

## **FRAMEWORK PROPOSAL FOR VOLUNTARY AGREEMENTS TO UPDATE AND IMPLEMENT THE BAY-DELTA WATER QUALITY CONTROL PLAN**

California Department of Fish and Wildlife (“CDFW”), California Department of Water Resources (“CDWR”), and other parties (collectively “Parties”) submit this Agreement Framework for analysis, adoption and implementation of voluntary agreements to support amendments to the Bay-Delta Water Quality Control Plan (“Bay-Delta Plan”) for protection of fish and wildlife beneficial uses.

### **SUMMARY**

1. The fundamental principle of this Agreement Framework is that protection of fish and wildlife beneficial uses in the Sacramento River and San Joaquin River watersheds and Delta ecosystem, including maintenance of viability of native fishes, will require comprehensive approach to management of their habitats and other factors that affect viability. The Parties propose an approach that integrates flow and non-flow measures, including management of tidal energy, to optimize outcomes of implementation; and establishes a science and monitoring program to evaluate, adjust, and achieve such outcomes.

- a. The Parties will develop Agreements consistent with the terms of this Framework and Appendix 1, and will cooperate in environmental analysis, as needed for the State Water Board to take final action by December 31, 2019. Implementation will begin immediately thereafter.
- b. Implementation will maintain viability of native fishes in the Sacramento River and San Joaquin River watersheds and Delta ecosystem, while concurrently protecting and enhancing water supply reliability, consistent with the statutory requirement of providing reasonable protection for all beneficial uses.

2. This Agreement Framework results from two years of negotiations by CDFW, CDWR, California Natural Resources Agency, Bureau of Reclamation, municipal and agricultural water suppliers, and other stakeholders to develop this comprehensive approach.

3. To date, Bay-Delta Plans have required changes in flow in isolation from the multiple other factors affecting fish and wildlife beneficial uses, including physical modifications of riverine channels and wetlands. The viability of native fishes has declined notwithstanding implementation of these plans.

- a. In the update process now underway, State Water Board staff have not proposed to require measures to address such other factors that affect viability. See Phase 1 SED, Master Response 5.2, p. 6.
- b. The State Water Board has recognized that a comprehensive approach may be implemented through voluntary agreements and could provide

quicker, more effective, and more durable outcomes. This Agreement Framework implements that recognition.

### **LEGAL TERMS**

4. The Parties respectfully request that the State Water Board adopt the following schedule and procedures leading to the adoption of amendments to the Bay-Delta Plan and supporting environmental analysis under the Porter-Cologne Water Quality Control Act and the California Environmental Quality Act (“CEQA”):

- a. **February 15, 2019** – Completion of drafting the proposed voluntary agreements.
- b. **March 1, 2019** – Submission by Parties to the State Water Board of a project description for the Bay-Delta Plan based on the voluntary agreements.
- c. **August 1, 2019** – Submission by Parties to the State Water Board of an administrative draft of a Comprehensive SED that is based on the project description. For this purpose, “Comprehensive” means that it will supplement the Phase 1 SED and integrate information pertaining to the Phase 2 update.
- d. **September 1, 2019** – Circulation by the State Water Board staff of a draft Comprehensive SED for a 45-day public comment period.
- e. **December 1, 2019** – Submission by Parties to the State Water Board of an administrative draft of a final Comprehensive SED.
- f. **As early as possible after December 1, 2019** – Consideration by the State Water Board of the certification of the Comprehensive SED and adoption of the proposed amendments to the Bay-Delta Plan, followed promptly by execution of the Agreements.

5. CDFW and CDWR propose to participate as CEQA responsible agencies in developing the Comprehensive SED.

6. The Parties agree that the Agreements will be enforceable under specified terms consistent with the State Water Board’s responsibilities. Each Agreement will have a minimum 15-year term.

7. This Agreement Framework is not precedent on any disputed issues of law or fact.

## SUBSTANTIVE TERMS

### A. Flow Measures

8. The Agreement Framework builds upon and assumes that existing implementation responsibilities for the 2006 WQCP remain in effect, other than as addressed through the Agreements. The Parties propose to provide additional instream flows as summarized in Table 1. Appendix 1 states the terms the Parties have reached in principle.

**Table 1. Summary of Annual Average Additional Flows in San Joaquin and Sacramento Basins**

<b>Contributing Area</b>	<b>Volume (TAF)</b>	<b>Seasons (AN, BN, Dry)</b>	<b>Proposed Sources</b>
San Joaquin Basin <ul style="list-style-type: none"><li>• Tuolumne<sup>1</sup></li><li>• Friant<sup>2</sup></li></ul>	140	Spring, summer	<ul style="list-style-type: none"><li>• Reservoir reoperation, storage withdrawal, restoration flow recapture reduction</li></ul>
South-of-Delta	300-600	Spring, summer	<ul style="list-style-type: none"><li>• SWP and CVP</li></ul>
Sacramento Basin <ul style="list-style-type: none"><li>• Sacramento</li><li>• American<sup>3</sup></li><li>• Feather</li><li>• Yuba</li><li>• Mokelumne</li></ul>	300	Spring, summer	<ul style="list-style-type: none"><li>• Land fallowing (35,000 acres)</li><li>• Reservoir reoperation</li><li>• Potential for limited groundwater substitution</li></ul>
<b>Total</b>	<b>740 – 1,040 TAF</b>		

9. The Parties propose to provide additional flows in a manner that: (a) does not conflict with the requirements of the Sustainable Groundwater Management Act; (b) does not reduce existing flows for designated wildlife refuges; and (c) maintains reliability of water supply for other beneficial uses. The Agreements may provide for adjustment of flow amounts in successive dry years and immediately subsequent years for the purpose of ensuring reliable reservoir storage.

### B. Habitat Improvements and Other Non-Flow Measures

10. The Parties propose to undertake non-flow measures to improve the current condition of fish and wildlife beneficial uses in the Delta ecosystem. Appendix 2 consists of maps which illustrate the proposed general locations and scales of habitat measures.

<sup>1</sup> Tuolumne's proposal also includes managed flows in Critical and Wet year types.

<sup>2</sup> Friant is not a party identified in the Phase I or Phase 2 Bay-Delta Plan update process.

<sup>3</sup> American's proposal includes managed flows in Critical year types.

11. The Parties propose to undertake measures to address multiple factors affecting fish and wildlife beneficial uses, including predation by non-native species, passage barriers, and hatchery productivity. The Parties propose to ensure timely completion of all measures specified in the Agreements. The Parties propose to maintain and adaptively manage successful restoration measures which they have already funded, constructed, or currently operate, in any combination. The Parties propose to provide a more comprehensive discussion of habitat quantities and suitability to support the development of the project description provided in 4(b) of this Framework Proposal.

12. Appendix 3 identifies environmental improvements that Parties propose to implement in 2019, assuming environmental review, the continued availability of funding that has been committed to them, and the issuance of necessary federal permits, such as permits under Clean Water Act sections 404 and 408. CDFW commits to expedite its review of any applications for permits necessary for these improvements to the maximum extent possible consistent with applicable law. CDFW and DWR respectfully request that the State Water Board similarly expedite any review of those projects that the State Water Board conducts and also to direct each applicable Regional Water Quality Control Board to also expedite any necessary reviews. CDFW and DWR will formally request that the United States Departments of Commerce and Interior, as well as the United States Army Corps of Engineers, also expedite all necessary federal approvals for these projects.

**C. Integrated Management of Flow and Other Measures**

13. The Parties propose to integrate management of flow and non-flow measures, to optimize benefits to fish and wildlife, including through management of existing and additional flows, tidal energy, and through habitat improvements. For anadromous fisheries, the Parties propose this approach to improve water temperatures for all life stages, and to increase access to floodplains as rearing habitats. For pelagic fisheries, the Parties propose to improve the water quality variables that affect viability, including salinity, flow velocity, and turbidity. Appendix 2 consists of maps that exemplify the integrated approach.

**D. Science and Monitoring Program / Structured Decision-making**

14. The Parties propose a comprehensive science and monitoring program that informs implementation of the flow and non-flow measures.

15. The science and monitoring program will include the following elements, except as specifically provided in the Agreements.

- a. **Implement specific experiments.** The science and monitoring program will adopt a “safe to fail” experimental approach to maximize learning.
- b. **Test hypotheses.** The science and monitoring program will identify and test key hypotheses, especially/even if conflicting, about how the

ecosystem functions and what measures will be most effective at achieving desired outcomes.

- c. **Learn from the experiments.** The science and monitoring program will ensure that each measure is implemented in a manner that maximizes learning.
- d. **Design the experiments to test specific outcomes.** The science and monitoring program will identify a manageable set of SMART (specific, measurable, achievable, relevant, and time-bound) objectives that describe desired environmental and biological outcomes.
- e. **Facilitate a collaborative process.** All Parties will be engaged in the development and implementation of the science and monitoring program.
- f. **Facilitate a transparent process.** All Parties will engage in a transparent process by collaborating, reporting, and sharing data.

16. The science and monitoring program will include a structured decision-making process to inform implementation of flow and non-flow measures. CDFW and DWR anticipate that this science and monitoring program would be overseen by an entity such as the Delta Independent Science Board in order to facilitate the production of neutral, peer-reviewed science to guide further restoration and protection efforts in the Sacramento River and San Joaquin River watersheds and Delta ecosystem. CDFW and DWR intend to propose that terms to guide this science and monitoring program will be part of the proposed amendments to the Bay-Delta Plan.

#### **E. Funding**

17. The Parties propose to utilize dedicated funds consisting of (a) contributions based on deliveries to or diversions by the Parties, and (b) repurposing of existing funding. The contributions will be collected annually during the term of the Agreements. Through the contributions, the Parties expect to secure funds totaling approximately \$425 million for the additional flows, and \$345 million for the science program, over the term of the Agreements. Appendix 1 contains the details of these funding arrangements. Table 2 provides the proposed contribution to the funds, except as provided for in Attachment 1.

**Table 2. Contribution to Funds<sup>4</sup>**

<b>Delivered Water</b>	<b>Contribution to Water Purchase Fund</b>	<b>Contribution to Structural Habitat and Science Fund</b>
CVP/SWP water	\$5/acre-foot	\$2/acre-foot
Water diverted by the Sacramento River Settlement Contractors (base and project) or Feather River Diversion Agreement Parties		\$1/acre-foot
Non-project water diverted by party contributing water under the terms of the Agreement Framework		\$2/acre-foot
Non-project water diverted by party not contributing water under the terms of the Agreement Framework	\$10/acre-foot	\$2/acre-foot

**F. Other Terms**

18. Although the State Water Board will have authority to enforce implementation of flow and non-flow measures, as stipulated in the Agreements, the State Water Board will not enforce or otherwise regulate the funding arrangements.

19. Each potential effort, project and/or activity listed in this Agreement Framework has been or will be fully evaluated in compliance with applicable law, including, but not limited to, the National Environmental Policy Act and California Environmental Quality Act. This Agreement Framework does not, and is not intended to, bind any party to a definite course of action or limit in any manner the discretion of the United States, State of California, any other public agency, as applicable, in connection with consideration of the efforts described in this Agreement Framework, including without limitation, all required environmental review, all required public notice and proceedings, consideration of comments received, and the evaluation of mitigation measures and alternatives, including the “no action” or “no project” alternatives.

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<sup>4</sup> Except as provided for in Attachment 1.

## **Appendix 1: Proposed Tributary Term Sheets**

Addendum A: Sacramento River

Addendum B: Feather River

Addendum C: Yuba River

Addendum D: American River

Addendum E: Mokelumne River

Addendum F: Tuolumne River

Addendum G: Friant Division

Addendum H: Delta

**Addendum A**  
**Sacramento River Mainstem Proposal**

**Purpose:**

The Mainstem Sacramento actions include habitat restoration designed to work with existing winter and spring flows. The habitat improvements target improved growth, survival, diversity, and abundance of the four runs of Chinook salmon and steelhead on the Sacramento River. Additionally, 100,000 acre-feet of water, available from fallowing approximately 24,000 acres, would be available to increase flows improving salmonid outmigration survival and increase Delta outflow.

**Proposed Commitments:**

**Flow**

Fall Flow Stabilization (in every year type)

Minimize fall-run spawning impacts during transition from summer/fall flows to winter base flows. Other benefits include increased rearing habitat for juvenile salmonids and conserving cold water storage for winter Chinook spawning and egg incubation in the following late spring through early fall.

Description of Proposal: Demands by the National Wildlife Refuges, upstream CVP contractors, and the Sacramento River Settlement Contractors in October result in Keswick releases that are generally not maintained throughout the winter due to needs to store water for beneficial uses the following year. These releases result in some early fall Chinook redds being dewatered at winter base flows.

Following the emergence of winter Chinook and prior to the majority of fall Chinook spawning, upstream Sacramento Valley CVP contractors and the Sacramento River Settlement Contractors propose to work to synchronize their diversions to lower peak rice decomposition demand. With lower late October and early November flows, fall Chinook are less likely to spawn in shallow areas that would be subject to dewatering during winter base flows. Reductions would balance the potential for dewatering late spawning winter-run redds.

Targets for winter base flows from Keswick would be set in October and would be based on Shasta Reservoir end-of-September (EOS) storage. These base flows would be set based on historic performance to accomplish improved refill capabilities for Shasta reservoir to build cold water pool for the following year.

