Habitat planned or proposed for implementation during the VA term is integrated into a salmonid habitat improvement program informed by American River-specific fisheries, topographic/bathymetric, hydraulic, and hydrologic data. To date, twelve spawning/rearing combination projects have been implemented and/or maintained under the existing salmonid habitat program and this is expected to grow with additional VA funding opportunities.

The Water Forum has a long, successful history of implementing habitat projects on the Lower American River. It is anticipated that the American River signatories will continue to rely on the Water Forum's ability to deliver habitat projects for the purposes of VA implementation. The Water Forum's currently permitted combination spawning/rearing program sites consist of 10 separate implementation areas concentrated in the upper portion of the river (RM 13-23). These spawning/rearing sites and their ongoing implementation and maintenance are planned to be used to fulfill a portion of the VA habitat requirements. Current program sites have been refined to a 65% level of design and have been individually and cumulatively analyzed using 2017 Digital Elevation Model (DEM) information incorporated into our HEC-RAS 2D hydrodynamic model developed and calibrated for the American River. The 10 program sites are also covered under a comprehensive programmatic permitting and regulatory framework, which includes the following: Corps 408 Programmatic Permission, Corps 404 Regional General Permit 16, Central Valley Flood Protection Board Encroachment Permit (annual), USFWS and NMFS Biological Opinions, Central Valley Regional Water Quality Control Board 401 Certification, CDFW 1600 Waivers, SHPO/106 Tribal Cultural consultations, a State Lands Commission lease, NPS Wild & Scenic concurrence, and NEPA/CEQA compliance. Additionally, there are several additional sites identified on the American River that have the potential to further support VA habitat projects. These sites are currently at the conceptual design level, and a portion of these site designs are planned to be refined, permitted, and implemented during the next 10 years, to fulfill the remainder of the VA rearing habitat requirements for the American River. The habitats described above will continue to be constructed and maintained throughout the VA term and beyond with the support of future funding sources.

The design process for all sites is and will be based on adaptive management, ongoing monitoring, and analysis of prior implemented projects along the American River. A long-term consistent team (Water Forum, consultants, and Reclamation fisheries staff) has collaborated on planning, analysis, design,

implementation, outreach, and monitoring of all sites. It is anticipated that the same or similar team, along with American River signatories, will continue this collaboration for future projects. All designs include and will continue to include analysis required for habitat optimization of spawning and/or rearing hydraulics, cut/fill volume balancing, bed mobility assessment and consideration of landowner and stakeholder concerns.

Habitat planned to be implemented or maintained during the VA term includes spawning habitat and in-stream rearing habitat. 75 acres of rearing habitat were committed to being constructed on the American Rive, in the Term Sheet. However, neither the 75-acre total commitment nor the total rearing acreage of a single constructed project would meet suitability criteria 100% of the time under all conditions. In-stream rearing habitat is designed to complement the geomorphic and hydrologic/operational regime of the American River and would become inundated and optimized (for flow and velocity) over a varying range of flows (and thus water year types). These designs also incorporate cover elements appropriate to the existing character of the American River and as allowed by permitting agencies. Based on habitat effectiveness monitoring, this design approach has proven successful to provide suitable habitat for rearing juveniles in the American River, over a range of water year types.

3.6.2 Default Implementation Schedule

Table 34. Default implementation schedule for Non-flow Measures on the American River.

Description of Measures	Early Implementation (Dec 2018 - 2024)	Years 1-3 (2025 – 2027)	Years 4-6[1] (2028 – 2031)	Years 7-8[1] (2032-2033)	Total Acres for VA[2]
Spawning[3]	25 [Additional acres have been constructed in these years above VA requirements and are not included in the total quantities here]	[Additional acres will be constructed in these years above VA requirements and are not included in the total quantities here]	[Additional acres will be constructed in these years above VA requirements and are not included in the total quantities here]	[Additional acres will be constructed in these years above VA requirements and are not included in the total quantities here]	25
Rearing: In-Channel[4]	26	13	23	13 [Additional acres will be constructed in these years above VA requirements and are not included in the total quantities here]	75

[1] Assumes adequate funding exists at the time of implementation.

