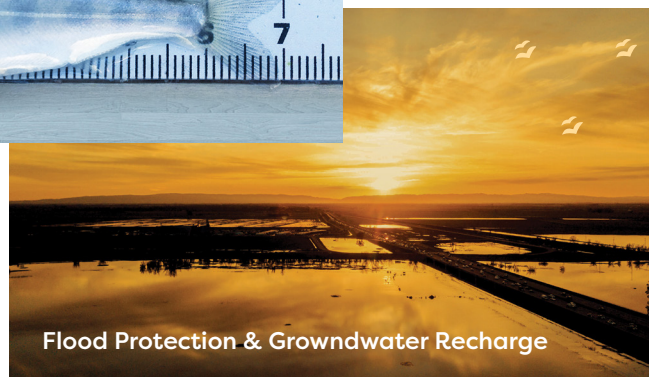
A PORTFOLIO OF SCIENCE-BASED ACTIONS

ADVANCING FLOODPLAIN REACTIVATION

in the Sacramento River Basin

Our respective organizations, the Floodplain Forward Coalition, are very excited to work with you and our various partners in our collective efforts to reactivate the floodplain in California's Sacramento River Basin, which will create multiple benefits for the region and the State of California. The diverse Floodplain Forward leaders are working on and have proposed the following portfolio of projects, which together will help reactivate our floodplains for the benefit of fish, wildlife, and people as part of a holistic approach for healthy rivers and landscapes.

FLOODPLAIN FORWARD



Reactivating the Floodplain

We are all very excited that farmland (primarily ricelands), wildlife refuges, private wetlands (primarily duck hunting lands), the rivers, and flood bypasses can be managed together in innovative ways to mimic the historic floodplains of the Sacramento River Basin to recreate a dynamic fisheries and wildlife conservation landscape that continues to provide flood protection for Sacramento, rural communities and nearby lands. Spreading out and slowing down water moving across this landscape is a nature-based, natural infrastructure solution that mimics natural floodplain processes and provides multiple benefits year-round by allowing farmers to cultivate rice and other crops for humans during the spring and summer, provide food and habitat for a diversity of migratory birds and other wetland- dependent wildlife in the fall and winter; and food for juvenile native fish species in the winter. This landscape-style water management can bring our ecosystem and farmlands to life through the careful interaction of water, sun, and land.

What Makes a Floodplain Special?

Take flight with us in this 360-degree view of the Sacramento Valley. Explore the Sacramento River Basin through an interactive, virtual tour of some of the most important lands and habitat for people, fish, birds and wildlife. Narrated by California Natural Resources Secretary Wade Crowfoot and featuring Jeff McCreary of Ducks Unlimited, Jacob Montgomery of California Trout and Kim Gallagher, a fifth-generation rice farmer. The camera/viewpoint can be controlled by dragging your cursor around the screen or using the arrows in the upper corner or on the keyboard.

Who is the Floodplain Forward Coalition?

We are a diverse coalition of conservation organizations, farmers and other landowners, local governments, water suppliers and academic institutions who care deeply about the future of California and have come together as the Floodplain Forward Coalition to advance a new model for water management and land use as shown in *Reactivating our Floodplains: A New Way Forward.* We share a vision to bring this vibrant region to life through the innovative management of the existing land uses and resource values that make this region so special, while at the same time restoring the missing components that are needed to truly provide a healthy, sustainable ecosystem. In advancing these efforts, we have truly valued and benefitted from the partnership and active collaboration with federal and state agencies. Their strong leadership, commitment and funding to work with us to reactivate the floodplains for all these multiple benefits is inspiring, and we look forward to continuing efforts with our partners to implement this program in the Sacramento River Basin.

A Holistic Approach for Healthy Rivers and Landscapes

Floodplain reactivation is a significant part of a holistic approach that is underway in the Sacramento River Basin - from ridgetop to river mouth - to improve conditions for fish and wildlife throughout the region. This approach and the actions throughout the region are designed to restore ecosystem function of the landscapes and riverscapes, while concurrently helping secure water supplies for communities, farms, fish and wildlife, recreation, and hydropower. We recognize that a healthy river ecosystem depends upon on a sufficient volume of water interacting with a healthy landscape in a way that approximates the habitat patterns to which the native flora and fauna are adapted. Our approach includes a portfolio of actions throughout the region designed to reactivate the landscape-scale patterns of biophysical habitat conditions that robust, resilient populations of salmon and other fish, bird, and wildlife populations depend upon.

Active Landowner-Conservation Partnerships

Landowners throughout the Sacramento River Basin are committed to working with conservation partners to advance these floodplain reactivation projects to improve habitat for fish and wildlife, while maintaining flood protection, farming, and managed wetland operations. The historical floodplain has been separated from its rivers by levees, yet there are actions being taken by landowners on both sides of the levees, the so-called *wet and dry sides of the levee,* to use their lands to help reactivate the historical floodplain.

Wet-Side lands are located within the footprint of the current flood protection system, including the river channels and bypasses. Allows for fish to freely access during wet stages.

Dry-Side farm fields are located outside the current flood protection system but were once part of the historical floodplain. Fish cannot access this side.

Moving Forward Together

The Floodplain Forward Coalition is working together with state and federal agencies to advance these projects as quickly as possible. There is a concerted effort to secure funding from various sources to support scaling-up these efforts and the Floodplain Forward Coalition is working in partnership with the Accelerating Restoration team at Sustainable Conservation to develop a permitting roadmap to help landowners, NGOs, and agencies implement Sacramento Valley fisheries and floodplain restoration actions by applying new restoration specific regulatory tools and seeking ways to further improve the process.

Landscape Vision with Long Term Benefits

The Floodplain Forward leaders are working together to advance a ***'landscape scale' vision*** with a portfolio of projects that will improve habitat conditions for fish, birds and other wildlife and advance actions to aid with their recovery. The scientific monitoring that will accompany these projects will also begin the robust science program necessary to inform future decision-making and adaptive management responses essential to successful fish and wildlife recovery. This portfolio is a collection of projects that are being advanced in the Sacramento River Basin and can be envisioned **in five categories.**

1 River Connections

Projects that reconnect rivers to their historical floodplains.

2 In-River Function

Projects that enhance, restore and create in-river function & habitat.

3 Floodplain Flow Corridors

Projects that improve/create flow conveyance infrastructure needed to reactivate floodplains and improve fish passage.

4 Floodplain Reactivation & Fish Food

Projects that reactivate floodplains, provide fish rearing habitat, and/or generate fish food.

5 Science, Data Acquisition and Innovation

Efforts that improve the knowledge base through research, experimentation, data collection and advanced analytics.

These opportunities are summarized in the tables on the following pages. The portfolio also includes one-page information sheets for each project.

FLOODPLAIN FORWARD

Fish & Wildlife Habitat Improvement Projects

Project Portfolio

Table of Contents

List of Acronyms

Abbreviation	Definition
ACID	Anderson-Cottonwood Irrigation District
BSOG	Butte Slough Outfall Gates
CBDF	Colusa Basin Drain
CDFW	California Department of Fish & Wildlife
CNRA	California Natural Resources Agency
CREEC	Carbon In Riparian Ecosystems Estimator for California
CVFPB	Central Valley Flood Protection Board
CVFPP	Central Valley Flood Protection Plan
CVJV	Central Valley Joint Venture
CWA	California Waterfowl Association
CY	Calendar Year
DRP	Dos Rios Project
DST	Decision Support Tool
DU	Ducks Unlimited
DWR	Department of Water Resources
EBC	East Borrow Canal
EIP	Ecosystem Environmental Partners
ESA	Endangered Species Act
GCID	Glenn Colusa Irrigation District
ID	Irrigation District
KLOG	Knights Landing Outfall Gates
MFDC	Managed Floodplain Design Criteria
NCWA	Northern California Water Association
NGO	non-governmental organizations
NMFS	National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
PCGID	Princeton-Codora-Glenn Irrigation District
PID	Provident Irrigation District
RD	Reclamation District
RFMP	Regional Flood Management Plan
RGF	River Garden Farms
RM	River Mile
RP	River Partners
SHRP	Salmon Habitat Restoration Program
SONEC	Southern Oregon-Northeastern California
SRSC	Sacramento River Settlement Contractors
SRWSLD	Sacramento River West Side Levee District
TNC	The Nature Conservancy
USACE	US Army Corps of Engineers
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
WBC	West Borrow Canal

1 Introduction

Sacramento River Basin water users and conservation partners have developed a portfolio of fish and wildlife-oriented floodplain enhancement and management opportunities to support water quality objectives set forth by Governor Gavin Newsom's Administration and the California State Water Board. This portfolio includes innovative habitat restoration and floodplain reactivation concepts that are intended to quickly improve and enhance fish and wildlife habitat by increasing opportunities for juvenile salmonid rearing and additional water onto the floodplains within the Sacramento River Basin to stimulate fish food production and to support the millions of migratory and resident birds that rely on the Sacramento Valley. These opportunity actions are anticipated to also support the proposed Water Resilience Portfolio and the Conservation Strategy of the Central Valley Flood Protection Plan 2017 Update. Together, these projects represent an historic, landscape-level effort to help recover anadromous fisheries by harnessing natural processes within working landscapes.