Below are examples of Keswick Releases based on Shasta storage condition – these would be refined through modeling efforts:

Keswick Release	Shasta EOS Storage
3,250 cfs	< 2.2MAF
4,000 cfs	< 2.8MAF
5,000 cfs	> 3.2 MAF



Governance/Decision Making: Following the emergence of winter Chinook and prior to the majority of fall Chinook spawning, upstream Sacramento Valley CVP contractors and the Sacramento River Settlement Contractors propose to work together to smooth Sacramento Valley CVP contractor diversions to improve the ability to reach the desired winter base flow targets when possible. Reclamation retains discretion over all CVP operations and propose to operate to downstream needs (e.g. Sacramento River or Delta). Furthermore, Reclamation makes operational decisions based on the CVP as a whole, and in accordance with any requirements under then-applicable Biological Opinions issued by federal fisheries agencies.

Additional Water Provided (Dry, Below Normal, Above Normal Year Types)

Dedicate 100,000 acre-feet of water for instream flow purposes focused in April and May to improve juvenile salmonid outmigration survival. This additional water would also contribute to increased Delta outflow while minimizing impacts to Shasta cold water pool.

Description of Action: In the spring, Keswick releases are typically steady until flows are needed to support instream demands on the mainstem Sacramento River and Delta requirements. As a standard practice, Reclamation operates Shasta in the spring to have storage in the reservoir high enough to use the Shasta temperature control device (TCD) upper shutters by the end of May to maximize the cold water pool potential for winter Chinook egg incubation management.

The Parties propose to utilize the 100,000 acre-feet made available through the land-fallowing program to make releases from Shasta, initially focused on April and May, for the primary purpose of increasing spring-run Chinook outmigration and survival in the lower Sacramento River, incorporating science, monitoring, and decision making and testing the hypothesis of flow and survival.

Based on initial review of historic data, the Parties believe that in the majority of these years, the spring pulse flow utilization of water can be accomplished. The fall stabilization action and targeted winter Keswick release is expected to further improve the likelihood and additional certainty regarding the ability to refill of Shasta Reservoir to attain appropriate storage levels under typical hydrological conditions associated with these year types to allow for the spring action to occur. If Reclamation determines that projected inflows to Shasta Reservoir are less than sufficient for summer temperature management pursuant to its ESA obligations, and/or taking the spring action would cause changes to water supply allocations and/or the timing of allocations (to each CVP division north or south of the Delta), or the action impacts other system-wide operations, the water would be added to releases during the summer or fall for other ecosystem benefits, and would serve to augment Delta outflows at those times.

A method for accounting for the 100,000 acre-foot release over the baseline release would be developed as the program of implementation is further refined. Timing and shaping of flows using the water would be based on testable hypotheses developed by the governance group described below.

Governance/Decision Making: Currently, the Sacramento River Temperature Task Group provides input to Reclamation on the operations in the winter/spring on Shasta Releases,

temperatures, spring flows, and cold water pool. The Parties would develop new governance to implement this action.

Actions in Wet Years (Wet Year Types only)

Proposed alteration to timing of Shasta Reservoir releases to support increased salmonid out-migration survival and floodplain habitat.

Description of Action: Reclamation currently generally operates Shasta Reservoir pursuant flood control and safety of dams requirements and procedures.

When inflow into Shasta Reservoir is forecasted to exceed the flood control requirements, Reclamation proposes early initiation of storage management releases for the purposes of spawning gravel cleaning functions, floodplain habitat, general fish migration flows and moderation of flood control-related pulse flows. The action would be subject to Reclamation's determination that there would be absolutely no elevated risk to public health, human safety, or property damage, and that there would be no water cost to the Projects.

Governance/Decision Making: Reclamation retains sole discretion over releases and other actions related to storage management for flood control.

Proposed Actions in Critical Years (Critical Year Types only)

Proposal to provide instream flows during critical years to support salmonid out-migration and temporary in-stream floodplain habitat.

Description of Proposed Action: In most critical years, the spring inflow into Shasta Reservoir is less than optimal and flows at Wilkins Slough are at times equal to or less than Shasta inflow. Significant runoff events that increase base flows on the Sacramento River are generally less frequent.

Reclamation proposes to provide a single spring pulse flow of 30,000 acre-feet in March, with a focus on last two weeks of the month. The water can be made available from Shasta or Whiskeytown reservoirs at Reclamation's sole discretion. The pulse would be timed to ensure that the water is 100% recoverable by the CVP and SWP through Delta exports (or other mechanisms at the discretion of Reclamation), as addressed through COA accounting. The action would be coupled with a storm event when possible, likely as an extension of the recession limb of rainfall runoff to ensure exportability.

The action would not occur if any of the following conditions occur:

- The action causes any impact to the amount or timing for Reclamation's allocations to any CVP contractors (in any CVP Division, north or south of the Delta).
- The Critical year in question immediately follows a Critical or Dry Year.
- Any new or additional RPMs, RPAs, or other regulatory actions affecting Project operations occur as a result of this action.

The action would also take into consideration temperature management considerations for the remainder of the year.

If the year type turns from Critical to Dry, any water released for this pulse action would be counted towards the 100,000 acre-foot commitment as outlined above for other year types.

### **Habitat**

#### **Spawning Habitat Keswick to Red Bluff Diversion Dam**

Propose to annually place 40,000 to 55,000 tons of gravel at the Keswick and/or Salt Creek injection site(s). Propose to create at least three site-specific gravel restoration projects upstream of Bonnyview Bridge within 5 years.

Projects that could be implemented in 2019 include: Salt Creek Gravel Injection Site; Keswick Dam Gravel Injection Site; South Shea Levee, Shea Levee; and, Tobiasson Island Side Channel.

#### **Rearing Habitat Keswick to Red Bluff Diversion Dam**

Propose to create a total of 40 to 60 acres of side channel habitat at no fewer than 10 sites in Shasta and Tehama County.

Project that could be implemented in 2019 include: Cypress Avenue; Shea Island; Anderson River Park; South Sand Slough; Rancheria Island; Tobiasson Side Channel; and, Turtle Bay.

#### **Rearing Habitat Red Bluff Diversion Dam to Verona**

Propose to enhance ~ 2,000 acres of floodplain habitat in the Sutter Bypass within the term of the Voluntary Agreement. Propose to provide fish passage and floodplain habitat at Tisdale Weir within 5 years and Colusa Weir within 10 - 15 years. Propose to complete the Hamilton City set back levee with appropriate floodplain habitat within 5 years. Inventory historic oxbows and design fish passage and floodplain projects within 5 years and implement projects within 10 years.

Projects that could be implemented in 2019 include: Tisdale Weir and Bypass Multi Benefit Project; and Hamilton City Levee Setback and Floodplain/Riparian Enhancement.

#### **Man Made Structures Keswick-Verona**

Propose to complete remaining high-priority fish screen projects. Propose to reduce lighting to 3 lux or less at fish screens and bridges within 5 years. Propose to incorporate ongoing redd dewatering coordination with Anderson Cottonwood Irrigation District into a Voluntary Agreement. Propose to address fish passage issues at Weir 1 and Weir 2 within 5 years.

Projects that could be implemented in 2019 include: reduced lighting at Sacramento River fish screens, reduced lighting at Sacramento River bridges; Sutter Bypass Weir 1 - Rehabilitation of weir structure and fish ladder (Coupled with new Lower Butte / Sutter Bypass water management plan); Sutter Bypass Weir 2 Multi Benefit Project; Screen Meridian Farms Water

Company; Screen Natomas Mutual Water Company; and, Anderson Cottonwood Irrigation District Dam operations to protect salmon redds.

Studies Keswick-Verona

Propose to design survival and predation studies within one year and implement them yearly for the term of the agreement.

Projects that could be implemented in 2019 include: Program to identify predation hot spot / adaptively manage for the reduction/improvement of predator contact points at man-made structures where predator interactions have been observed; Study route specific survival at key diversion facilities and implement appropriate devices that reduce route selection into lower survival areas; and study, design and implement modifications to known redd dewatering locations.

**Funding Commitments:**

The Sacramento water service and settlement contractor groups propose to contribute to the Water Purchase Fund and Structural Habitat and Science Fund.

Water Purchase Fund

- \$5 per acre-foot on Project Water Diverted

Structural Habitat and Science Fund

- SRSC contribute \$1 per acre-foot of all water diverted
- All other contractors contribute \$2 per acre-foot on all Project Water diverted

## Addendum B Feather River Proposal

### Purpose:

The Feather River proposal includes habitat restoration intended to work with existing and proposed Spring and Summer flows. The habitat improvements target improved growth, survival, diversity, and abundance of salmon and steelhead on the Feather River. Fifty-thousand acre-feet of water available from fallowing of 11,000 acres of agricultural land will be available to increase flows improving fish survival and providing for increases in Delta outflow.

### Proposed Commitments:

#### 1. Flow

As set forth in Table 1 below, the Feather River Settlement Contractors propose to provide for additional managed flows beyond current flow regimes on the Feather River to reestablish functionality of the habitat for native fishes.

**Table 1. Additional Managed Flow**

Water Quantity (TAF)	Implementation Date	Water Year Types
50	Spring or Summer <sup>1</sup>	Dry, Below Normal, Above Normal

In addition, DWR proposes to provide an immediate adjustment to river flow and temperature in the Feather River, as provided under the Federal Energy Regulatory Commission (FERC) Settlement Agreement (SA) for the Licensing of the Oroville Facilities, FERC Project No. 2100, to create additional spawning and rearing habitat by increasing useable area for adult and juvenile salmonids.<sup>2</sup>

**Table 2. River Flow and Temperature Adjustments**

Flow	
Flow Velocity (cfs)	Implementation Date <sup>3</sup>
700	April 1 – September 8
800	September 9 – March 31
Temperature	
Target (F, mean daily)	Compliance Point
56 – 63	Robinson Riffle

DWR also proposes to provide for re-operation of the Oroville facilities to maximize spawning and rearing in the Feather River for salmonids. Instead of routing flows through Thermalito Forebay and the power generation facilities at Oroville, a pulse flow would instead be routed

<sup>1</sup> Subject to coordination with fisheries agencies.

<sup>2</sup> This is included in the FERC SA. However, unlike the non-flow measures provided in the FERC SA, the Department of Water Resources would be able to implement this plan of operation immediately.

<sup>3</sup> Implementation would occur for the duration of the current annual and future FERC license.

directly through the low-flow channel to create optimal conditions for fish in the upper Feather River.

**Table 3. Pulse Flow**

<b>Water Quantity (TAF) – Average Annual</b>	<b>Pulse Velocity (cfs)</b>	<b>Date &amp; Duration</b>	<b>Water Year Types</b>
43	2,000	14 or more continuous days between January 1 – April 15	Dry, Below Normal, Above Normal

## **2. Non-Flow Habitat**

The Parties propose to enhance and create riverine habitat sufficient to support salmon and sturgeon populations in the Feather River with specific years of implementation, as described in Table 4 below. These projects would target specific critical life stages for fish including spawning (S), rearing (R), migration (M), and adult migration (AM).

**Table 4. New Riverine Habitat**

<b>Project</b>	<b>Description</b>	<b>Targeted Habitat</b>	<b>Years</b>	<b>Life Stage</b>
Gravel augmentation	Improve substrate conditions for spawning salmonids at key riffles	25,000 cu. yd.	0-5 years	S
Remove Sunset Pumps and associated rock dam	Remove barrier/entrainment risk for upstream salmonid and sturgeon passage	Over 25 miles upstream	0 – 5 years	AM, M
Oroville Wildlife Flood Stage Reduction Project	Weir improvements and ecosystem restoration and Oroville Wildlife Area to allow floodplain access	100 – 600 acres	3 – 8 years	R
Nelson Slough Floodplain Restoration	Provide optimal habitat for floodplain rearing and reduce stranding during high flow events	20 acres	3 – 15 years	R
Abbott Lake Re-Connection/Restoration	Provide optimal habitat for floodplain rearing and reduce stranding during high flow events	440 acres	3 – 15 years	R
Star bend Setback Levee	Provide optimal habitat for floodplain rearing and reduce stranding during high flow events	50 acres	3 – 15 years	R
Feather River Setback Levee below Yuba River on River Left Floodplain	Provide optimal habitat for floodplain rearing and reduce stranding during high flow events	1,100 acres	3 – 15 years	R
Identification of Predation Hot Spots and Adaptive Management for Predator Reduction	Improve rearing and migration conditions by reducing predation	Entire reach of river	0 – 15 years	R, M

As set forth in Table 5 below, DWR proposes to accelerate the creation of riverine habitat under FERC SA for the Licensing of the Oroville Facilities, FERC Project No. 2100. This acceleration would be an improvement over the timing for completion of projects identified in the FERC SA and would occur within the FERC jurisdictional boundary.

**Table 5. Accelerated Riverine Habitat in the FERC SA**

<b>Project<sup>4</sup></b>	<b>Description</b>	<b>Years after FERC License</b>	<b>Life Stage</b>
Habitat Improvement Plan (A101)	Develop and adaptive management plan to respond to restoration project feedback	2 years	All
Gravel Supplementation Improvement Program (A102)	File a gravel supplementation and improvement plan to respond to restoration project feedback	2 projects within 2 years; 5 within 5; 10 within 10	S
Channel Improvement Program (A103)	Creation and improvement of side channel habitat	Develop plan within 2 years; 3 channels in 5; all channels within 7	S, R
Structural Habitat Program (A104)	Installation of large woody debris, boulders, etc. and filing a plan for implementation	Submit plan within 1 year; implement within 2 years	R
Fish Weir Program (A105)	Filing plans for weir installation, installation of monitoring and segregation weirs	Install count weir within 1 year and segregation weir within 3	AM, S
Riparian Floodplain Program (A106)	Filing of recommendations for riparian projects, physical completion of projects	Screening level within 3 years; 1 project within 10; 2 projects within 15	R
Hatchery Improvement Implementation (A107)	Implementation of temperature targets, filing a hatchery genetics management plan (HGMP), data collection – minimize straying	Target hatchery temperatures and data collection immediately; HGMP within 1 year	AM, S

### 3. Governance

Governance for the Feather River proposal will be consistent with the terms of the Agreement Framework.