[2] The VA commitment includes 75 acres of rearing and 25 acres of spawning habitat. More habitat may be constructed during the VA timeframe above that required. Any acreages created during the VA term above those obligations will not be subject to VA governance or Board oversight.

[3] Includes implementation of current programmatically permitted and designed spawning/rearing combination sites and ongoing maintenance of spawning sites, to ensure continued habitat function at early implementation program (EIP) funded sites through the period of performance for the Voluntary Agreements.

[4] Includes implementation of current programmatically permitted rearing and spawning combination habitat sites and implementation of new rearing-only sites that have not yet been permitted and for which designs are currently at the conceptual level.

3.6.3 Implementation Details

The American River signatories, in collaboration with the Water Forum, are expected to continue to lead implementation of non-flow measures on the American River.

Acreages presented in Table 34 include a mix of projects along the American River: 1) currently designed (65% level) and programmatically permitted combination spawning/rearing habitat sites, which are generally implemented in the following manner - material excavated from existing gravel bars is sorted to specified sizes and placed in the river for spawning gravel, and the subject excavated area is reworked to provided adjacent paired rearing habitat, 2) rearing-only sites of varying sizes and complexity which are currently at the conceptual design level and do not yet have regulatory coverage but would be constructed through localized grading and the addition of willow/riparian plantings and/or large woody material, and 3) maintenance of EIP sites using gravel from designated borrow sites (for spawning habitat) and targeted grading (for rearing habitat) to ensure continued habitat function at previously implemented EIP sites through the period of performance for the Voluntary Agreements.

Final habitat acreages for each site are refined during the final design process and are dependent on site-specific hydraulic conditions and constructability. Spawning/rearing combination sites are concentrated in the upper 10 miles of the river (RM 13-23), where hydraulic and substrate conditions are most suitable for spawning and where ongoing monitoring shows a concentration of spawning activity. Rearing-only sites extend into the lower portion of the river (RM 3-13).

3.7 Mokelumne

3.7.1 Non-flow Measure Descriptions

Consistent with the Mokelumne River amendment (August 2022) to the MOU Advancing a Term Sheet for VAs (March 2022), the Mokelumne River VA non-flow (habitat) action is for the restoration of 25 acres of floodplain rearing habitat and 1 acre of instream rearing habitat. Additional habitat measures are planned to provide a suite of habitat improvements to benefit the Mokelumne River anadromous fish populations, including screening riparian diversions and maintenance of restored gravel sites to maintain suitability throughout the term of the VA.

Twenty-five acres of new floodplain rearing habitat enhancement measures will be created. In addition, EBMUD has committed to the annual maintenance of a restored 1-mile (15 acres) spawning reach. No designated spawning habitat is required under minimum required habitat goals, but EBMUD has implemented 1.27 acres of new spawning habitat and 0.87 acres of maintenance of existing habitat as early implementation actions and will continue to implement habitat improvements above the minimum required as landowner and funding opportunities allow. One acre of suitable instream rearing habitat will be implemented through screening diversions and providing habitat complexity during spawning habitat restoration work.

Floodplain Habitat Enhancement Projects

New floodplain habitat enhancement areas would be designed to primarily be inundated at river flows between 900 cubic feet per second (cfs) and 1,500 cfs, and portions of the habitat enhancement areas would provide suitable juvenile rearing habitat at flows as low as 700 cfs, and as high as 5,000 cfs. Under the current flow regime, the recurrence interval for inundation of these habitats is once every 1.5 years. This frequency could change depending on how voluntary agreement flow assets are allocated.

Spawning Habitat Enhancement (Maintenance) and Augmentation (New) Projects

New and maintained suitable spawning habitat areas would be designed to be inundated at river flows between 200 cfs and 600 cfs, and a portion of the habitat would provide suitable salmonid spawning habitat at flows as low as 150 cfs, and as high as 1,000 cfs.