Sacramento River Basin water users and conservation partners are proposing to 'kick-start' the execution of this portfolio of opportunities through an accelerated actions effort which would rapidly develop a comprehensive program with an implementation strategy, schedule and cost estimates so these accelerated actions can be completed promptly, efficiently, and effectively. This effort would involve Sacramento River Basin water users working closely and collaboratively with Local, State and Federal agencies, landowners, non-governmental organizations (NGOs), and the public to develop these opportunities. Collectively, the projects envisioned under this portfolio will improve habitat conditions for many species and advance actions to aid with their recovery. This portfolio and the scientific monitoring effort that will accompany it, will also begin the robust science program necessary to inform the decision-making and adaptive management essential to successful fish and wildlife recovery.

The key elements of the portfolio are:

- Identify and assemble key participants and strengthen the partnerships needed to implement successful projects.
- Develop a strong, open communication and engagement plan to facilitate stakeholder participation in the effort.
- Facilitate interagency coordination to aid implementation of the actions identified
- Document existing conditions and resource values to develop system models to evaluate and refine opportunity actions.
- Work with landowners early and often as a cornerstone of this portfolio. The benefit of local knowledge, needs, constraints and opportunities will increase the chance of developing timely and implementable solutions.
- Develop measurable criteria and testable hypotheses to guide program implementation and measure progress towards outcomes to facilitate learning and adaptive management.
- Develop and advance the projects which have been identified areas part of the portfolio.
- Create, evaluate, and refine scenarios of combined system modifications, wetland footprint improvements, and associated operations.
- Provide technical resources to landowners for developing locally supported actions and impact mitigation solutions.

This document is the initial collection of project opportunity concepts that are being advanced by Sacramento River Basin water users and their conservation partners. The opportunities have been grouped into the following 5 functional categories:

River Connections:

- Projects which reconnect rivers to their historical floodplains

In-River Function:

- Projects which enhance, restore and create in-river function & habitat

Floodplain Reactivation & Fish Food:

- Projects which reactivate floodplains and/or generate fish food

Floodplain Flow Corridors:

- Projects which improve/create flow conveyance infrastructure needed to reactivate floodplains

Science & Data Acquisition:

- Efforts which improve the knowledge base through research, experimentation and data collection.

These opportunities are summarized in the tables at the beginning of this document. This portfolio also includes one page project information sheets, and a proposed initial priority list for the identified projects.

2 Portfolio Goals

- Re-envision Floodplains to provide combined Flood, Ecosystem and Agricultural Sustainability benefits.
- Restore historic floodplains function on a landscape scale to measurably provide habitat for multiple species, and help rebuild the river's food web, while improving flood protection, water supply reliability and agricultural sustainability.
- Work in partnership to achieve the management plan vision.
- Demonstrate how working in partnership can improve outcomes and help achieve a re-envisioned floodplain system.

3 Study Area

The program's geographical footprint for this portfolio of early implementation actions will be from the Shasta Dam in the north to near Liberty Island in the north Delta in the south. Within this footprint, particular emphasis is given to:

- The Upper Sacramento River, and tributaries to it, spanning from Redding area to Chico area.
- East-side complex which includes the area east of the Sacramento River from the southern end of the Sutter Bypass northerly to the northern end of the Butte Sink.
- West-side complex which includes the lower Colusa Basin from Wallace Weir northerly past the Knights Landing Outfall Gates to Davis Weir including the expansive flood footprint south and westerly of these channels.
- The Yolo Bypass, from Fremont Weir to Lookout Slough

4 Project Opportunities

The following section provides brief summaries of the identified project concepts. The projects are described in greater detail in the project sheets that follow.

4.1 River Connection Projects

The following are River Connection Projects that have been identified as part of this portfolio:

4.1.1 Tisdale Bypass

This project proposes to build off of the DWR Tisdale Weir Rehabilitation and Fish Passage Project, which includes installation of a notch in the Tisdale Weir to allow for adult fish passage to the bypass and return to the Sacramento River as flood flows to the Tisdale Bypass recede. The project proposes to regrade within the Tisdale Bypass will allow for water to be held within the Tisdale Bypass once it overtops the new notch. This would provide approximately 500 acres of rearing habitat within the Tisdale bypass as well as maintaining the agricultural productivity within the Sutter Bypass.

4.1.2 Butte Slough Outfall Gates Rehabilitation

The project would rehabilitate the Butte Slough Outfall Gates (BSOG) to provide better flow control through the structure. The existing outfall structure will be updated with new gates and will be provide upgraded site communications and electrical to operate the gates. Under current operations, occasionally stagnant, low oxygen, and high temperature water has been held behind the outfall gates, creating nuisance conditions. Upgrading the gates and site electrical will allow for operation of the structure to be more regimented, which allows flows to be managed in manner that reduces environmental impacts. As a second phase of implementation re-operation of BSOG is proposed to allow for juvenile recruitment into the Butte Slough and Sutter Bypass.

4.1.3 KLOG Juvenile Recruitment Project

The proposed project is a feasibility study to assess effects of re-operation of the Knights Landing Outfall Gates (KLOG) on juvenile fish recruitment into the Colusa Basin Drain (CBD). By allowing water from the Sacramento River to flow back into the CBD during high flow events and provide inundation of the surrounding floodplains to create fish rearing habitat as well as provide juvenile access to the habitat. This would allow CBD to act as a slough, which is similar to the area's historic functionality.

4.1.4 Moulton Weir

This project includes installation of a notch and low-flow channel at Moulton Weir to lower the elevation of the weir and allow increased activation of the adjacent floodplain area to provide both adult and juvenile fish habitat. Installation of a notch in the Moulton Weir will allow for increased inundation (both frequency and duration) of the Butte Sink and Sutter Bypass system, providing rearing habitat for fish species including salmonids. Construction of a low-flow channel will also improve hydraulic connectivity for fish passage between the Sacramento River and the Bypass, and allow for volitional passage onto the floodplain as well as back into the river system as flood waters recede. Establishment of a riparian corridor along the low-flow channel will provide cover for fish species as well as valuable habitat for other non-aquatic species.

4.1.5 Colusa Weir

This project includes installation of a notch in the Colusa Weir and a low-flow channel through the Colusa Bypass to allow for increased inundation (both frequency and duration) of the Colusa and Sutter Bypass system, providing habitat for adult fish and juvenile fish rearing habitat. Inclusion of an adjustable water control feature at the notch (similar to what is planned at Tisdale and Fremont Weirs) would allow for control of the water levels within the bypass to also maintain agricultural water supply and agricultural productivity. Benefits include increased fish passage onto the floodplain; increased rearing habitat for fish species, increased riparian habitat, and increased agricultural water supply flexibility.

4.2 In-River Function Projects

The following are In-River Function Projects that have been identified as part of this portfolio:

4.2.1 Upper Sacramento River Salmon Habitat Restoration Program

The Upper Sacramento River Salmon Habitat Restoration Program is a programmatic project which includes multiple integrated restoration projects that create spawning, rearing and, non-natal salmonid habitat by constructing side channels; reconnecting floodplains; adding spawning gravel, and placing woody material, boulders, and other structures within the Sacramento River between the Shasta Dam and City of Chico. Current funding for this project has been provided by the United States Bureau of Reclamation (USBR) to four project proponents including Reclamation District 108, Glenn Colusa Irrigation District, California State University Chico, and River Partners. Nearly 20 individual project elements will be implemented in as part of the program. Additionally, a comprehensive monitoring program will be implemented under the program.

Coordinating activities with an interagency restoration group consisting of agencies and local potential benefits of the project include making a significant contribution to restoring, maintaining and improving Sacramento River Chinook Salmon and steelhead habitats consistent with the goals of Public Law (P.L.) 102-575, Title XXXIV, Central Valley Project Improvement Act, Sections 3406(b)(13), (b)(1), and 3407(e).

4.2.2 Missouri Bend Setback Levee

This project would restore approximately 16 acres of floodplain habitat between the remnant levee and new setback levee to be constructed by the US Army Corps of Engineers (USACE). Due to damage sustained during the 2017 storm season, the existing levee along Missouri Bend, which was originally constructed by local interests before 1915, is in need of replacement. USACE plans to construct a setback levee which would afford an opportunity to construct in-river restoration by breaching the remnant levee and reconnecting a portion of the historical floodplain to the Sacramento River. Construction of a setback levee at the site presents an opportunity to create a 16 acre on-river habitat restoration area by breaching the existing levee and allowing inundation to occur between the new setback levee and the remnant levee. Department of Water Resources (DWR) has expressed interest in using the site to offset impacts associated with other DWR projects in the region, and funded Sacramento River West Side Levee District (SRWSLD) to conduct an evaluation of potential restoration alternatives at the site.