### 4. Funding Commitments

The Feather River Contractors propose to help fund the science and monitoring program at a rate of \$1 per acre-foot of all water diverted.

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<sup>4</sup> Includes FERC SA project identifier (e.g., A104, A109, etc.).

## **Addendum C**

### **Yuba Water Agency Proposal**

This document summarizes the framework (Framework) that the California Department of Water Resources, the California Department of Fish and Wildlife (CDFW) and Yuba Water Agency (YWA) have approved in concept for the voluntary agreement (Voluntary Agreement).

1. The Voluntary Agreement will be based on foundational principles that are set forth in the Framework.
2. YWA would: (a) repurpose all Yuba Accord Released Transfer Water in April through June that cannot be accounted for as Delivered Transfer Water (as these terms are defined in the Yuba Accord Water Purchase Agreement); and (b) reoperate New Bullards Bar Dam and Reservoir by up to 50,000 acre-feet, to provide: (1) a Base Contribution of 9,000 acre-feet per year in above-normal, below-normal and dry-years; and (2) a Supplemental Contribution of up to an additional 41,000 acre-feet per year in above-normal, below-normal and dry-years, based on releases from storage with YWA's reoperation plan, to assist other agencies in meeting the Sacramento River Basin's Delta flow contribution target.
3. YWA would not receive any compensation for YWA's Base Contribution.
4. YWA would be paid \$290 per acre foot for all Supplemental Contribution water.
5. The Base Contribution is comparable and proportionate to YWA's proportionate share of the Yuba River watershed's comparable and proportionate share of flow contributions for Delta inflow from the Sacramento River Basin.
6. The Supplemental Contribution exceeds what would be YWA's comparable and proportionate share of contributions to Delta inflow.
7. YWA would make an annual payment to the Structural Science Fund of \$520,000.
8. All parties to the YWA Voluntary Agreement will support YWA's Amended Final License Application for the Yuba River Development Project.
9. CDFW would notify FERC of its support for the AFLA when YWA notifies it that YWA would provide the Supplemental Contribution prior to the execution of the Voluntary Agreement (i.e., early implementation of flow releases).
10. YWA would enhance a minimum of 100 acres of floodplain and in-channel habitat along the lower Yuba River.
11. YWA would contribute \$10 million for Habitat Enhancement Measures.
12. The parties to the YWA Voluntary Agreement would define the process for and respective obligations of the parties to select, fund, develop, operate, maintain and repair Habitat Enhancement Measures.



## **Addendum D American River Proposal**

### **Purpose**

The American River Parties believe that implementation of the flow, habitat and non-flow measures, described below, when integrated, would materially improve conditions for anadromous fish in the lower American River, maintain water supply reliability, and provide additional new water for purposes of improving ecosystem conditions in the Delta.

The American River flow, storage, habitat and infrastructure improvement actions are designed to work in harmony to improve conditions for all life stages of Central Valley steelhead and Fall-run Chinook salmon in the lower American River. The combined actions are also additive to the overall package of measures being undertaken in other tributaries and in the Delta to improve conditions for the Sacramento River and San Joaquin River watersheds and Delta ecosystem.

### **Proposed Commitments**

#### **A. Flows and Storage**

##### **i. Proposed Environmental Flow Commitments by American River Parties**

- **Additional Water for Environmental Purposes.** The water provided by the American River Parties under the Voluntary Agreement would be in addition to and would be used to supplement the environmental flows described in the Attachment.
- **Groundwater Substitution Water.** American River Parties propose to make available a contribution of 10,000 acre-feet of groundwater substitution water in Sacramento Valley Index Critical and Dry years, for an upfront payment of \$15M (from a public source).
  - Calls for this water may be made in up to 6 Critical or Dry years during the 15-year term of the Voluntary Agreement.
  - The water made available in Folsom Reservoir under the voluntary agreement would be managed in a manner to meet identified biological objectives developed in the American River Group through a collaborative process. See Monitoring, Reporting, and Adaptive Management below. The stakeholders participating in the collaborative process propose to designate a single point of contact with authority to make decisions. Reclamation, CDFW, NMFS and FWS will retain their discretion to determine the biological objectives.
  - Depletion rates would be determined by BOR and DWR (currently 8%), in consultation with American River Parties, based on local conditions and data developed by American River Parties, or, absent a determination, based on white paper.

- Groundwater recharge would occur in wetter years, consistent with sustainable groundwater management principles.
- **Reservoir Reoperation Water.** American River Parties propose to make available an additional 10,000 acre-feet of reservoir reoperation water in Sacramento Valley Index Above Normal and Below Normal years, for a payment of \$290/acre-foot.
  - Calls for this water may be made in up to 6 Above Normal or Below Normal years during the 15-year term of the Voluntary Agreement.
  - The cost of this water would be paid out of the Water Purchase Fund.
  - This water would be subject to the then-applicable refill criteria.
- **Additional Dry Year Water.** In Sacramento Valley Index Dry years, American River Parties propose to make available an additional 10,000 acre-feet of water from reservoir reoperation and/or groundwater substitution, for a payment of \$290/acre-foot out of the Water Purchase fund.
  - All of the caveats relating to Reservoir Reoperation Water and Groundwater Substitution Water apply to this block of water.
- **Groundwater Bank.** If American River Parties are awarded bond funding for infrastructure improvements under Public Resources Code section 80114 or another public fund identified for supporting or facilitating the voluntary agreements, the American River Parties would produce up to 20,000 acre-feet of additional water in Sacramento Valley Index Critical and Dry years, under the following terms:
  - For each \$1 million dollars of funding received by the American River Parties, the American River Parties propose to make 500 acre-feet of additional water available, up to a maximum call amount of 20,000 acre-feet. Water would be made available for call within 18 months after the American River Parties receive the funding agreement.
  - Calls for this water may be made in up to 6 Critical or Dry years during the 15-year term of the Voluntary Agreement.
  - Depletion rates would be determined by BOR and DWR (currently 8%), in consultation with American River Parties, based on local conditions and data developed by American River Parties, or, absent a determination, based on white paper.
  - Groundwater recharge would occur in wetter years, consistent with sustainable groundwater management principles.

ii. **Lower American River Management Framework:**

- **Flows.** Within the Lower American River, Reclamation would adopt the minimum flow schedule and approach proposed by the Water Forum in 2017. Flows range from 500 to

2000 cfs based on time of year and annual hydrology. The flow schedule is intended to improve cold water pool and habitat conditions for steelhead and fall-run Chinook salmon.

- **Temperature Management.** The Parties would continue the existing water temperature planning and operations actions as described in the 2009 NMFS BiOps, including development of a temperature management plan every May which optimizes monthly temperature targets developed using latest reservoir operations forecast data. The purpose of the temperature management plan is to balance the habitat needs of rearing steelhead and fall-run Chinook salmon.
- **Folsom Reservoir Operations.** All of the following measures are subject to the understanding that Reclamation at all times retains all of its discretion to operate the CVP consistent with its authorizing acts and all other applicable legal authority.
  - Reclamation and the American River parties propose to work together using their expertise to define an appropriate amount of storage that represents the lower bound for typical forecasting processes in Folsom Reservoir at the end of calendar year (the "planning minimum"). The objective of the planning minimum is to preserve storage to protect against future drought conditions and to facilitate the development of the cold water pool when possible. This planning minimum will be a single value (or potentially a series of values for different hydrologic year types) to be used for each year's forecasting process into the future. To meet the objective identified above, Reclamation and American River parties propose to work together to determine the draft value(s) that they believe are appropriate. The draft value(s) for the planning minimum developed by the parties would also be shared with CVP contractors from outside of the American River Division, and the parties would meet with other CVP contractors to explain the basis of the selection of the draft value(s) and receive their comments. Reclamation would then determine its preferred value(s) for use in its forecasting process for guiding seasonal operations. The American River Parties acknowledge that Reclamation's selection of a preferred value is not a final agency action and is not subject to judicial review.
  - Reclamation and the American River Parties understand that the forecasted storage may fall below the planning level minimum due to a variety of circumstances and causes. As such, Reclamation and the American River Parties would develop a list of potential off-ramp actions that may be taken to either improve forecasted storage or decrease demand on Folsom.
  - Both the planning minimum value(s) and the list of potential off-ramp options would be completed before the Voluntary Agreement is executed.
  - In its forecasting process for guiding seasonal operations, Reclamation would plan to maintain or exceed the agreed-upon Folsom planning minimum at the end of the calendar year.

- When Reclamation estimates, using the forecasting process, that it would not be able to maintain Folsom Reservoir storage at the end-of-December planning minimum for that year type (such as in extreme hydrologic conditions) or unexpected events cause the storage level to be at risk, American River Division contractors would consult with Reclamation to identify and implement appropriate actions to improve forecasted storage conditions, and the parties would work together to educate the public on the actions that have been agreed upon and implemented and the reasons and basis for them. Reclamation would also meet with American River contractors and CVP Contractors from outside the American River Division in circumstances when potential changes to Folsom operations would have impacts on other parts of the system and when the actions need to be taken that affect the entire integrated system.
- In incorporating the planning minimum into its forecasting process, Reclamation recognizes the parties' shared goals of providing releases of salmonid-suitable temperatures to the lower American River and reliable deliveries (using the existing water supply intakes and conveyance systems) to American River water agencies that are dependent on deliveries or releases from Folsom Reservoir, as well as its obligations, including the terms of the American River settlement contracts and all of the purposes authorized for the American River Division as an integrated facility of the Central Valley Project.
- The parties recognize that, during the term of the Voluntary Agreement, changed circumstances may necessitate adjustments to the value(s) for the planning minimum. Any party may request that the technical group reconvene and that Reclamation re-evaluate its preferred value(s) based on the changed circumstances.
- Reclamation would ramp down to the revised minimum flows from Folsom Reservoir as soon as possible in the fall and maintain these flows, where possible, given all of the purposes authorized for the American River Division as an integrated facility of the Central Valley Project and consistent with required flood control operations, in the winter in an effort to maximize spring storage for the purpose of developing the largest possible annual cold-water pool.

**iii. Non-Flow Proposed Commitments by the American River Parties**

- 50 acres of anadromous fish spawning habitat, implementation costs split between local agencies and Reclamation. Parties may seek outside funding to offset their cost shares.
- 150 acres of anadromous fish rearing habitat, paid for by the Structural Habitat Science Fund and/or State bond funds.
- The Parties propose to work collaboratively to determine the highest value locations for habitat restoration within the watershed and will prioritize projects accordingly.

iv. **Conditions and Assumptions for All American River Parties' Proposed Commitments**

- The terms and conditions of the FERC licenses and water rights settlement agreements will be implemented.
- Final terms and conditions for the Voluntary Agreement must be acceptable to Reclamation, the Water Forum and the governing bodies of the Parties.

**Monitoring, Reporting and Adaptive Management**

- American River Parties propose to continue the science program established by the Water Forum, including its monitoring, reporting, and adaptive management components. As noted above, the water made available in Folsom Reservoir under the voluntary agreement would be managed in a manner to meet identified biological objectives developed in the American River Group through a collaborative process.
- The collaborative process would consider potential uses of water made available by American River Parties, including, but not limited to, the following:
  - Improving cold water pool storage for steelhead rearing and fall-run Chinook spawning
  - Augmenting spring flows and improving temperatures to support juvenile outmigration and inundate floodplain habitat
  - Augmenting flows and improving temperature for fall-run Chinook salmon spawning
  - Augmenting Delta outflow
- The stakeholders participating in the collaborative process, including the agencies, would designate a single point of contact with authority to make decisions to participate in the meetings.

**Early Actions Pending Completion of Voluntary Agreement and Environmental Review**

- American River Parties would cooperate with CDFW, DWR and the Water Forum to implement, in 2019, a salmonid habitat restoration project on the lower American River consisting of the following elements: (1) approximately 3.35 acres of spawning habitat, and approximately 2.14 acres of rearing habitat, at Upper Sailor Bar; and (2) approximately 2.45 acres of spawning habitat, and 0.28 acres of rearing habitat, at Lower Sailor Bar. Implementation of this project is dependent on the continued availability of \$2.3 million in federal funds that have been committed to the Water Forum, as well as the issuance of Clean Water Act section 404 and 408 permits by the U.S. Army Corps of Engineers (USACE). CDFW and DWR would formally request that the USACE expedite the issuance of these permits and would coordinate with the Central Valley Flood Protection Board to support that USACE action. CDFW and DWR would expedite the issuance of any approvals for this project that are within their respective jurisdictions.

## **Funding Commitments**

### **A. Proposed Contributions by American River Parties**

- American River Parties would contribute \$2 per acre-foot for all water delivered for consumptive use by local agencies in the American River watershed to the Structural Habitat and Science Fund.
- To offset the cost of water and habitat needed to implement the voluntary agreement, American River Parties propose to pay an additional \$5 per acre-foot on all CVP water service water and Warren Act water delivered through Project facilities, except for pre-1914 water rights water conveyed subject to a Warren Act contract, which will not pay the \$5 charge.
- The \$5 per acre-foot fee would be deposited the Water Purchase Fund.