The habitat augmentation projects add to existing habitat within the lower Mokelumne River. These projects would also provide additional juvenile rearing space, habitat complexity, and ultimately provide conditions that would allow for meeting habitat suitability metrics related to juvenile salmon size and survival.

Water Diversion Screening Projects

Surface water diversion structures have been indicated as a significant threat to the salmonid populations in the California Central Valley, with hydrologic conditions, timing of juvenile fish emigration, and timing of water diversions, identified as important factors in juvenile entrainment (Moore et al. 1996; Vogel 2013; Goodman et al 2017). Therefore, one of the priorities of the Central Valley Project Improvement Act (CVPIA), is to modify and/or replace unscreened diversions in order to protect juvenile anadromous fish in both the Sacramento and San Joaquin watersheds.

On the Mokelumne River, a critical time-period has been identified in which juvenile salmonid are rearing and/or out-migrating (February - July) and agriculture irrigation season (April - August) is on-going, in which farms with water rights (riparian or appropriative) pull water directly from the river via privately-owned pumps. During this time-period, both Fry (Length < 2.36 inches: 60 mm) and Fingerling (Length > 2.36 inches: 60 mm) size salmonids are present and distributed throughout the Mokelumne River. Based on this information, the screens that are fabricated and installed on water diversion structures in the Mokelumne River must meet the strictest criteria (fry criteria) set forth by the National Marine Fisheries Service (NMFS; NMFS, 1997), which ensures a project's effectiveness at protecting a variety of aquatic species and life stages based on swimming ability and project design criteria.

<u>Criteria for Water Diversion Screening Projects</u>

- Screens must accommodate the expected range of water surface elevations
- Screens must be generally parallel to river flow and aligned with the adjacent bank line
- Approach velocities must be ≤ 0.33 f/s (0.10 m/s)
- Sweeping velocities must be ≤ approach velocity
- Perforated plate screen face ≤ 3/32 inches (2.38 mm)

As juvenile salmonids out-migrate from the Mokelumne River (0 - 103 river kilometers (rkm)) they may encounter up to 300 water diversion structures, of which over 90% of these water diversions lack a screening design sufficient to prevent fish entrainment (PSMFC 2017). Based on this knowledge, researchers with EBMUD conducted field surveys of water diversions in the Mokelumne River (46-103 rkm) in which data was collected (i.e., intake size, pipe size, site hydraulics, channel substrate, and vegetation/cover). This information was then paired with historic data from riparian water diversions and juvenile fish outmigration timing to create a Relative Risk Model (RRM; Bilski, 2019). The RRM enabled researchers to rank each water diversion and therefore identify the diversion that pose the greatest threat to the native anadromous salmonids. Due to the potential harm to native salmonids caused by unscreened water diversion structures in the Mokelumne River, EBMUD has made it a priority to work with local, regional, state, and federal partners to screen high priority water diversion structures identified by the RRM (priority water diversions 1-50).

In order to ensure that water diversion screening projects meet the NMFS screening criteria, water velocity field surveys will be conducted pre- and post-screen construction using an acoustic doppler current profiler (ADCP), which uses an unmanned remote operated boat to map the water column

velocities around each of the active water diversion locations. Measuring the three-dimensional velocity field in the vicinity of the water diversions provides a means of assessing the projects effectiveness for protecting a variety of aquatic species and life stages based on their swimming ability and project design criteria.

3.7.2 Default Implementation Schedule

Table 35. Default implementation schedule for Non-flow Measures on the Mokelumne River.