4.2.3 Tule Canal Riparian Restoration

This project would establish native riverside forests along 7.5 miles of the banks of the Tule Canal through planting and three years of cultivation. Tule Canal runs along the west side of the Lower Elkhorn Basin Levee Setback Project, currently being undertaken by the California DWR. The Tule Canal is a primary fish passage through the area and it currently lacks suitable vegetative cover to support migrating salmon – lacking shade, fish food production, and cover from predation. Riverside reforestation along the Tule Canal is designed and permitted as part of the larger Lower Elkhorn Basin Levee Setback project, currently being undertaken to improve flood management and ecosystem outcomes in the Yolo Bypass. Riverside reforestation would be undertaken using methods that have been developed in the Sacramento River watershed over the last 20 years. Reforestation typically results in accumulation of 50 metric tons of carbon within 30 years, and provides habitat for numerous other threatened and endangered species including songbirds, invertebrates, and other aquatic species.

4.2.4 Blethen Island Side Channel Project

The proposed project would provide hydraulic connectivity of the Blethen Island side channel to restore perennial flows in high value rearing habitat and habitat connectivity with Toomes Creek, a tributary to the side channel. The project involves the following three key components: (1) excavation of the side channel inlet to restore perennial flows to the side channel; (2) selective removal of aggraded sediment deposits and mechanical rehabilitation of more complex morphology, structure, and cover between the side channel inlet

and outlet, including the mouth of Toomes Creek, and (3) adding a large wood structure to the side and the outlet to increase habitat complexity for winter and summer rearing and adult holding. An estimated 2-3 acres of salmonid rearing habitat in the Blethen Island side channel and increased connectivity with existing rearing habitat in Toomes Creek will be created.

4.2.5 Shaded River Corridor

This project proposes to establish four miles of shaded riverine aquatic habitat along the banks of the Sacramento River in an area currently in public ownership for conservation and fish and wildlife management. Through this project, River Partners proposes to restore riparian habitat function along four miles of the banks of the Sacramento River through rock revetment removal, increasing channel meander, and establishment of native forest vegetation while simultaneously increasing the durability of salmon habitat needs by promoting channel meander dynamics on compatible lands in public ownership. This project would also promote the natural channel dynamics of erosion and deposition that maintain salmon habitat over time in the river on lands in which significant investment has already been made to preserve the lands as habitat areas. This project would also increase inundation frequency and duration across more than 1,200 acres of natural floodplains of the Sacramento River.

4.2.6 Riparian Sanctuary

The project recommends restoring 400 acres of riparian habitat within the 950-acre Riparian Sanctuary unit of the US Fish and Wildlife Service's (USFWS) Sacramento River National Wildlife Refuge as well as removing over 2,000 linear feet of degraded revetment on State land immediately upstream of the project area, while placing a similar amount of revetment on USFWS property to protect the plant. Removing the upstream revetment will allow the river to recapture a historic channel. This will create an oxbow habitat and allow for improved river process upstream, while also protecting the fish screens, which are needed to provide water to 30,000 irrigated acres. Fragmented, disconnected river and riparian habitat in the Sacramento River has put strain on already vulnerable fish species such as salmonids. Through this project, River Partners proposes to restore floodplain function along 1.5 miles of the Sacramento River through rock revetment removal, increasing channel meander, and establishment of native forest vegetation while simultaneously increasing the durability of the Princeton-Codora-Glenn Irrigation District pumping plant by promoting channel meander dynamics that support continued operation.

4.2.7 Salmon Rest Stops Phase 1

The project seeks to realize 35% of the remaining fish habitat conservation goals of state and federal partners through fee-title or easement acquisition of lands on the primary floodplain of the Sacramento River that are currently disconnected from overbank flooding by private berms and structures. River Partners proposes to conserve and reconnect floodplain habitat areas in 5 distinct locations providing strategic rest stops for migrating salmon and food and resting refuge for out-migrating juveniles. Two additional locations are under development currently. All properties are in purchase agreement and have valid appraisals. All properties can be reconnected to overbank flooding under current hydrological conditions (i.e., without changes in flow regime or modification to the flood system). This project will reconnect 1,400 acres of the Sacramento River's primary floodplain to frequent overbank flows at the appropriate time of year for salmon passage and rearing, increasing overall aquatic habitat availability by 10% in high water years.

4.2.8 Lower Stony Creek Fish Habitat Restoration

This project seeks to deliver the goals of the Recovery Plan for Chinook salmon and Central Valley steelhead in the Sacramento valley, particularly in Stony Creek where the vast majority of lands are in private ownership. River Partners would work from extensive weed mapping already completed by the California Invasive Plant Council to prioritize treatment locations and methods, then work with private landowners to develop plans for treatment. Additionally, this project would engage with the multiple overlapping agencies involved in salmon recovery in the watershed to develop new outflow targets from Black Butte Dam that

benefit the continued removal of giant reed, the restoration of Stony Creek floodplains for salmon habitat values, and streamflow for salmon. This project seeks to prioritize, remove, and replace invasive giant reed with native plants that are resistant to reinfestation and support native ecosystem values including enhanced water quality and quantity benefitting Sacramento River salmon. It also seeks to advance planning to revise the outflows in Stony Creek to benefit Sacramento River salmon runs.

4.2.9 Olney Creek Non-Natal Rearing Habitat Project

The Olney Creek Project will restore access and improve functional habitat to Olney Creek above and below a partial fish barrier created by the Anderson-Cottonwood Irrigation District (ACID), main canal crossing of Olney Creek two miles above its confluence with the Sacramento River, increasing fish access to, and habitat quality of, over two and a half miles of rearing habitat in Olney Creek. A new siphon will be sized and installed to flow under the creek and include a turn-out to direct irrigation flows from the siphon to the creek at agreed upon ecologically recommended flows. Channel, bank and floodplain habitat above the canal will be restored to create high quality habitat for rearing juvenile chinook salmon and other native aquatic and riparian species. This project builds on past work to remove a full barrier two miles above the ACID canal just upstream of Texas Springs Road, thus increasing fish access to, and habitat quality of, over two and a half miles of rearing habitat in Olney Creek. Removal of the structure will improve fish passage to the reach above the canal crossing, thereby increasing the extent and quality of non-natal habitat while also reducing flood risk to adjacent underserved communities.

4.3 Floodplain Reactivation & Fish Food Projects

The following are Floodplain Reactivation & Fish Food Projects that have been identified as part of this portfolio:

4.3.1 Dos Rios Project

The Dos Rios Project (DRP) consists of 1500 acres of actively farmed floodplain and pristine riparian habitat. DRP will provide rearing habitat and food production for salmon within in the upper Sacramento River, Butte Creek, and Feather River. DRP has the potential to demonstrate successful enhancement of ephemeral floodplain habitat through an early implementation-based project in the form of an agricultural conservation easement covering 1500 acres in a key location where natural flood processes occur for both salmon and migratory birds. DRP will serve as a multi-benefit model for future innovative water management, continued farming, salmon recovery efforts, and will provide additional benefits to migratory birds.

4.3.2 Goose Club Farms

This project will enhance floodplain rearing habitat for salmonids within the Sutter Bypass by allowing for more frequent seasonal inundation of the floodplains on the Goose Club Property. A portion of flow from Nelson slough and the East Borrow of Butte Creek would be diverted through the property to seasonally inundate the lower elevation fields on the west side of the bypass. Enhancements will be made within the property to enhance seasonal inundation and natural flood processes, allowing for fish from the Feather River and Butte Creek, access on and off of the floodplain along the property, provide increased fish food production, and create additional migratory bird habitat. This project has the potential to provide volitional passage of adult salmonids through the lower bypass system if implemented in conjunction with similar projects in the lower Sutter Bypass. Notches or other means of access would be provided at key locations along the west borrow canal and lower Feather River to provide volitional passage onto/off of the floodplain.

4.3.3 Flowage Easements and Acquisition Funds: Bypass Lands

This project seeks to connect landowners with easement and acquisition program funding, to connect potentially impacted landowners with fair market value flowage and habitat easements as well as fee title sale to suitable habitat managers in public and private sectors. Proposed modifications to the flood management infrastructure of the Sutter Bypass may create conditions that impact the continued viability of

agricultural operations on bypass lands. Strategic management of bypass lands in wetlands and other flood-compatible lands uses will benefit salmon recovery through provision of ideal rearing conditions, ample food, and water quality improvements. Existing state and federal easements programs managed by the US Fish and Wildlife Service, USDA Natural Resources Conservation Service, and California Department of Fish and Wildlife are all existing vehicles to deliver funds to potentially effected landowners. Additionally, funds administered through the USFWS Land and Water Conservation Fund are perfectly suited to this purpose.