### **B. Proposed Local Expenditure of Funds Collected**

- The Parties recognize that the American River Parties have a long history of managing the American River watershed for environmental purposes through a multi-party collaborative effort led by the Water Forum, which the American River Parties have funded themselves for the last twenty years, pursuant to the Water Forum Agreement.
- To continue to support the Water Forum's efforts, for every \$2 contributed to the Sacramento Watershed Habitat and Science Fund over the term of the 15-year voluntary agreement, Reclamation would direct \$1.75 of benefits to be returned to the American River region for the purpose of funding local science and habitat, and \$0.25 would be directed to Delta science and habitat efforts.
- The Parties recognize that the American River Parties have been, for many years, investing in regional water supply infrastructure which can help reduce their reliance on flows from the American River, and the Parties desire to continue to support these efforts during the term of the Voluntary Agreement. Therefore, to offset the costs of or otherwise support the American River Parties' implementation of the voluntary agreement, of the funds collected in the Water Purchase Fund, each American River Party would be provided funds in an amount equivalent to the amount contributed by each party, to be expended locally by the water supply agencies. These funds would not be used to pay for or purchase the water made available under the Voluntary Agreement. Release of these funds would not be subject to federal budgeting processes or appropriations. These funds may be used by the local agencies for any legal purpose, including, but not limited to, projects to improve water supply reliability, infrastructure built in the service area that has reliability benefits in the service area, and projects that may have regional water supply benefits. The Parties propose to agree on an appropriate mechanism for the local agencies to claim the funds.

## **Proposed Implementation, Related Approvals and Support**

- Provided that the improvements are deemed non-reimbursable, Reclamation would agree to support and advocate for the completion of Folsom temperature infrastructure

improvements during the term of this agreement. These improvements would include improving efficiency of the existing temperature shutters. Reclamation and the American River Parties agree that completing the planned improvements to the temperature shutters concurrently with the planned flood raise for Folsom Dam would provide multiple benefits. Reclamation would use its best efforts to urge the Corps of Engineers to complete improvements to the temperature shutters on this schedule. Reclamation would also continue to collaborate to develop a feasible modified penstock intake to access maximum extent of cold-water pool and minimize need for power production bypass to the extent reasonable.

- Reclamation and the California Department of Fish and Wildlife would agree to make physical and operational improvements to the Nimbus hatchery to ensure efficient production of healthy anadromous fish to meet the obligated mitigation spawning requirements. Reclamation would provide \$2.5 M of capital funds for these improvements, subject to appropriations and limits imposed by federal law.
- The Parties propose to prepare a written agreement containing these terms and would execute it once they secure final approval from governing bodies.
- The Parties propose to agree to support all necessary regulatory, legislative and legal actions required to implement this proposal as allowed by law. It is intended that implementation of this operational framework for Folsom would resolve all of the parties' disputes regarding Folsom operations. An initial list of measures to be supported would be provided to the parties.

# LOWER AMERICAN RIVER - STANDARDS FOR MINIMUM FLOWS -

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The following are the standards for calculating Minimum Release Requirements (MRRs) that the Water Forum submitted to the State Water Resources Control Board in 2017.

## 1 HYDROLOGIC INDICES

Hydrologic indices of water availability are used in these Standards to scale MRRs from Nimbus Dam to water year type. Lower MRRs are prescribed in drier years and higher MRRs are prescribed in wetter years. The MRRs are updated each month from January through May based on updated forecasts and indices for the water year. During the latter portion of the year (June through December), MRRs are based on the May index, because at that time the majority of the precipitation has occurred in the watershed (i.e., the amount of water available is fairly certain). The criteria used to develop the most appropriate hydrologic index were that the index was well established, publicly available or easy to calculate, accurate, available January through May, and updated monthly as the water year progressed. The two indices that were selected to specify the MRR were the SRI for the month of January, and the ARI for the months of February through December. Each index is described below.

### 1.1 SACRAMENTO RIVER INDEX

The SRI, previously referred to as the “4 River Index” or “4 Basin Index,” is published by the California Department of Water Resources (DWR) each year on December 1, January 1, February 1, March 1, April 1, and May 1 for several exceedance levels. The value of the SRI at 75% exceedance is used for determining the MRR in January (**Figure 1**). The SRI can be found at [http://cdec.water.ca.gov/cgi-progs/iodir\\_ss/wsi](http://cdec.water.ca.gov/cgi-progs/iodir_ss/wsi). DWR computes the SRI by adding the forecasted unimpaired flow for the water year from the Sacramento River above Bend Bridge, the Feather River at Oroville, the Yuba River near Smartsville, and the American River below Folsom Reservoir.

**Cooperative Snow Surveys Website - Snowpack**

**WSI (05/08/15 1506)**

Department of Water Resources  
California Cooperative Snow Surveys  
WATER SUPPLY INDEX (WSI) FORECASTS  
2015 Water Year Hydrologic Classification Indices

2015 Water Year Forecast as of May 1, 2015

SACRAMENTO RIVER UNIMPAIRED RUNOFF - SACRAMENTO RIVER INDEX (SRR)

Forecast Date	Probability of Exceedance					
	99%	90%	75%	50%	25%	10%
Dec 1, 2014	4.9 (27%)	7.2 (39%)	9.7 (53%)	13.7 (75%)	18.5 (101%)	23.7 (130%)
Jan 1, 2015	8.9 (49%)	11.5 (63%)	14.3 (78%)	17.1 (94%)	21.6 (118%)	26.0 (142%)

**Figure 1. Excerpt from the California Data Exchange Center website showing the Sacramento River Index value at 75% exceedance.**

## 1.2 AMERICAN RIVER INDEX

The ARI is a measure of the unimpaired inflow to Folsom Reservoir minus the amount of “spill” water that could not be captured at the reservoir (unimpaired runoff minus spill flows). The equations for calculating the ARI are provided in **Table 1**.

The unimpaired inflow used in the ARI is based on the DWR “Bulletin 120, Water Conditions in California” (B120) estimate of unimpaired water year runoff in the “American River below Folsom Lake.” DWR initially publishes the B120 each year in early February, and subsequently publishes the March, April, and May B120 on the 6<sup>th</sup> working day of each month. Between the monthly B120 publications and after the May publication, DWR publishes weekly updates reflecting current snow pack and precipitation monitoring information. The final weekly update is typically released in early June, but depending on conditions, the release of weekly updates can extend into mid-or late-June.

**Table 1. Equations to calculate the American River Index.**

Variable & Units	Equation/Calculation Method	Description and Citations
ARI <sub>i,j</sub> (TAF)	$ARI_{i,j}$ $= B120\ WY\ Forecast_{i,j}$ $- Folsom\ WYTD\ Spill_{i,j}$	American River Index for water year i estimated based on data available in month j.
B120 WY Forecast <sub>i,j</sub> (TAF)	Published Bulletin 120.	DWR Bulletin 120, 50% exceedance “water year forecast” in the “American River below Folsom Lake” for water year (WY) i published in month j.
Folsom WYTD Spill <sub>i,j</sub> (TAF)	$\sum_{k=Oct\ 1}^{End\ of\ Month\ j-1} (Spill_k\ (cfs))$ $+ ContReg_k\ (cfs) \cdot 0.001983$	The water-year-to-date (WYTD) i volume of the Folsom Dam spillway and/or control regulating discharge (ContReg) for each day k through the end of month j as reported by DWR’s California Data Exchange Center website; where Spill = spillway discharge (cfs) and ContReg = control regulating discharge (cfs), but only control regulating discharges related to avoiding reservoir spills, not releases used for temperature control in the fall or other discretionary releases

B120 provides both a forecast of monthly unimpaired flows for the water year (October through September), a forecast of water year unimpaired runoff, commonly referred to as the median forecast, and an 80 percent probability range, that essentially defines the 10 percent and 90 percent exceedance levels. DWR’s B120 publications can be found at <http://cdec.water.ca.gov/snow/bulletin120/index.html>. An excerpt of pages 4 and 5 from B120 is shown in **Figure 2**. The median value (“Water Year Forecast”) is used in computing the ARI.

The amount of spill water in the ARI computation is the cumulative water-year-to-date (WYTD) amount of discharge from the Folsom Dam Spillway and the Control Regulating Gates as reported by DWR’s California Data Exchange Center (CDEC) website ([http://cdec.water.ca.gov/cgi-progs/queryCSV?station\\_id=FOL](http://cdec.water.ca.gov/cgi-progs/queryCSV?station_id=FOL)) as shown in **Figure 3**. However, only “Control Regulating Gate” discharges related to avoiding reservoir spills are used in the calculation, not releases used

for temperature control in the fall (or other discretionary releases). The WYTD discharge is calculated from October 1 through the end of the month preceding the forecast (e.g., October 1 through January 31 for the February forecast).

FEBRUARY 1, 2014 FORECASTS APRIL-JULY UNIMPAIRED RUNOFF							FEBRUARY 1, 2014 FORECASTS WATER YEAR UNIMPAIRED RUNOFF														
HYDROLOGIC REGION and Watershed	HISTORICAL			FORECAST			DISTRIBUTION														
	50 Yr Avg (2)	Max of Record	Min of Record	Apr-Jul Forecasts	Pct of Avg	50 % Probability Range (1)	50 Yr Avg (2)	Max of Record	Min of Record	Oct Thru Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Water Year Forecasts	Pct of Avg	50 % Probability Range (1)
<b>North Coast</b>																					
Trinity River at Lewiston Lake	651	1,593	80	220	34%	70 - 560	1376	2990	200	38	55	65	85	85	40	10	2	0	380	28%	145 - 910
<b>SACRAMENTO RIVER</b>																					
<b>Upper Sacramento River</b>																					
Sacramento River at Delta above Shasta Lake	302	711	39	120	40%		876	1,965	165												
McCloud River above Shasta Lake	392	850	185	210	54%		1,200	2,353	567												
Pi River near Montgomery Creek + Squaw Creek	1,044	2,098	450	560	50%		3,082	5,150	1,454												
Total Inflow to Shasta Lake	1,806	3,525	726	950	53%	650 - 1,780	5,979	10,790	2,479	697	300	315	325	275	185	165	155	153	2,570	43%	1,075 - 4,210
Sacramento River above Bend Bridge, near Red Bluff	2,485	5,075	943	1,200	48%	850 - 2,470	6,727	17,180	3,294	922	455	475	430	340	235	195	177	171	3,400	39%	2,615 - 6,025
<b>Feather River</b>																					
Feather River at Lake Almanor near Prattville (3)	333	675	120	150	45%		780	1,269	366												
North Fork at Pulga (3)	1,028	2,416	243	340	33%		2,417	4,400	666												
Middle Fork near Clo (4)	86	518	4	25	29%		219	637	24												
South Fork at Fordsota Dam (3)	110	267	13	30	27%		291	562	32												
Feather River at Oroville	1,758	4,076	392	570	32%	360 - 1,500	4,523	9,492	994	308	175	245	220	210	75	65	60	52	1,410	31%	1,000 - 3,210
<b>Yuba River</b>																					
North Yuba below Goodyears Bar	279	647	51	90	32%		564	1,056	102												
Inflow to Jackson Mews and Bowman Reservoirs (3)	112	236	25	45	40%		181	292	30												
South Yuba at Langs Crossing (3)	233	481	57	90	39%		379	565	98												
Yuba River near Smartsville plus Deer Creek	996	2,424	200	350	35%	170 - 850	2,329	4,926	369	91	100	125	150	145	40	15	7	7	680	29%	375 - 1,525
<b>American River</b>																					
North Fork at North Fork Dam (3)	262	716	43	80	31%		616	1,234	66												
Middle Fork near Auburn (3)	522	1,406	100	180	34%		1,070	2,576	144												
Silver Creek Below Camino Diversion Dam (3)	173	389	37	60	35%		316	705	59												
American River below Folsom Lake	1,231	3,074	229	440	36%	180 - 1,210	2,683	6,382	349	48	105	145	210	180	45	5	1	1	740	60%	330 - 955
<b>SAN JOAQUIN RIVER</b>																					
Cosumnes River at Michigan Bar	128	363	8	28	22%	5 - 150	385	1,253	20	7	16	19	14	10	3	1	0	0	70	18%	15 - 115
Mokelumne River																					
North Fork near Delta	437	920	154	170	39%		828	1,690	167												
<b>San Joaquin River</b>																					
<b>Stanislaus River</b>																					
Middle Fork																					
Stanislaus																					
<b>Tuolumne River</b>																					
Cherry Creek																					
Tuolumne																					
<b>Merced River</b>																					
Merced																					
<b>American River below Folsom Lake</b>																					<b>740</b>
<b>TULARE LAKE</b>																					
<b>Kings River</b>																					
North Fork Kings River near Cliff Camp (3)	239	565	50	90	38%		284	607	58												
Kings River below Pine Flat Reservoir	1,236	3,113	274	470	38%	200 - 1,090	1,729	4,287	386	39	28	60	115	215	115	25	12	8	615	36%	340 - 1,380
Kaweah River below Terminus Reservoir	290	814	62	160	34%	50 - 280	456	1,402	94	9	8	16	30	45	20	5	2	1	135	30%	70 - 370
Tule River below Lake Success	64	250	2	9	14%	2 - 65	147	615	16	3	5	7	5	3	1	0	0	0	24	16%	7 - 120
<b>Kern River</b>																					
Kern River near Kernville	384	1,203	83	130	34%		558	1,577	163												
Kern River inflow to Lake Isabella	465	1,657	84	140	30%	80 - 470	733	2,319	175	37	15	25	40	50	35	15	10	8	235	32%	150 - 710

Figure 2. Excerpt from Bulletin 120 showing the water year 50% exceedance forecast (“Water Year Forecasts” column) of unimpaired flow in the “American River below Folsom Lake” circled in red.

**FOLSOM LAKE**

[Map of surrounding area](#)

Station ID	FOL	Elevation	466' ft
River Basin	AMERICAN R	County	SACRAMENTO
Hydrologic Area	SACRAMENTO RIVER	Nearby City	FOLSOM
Latitude	38.68300	Longitude	-121.18300
Operator	US Bureau of Reclamation	Data Collection	

Additional types of information available: [Dam Information](#) | [Reservoir Information](#)

The following data types are available online. Select one of the links below to retrieve recent data.