Description of Measures	Early Implementation (Dec 2018 -2024)	Years 1-3[1] (2025 – 2027)	Years 4-6[1] (2028 – 2031)	Years 7-8[1] (2032-2033)	Total[2]
Spawning (acres)	2.14	0.6	0.6	0.6	3.94
Rearing: In-Channel (acres)	0.87	1.14	-	-	2.01
Rearing: Tributary Floodplain (acres)	3.67	11	11	-	25.67
Fish passage improvements[3] (# of projects)	3 Screens[4] (0.87 acre of In-Channel rearing habitat)	2 Screens[5] (1.14 acre of In-Channel rearing habitat)	-	-	5 Screens (2.01 acre of In-Channel rearing habitat)

[1]Assumes adequate funding exists at the time of implementation.
[2]More habitat is planned for the program during this timeframe than is required under the VA Agreement. Although more habitat is planned than required under the VAs, by providing a programmatic view of potential feasible acreages, it offers flexibility for adaptive management while fully meeting VA habitat acreage requirements.
[3]Screening projects are converted to acres of in-channel rearing habitat for juvenile salmonids habitat improvement based on Flowwest/USBR calculation (20 cfs screened = 1 acre; USBR 2021)
[4]Site #1 = 8.47 cfs; Site #2 = 4.46 cfs; Site #3 = 4.46 cfs; Total cfs = 17.39; Total acres = 0.87
[5]Site #1 = 11.4 cfs; Site #2 = 11.4 cfs; Total cfs = 22.8; Total acres = 1.14

3.7.3 Implementation Details

EBMUD will be the lead implementing agency with support from the federal and state fisheries agencies (USFWS, NMFS, CDFW) and the Joint Settlement Agreement Partnership Coordinating Committee (JSA PCC). The implementation schedule will be dependent on funding availability and permitting support from the regulatory agencies.

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US Bureau of Reclamation (USBR). (2021). Central Valley Project Habitat & Facility Improvements: Notice of Funding Opportunity No. R21AS00617 - FY2022, FY2023, FY2024. 1–58 (2021). Sacramento, California.

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3.8 Putah

3.8.1 Non-flow Measure Descriptions

The Solano County Water Agency (SCWA) in association with the Yolo Bypass Wildlife foundation and CDFW completed the Program Environmental Impact Report for the Lower Putah Creek Restoration Project – Upper Reach Program in 2022 (PEIR, 2022). The overall Program purpose is to restore and rehabilitate the creek channel, banks, and associated habitats to more natural, self-sustaining form and function, consistent with the current (post-Monticello Dam) hydrologic regime. The Program is being implemented to stop further degradation of the creek corridor and to “jump-start” natural geomorphic and ecological processes systematically.

Although Lower Putah Creek (including its riparian corridor) is one of the largest remaining tracts of high-quality wildlife habitat in Yolo and Solano counties and provides habitat for a unique assemblage of fish and wildlife species native to the Central Valley, it is characterized by altered channels and eroding banks, habitat loss and degradation, flood and flood control related impacts, invasive weed infestations, and other problems. The Lower Putah Creek channel is, in many locations, no longer in natural form and function in response to the modified flow regime post-dam. Additionally, historic gravel extraction, channelization, vegetation removal, and other channel modifications have caused significant degradation of natural channel form, process, and ecology. As a result, the Putah Creek channel has become deeply incised, overly wide and is generally lacking in pool-riffle-run sequences, natural meander patterns, and functional floodplains. The existing channel condition cannot ‘self-adjust’ to a more natural morphology because flow velocities are insufficient to mobilize sediment, and natural gravel recharge is substantially arrested. In this condition, the creek is virtually devoid of riffles and spawning habitat, and lacks the materials and functions needed to build such features naturally.

Proposed Program activities will reconfigure degraded areas of the creek channel to more natural cross-sectional form (confined, sinuous low flow channel with adjacent floodplain surfaces) to stabilize eroding banks, facilitate channel shading with bank-side riparian vegetation, and improve habitat values for native fish species. A narrower (more efficient) low flow channel will also serve to increase flow velocities, lower water temperatures, restore competency of the channel to mobilize gravels (for spawning), and restore geomorphic processes that support natural channel and ecosystem dynamics. Implementation of these activities would expand the geographical extent of high-quality habitat for native fish species, including local fall-run Chinook salmon and rainbow trout, and increase riparian habitat by converting shallow, open water areas to floodplains. Channel reconfiguration activities may consist of modifications to channel geometry, construction of grade/flow control structures (i.e., rock-vanes), stabilizing channel banks, creating side-channels, improving spawning gravels, and/or filling abandoned gravel pits.