4.3.4 Lower Peters Pocket Multi-benefit Project

The Lower Peters Pocket Multi-benefit Project is a feasibility study to assess effects of multiple local tidal restoration actions both planned, conceived, and theoretical. Lower Peters Pocket presents unique and relatively low-cost opportunities for wetland, riparian, seasonal wetland, grassland, and floodplain enhancement and restoration. The Feasibility Study for restoring native habitat to Peters Pocket will include: 1. Stakeholder engagement; 2. Technical Advisory Committee; 3. Water quality and hydraulic effects analysis and reports, regulatory requirements and review of potential protection needs for landowners (e.g., safe harbor agreements or integration into a local Habitat Conservation Plan/Natural Community Conservation Plan; 4. Agricultural economics analysis of land use reversion; 5. Development of Conceptual design alternatives, including opportunities and constraints analysis; and 6. Roadmap summarizing subsequent steps needed to implement the project. Implementation of a native habitat restoration project at Lower Peters Pocket will provide many ecological benefits through increasing the extent of native riparian and tidal wetlands, as well as potentially restoring native grassland and seasonal wetlands.

4.3.5 Managed Wetlands and Floodplain Reactivation

The proposed project will identify and integrate the needs of managed wetlands, wetland owners, and waterfowl hunters as well as existing conservation commitments for managed wetlands in floodplain reactivation planning for the Sutter Bypass, Butte Sink, and Colusa Drain while assisting in identifying reactivation scenarios that will provide multi-benefits. Many of the managed wetlands in the Central Valley are located within historic floodplains. These wetlands provide important habitat for waterfowl, shorebirds, and other waterbirds, and most have long-term management commitments for avian species and are being managed for waterfowl hunting. This project will help identify how these current commitments and requirements can balance the desire to improve floodplains for salmon, while maintaining benefit to bird groups and not adversely impact wetland management, long-term commitments for avian species, and waterfowl hunting.

4.3.6 Floodprint Project

The Floodprint Project integrates two restoration sites in the Yolo Bypass. The Tide's End component at the bottom of the Yolo Bypass and the Nigiri component, located at the top of the Yolo Bypass between the Fremont Weir and the Interstate 5. Together these sites provide approximately 550 acres of fluvial-tidal interface, critical habitat for smelt and salmonids, and over 4,000 acres of high-value seasonal floodplain habitat for fish rearing, as well as riparian habitat. As proposed, Nigiri will divert water and fish from the Fremont Weir Notch and from the Knights Landing Ridge Cut over rice fields inside of a constructed berm with water control structures to hold a designed water surface elevation. This will allow early season flood-up and activation of the food web, and volitional passage on and off the floodplain. By incorporating the restoration of floodplain processes at the top of the Bypass with the restoration of a receiving site at the tideline at the bottom, the Floodprint Project will maximize the benefits of Notch operation. This in turn will deliver food and juvenile fish to 2,000-acres of protected and managed land at Tide's End, the Flyway Farms, Yolo Ranch and Lookout Slough projects and then downstream priming the food web of the North Delta Arc.

4.3.7 Landscape Scale Floodplain Enhancements

There is incredible potential for multi-benefit floodplain enhancement within the Sacramento Valley. Landowners, scientists, water users, conservation organizations and state and federal agencies are

collaborating to develop an approach to managing our floodplains and implementing landscape scale floodplain habitat projects. Multi-benefit water management efforts that restore floodplains, provide habitat for multiple species, and help rebuild the rivers food web all while improving food protection are key to securing the reliability of the regions water supply. These efforts can be 'kick-started' by execution of a portfolio of innovative habitat restoration and floodplain reactivation opportunities. This project will provide an implementation strategy, schedule, and cost estimates for a comprehensive program of accelerated actions which can be completed promptly, efficiently, and effectively.

4.3.8 Conaway Ranch Fisheries Floodplain Restoration Project

The Conaway Preservation Group (CPG) Owners of the Conaway Ranch are proposing an integrated floodplain restoration project encompassing three types of restoration components on their ranch to benefit salmonids, waterfowl and terrestrial species. These components include:

- Seasonal Salmonid Floodplain Habitat Restoration (Phase I and II)
- Seasonal Salmonid Food Production (Food Subsidy Area), and
- In-river Tule Canal Restoration and Wetland re-creation (Tule Corridor Enhancement Area).

The Salmonid Floodplain Restoration component would reconfigure rice farmland water control structures to pond water for seasonal flooding and remove impediments to volitional travel back to the Sacramento River by juvenile fish and provide access to over 2,675 acres of fields for rearing. *The project takes advantage of water flowing into the Yolo Bypass through the new notch provided in the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project (Fremont Weir notch). The project will also provide fish food benefits to the Delta, aiding feeding of salmonids and other fish species resident within and migrating through the Delta.*

The Salmonid Food Production component is an additional 2,800-acre area that would be seasonally flooded to grow micro invertebrates and other fish food to be released to the Sacramento River system, providing additional food sources to the lower Sacramento River and the Delta, aiding in the growth of native species.

The In-River Tule Canal component, similar to other restoration proposals adjacent to Conaway Ranch and upstream from the Ranch, would restore riparian habitat along the canal, increase sinuosity of the drainage and water supply channel and potentially expand off channel wetland habitat up to about 300 acres of permanent, annual wetland habitat. This would benefit the endangered Giant Garter Snake and other wetland species as well as promote food production for salmonids as well as provide feeding and rearing habitat for juvenile salmonids.

4.3.9 Fish Food Program

Hundreds of thousands of acres of rice ground in the Sacramento Valley are flooded in fall and early winter to aid in rice stubble decomposition (decomp). Under current agricultural practices, very little decomp water containing floodplain-derived "fish food" resources drains back to fish-bearing streams. However, if management practices are altered to actively drain floodplain waters back to the river there is potential to export these critically important floodplain-derived food web resources to the river where they may augment the aquatic ecosystem's depleted food webs and help recover endangered fish populations. This program seeks to build upon prior field level studies which have identified the mechanisms that drive floodplain fish food production. This program will 'scale-up' those field level studies by inundating between 20,000-40,000 acres during winter month. Existing irrigation and flood protection infrastructure will be utilized to deliver waters containing floodplain-derived food web resources produced on intentionally inundated winter farm fields, to fish populations of conservation concern stuck inside leveed river channels. Landowners and tenants will be enrolled in the program. Participants will be paid a stipend for each acre which under goes a "flood/drain cycle", defined as an acre inundated to minimum depth of eight inches for a minimum of three weeks before being drained. All participating acres will need to be drained to the salmon-bearing Sacramento Valley Rivers. The goal is to conduct up to three inundation/drain cycles per acre enrolled. Data collected

from this program will be compiled and shared to assist in the development of a bio-energetic food web model to investigate the effect of enhancing habitat quality and food availability on Chinook salmon (Oncorhynchus tshawytscha) production in the Sacramento Valley via the augmenting in-river habitats with floodplain-derived food web resources.

4.3.10 Decision Support Tool

This project will develop a Decision Support Tool (DST) to will help guide floodplain reactivation efforts by incorporating the objectives of multiple stakeholder interests. The need to provide native fish species with greater access to floodplain food resources has emerged as a conservation priority for the Central Valley. To effectively provide this, multiple stakeholders and their interests must be considered. These stakeholders include: 1) agricultural producers, 2) water districts, 3) public agencies and NGOs involved in fish recovery, 4) waterfowl hunters, 5) public agencies and NGOs that provide habitat for waterfowl and other wetland dependent birds, and 6) public agencies responsible for flood control. Where and how we provide fish with greater access to floodplain food resources will need to consider these stakeholder's objectives. As a first step, we propose developing data layers to be used in a future DST.

4.3.11 Ricelands Salmon Project

The California Rice Commission is spearheading this project which proposes to "pre-flood" farm fields in the fall to provide for fish food production. When juvenile salmon are introduced into the fields through bypass flooding, this will provide them with a highly nutritious food web. Once the floodwaters recede, specialized water flow control structures (with special pass-through holes and notches) will allow for fish to volitionally pass out of the fields if/when they desire.

4.3.12 Jobs Creation Through Floodplain Restoration

Under this project, River Partners proposes to coordinate with agencies and private landowners along the Sacramento River corridor to manage and operate a comprehensive weed management and jobs creation program that benefits both salmon and people. Floodplain habitat management can be developed and delivered in a way that puts people back to work while improving ecological conditions for salmon and communities. Agricultural workers and equipment operators can apply their skills to weed control, revegetation, and other habitat management activities with small time investments from specialized resource managers to plan, permit, oversee, and monitor the work. The result is public investment that yields ecosystem restoration and economic stimulus. The floodplains of the Sacramento River are a perfect location to mobilize this workforce for ecological restoration.