Sensor Description	Duration	Plot	Data Collection	Data Available
<a href="#">DISCHARGE, POWER GENERATION, cfs</a>	<a href="#">(daily)</a>	<a href="#">(DIS PWR)</a>	DATA XCHG-USBR	04/01/2000 to present.
<a href="#">DISCHARGE, PUMPING, cfs</a>	<a href="#">(daily)</a>	<a href="#">(DC PUMP)</a>	DATA XCHG-USBR	02/01/1995 to present.
<a href="#">DISCHARGE, SPILLWAY, cfs</a>	<a href="#">(daily)</a>	<a href="#">(SPILL)</a>	DATA XCHG-USBR	04/01/2000 to present.
<a href="#">DISCHARGE, CONTROL REGULATING, cfs</a>	<a href="#">(daily)</a>	<a href="#">(RIV REL)</a>	DATA XCHG-USBR	04/01/2000 to present.

**Figure 3. Excerpt from the California Data Exchange Center website for the Folsom (FOL) Station showing hyperlinks to the daily flow data for the “Spillway” and “Control Regulating” discharges.**

The ARI is initially determined in early February when the February B120 is released. The ARI is then updated for each B120 publication for the months of March, April, and May, and subsequent updates after the May publication, by subtracting the spills through the end of the preceding month from the B120 forecast (e.g., for the May ARI, October 1 through April 30 spills are subtracted from the May B120 forecast). The ARI value computed from the final B120 update each year is the final ARI for the year and remains in effect until the end of December.

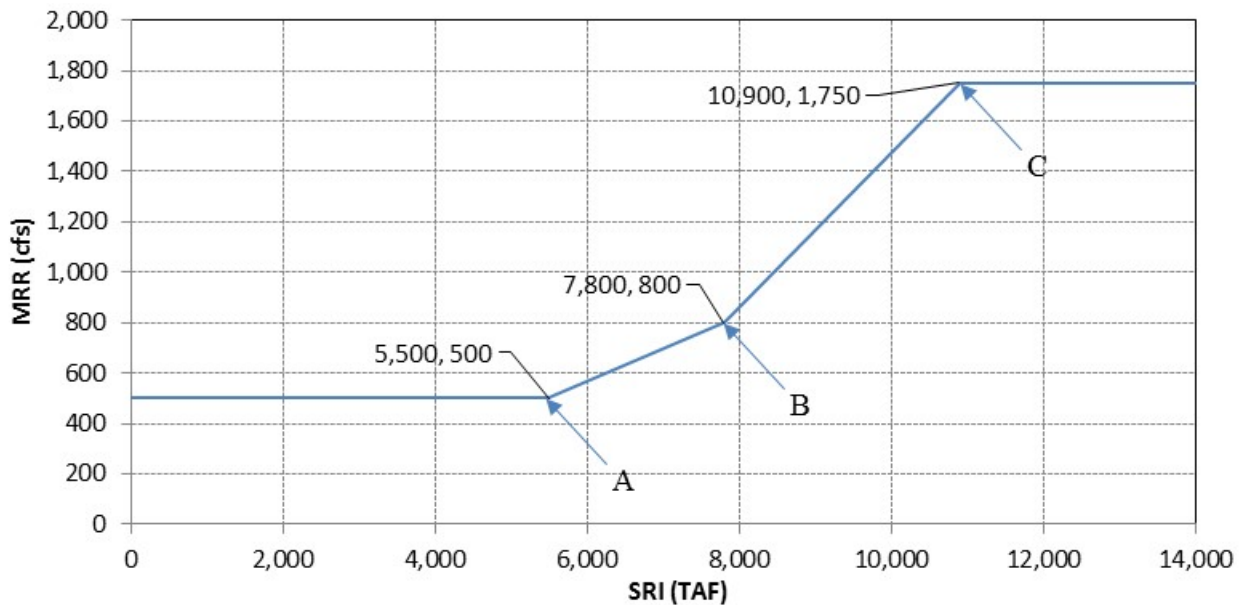
## 2 DETERMINATION OF THE MONTHLY MINIMUM RELEASE REQUIREMENTS

The monthly MRR at Nimbus Dam is determined using SRI index values (for January) and ARI index values (for February through December), and the MRR implementation curves. **Table 2** summarizes the specified values associated with points A, B, and C in **Figures 4** through **9**, which show the specific MRR implementation curves for various months of the year. The MRR for index values between points specified on the table are calculated by linearly interpolating between specified points. At any point on the curves, the MRR value would specify the minimum release, but would not preclude releases at rates above the MRR.

**Table 2. Summary of Hydrologic Indices and specified values for the Minimum Release Requirements.**

Months	Hydrologic Index Used	Point A		Point B		Point C					
		Index Value (TAF)	MRR Value (cfs)	Index Value (TAF)	MRR Value (cfs)	Index Value (TAF)	MRR Value (cfs)				
Jan	SRI	5,500	500	7,800	800	11,500	1,750				
Feb – Mar	ARI	800		1,000		1,958	1,750				
Apr – Jun								1,958	1,750		
Jul – Sep <sup>1</sup>										1,914	1,500
Oct											
Nov – Dec											

<sup>1</sup>The July through September curve includes an additional point between points B and C, corresponding to an ARI of 1,200 TAF and an MRR of 1,500 cfs.

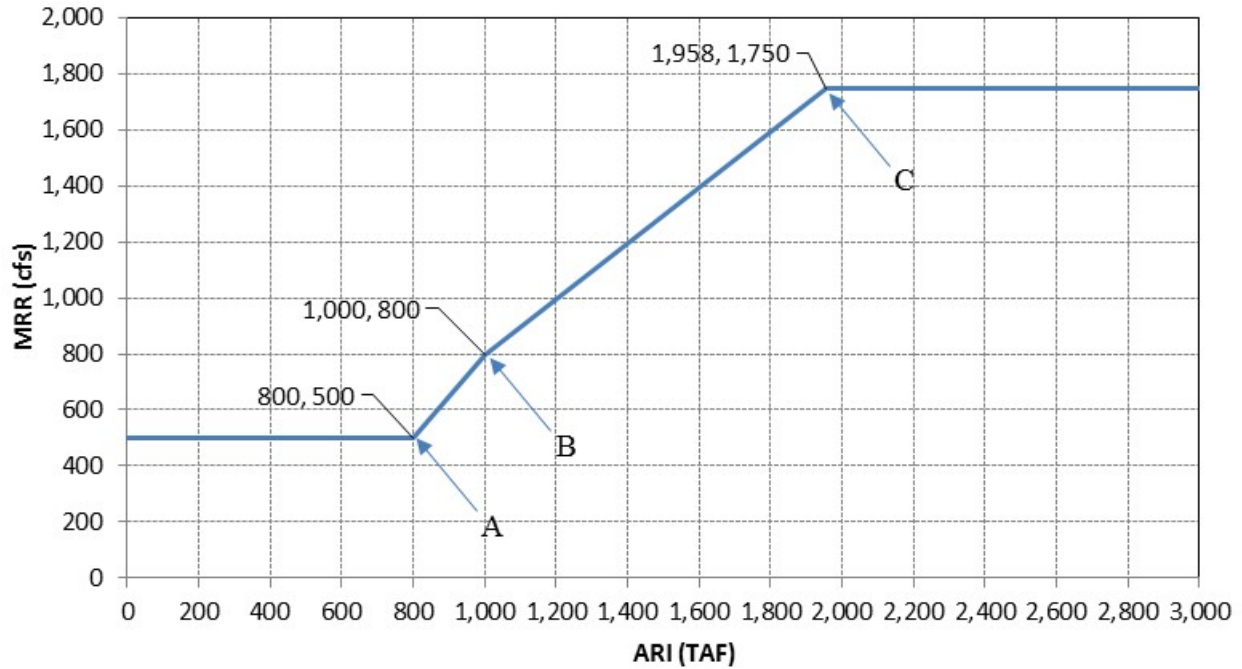


**Figure 4. Relationship between the Sacramento River Index and monthly Minimum Release Requirements for January.**

For January, the following equations can be used to determine the MRR for a given SRI:

- If  $SRI \leq 5,500$  TAF, then  $MRR = 500$  cfs
- If  $5,500 \text{ TAF} < SRI \leq 7,800$  TAF, then  $MRR = 0.1304 * SRI - 217$  cfs
- If  $7,800 \text{ TAF} < SRI \leq 11,500$  TAF, then  $MRR = 0.2568 * SRI - 1203$  cfs
- If  $SRI > 11,500$  TAF, then  $MRR = 1,750$  cfs

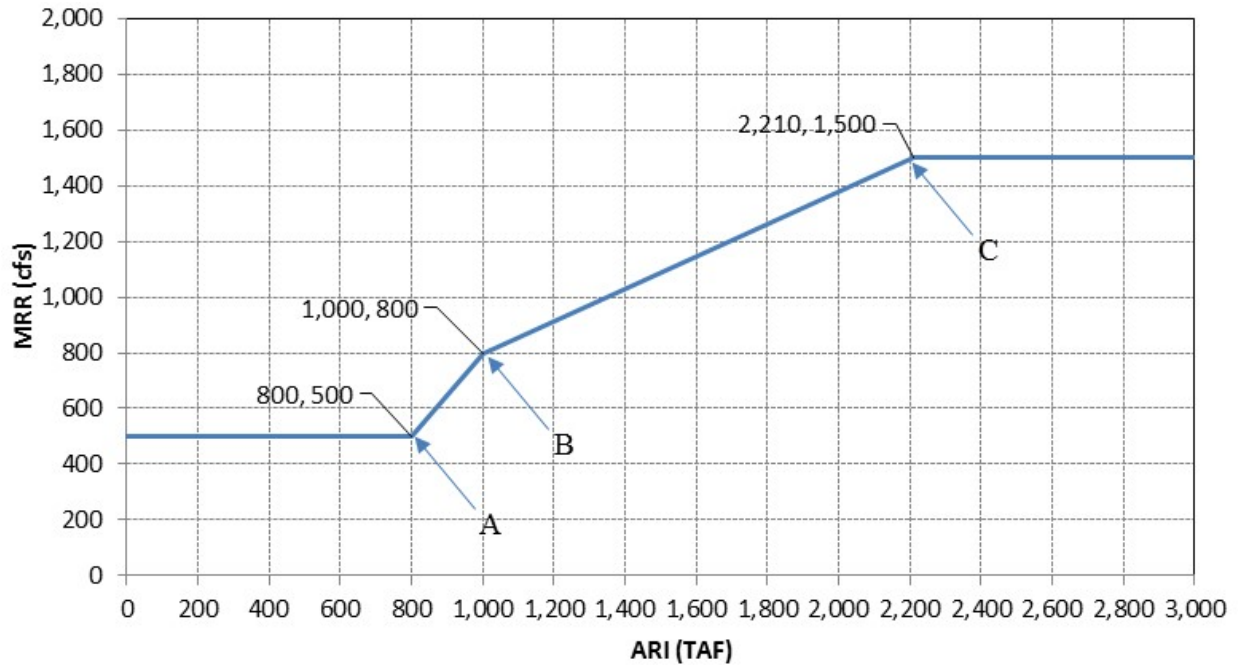
In recognition of the uncertainty associated with the SRI forecast, the January MRR is not allowed to be greater than the December MRR.



**Figure 5. Relationship between the American River Index and monthly Minimum Release Requirements for February and March.**

For February through March, the following equations can be used to determine the MRR for a given ARI:

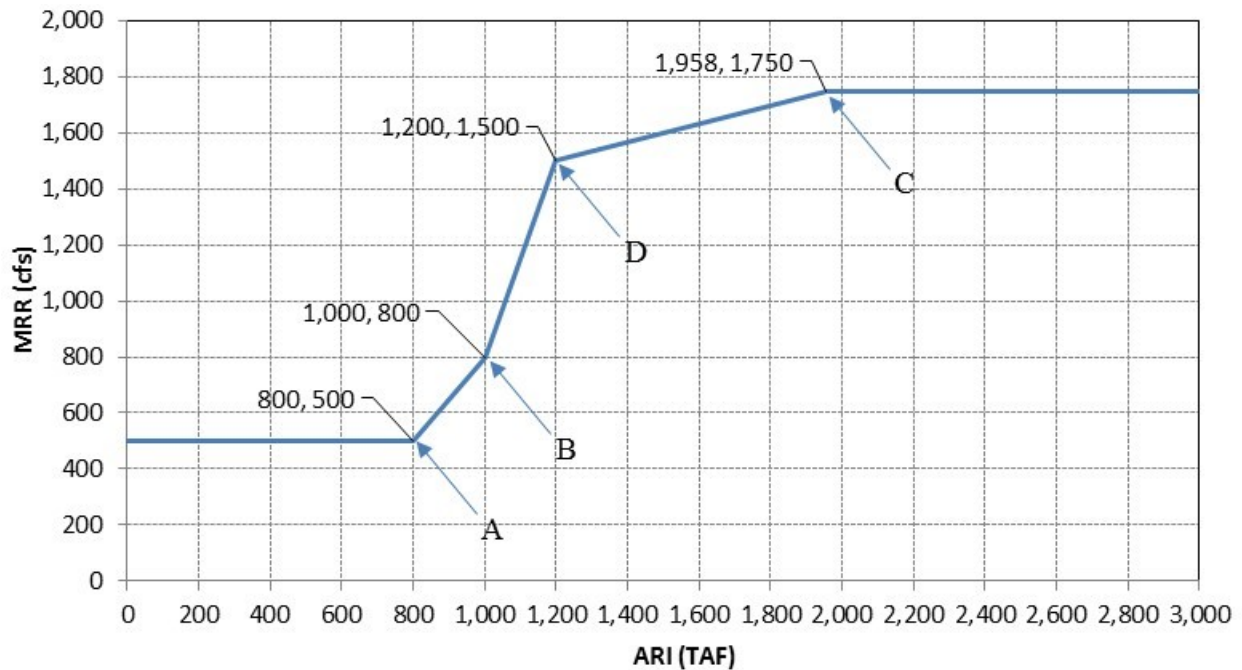
- If  $ARI \leq 800$  TAF, then  $MRR = 500$  cfs
- If  $800 \text{ TAF} < ARI \leq 1,000$  TAF, then  $MRR = 1.500 * ARI - 700$  cfs
- If  $1,000 \text{ TAF} < ARI \leq 1,958$  TAF, then  $MRR = 0.9916 * ARI - 192$  cfs
- If  $ARI > 1,958$  TAF, then  $MRR = 1,750$  cfs