3.8.2 Default Implementation Schedule

Table 36. Default implementation schedule for Non-flow Measures on Putah Creek.

Description of Measures	Early Implementation (Dec 2018 -2024)	Years 1-3 (2025 – 2027)	Years 4-6[1] (2028 – 2031)	Years 7-8[1] (2032-2033)	Total
Spawning (acres)	1.4	-	-	-	1.4

[1]Assumes adequate funding exists at the time of implementation.

3.8.3 Implementation Details

SCWA has nearly 20 years of practical experience in adaptive management of functional flow relationships aligned with habitat restoration with much success and is well versed in the hydrology and aquatic biology of Lower Putah Creek. Since the execution of the Putah Creek Accord, SCWA has restored, enhanced, and managed many miles of Putah Creek and its tributaries.

SCWA has secured Prop 68 grant funding (#H90410-0) from CNRA to construct the first shovel ready project approved in the Lower Putah Creek Restoration Project – Upper Reach Program. SCWA as the lead CEQA agency will tier off of the PEIR and permitting is in progress with construction planned for summer-fall 2024. The project area encompasses 29 acres of primarily riparian habitat and 0.5-mile section of Lower Putah Creek channel in Yolo and Solano counties. The proposed project objective is to restore this section of active channel that is currently in an over-widened condition and degraded aquatic habitat for native assemblages (i.e., lacking floodplain habitat, essentially stagnant velocities, and long residence time in pools with excessive solar exposure that increases water temperatures). The plan is to create a narrow design channel in a more central, meandering form and new spawning side channels in conjunction with other floodplain habitat improvements that will be more conducive to the favor the needs of native species over invasives. The goal of this proposed project is to create 62,000 sq ft of new spawning habitat in Lower Putah Creek and 0.5 mile of nearly continuous instream and riparian habitat to double the available salmonid spawning habitat in Lower Putah Creek.

In addition, SCWA has a CDFW Routine Maintenance Agreement to implement approximately 0.4 acres of gravel scarification, a mechanized process of loosening embedded gravels in locations where armoring by cementation has rendered streambed gravels inaccessible for use by spawning salmon, annually. The scarification program began in 2014 and results have shown that between 2014 and 2019, 89 -100% of newly reclaimed spawning areas were occupied by spawning adult salmon and rainbow trout.

SCWA has additional conceptual projects that may be implemented in years 1-8 dependent on availability of resources and funding.

3.9 Tuolumne

3.9.1 Non-flow Measure Descriptions

Consistent with the MOU Advancing a Term Sheet for VAs (November 2022), the Tuolumne River Partners propose a number of non-flow actions that, in combination with the proposed VA flow commitments, are intended to improve salmonid spawning and rearing habitat on the lower Tuolumne River. Some of the highlights of the Tuolumne non-flow measures include additional in-channel spawning and rearing habitat, as well as 77 acres of rearing/floodplain habitat that will be inundated at the flows proposed in the MOU for the VA. Many of the proposed projects include a mixture of habitat features that include both instream and floodplain benefits. The non-flow actions proposed by the Tuolumne River Partners go

beyond habitat restoration projects and include additional measures, such as predation management, that are also intended to improve conditions for native fish on the lower Tuolumne River.