4.3.13 Annual Waterbird Surrogate Habitat

Over the last 200 years, the 90 percent of the natural habitat in the Sacramento Valley has been converted to cities and agricultural. The loss of natural wetlands, riparian areas and floodplains has led to large declines in bird population levels – particularly migratory birds which rely heavily on the Sacramento Valley as part of their migration along the Pacific Flyway. The remaining wetland habitat provided by wildlife refuges and private duck clubs is not sufficient to provide the food and resting habitat needed by the millions of migratory waterbirds that rely on the Central Valley. Research has shown that there is a suite of on-farm practices that can be done to mimic historic habitat at critical times of the year to fill some of the missing habitat and food resources needed by migratory birds. This project will create surrogate waterbird habitat on agricultural land through a series of annual practices that include early spring or fall flooding of fields, wetland restoration, widening berms to create nesting habitat, installing nesting islands, varying drawdown of decomposition water, leaving nesting cover, and passively capturing and holding water through field management. Previous investment of $10 million created 100,000 acres of habitat over 5 years at a fraction of the cost to permanently protect and secure that same acreage.

4.4 Floodplain Flow Corridor Projects

The following are Floodplain Flow Corridor Projects that have been identified as part of this portfolio:

4.4.1 Weir 1 Rehabilitation

Weir 1 currently poses an impediment to adult fish passage in the West Borrow Canal (WBC) of the Sutter Bypass for Environmental Species Act Threatened Spring Run Chinook trying to make their way up the canal from the Sacramento River to Butte Creek. This project proposes to replace the existing weir structure with a roughened channel to allow for fish passage. The proposal would allow for unimpeded fish passage up the WBC while maintaining the water surface elevations for upstream and downstream agriculture diversions.

4.4.2 Aquatic Vegetation Removal

The East and West Borrow Canals (EBC & WBC) of the Sutter Bypass are heavily impacted by invasive aquatic vegetation which impacts aquatic species, fish passage, nutrient cycling, water quality, water diversions, and resulting in direct impacts to agriculture and livestock operations. Active invasive vegetation removal is key to avoiding these impacts. Numerous benefits would be realized by managing the presence and spread of aquatic invasive vegetation. Suitable habitat would be maintained for aquatic and semi-aquatic species, water quality would be increased, and water diversions for agriculture and livestock would be protected from fouling.

4.4.3 WCWD Reservoir Project

The Western Canal Water District (WCWD) Reservoir Project would include retrofitting the Front Slide Gates of the WCWD reservoir located on Little Butte Creek, approximately 2.7 miles upstream from its confluence with Butte Creek and approximately 300 feet north of where Nelson Road crosses the Creek. The existing structure consists of 25 manually operated 67-inch-wide slide gates-oriented side-by-side across the channel. The project would enhance WCWD's ability to accurately, flexibly, and reliably manage Feather River diversions to meet agricultural and environmental beneficial uses during the irrigation season, and safely support flood flow management objectives during the non-irrigation season. Additional benefits of the proposed project include a reduction in spillage, both in unintended flows throughout the structure and spillage at the ends of the Main and the Ward Canal as a result of mismatches in supply and demand. The proposed improvements would provide an enhanced ability to control reservoir water levels therefore reducing unintended flow fluctuations throughout the Main and Ward Canal headings. Increased real-time monitoring provides the feedback loop for timely and effective management decisions that can be employed during the irrigation season to conserve water, or during the winter or fall months to operate the structure to balance flood water conveyance while also providing winter flooding of rice fields for straw decomposition, waterfowl habitat, and the creation of 'fish food' that can be conveyed directly to Butte Creek.

The proposed Project has a nexus with several ongoing resource management initiatives or objectives including building dry-year surface water supply resiliency via spillage reductions; groundwater management and in lieu recharge within the Main and Ward Canals service area; and continued environmental stewardship via support of the Pacific Flyway habitat, management of State wildlife areas, and support of habitat within existing natural riparian corridors. The Project is described or included in the District's 2014 Agricultural Water Management Plan and subsequent updates, the Butte Subbasin Groundwater Sustainability Plan, and the Northern Sacramento Valley Integrated Regional Water Management Plan.

4.5 Science & Data Acquisition Projects

The following are Science & Data Acquisition Projects that have been identified as part of this portfolio:

4.5.1 Managing Fields for Multi-Species Recovery and Ecosystem Resiliency

There is now the opportunity to combine bird focused flooding practices with new water management recommendations for enhancing fish habitat, while optimizing multi-species benefits. Research is needed to help agencies and other stakeholders understand potential benefits and how practices could best be combined to benefit fish and birds, expanding on-farm winter water management programs. This multi-benefit approach is needed to create working landscapes that support ecosystem function and agricultural sustainability in an increasingly variable and contentious water environment. The proposal goals are 1) advance the understanding of how harvested rice fields can best be managed to generate critical food resources for birds and fish, 2) map where in the Sacramento Valley these practices will work best for producers and the ecosystem, 3) identify the scale and cost of this effort, and 4) communicate and publicize the benefits to jump start adoption. The future of natural resource protection in the Sacramento Valley will be focused on restoring ecosystem function, reaching multiple objectives with limited resources, and strategic placement of conservation practices for the greatest benefit for natural resources and producers. Total cost of study: $2 million.

4.5.2 Pacific Flyway Integrated Landscape Conservation

The water supply and water management vulnerabilities associated with the Central Valley, Klamath Basin, and Southern Oregon-Northeastern California (SONEC) span vast areas. Water supply reductions have resulted in a predictably sharp decline in fall waterfowl use of the refuges and in change in shorebird use of the landscape. How might this increase the number of birds using the Central Valley in fall, and what is the conservation price tag for supporting these additional birds? Until we integrate our planning efforts across these landscapes, it will be difficult to answer such questions. Given the growing challenge of providing adequate habitat for waterfowl and other wetland dependent birds in these water-limited and intensively managed landscapes, public agencies, NGOs, private landowners, and water managers require a better picture of the risks and potential impacts of declining water supplies in each of these landscapes—and how such impacts may compound one another to the detriment of both birds and people.

The objectives of this proposed study are to: 1) Document monthly changes in the number of flooded waterfowl and shorebird habitat, both wetland and agricultural, for each landscape over the past 37 years using a consistent methodology. This retrospective analysis is foundational to addressing the objectives that follow. 2) Clearly identify the risks to surface water supplies that are important to waterfowl and other wetland dependent birds in each landscape. 3) Estimate how these risks to surface water supplies would impact waterfowl and shorebird carrying capacity within each landscape. 4) Evaluate how a decline in surface water supplies within one landscape may compound the conservation challenges for waterfowl and shorebirds in the other landscapes. 5) Integrate management scenarios across the three landscapes and determine the conservation actions needed to maintain the overall resiliency of this “one big landscape”. Although the proposed study focuses on waterfowl and shorebirds, the integrated science foundation across this entire region has broad application for waterbirds and potentially other wetland-dependent species.

Project Summary Sheets

Western Canal Water District's Front Slide Gate Enhancement Project

Project Details

➢ Location

This project is located on Little Butte Creek (Creek), approximately 2.7 miles upstream from its confluence with Butte Creek and approximately 300 feet north of where Nelson Road crosses the Creek.

➢ Recommendations

Replace or retrofit the existing Front Slide Gates Structure to enhance WCWD's ability to accurately, flexibly, and reliably manage their Feather River diversions to meet agricultural and environmental beneficial uses during the irrigation season, and safely support flood flow management objectives during the non-irrigation season. The existing structure consists of 25 manually operated 67-inch-wide slide gates-oriented side-by-side across the channel. Original construction date is unknown. Total structure length is 150 feet. Four of the gates are operated via gear drive and handwheel and the remainder are raised/lowered seasonally using a cable that is attached to a mobile winch that is moved from gate to gate to individually raise/lower the gates.

➢ Proposal

The existing Front Slide Gates structure spans Little Butte Creek just north of Nelson Road and impounds Creek flows (when present) that are comingled with upstream inflows from the Thermalito Afterbay via the Western Main Canal. The impounded area, or "Reservoir", facilitates diversions to the Main Canal and the Ward Canal to the west for irrigation purposes and provides terrestrial and aquatic habitat during the typically dry summer months. Additionally, the structure facilitates seasonal water deliveries to duck clubs and wildlife areas within the WCWD service area, including the Upper Butte Basin Wildlife Area.