**Figure 6. Relationship between the American River Index and monthly Minimum Release Requirements for April through June.**

For April through June, the following equations can be used to determine the MRR for a given ARI:

- If  $ARI \leq 800$  TAF, then  $MRR = 500$  cfs
- If  $800 \text{ TAF} < ARI \leq 1,000$  TAF, then  $MRR = 1.500 * ARI - 700$  cfs
- If  $1,000 \text{ TAF} < ARI \leq 2,210$  TAF, then  $MRR = 0.579 * ARI + 221$  cfs
- If  $ARI > 2,210$  TAF, then  $MRR = 1,500$  cfs

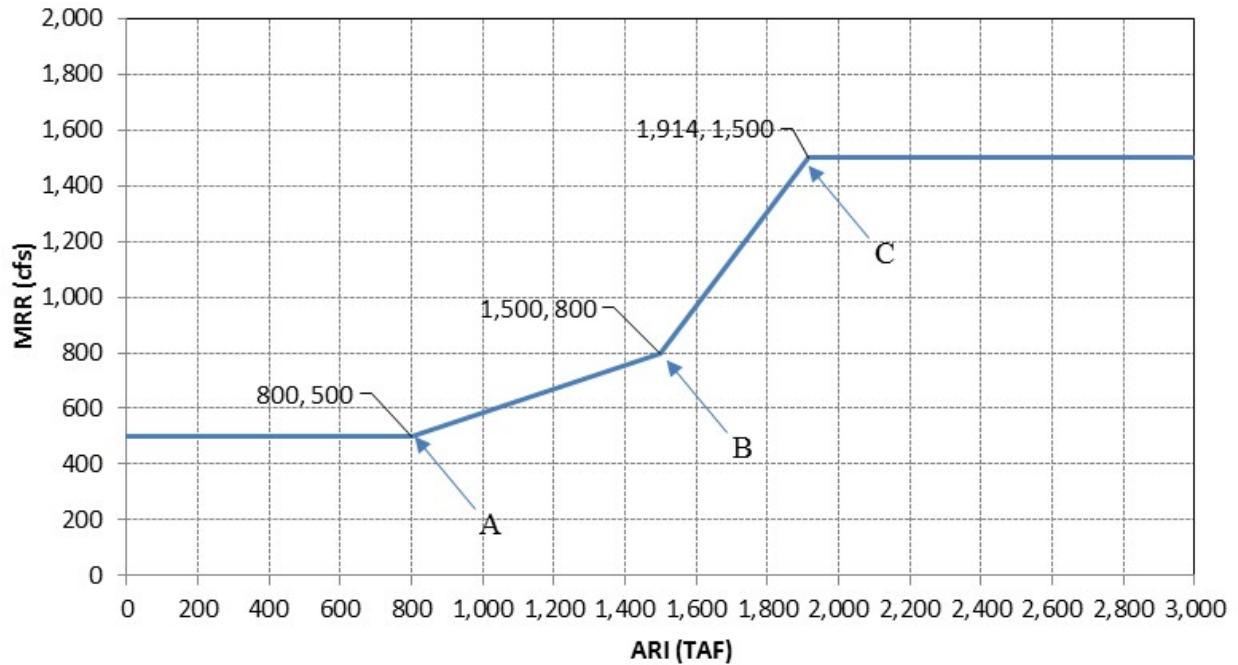


**Figure 7. Relationship between the American River Index and monthly Minimum Release Requirements for July through September.**

For July through September, the following equations can be used to determine the MRR for a given ARI:

- If  $ARI \leq 800$  TAF, then  $MRR = 500$  cfs
- If  $800 \text{ TAF} < ARI \leq 1,000$  TAF, then  $MRR = 1.500 * ARI - 700$  cfs
- If  $1,000 \text{ TAF} < ARI \leq 1,200$  TAF, then  $MRR = 3.500 * ARI - 2,700$  cfs
- If  $1,200 \text{ TAF} < ARI \leq 1,958$  TAF, then  $MRR = 0.330 * ARI + 1,104$  cfs
- If  $ARI > 1,958$  TAF, then  $MRR = 1,750$  cfs

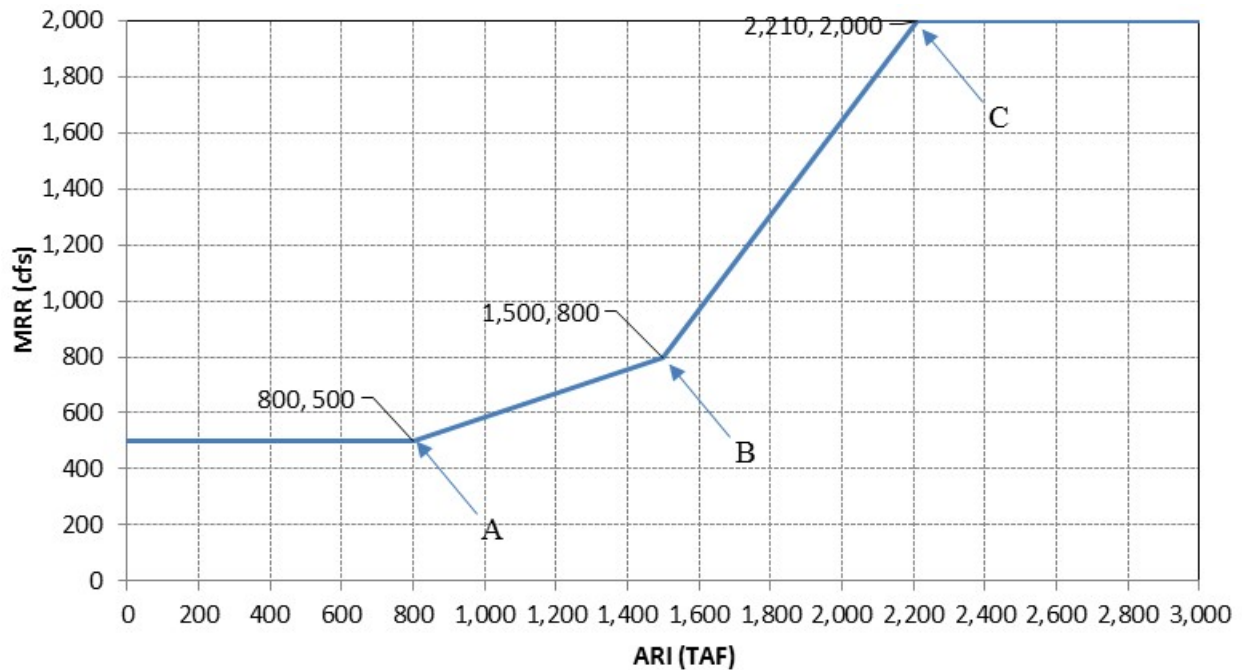




**Figure 8. Relationship between the American River Index and monthly Minimum Release Requirements for October.**

For October, the following equations can be used to determine the MRR for a given ARI:

- If  $ARI \leq 800$  TAF, then  $MRR = 500$  cfs
- If  $800 \text{ TAF} < ARI \leq 1,500$  TAF, then  $MRR = 0.429 * ARI + 157$  cfs
- If  $1,500 \text{ TAF} < ARI \leq 1,914$  TAF, then  $MRR = 1.690 * ARI - 1,736$ cfs
- If  $ARI > 1,706$  TAF, then  $MRR = 1,500$  cfs



**Figure 9. Relationship between the American River Index and monthly Minimum Release Requirements for November and December.**

For November and December, the following equations can be used to determine the MRR for a given ARI:

- If  $ARI \leq 800$  TAF, then  $MRR = 500$  cfs
- If  $800 \text{ TAF} < ARI \leq 1,500$  TAF, then  $MRR = 0.429 * ARI + 157$  cfs
- If  $1,500 \text{ TAF} < ARI \leq 2,210$  TAF, then  $MRR = 1.690 * ARI - 1,736$  cfs
- If  $ARI > 2,210$  TAF, then  $MRR = 2,000$  cfs

## **Addendum F Tuolumne Proposal**

### Terms

- Proposed FERC relicensing flows as submitted on November 14, 2018 constitute the base flows.
- FERC flows modified from 75 cfs to 125 cfs in critical and dry water years and reduce FERC flows from 350 cfs to 300 cfs in wet , above normal and below normal years from June 1 to October 15.
- Flood plain pulse flows as follows:
  - 2,750 cfs for 20 days in W and AN WYs with decision on WY type in March using SJR Index 60-20-20 at 90% exceedance for floodplain pulse.
  - 2,750 cfs for 18 days in BN WYs with decision on WY type in March using SJR Index 60-20-20 at 90% exceedance for floodplain pulse.
  - 2,750 cfs for 14 days in D WYs with decision on WY type in March using SJR Index 60-20-20 at 90% exceedance for floodplain pulse.
  - 2,750 cfs for 9 days in C WYs with decision on WY type in March using the SJR Index 60-20-20 at 90% exceedance for floodplain pulse.
  - Dry and critical year off ramps.
- Predation barrier and counting weir to be designed in consultation with DFW and may be constructed with permanent concrete abutments and necessary appurtenances and will be a part of annual predator suppression activities.
- Develop initial feasibility studies within 2 years to develop additional supplies for river flows. Implementation is subject to mutual agreement of the parties.

## **Addendum G Friant Proposal**

As part of a comprehensive approach to coordinated operations and implementing updates to the State Water Resources Control Board's Water Quality Control Plan objectives, for 15 years from the date of this agreement, the Secretary of Interior, pursuant to section 10004(a)(4)(C) of the San Joaquin River Settlement Act (P.L. 111-11), proposes to manage San Joaquin River Restoration Flows (Restoration Flows) that are otherwise capable of being recaptured and recirculated for the benefit of Friant Division Contractors under the San Joaquin River Restoration Settlement (SJRRS) and San Joaquin River permits 11885, 11886, 11887 and License 1986.

In all years, except for those determined to be Critical-High or Critical-Low under the SJRRS, Reclamation proposes to reduce the recapture of Restoration Flows to the extent necessary 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 and May (Delta Outflow Goal), subject to the following:

1. Reclamation proposes to recapture, protect and manage Restoration Flows for the purpose of reducing or avoiding impacts to water deliveries to Friant Division long-term contractors caused by Restoration Flows except when, during the months of February through May, reducing recapture diversions as part of this agreement is necessary to satisfy the Delta Outflow Goal above.
2. 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.
3. It is understood and allowed that in some years there would not be sufficient Restoration Flows to meet the Delta Outflow Goal. In such years, Reclamation would still reduce recapture of San Joaquin Restoration flows by 50% of the existing flows, but the Delta Outflow Goal would not be satisfied, and Reclamation would not be required to take other actions or make other releases of water.
4. Consistent with law, Reclamation would not reduce water supply to other CVP contractors in order to achieve the Delta Outflow Goal.
5. All flows released below Friant Dam, including those flows released and/or bypassed at Friant Dam necessary to address flood conditions, would contribute towards satisfying the 50,000 acre-foot Delta Outflow Goal.

The State Water Resources Control Board would agree that implementation of this agreement, in conjunction with continued implementation of the San Joaquin River Restoration Program, would be deemed sufficient to satisfy the Friant Division Contractors' contribution to implementation of the Water Quality Control Plan updates, as long as this provision remains in effect.

## **Addendum H Delta Proposal**

### **Purpose:**

The flow provided through D-1641, combined with the additional flow, structural habitat, and funds included herein, would be used to create substantial benefits to ecosystem functions and to create conditions necessary to improve the viability of native fish. The augmented outflow would be applied based on the governance described below and would be integrated with landscape and other changes to achieve ecological outcomes favorable to native fish and wildlife.

### **Proposed Commitments:**

#### **1. Flow**

Reclamation and DWR, with the support of SWP Contractors and South of Delta CVP Contractors, commit 300 TAF of water from SWP Contractors and South of Delta CVP Contractors to annual outflow after April 1 of Above Normal, Below Normal, and Dry water year types.

In addition to the 300 TAF and the 440 TAF from the Agreement Framework, 300 TAF of additional water will be made available, subject to conditions below, through Prop 1 storage projects that generate environmental water; purchases of additional water through the Agreement Framework, other willing seller/buyer arrangements; future bond funding; and, if required, from SWP Contractors and South of Delta CVP Contractors. Environmental water provided through Prop 1 storage projects would be made available as these projects are constructed. If the science demonstrates a need, additional water to generate a total of 300 TAF will be made available in year 8 or beyond. This water would be used to test specific hypotheses for identified species or ecosystem needs, as agreed to through the new governance structure by a stakeholder group. The availability of this water is contingent upon the restructuring of the Delta science and monitoring program.