The non-flow measures for the lower Tuolumne River are based on science developed on the lower Tuolumne River over several decades, including the most recent studies completed as part of the relicensing of the Don Pedro hydroelectric project. The non-flow measures identified for the 8-year term of the VA are included in the tables below and descriptions of the various actions are also provided. All of the non-flow measures described below are supported by studies conducted as part of the Amended Final License Application (AFLA) for the Don Pedro Hydroelectric Project and can be found at the Don Pedro relicensing website: www.donpedro-relicensing.com. Of importance is the fact that the projects and resulting acreages listed in the tables below were developed for the AFLA and are subject to adjustment as part of ongoing and future project specific design.

Non-flow habitat projects *1, 2, 3, 4, 6, 7, 8, 9, 11* as listed in the table below will improve spawning gravel quantity and quality through (1) gravel augmentation of approximately 75,000 tons between RM 52 and 39 and 25,000 tons between RM 39 and 24.5; (2) gravel cleaning of selected gravel patches for two to three weeks for 5 years to expand availability of high quality gravel which would improve spawning success and egg-to-emergence survival for fall-run Chinook salmon; and (3) placement of properly-sized and designed large woody debris between RM 43- 50 to provide favorable micro-habitats for *O. mykiss* and promote localized scour of fines to benefit fall-run Chinook salmon spawning.

The Lower Tuolumne River Habitat Improvement Program (project 5) will identify, design, construct and monitor floodplain and in-channel habitat improvements to benefit fall-run Chinook and *O. mykiss* juvenile rearing life stages. Individual projects will be located along the lower Tuolumne River and will be designed in coordination with the flow regimes in the Tuolumne River VA. Specific individual projects envisioned to be undertaken through the fund are likely to include floodplain restoration; floodplain lowering to foster floodplain access at lower flows; backwater slough connections to the mainstem; riparian vegetation enhancements using native species; in-channel habitat improvements through placement of LWD; and/or re-contouring of potential juvenile Chinook stranding areas.

Non-flow habitat projects 12 &13 target a reduction in annual predation rates of 10% below RM 25.5 and 20% above RM 25.5 through (1) construction and operation of a fish barrier and counting weir that will prohibit the movement of striped bass into upstream habitats used by rearing juvenile fall-run Chinook salmon and *O. mykiss*, while simultaneously providing a location where striped bass will congregate, facilitating their isolation and removal; and (2) annual predator suppression activities not limited to, removal and/or isolation methods such as electro-fishing, fyke netting, seining and other positive collection methods.

Non-flow habitat project 14 will involve deployment of a temporary barrier when female spawners counted at the RM25.2 counting facility reaches 4,000 to encourage use of suitable habitats at locations further downstream.

Non-flow habitat project 10 will complete/construct and operate two infiltration galleries near RM 26 for the purpose of benefiting lower Tuolumne River cold-water fisheries, notably *O. mykiss*, while at the same time protecting the Districts' water supplies.

3.9.2 Default Implementation Schedule

Table 37. Non-flow measures in the Tuolumne VA, including information on location, approximate area, and estimated implementation timing.[1]

Project No.	Project and location	Description	Life stage	Benefits	Early Implementation (Dec 2018-2024)	Years 1-3	Years 4-6	Years 7-8	Total
1	Riffle A2 Rehabilitation River Mile (RM) 50.6/50.7	Add appropriately sized gravel to improve substrate conditions for spawning and incubation	Spawning and incubation	Increased spawning opportunity and improved egg-to- emergence survival	-	0.15 acres	-	-	0.15 acres
2	Riffle A3 Rehabilitation RM 50.4 to 50.6	Add appropriately sized gravel to improve substrate conditions for spawning and incubation	Spawning and incubation	Increased spawning opportunity and improved egg-to- emergence survival	-	1.00 acres	-	-	1.00 acres
3	Riffles 3A and 3B RM 49.2 to 49.6	Add appropriately sized gravel; restore banks to appropriate floodplain elevation and function; remove invasive hardwood	Spawning incubation and juvenile rearing	Improved egg-to-emergence survival and expanded floodplain rearing habitat	-	-	0.50 acres	-	0.50 acres
4	Gravel Cleaning RM 45-49	Clean select gravel patches to expand availability of high-quality gravel to improve spawning and incubation	Spawning and incubation	Improved spawning habitat quality and egg-to-emergence survival	-	†	†	-	-
5	Lower Tuolumne River Habitat Improvement Program	$19M capital fund shall be used for a variety of improvement and restoration projects to	Juvenile rearing, smolt outmigration	Expanded floodplain rearing; expanded in-channel rearing;	-	-	77 acres	-	77 acres