#### **2. Habitat**

The application of the 740-1,040TAF of water across seasons and water years would vary and would be based on direction from the stakeholder group, although would be primarily focused on above Normal, Below Normal, and Dry water year types. This flexibility would allow for real-time adjustments to hydrologic conditions (for example, to take advantage of pulse flows from storms), experimental flows to test ecological responses to landscape changes, and strategic use of flows to improve water quality. This also involves narrowly targeting flows to improve ecological conditions in specific areas, which increases the efficiency of the use of this water. Additionally, several projects are proposed to increase the land-water interaction in the Delta (described below). Freshwater flows, tidal flows, and landscapes would be managed together to stimulate ecosystem processes and functions to improve habitat conditions for fish. This increased flexibility in the timing and magnitude of freshwater flows and linkages to landscape modifications would increase habitat benefits and take advantage of tidal energy. For example,

flows in combination with structural habitat projects would be used to reverse declines in food resources for the Delta ecosystem, maximize high-quality habitat that favors native plants and animals, and manage nutrient pollution to reduce harmful algal blooms. Flow and non-flow habitat actions can also be influenced by existing and planned gates and barriers to further maximize the benefits of these resources. Clear hypotheses would be used to monitor, report and adjust both flow and non-flow actions to maximize the benefits of the water and funding made available to the Delta habitats. This approach has the best chance of improving our understanding of how to manage the Delta in the future.

Additionally, there are opportunities to provide substantial benefits in Cache Slough and some augmented Delta outflow through the use of water from the Solano project or other water available in Putah Creek. This can provide foodweb benefits in Cache Slough and the North Delta as well as provide a modest contribution to outflow for other ecological functions.

Delta habitat projects that may contribute to the above are included in Table 1.

**Table 1. In Delta Habitat Actions**

- |  |
|--|
| <ul style="list-style-type: none"><li>• North Delta Arc</li><li>• Complete CWF tidal and channel margin restoration on Sacramento River, Steamboat Slough and Sutter Slough</li><li>• Chipps Island restoration</li><li>• Increased aquatic weed removal</li><li>• Predator hot spot removal</li><li>• North Delta food subsidies</li><li>• Suisun Marsh food subsidies</li><li>• Construct RVRS facility</li><li>• Consolidate and screen intakes in Cache Slough</li><li>• Funding for game wardens for enforcement/boats in Delta</li></ul> |
|--|

### **3. Governance/Decision Making:**

An organized, deliberate approach to integrating science into decision-making, and continually adjusting actions in response, is needed to reduce uncertainty and more effectively use the resources made available as part of this agreement (Figure 1).

This approach would define a set of initial projects throughout the Sacramento and San Joaquin River basins and the Delta that have high probability to provide benefits to improve Delta ecosystem functions and to create conditions necessary to improve the viability of native fish. (See Appendix 2 to Agreement Framework, Proposed Actions for Species Objectives: The Delta and American & Mokelumne Rivers).

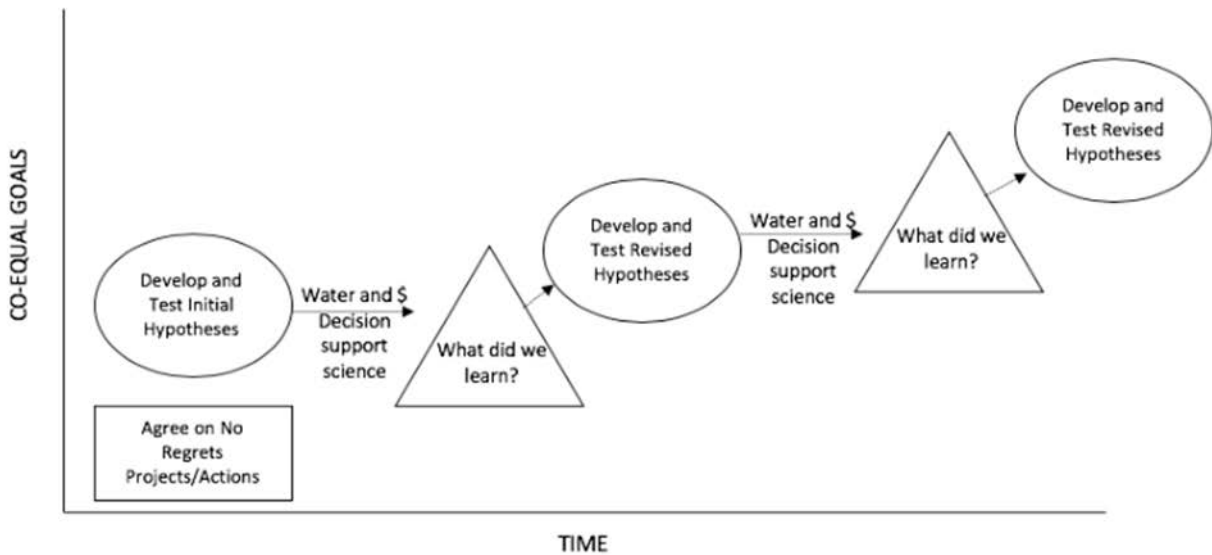
This approach would define a set of initial testable hypotheses that are used to test the integration of flow and habitat actions to provide identified, measurable benefits. It would also facilitate coordination among parties throughout the Delta ecosystem to better integrate habitat and species management activities.

This approach would define a program to answer management questions and support the investigation of the testable hypotheses. This would be accomplished by using existing funding that has been used for compliance monitoring and science program implementation and redirecting it; funding generated through this agreement, and other sources. The purpose of the program would be to accomplish the following:

- Implementing specific experiments – The Science Program would adopt a “safe to fail” experimental approach to maximize learning.
- Testing hypotheses – the program should identify and test key hypotheses, especially/even if conflicting, about how the system functions and what measures are most effective at achieving desired outcomes.
- Learning from the experiments – ensure each action undertaken is designed to gain as much knowledge as possible.
- Designing the experiments to be outcomes based – The VA Science Program would identify a manageable set of SMART objectives that describe desired environmental and biological outcomes.
- Facilitating a collaborative process – all stakeholders are engaged in the development and implementation of the science program.
- Facilitating a transparent process – through collaboration, reporting, and working towards open data.

This approach would establish a collaborative structured decision-making process to determine flow and structural habitat actions, direct science needs, and incorporate outcomes of the testable hypotheses to continue to inform decision-making.

Figure 1. Summary of proposed science and decision-making process



#### **4. Funding Commitments:**

Sacramento River Flow and Delta Outflow Augmentation Effort, With Fund: A fund will be developed to compensate farmers in the Sacramento River basin, Sacramento River, and Feather River who fallow land to contribute water for Delta outflow and tributary flows. The fund would be initially established with Prop 1 funds and subsequently funded through the collection of a surcharge on water diverted, as described below. Collection of the surcharge would begin immediately and would be collected for each of the 15 years of this agreement.

CVP and SWP contract water: Each acre-foot of CVP and SWP water diverted would be assessed a charge. Based on the last 10 years of diversions, this per acre foot charge could generate in excess of \$370M over the 15-year term. After the 5<sup>th</sup> call for water using this revenue, the Reclamation, DWR, SWP Contractors and South of Delta CVP Contractors would reconvene to determine if the surcharge needs to be adjusted to ensure the fund can support future calls for water.

Non-CVP and SWP contract water: Agencies who contribute water would not pay a charge on their non-CVP/SWP water diversions, but agencies who do not contribute water would pay \$10/acre-foot towards the revolving fund for water acquisition.

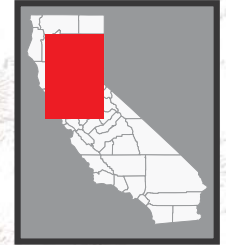
State and Federal contributions: The State and Federal governments commit to pursuing State bond money and seeking any necessary legislation to provide additional monetary funds. This includes potential directed and competitive funding opportunities from various State sources. Up to approximately \$1.3 billion in bond funding is available for instream flows, restoration, multi-benefit flood projects, and other activities.



## **Appendix 2: Locations and Scale of Habitat Measures**

# PROPOSED ACTIONS FOR SPECIES OBJECTIVES

Full Project Area



## ADDITIONAL PROPOSED ACTIONS for SACRAMENTO RIVER

*(not shown on map)*

- Gravel augmentation
- New spawning / rearing habitat restoration up to 50 acres
- Flow measure will create 600-700 acres in the mainstem channel within project levels
- Reduced lighting at Sacramento River bridges
- Predator suppression and control
- Inventory and reconnect historic onbars and other off-channel habitat within project levels

## ADDITIONAL PROPOSED ACTIONS for FEATHER RIVER

*(to be implemented in orange shaded area)*

- Fish Weir Program
- Hatchery Improvement Program & HGMP Implementation
- Creation & Improvement of Side Channel Habitat
- Structural Habitat Program - LWD and boulder installations
- Identification of Predation Hot Spots & Adaptive Management for Predator Reduction
- Lower Feather River Habitat Improvement Program
- Oroville Wildlife Flood State Reduction Project
- Restoration of Floodplain Habitat Within Existing Setback Levels
- Riparian Floodplain Program
- Riparian Floodplain Program Second Project
- Gravel Supplementation Improvement Program, 10 projects within 10 years
- Gravel Augmentation

## ADDITIONAL PROPOSED ACTIONS for YUBA RIVER

*(to be implemented in green shaded area)*

Multi benefit projects to improve habitat including grading or lowering river bed, riparian planting, creating backwater, off-channel areas and fish screen improvement.

## ADDITIONAL PROPOSED ACTIONS for DELTA

*(not shown on map)*

- Aquatic weed removal
- Predator hot spot removal
- Funding for game wardens / enforcement

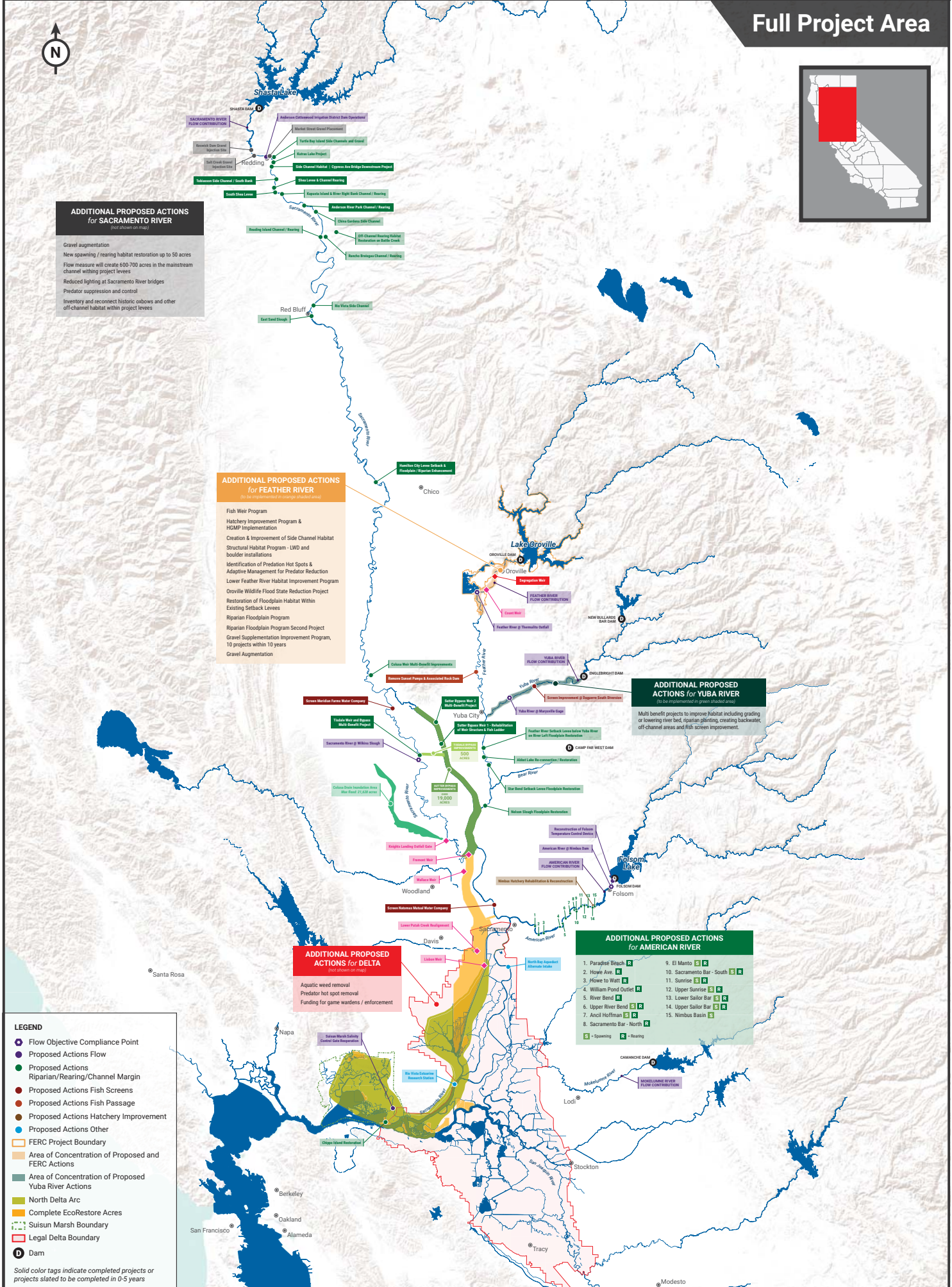
## ADDITIONAL PROPOSED ACTIONS for AMERICAN RIVER

- Paradise Beach **R**
  - Howe Ave **R**
  - Howe to Watt **R**
  - William Pond Outlet **R**
  - River Bend **R**
  - Upper River Bend **S R**
  - Ancil Hoffman **S R**
  - Sacramento Bar - North **R**
  - El Mantito **S R**
  - Sacramento Bar - South **S R**
  - Sunrise **S R**
  - Upper Sunrise **S R**
  - Lower Sailor Bar **S R**
  - Upper Sailor Bar **S R**
  - Nimbus Basin **S**
- S** - Spawning **R** - Rearing

### LEGEND

- Flow Objective Compliance Point
- Proposed Actions Flow
- Proposed Actions Riparian/Rearing/Channel Margin
- Proposed Actions Fish Screens
- Proposed Actions Fish Passage
- Proposed Actions Hatchery Improvement
- Proposed Actions Other
- FERC Project Boundary
- Area of Concentration of Proposed and FERC Actions
- Area of Concentration of Proposed Yuba River Actions
- North Delta Arc
- Complete EcoRestore Acres
- Suisun Marsh Boundary
- Legal Delta Boundary
- D Dam

Solid color tags indicate completed projects or projects slated to be completed in 0-5 years



# PROPOSED ACTIONS FOR SPECIES OBJECTIVES

Sacramento River



Shasta Lake

SHASTA DAM **D**

SACRAMENTO RIVER FLOW CONTRIBUTION

Anderson Cottonwood Irrigation District Dam Operations

Market Street Gravel Placement

Turtle Bay Island Side Channels and Gravel

Kutras Lake Project

Side Channel Habitat | Cypress Ave Bridge Downstream Project

Tobiasson Side Channel / South Bank

Shea Levee & Channel Rearing

South Shea Levee

Kapuesta Island & River Right Bank Channel / Rearing

Anderson River Park Channel / Rearing

China Gardens Side Channel

Off-Channel Rearing Habitat Restoration on Battle Creek

Reading Island Channel / Rearing

Rancho Breisgau Channel / Rearing

Rio Vista Side Channel

East Sand Slough

## ADDITIONAL PROPOSED ACTIONS for SACRAMENTO RIVER

- Gravel augmentation
- New spawning / rearing habitat restoration up to 50 acres
- Flow measure will create 600-700 acres in the mainstream channel withing project levees
- Reduced lighting at Sacramento River bridges
- Predator suppression and control
- Inventory and reconnect historic oxbows and other off-channel habitat within project levees

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SETTLEMENT COMMUNICATION.

### LEGEND

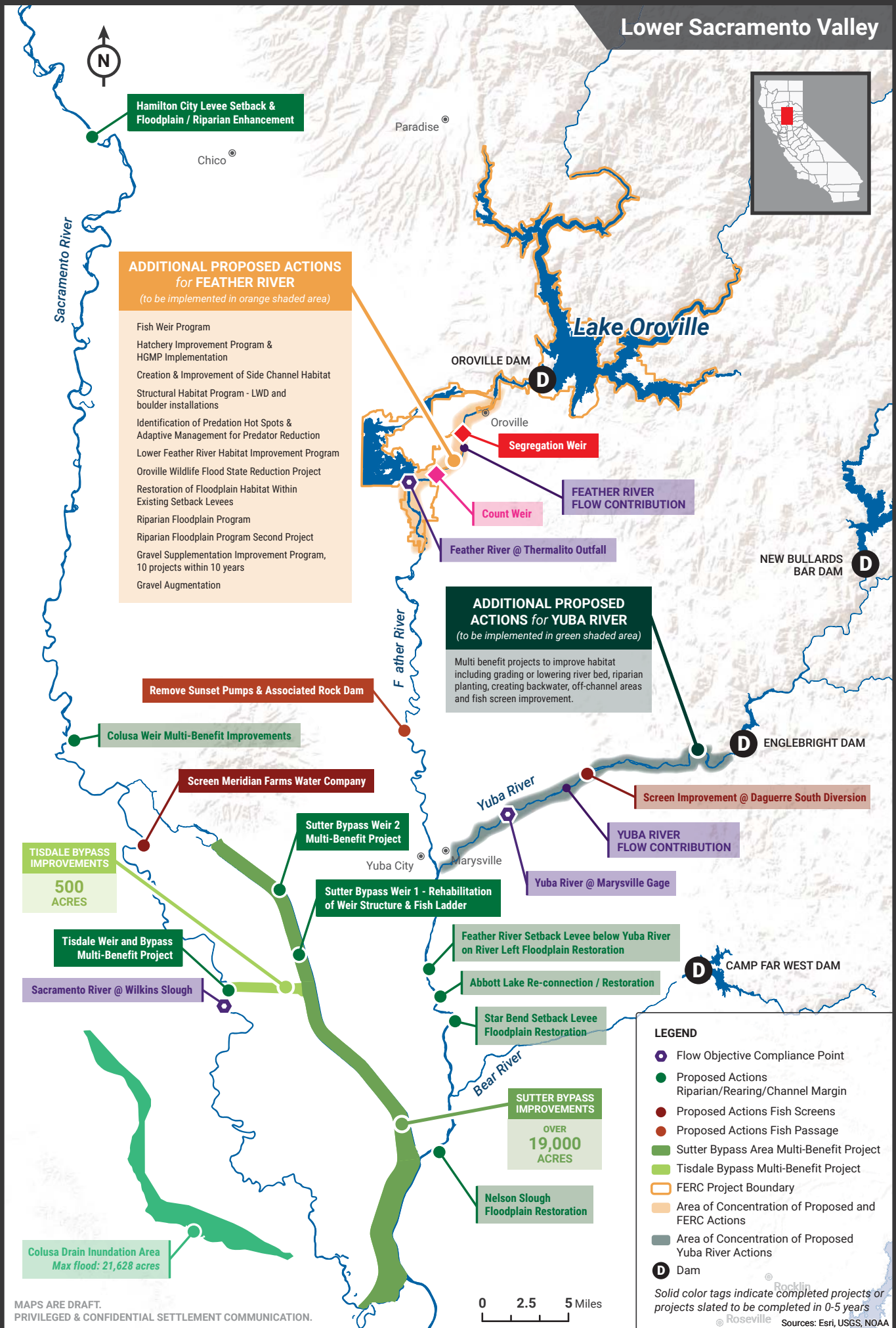
- Proposed Actions Flow
- Proposed Actions Gravel
- Proposed Actions Riparian/Rearing/Channel Margin
- D** Dam

Solid color tags indicate completed projects or projects slated to be completed in 0-5 years

Red Bluff

# PROPOSED ACTIONS FOR SPECIES OBJECTIVES

## Lower Sacramento Valley



### ADDITIONAL PROPOSED ACTIONS for FEATHER RIVER *(to be implemented in orange shaded area)*

- Fish Weir Program
- Hatchery Improvement Program & HGMP Implementation
- Creation & Improvement of Side Channel Habitat
- Structural Habitat Program - LWD and boulder installations
- Identification of Predation Hot Spots & Adaptive Management for Predator Reduction
- Lower Feather River Habitat Improvement Program
- Oroville Wildlife Flood State Reduction Project
- Restoration of Floodplain Habitat Within Existing Setback Levees
- Riparian Floodplain Program
- Riparian Floodplain Program Second Project
- Gravel Supplementation Improvement Program, 10 projects within 10 years
- Gravel Augmentation

### ADDITIONAL PROPOSED ACTIONS for YUBA RIVER *(to be implemented in green shaded area)*

- Multi benefit projects to improve habitat including grading or lowering river bed, riparian planting, creating backwater, off-channel areas and fish screen improvement.

TISDALE BYPASS IMPROVEMENTS  
**500 ACRES**

SUTTER BYPASS IMPROVEMENTS  
**OVER 19,000 ACRES**

Colusa Drain Inundation Area  
Max flood: 21,628 acres

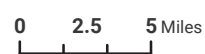
**LEGEND**

- Flow Objective Compliance Point
- Proposed Actions Riparian/Rearing/Channel Margin
- Proposed Actions Fish Screens
- Proposed Actions Fish Passage
- Sutter Bypass Area Multi-Benefit Project
- Tisdale Bypass Multi-Benefit Project
- FERC Project Boundary
- Area of Concentration of Proposed and FERC Actions
- Area of Concentration of Proposed Yuba River Actions
- Dam

*Solid color tags indicate completed projects or projects slated to be completed in 0-5 years*

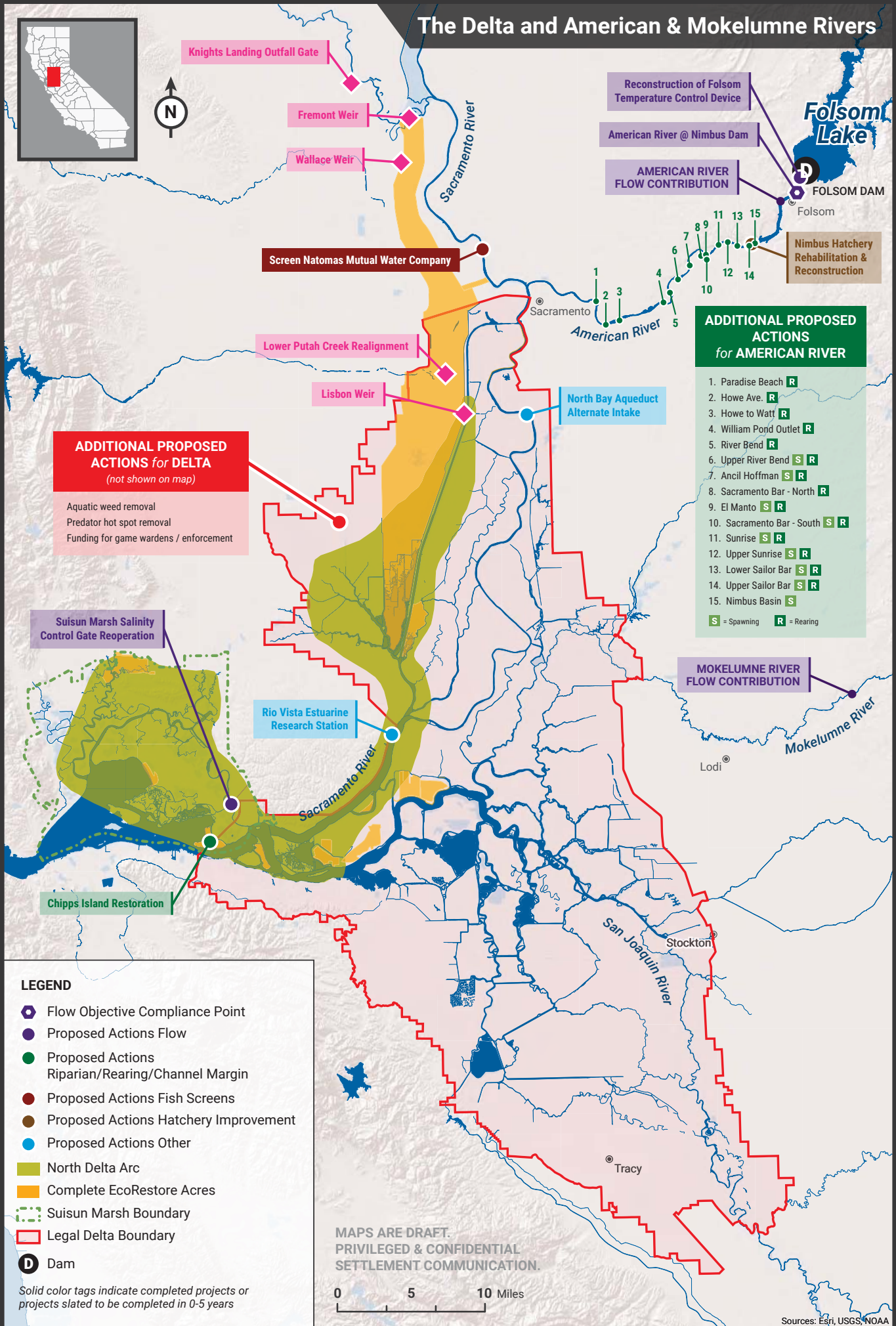
Sources: Esri, USGS, NOAA

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# PROPOSED ACTIONS FOR SPECIES OBJECTIVES

## The Delta and American & Mokelumne Rivers



Knights Landing Outfall Gate

Fremont Weir

Wallace Weir

Screen Natomas Mutual Water Company

Lower Putah Creek Realignment

Lisbon Weir

North Bay Aqueduct Alternate Intake

**ADDITIONAL PROPOSED ACTIONS for DELTA**  
(not shown on map)

- Aquatic weed removal
- Predator hot spot removal
- Funding for game wardens / enforcement

Suisun Marsh Salinity Control Gate Reoperation

Rio Vista Estuarine Research Station

Chipps Island Restoration

Reconstruction of Folsom Temperature Control Device

American River @ Nimbus Dam

AMERICAN RIVER FLOW CONTRIBUTION

Folsom Lake

FOLSOM DAM

Folsom

Nimbus Hatchery Rehabilitation & Reconstruction

**ADDITIONAL PROPOSED ACTIONS for AMERICAN RIVER**

1. Paradise Beach **R**
  2. Howe Ave. **R**
  3. Howe to Watt **R**
  4. William Pond Outlet **R**
  5. River Bend **R**
  6. Upper River Bend **S R**
  7. Ancil Hoffman **S R**
  8. Sacramento Bar - North **R**
  9. El Manto **S R**
  10. Sacramento Bar - South **S R**
  11. Sunrise **S R**
  12. Upper Sunrise **S R**
  13. Lower Sailor Bar **S R**
  14. Upper Sailor Bar **S R**
  15. Nimbus Basin **S**
- S** = Spawning    **R** = Rearing

MOKELUMNE RIVER FLOW CONTRIBUTION

Mokelumne River

Lodi

San Joaquin River

Stockton

Tracy

**LEGEND**

- Flow Objective Compliance Point
- Proposed Actions Flow
- Proposed Actions Riparian/Rearing/Channel Margin
- Proposed Actions Fish Screens
- Proposed Actions Hatchery Improvement
- Proposed Actions Other
- North Delta Arc
- Complete EcoRestore Acres
- Suisun Marsh Boundary
- Legal Delta Boundary
- Dam

Solid color tags indicate completed projects or projects slated to be completed in 0-5 years

MAPS ARE DRAFT. PRIVILEGED & CONFIDENTIAL SETTLEMENT COMMUNICATION.

0 5 10 Miles