Project No.	Project and location	Description	Life stage	Benefits	Early Implementation (Dec 2018-2024)	Years 1-3	Years 4-6	Years 7-8	Total
	RM 5-48	be developed in conjunction with the TRPAC (below). Examples of likely projects include floodplain lowering, floodplain connectivity, riparian plantings, in-channel placement of LWD		and improved smolt outmigration survival					
6	Riffle A5 RM 51.2	Construct alternative riffle/pool morphology	Over-summering *O. mykiss* juvenile and adults	Improved juvenile rearing; improved foraging; improved spawning habitat	2.78 acres	-	-	-	2.78 acres
7	Riffle A6 RM 51.0	Construct alternative riffle/pool morphology	Over-summering *O. mykiss* juvenile and adults	Improved juvenile rearing; improved foraging; improved spawning habitat	2.29 acres	-	-	-	2.29 acres
8	Basso Pool RM 47.0-47.3	Construct medial bar: riffle pool-tail morphology	Over-summering *O. mykiss* juvenile and adults	Improved juvenile rearing; improved foraging; improved spawning habitat	-	-	8.78 acres	-	8.78 acres
9	Large Woody Debris	Improve instream habitat complexity through targeted	*O. mykiss* Juvenile rearing	Improved juvenile rearing and increased	-	Place 6,535 cubic feet	-	-	6,535 cubic feet of

Project No.	Project and location	Description	Life stage	Benefits	Early Implementation (Dec 2018-2024)	Years 1-3	Years 4-6	Years 7-8	Total
		addition of LWD to the lower Tuolumne River		in-channel rearing area		of large woody material			large woody material
10	Infiltration Galleries (IG) RM 26	Construct IG#2 and operate IG#1 (existing) and IG#2 (proposed) from June through mid- October, enabling an increase of flow between La Grange and the IGs to benefit *O. mykiss*	*O. mykiss* Juvenile rearing and over-summering adults.	Improve temperature conditions for *O. mykiss* juvenile rearing and adult habitat	-	Operate IG #1	Construct IG #2	-	-
11	Riffle A3/A4 (RM 51.5); Gravel Augmentation	Spawning gravel size and distribution integrated with VA flow regime	Stream geomorphology	Resorting gravels and improved gravel size for Chinook spawning	-	-	5.85 acres	-	5.85 acres
12	Fish Counting Barrier and Weir RM 25	Improve rearing and migration conditions upstream of the weir by preventing access by striped bass and other predators	Fry and juvenile rearing; smolt outmigration	Reduce predation on fry and juvenile fall-run Chinook Salmon	-	Construct Fish Counting and Barrier Weir	-	-	-
13	Predator Control	Improve rearing and migration conditions by reducing predation	Fry and juvenile rearing; smolt outmigration	Reduce predation on fry and juvenile fall-run Chinook salmon	-	-	Implement Predator Control	Implement Predator Control	-
14	Reduce Redd Superimposition (seasonal weir) RM 47-52	Construct a seasonal weir when upstream gravel patches are at capacity to encourage use of suitable	Spawning and incubation	Improve overall fall-run Chinook spawning success by	-	‡	‡	‡	-

Project No.	Project and location	Description	Life stage	Benefits	Early Implementation (Dec 2018-2024)	Years 1-3	Years 4-6	Years 7-8	Total
		habitats at downstream locations		reducing red superimposition					

[1] The projects and their associated attributes listed in above table were derived as part of on-going FERC relicensing activities and are subject to adjustment as part of ongoing and future project specific design.

† Clean selected gravel patches in the lower Tuolumne River at or below the confluence of intermittent streams downstream from La Grange Diversion Dam, including Gasburg Creek (RM 50.3) and Peaslee Creek (RM 45.5), for two to three weeks each year for 5 years

‡ Implement seasonal weir operational when >5,000 female spawners are observed in the Tuolumne River.

Table 38. Gravel augmentation volumes for specific non-flow measure projects.

Riffle location	Volume (cu. yds.)	Tons
Project 1: Riffle A2	519	700
Project 2: Riffle A3	3,707	5,000
Project 6: Riffle A5	9,637	13,000
Project 7: Riffle A6	14,456	19,500
Project 8: Basso Pool	27,281	36,800
Totals	**55,600**	**75,000**
Project 11: Riffle A3/A4[2]	**TBD**	**TBD**
Project 3: Riffle 3A/3B[2]	**TBD**	**TBD**
New Project(s) TBD between RM 39 and 24.5	**18,535**	**25,000**

[2] These riffle projects will include gravel augmentation above the VA MOU commitment of 75,000 tons of new gravel between RM 52 and 39.

3.9.3 Implementation Details

The Tuolumne River Partners will be responsible for funding and implementing the Non-flow Measures, as well as the formation of the Tuolumne River Partnership Advisory Committee (TRPAC) which shall include USFWS, CDFW, SF, MID and TID as initial members; other resource agencies will be invited to actively participate. The TRPAC will provide advice regarding the selection and design of individual habitat projects and the management of spill to benefit salmonids. The TRPAC could function as an appropriate forum for implementing the Tuolumne River VA, including consideration of recommendations from the Systemwide Governance Committee.

The VA timeframes identified in the table for implementation include the expected timeframe for construction to be completed as well as the timeframes associated with performing activities associated with project implementation. For example, under “Predator Control,” the fish counting and barrier weir would be in place by Year 3 and the predator suppression would occur in tandem with placement and continue through Years 4 through 8.

3.10 North Delta Arc and Suisun Marsh

3.10.1 Non-flow Measure Descriptions

Non-flow measures in the North Delta Arc and Suisun Marsh involve restoration of shallow-water habitat for native fish spawning, rearing, and to restore ecosystem function including increased production of zooplankton and macroinvertebrate taxa that support growth of native fishes. The target species list is an assemblage of natives, including Delta and Longfin smelt, Chinook salmon, as well as tule perch and native minnows such as Sacramento blackfish, Sacramento splittail, and hitch. Restored project areas in many cases will consist of tidal wetlands, floodplain, subtidal areas, riparian habitat, enhanced fish food production areas, and enhanced channel margins. Some non-flow projects may be located within areas and/or designed to be enhanced from VA flow actions.

3.10.2 Default Implementation Schedule

Table 39. Default implementation schedule for non-flow measures for the North Delta Arc and Suisun Marsh.

Description of Measures	Early Implementation (Dec 2018 -2024)	Years 1-3 (2025 – 2027)	Years 4-6[1] (2028 – 2031)	Years 7-8[1] (2032-2033)	Total
Tidal Wetland and associated restored habitats (acres)	500	2,500	2,350	-	5,350

[1]Assumes adequate funding exists at the time of implementation.

3.10.3 Implementation Details

A variety of federal, State, and local entities are anticipated to implement the habitat measures described above. Funding for these habitat measures is anticipated to come from a variety of sources including State, federal, and funding collected from VA implementing entities. The Department of Water Resources (DWR), in collaboration with other State, federal, and local entities, is in the preliminary planning stages for several projects within the North Delta Arc, with potential implementation beginning in late 2024 or early 2025. Funding for some of these planning projects is partially secured and DWR is actively working with project partners to secure additional funding to support implementation.

Appendix A

Memorandum of Understanding (March 29, 2022) and associated amendments

Appendix B

Draft Governance Program

Appendix C

Draft Science Plan

Appendix D

Draft Early Implementation Project List