The Front Slide Gates structure is critical to WCWD's ability to provide reliable and efficient water delivery. However, this is made difficult by the topographically flat nature of the reservoir and resulting delay in surface water level increases during changing upstream flows, the lack of accurate or flexible flow control mechanisms, lack of flow measurement devices, and the significant labor and time to accomplish the limited control mechanism available. Additional risks of the current structure are safety risks to WCWD operational staff during seasonal adjustments, and potential catastrophic failure of the structure due to its aged condition. Additionally, the site does not support WCWD's district-wide modernization objectives of enhanced operational control to provide flexibility in water delivery, manage spillage, and improve measurement, monitoring, and water accounting. Therefore, WCWD is currently engaged in an Options Analysis and Constraints Assessment to identify a long-term solution that meets with the following objectives:

1. Preserve and enhance service capabilities to the Main Canal, Ward Canal and habitat areas.
2. Reduce spillage through improvement of water measurement and control infrastructure.
3. Integrate the improvements with WCWD's SCADA system for remote monitoring and control.
4. Improve operational safety and reduce the seasonal operation and maintenance effort.
5. Retain or increase the existing flow capacity of the Project site for winter flood events.

➢ Potential Benefits

The primary quantifiable benefit of the proposed project is a reduction in spillage, both unintended flows through the structure and spillage at the ends of the Main and the Ward Canal that result from mismatches in supply and demand. The proposed improvements would provide enhanced ability to control reservoir water levels and thus reduce unintended flow fluctuations through the Main and Ward Canal headings.

Increased real-time monitoring provides the feedback loop for timely and effective management decisions that can be employed during the irrigation season to conserve water, or during the winter or fall months to operate the structure to balance flood water conveyance while also providing winter flooding of rice fields for straw decomposition, waterfowl habitat, and the creation of 'fish food' that can be conveyed directly to Butte Creek.

➢ Integration with other Projects

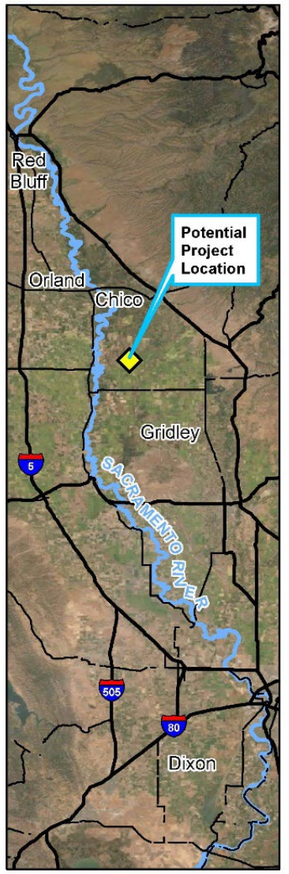
The proposed Project has a nexus with several ongoing resource management initiatives or objectives including building dry-year surface water supply resiliency via spillage reductions; groundwater management and in lieu recharge within the Main and Ward Canals service area; and continued environmental stewardship via support of the Pacific Flyway habitat, management of State wildlife areas, and support of habitat within existing natural riparian corridors. The Project is described or included in the District's 2014 Agricultural Water Management Plan and subsequent updates, the Butte Subbasin Groundwater Sustainability Plan, and the Northern Sacramento Valley Integrated Regional Water Management Plan.

➢ Project Advocates

Western Canal Water District is the primary project proponent.

➢ Potential Constraints

WCWD is currently conducting an Options Analysis and Constraints Assessment to define potential improvement options. Therefore, constraints have not been fully identified and evaluated at this time.



OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]	X				High potential for fish food production.
	Fish Passage				X	
	Fish Spawning				X	
	Agricultural (acres)[2]	X				20,000 acres served
	Waterfowl (acres)[2]	X				Provides water supply to duck clubs and wildlife areas. Winter flooding of fields support Pacific Flyway
Secondary Benefit	Recreational			X		Water supply supports duck hunting and bird watching
	Educational			X		Supports WCWD's long-term modernization and water use efficiency improvement mission. "Story" and lessons
	Water supply		X			Efficient management = drought resiliency
	Listed Species Benefit				X	
	Other?					
Feasibility Criteria	Landuse Compatibility	X				
	Shovel Readiness		X			Currently in design phase
	Cost[1]		$			
	Potential for State/Federal Funding		X			
	Potential for Local Match	X				
	Project Sponsor, Champion, Partners		X			

1: $ = less than $5m, $$ = $5-15M, $$$ = more than $15M

2: L = less than 1,000 ac, M = 1,000 - 5,000 ac, H = More than 5,000 ac

Tisdale Weir and Bypass Modifications

Project Details

➢ Location

This project is located along the left bank of the Sacramento River at the Tisdale Weir, in Western Sutter County.

➢ Recommendations

The Department of Water Resources (DWR) is currently underway with the planning and design phases of the Tisdale Weir Rehabilitation and Fish Passage Project, which includes installation of a notch in the Tisdale Weir to allow for adult fish passage to the bypass and return to the Sacramento River as flood flows to the Tisdale Bypass recede.

Building on the increased access to the floodplain provided by the DWR project, as part of a second phase of modifications to the Tisdale Bypass, further fish rearing improvements including regrading Tisdale Bypass to retain water in shallow depths to create additional rearing habitat without impacting downstream agricultural land uses within the Suter bypass.

➢ Proposal

Using the new notch and regrading of the Tisdale Bypass will allow for water to be held within the Tisdale Bypass at lower Sacramento River flow events. This would provide approximately 500 acres of rearing habitat within the Tisdale bypass. As water levels in the Sacramento River recedes, the notch at the Tisdale Weir would be lowered to allow volitional passage of fish back into the river. Further improvements may include irrigation canal drainage improvement to convey additional water to the east borrow canal and bolster water supply within the Bypass for winter uses.

➢ Potential Benefits

Potential project benefits include increased fish passage onto the floodplain; increased rearing habitat for fish species, increased riparian habitat, and sustained agricultural productivity within the Sutter Bypass. The project will also be designed to maintain appropriate irrigation water surface elevations without impeding outflows during flood season.

➢ Integration with other Projects

This project will take advantage of the fish passage improvements put in place by the DWR Tisdale Weir Rehabilitation and Fish Passage Project. Additionally, the project is in-line with goals of the Sutter and Tisdale Bypasses Flood & Multi-Benefit Strategy and Management Plan, which include providing flood conveyance potential within the Sutter and Tisdale Bypasses, maintaining agricultural production within the bypass, and providing multi-benefit opportunities.

Finally, the project is consistent with the goals of the 2016 Central Valley Flood Protection Plan Conservation Strategy, including:

- Promoting natural dynamic hydrologic and geomorphic processes.
- Increasing and improving the quantity, diversity, and connectivity of riparian, wetland, floodplain, and riparian habitats, including the agricultural and ecological values of these lands.
- Promoting the recovery and stability of native species populations and overall biotic community diversity.

➢ Potential Constraints

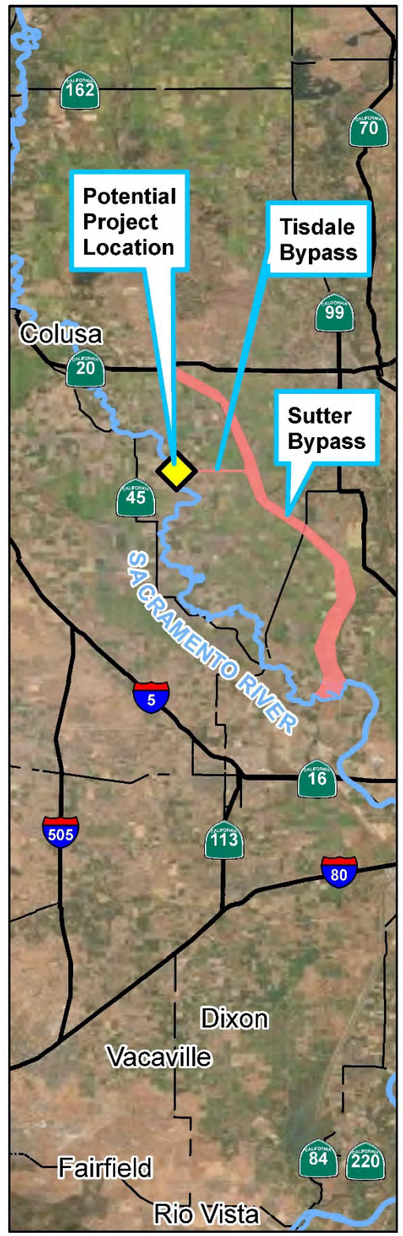
Project is located in a flood channel and will need to comply with USACE Section 408 requirements.

OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]			●		Potential to increase rearing habitat in the Tisdale Bypass area up to approximately 500 Acres.
	Fish Passage		●			The notch installed as part of DWRs project will allow for volitional passage of fish back to the river.
	Fish Spawning				●	
	Agricultural (acres)[2]					
	Waterfowl (acres)[2]		●			Increased frequency and duration of inundation will provide additional waterfowl habitat in addition to fish habitat.
Secondary Benefit	Recreational				●	No recreational opportunities are expected as a result of the project.
	Educational				●	No educational opportunities are expected as a result of the project.
	Water supply			●		Potential winter water supply improvements include addition of water supply to the east borrow canal from the irrigation canal on the north side of the Tisdale Bypass.
	Listed Species Benefit		●			Benefits to salmonids, waterfowl, and potential to benefit other species.
	Other?					
Feasibility Criteria	Landuse Compatibility	●				Consistent with the existing flood control landuse within the Tisdale Bypass and provides for sustained agricultural production within the Sutter Bypass.
	Shovel Readiness			●		Would require design and environmental review.
	Cost[1]		●			
	Potential for State/Federal Funding					
	Potential for Local Match					
	Project Sponsor, Champion, Partners					

1: $ = less than $5m, $$ = $5-15M, $$$ = more than $15M

2: L = less than 1,000 ac, M = 1,000 - 5,000 ac, H = More than 5,000 ac



Butte Slough Outfall Gates Rehabilitation

Project Details

➢ Location

The project is located the confluence of Butte Slough and the Sacramento River on the left bank of the Sacramento River, east of the City of Colusa.

➢ Recommendations

Rehabilitate the Butte Slough Outfall Gates (BSOG) and provide better flow control through the structure by upgrading the existing outfall structure with new gates and providing upgraded site communications and electrical to operate the gates. Structural rehabilitation is estimated to cost approximately $40M.

As a second phase of implementation re-operate BSOG to allow for juvenile recruitment into the Butte Slough and Sutter Bypass.

➢ Proposal

Flows from Butte Creek into the Sacramento River are controlled by BSOG. The original BSOG structure was built in the 1930s to provide flood control as well as agricultural water control. BSOG consist of culverts through the levee with flap gates on the Sacramento River end. When the Sacramento River water level is higher than Butte Creeks, the flap remains shut preventing outflow to the Sacramento River. In this case, water from Butter Creek flows to the south-east through the Butte Slough and into the Sutter Bypass. Under normal flow conditions, most of Butte Creeks flow is through Butte Slough and the bypass. When water levels in the Sacramento River are low, and Butte Creeks flows are high, there is the potential for water from Butte Creek to flow into the River. Under current operations, there have been conditions in which stagnant, low oxygen, high temperature water has been held behind the outfall gates and created nuisance conditions. Upgrading the gates and site electrical will allow for operation of the structure to be more tightly controlled, and allows for flows to be controlled in manner that reduces environmental impacts.

As a later phase of the BSOG project, re-operation of gates is proposed. This re-operation would include opening of the gates when the river level is high to allow for water from the Sacramento River to enter the Butte Slough and provide juvenile recruitment into the Sutter Bypass, mimicking the area's historic slough functionality. This would provide an opportunity for juvenile recruitment and provide valuable rearing habitat during times when velocities within the river are high. As flows in the river recede, any remaining juveniles within the bypass as will have volitional passage back to the river through bypass borrow canals.

➢ Potential Benefits

Project benefits include:

- Increased flood and agricultural water level control in Butte Creek and Butte Slough
- Potential to increase juvenile recruitment onto the bypass and provide rearing habitat

➢ Project Advocates

DWR

➢ Potential Constraints

Project is located in a flood channel and will need to comply with USACE Section 408 requirements.

OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]	●				
	Fish Passage		●			
	Fish Spawning		●			
	Agricultural (acres)[2]		●			
	Waterfowl (acres)[2]		●			
Secondary Benefit	Recreational				●	
	Educational				●	
	Water supply		●			
	Listed Species Benefit		●			
Feasibility Criteria	Landuse Compatibility	●				
	Shovel Readiness			●		
	Cost[1]	●				
	Potential for State/Federal Funding		●			
	Potential for Local Match		●			
	Project Sponsor, Champion, Partners	●				

1: $ = less than $5m, $$ = $5-15M, $$$ = more than $15M

2: L = less than 1,000 ac, M = 1,000 - 5,000 ac, H = More than 5,000 ac

Knights Landing Outfall Gates (KLOG) Juvenile Fish Recruitment

Project Details

➢ Location

This project is located along the right bank of the Sacramento River at the confluence of the Colusa Basin Drain (CBD) and the Sacramento River near the community of Knights Landing.

➢ Recommendations

Re-operation of the Knights Landing Outfall Gates (KLOG) to encourage for juvenile fish recruitment by allowing water from the Sacramento River to flow back into the CBD during high flow events and provide inundation of the surrounding floodplains to create fish rearing habitat as well as provide juvenile access to the habitat.

➢ Proposal

The proposed re-operation of KLOG includes opening of the gates when the river level is high to allow for water from the Sacramento River to enter the CBD and provide inundation of the surrounding floodplain fields. This would allow CBD to act as a slough, similar to the area's historic functionality. This would also provide an opportunity for juvenile fish passage into the CBD and onto the adjacent floodplains, providing valuable rearing habitat during times when velocities within the river are high. As the water level in the river recedes, the floodplains would slowly drain and fish would be signaled to head back to the river.

The proposed re-operation of KLOG would cease on or about March 1 of every year, to allow enough water to be stored in the CBD to provide for farming operations. At this time the gates would be closed to allow for the backup of water in the CBD. Any remaining juveniles within the CBD will have volitional passage back to the river through Knights Landing Ridge Cut. Once the re-operation of the KLOG gates has been initiated, the project will be monitored for three years to ensure that the juvenile fish are prospering.

➢ Potential Benefits

Potential project benefits include increased floodplain connectivity, increased juvenile passage onto the floodplain, increased rearing habitat for fish species, increased riparian habitat, and sustained agricultural productivity along the CBD. The project will also be designed to maintain appropriate irrigation water surface elevations without impeding outflows during flood season.

➢ Integration with other Projects

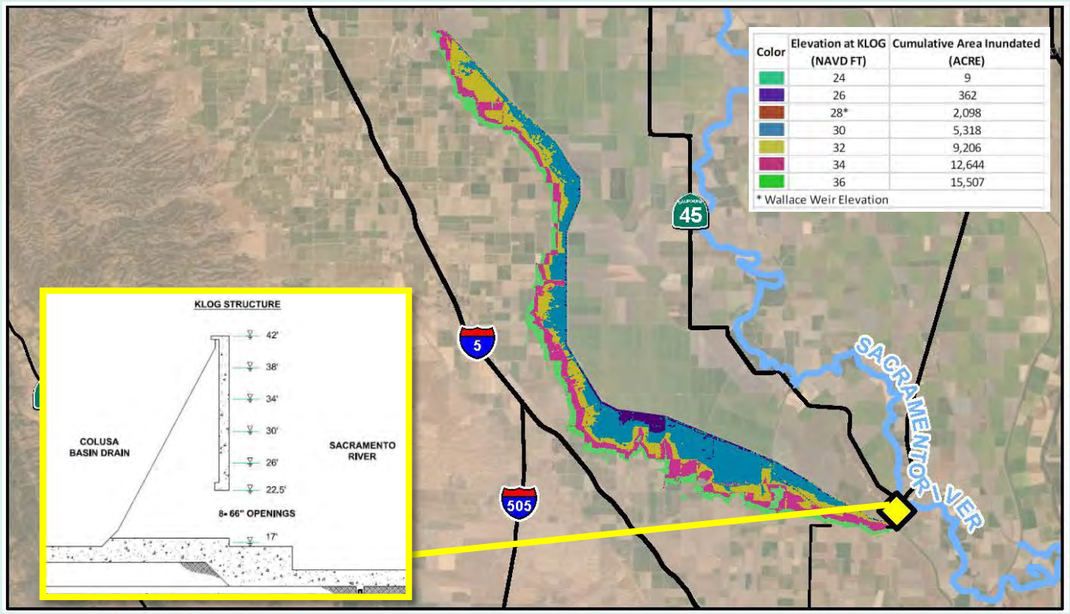
The project is consistent with the goals of the 2016 Central Valley Flood Protection Plan Conservation Strategy, including:

- Promoting natural dynamic hydrologic and geomorphic processes.
- Increasing and improving the quantity, diversity, and connectivity of riparian, wetland, floodplain, and riparian habitats, including the agricultural and ecological values of these lands.
- Promoting the recovery and stability of native species populations and overall biotic community diversity.

Additionally, if implemented in conjunction with the Delevan and Colusa NWR projects, the project would provide an opportunity for juvenile fish rearing from KLOG at the south all the way up the river to Delevan/Maxwell in the north. Fish would have access to the CBD and adjacent floodplains, the Colusa NWR and Delevan NWR, opening up approximately 30,000 acres of floodplain providing valuable rearing habitat.

➢ Potential Constraints

Project is located in a flood channel and will need to comply with USACE Section 408 requirements.



OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]	●				Potential to increase rearing habitat in the Colusa Drain Inundation area up to approximately 21,600 acres.
	Fish Passage				●	No adult passage benefits related to the project.
	Fish Spawning				●	No spawning benefits related to the project.
	Agricultural (acres)[2]				●	
	Waterfowl (acres)[2]	●				Increased frequency and duration of inundation will provide additional waterfowl habitat in addition to fish habitat.
Secondary Benefit	Recreational				●	No recreational opportunities are expected as a result of the project.
	Educational				●	No educational opportunities are expected as a result of the project.
	Water supply		●			Increased frequency and duration of inundation has the potential to provide additional groundwater recharge.
	Listed Species Benefit	●				Benefits to salmonids, waterfowl, and potential to benefit other species.
Feasibility Criteria	Landuse Compatibility	●				Consistent with the existing flood control landuse within the Sacramento River basin and provides for sustained agricultural production within the area.
	Shovel Readiness			●		Would require design and environmental review.
	Cost[1]		●			
	Potential for State/Federal Funding					
	Potential for Local Match			●		
	Project Sponsor, Champion, Partners	●				

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2: L = less than 1,000 ac, M = 1,000 - 5,000 ac, H = More than 5,000 ac

Moulton Weir Modifications

Project Details

Location
This project is located along the left bank of the Sacramento River at the Moulton Weir, north of Highway 20 and East of Interstate 5 in North-eastern Colusa County.

Recommendations
Construct a notch and low-flow channel at Moulton Weir to lower the elevation of the weir and allow increased activation of the adjacent floodplain area to provide both adult and juvenile fish habitat.

Proposal
Installation of a notch in the Moulton Weir will allow for increased inundation (both frequency and duration) of the Butte Sink and Sutter Bypass system, providing rearing habitat for fish species including salmonids. Construction of a low-flow channel will also improve hydraulic connectivity for fish passage between the Sacramento River and the bypass, and allow for volitional passage onto the floodplain as well as back into the river system as flood waters recede. Establishment of a riparian corridor along the low-flow channel will provide cover for fish species as well as valuable habitat for other non-aquatic species.

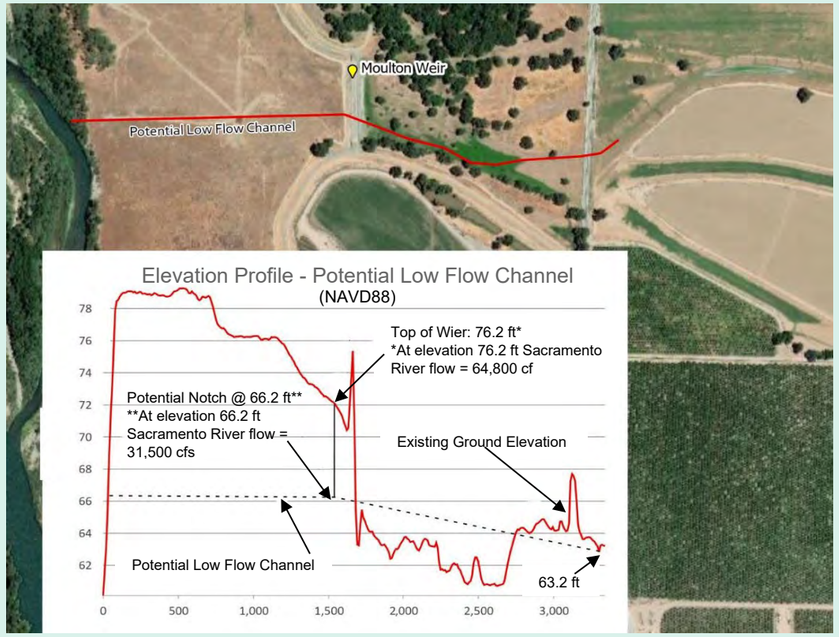
Inclusion of an adjustable water control feature at the notch (similar to what is planned at Tisdale and Freemont Weirs) would allow for control of the water levels within the bypass to also maintain agricultural water supply and agricultural productivity.

Potential Benefits
Potential project benefits include increased fish passage onto the floodplain; increased rearing habitat for fish species, increased riparian habitat, and increased agricultural water supply flexibility. The project will also be designed to maintain appropriate irrigation water surface elevations without impeding outflows during flood season.

Integration with other Projects
This project is consistent with the goals of the 2016 Central Valley Flood Protection Plan Conservation Strategy, including:

- Promoting natural dynamic hydrologic and geomorphic processes.
- Increasing and improving the quantity, diversity, and connectivity of riparian, wetland, floodplain, and riparian habitats, including the agricultural and ecological values of these lands.
- Promoting the recovery and stability of native species populations and overall biotic community diversity.

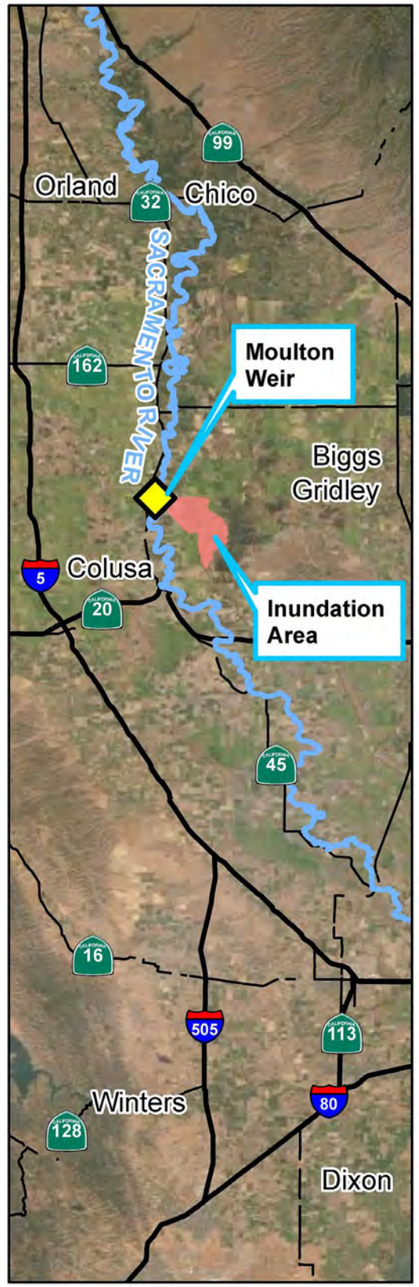
Potential Constraints
Project is located in a flood channel and will need to comply with USACE Section 408 requirements.



OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]	●				Potential to increase rearing habitat in the Moulton Bypass area up to approximately 800 acres. Additional potential rearing areas within the Butte Sink up to approximately 9,600 acres.
	Fish Passage		●			Low-flow channel and notch will allow for volitional passage of fish back to the river.
	Fish Spawning				●	No direct fish spawning benefit is expected from the project, however indirect benefits may be achieved by providing additional resting places for fishing during their spawn.
	Agricultural (acres)[2]				●	
	Waterfowl (acres)[2]		●			Increased frequency and duration of inundation will provide additional waterfowl habitat in addition to fish habitat.
Secondary Benefit	Recreational				●	No recreational opportunities are expected as a result of the project.
	Educational				●	No educational opportunities are expected as a result of the project.
	Water supply		●			Increased frequency and duration of inundation has the potential to provide additional winter water to water users within the bypass system.
	Listed Species Benefit	●				Benefits to salmonids, waterfowl, and potential to benefit other species.
	Other?					
Feasibility Criteria	Landuse Compatibility	●				Consistent with the existing flood control landuse within the Colusa Bypass and provides for sustained agricultural production within the Sutter Bypass.
	Shovel Readiness			●		Would require design and environmental review.
	Cost[1]	●				
	Potential for State/Federal Funding					
	Potential for Local Match			●		
	Project Sponsor, Champion, Partners	●				

1: $ = less than $5m, $$ = $5-15M, $$$ = more than $15M
2: L = less than 1,000 ac, M = 1,000 - 5,000 ac, H = More than 5,000 ac



Colusa Weir and Bypass Modifications

Project Details

➢ Location

This project is located along the left bank of the Sacramento River at the Colusa Weir, just north of the City of Colusa in North-eastern Colusa County.

➢ Recommendations

Construct a notch in the Colusa Weir and a low-flow channel through the Colusa Bypass to allow increased frequency of activation of the adjacent floodplain areas to provide both adult and juvenile fish habitat.

➢ Proposal

Installation of a notch in the Colusa Wier will allow for increased inundation (both frequency and duration) of the Colusa and Sutter Bypass system, providing rearing habitat for fish species including salmonids. Construction of a low-flow channel will also improve hydraulic connectivity for fish passage between the Sacramento River and the bypass, and allow for volitional passage onto the floodplain as well as back into the river system as flood waters recede. Establishment of a riparian corridor along the low-flow channel will provide cover for fish species as well as valuable habitat for other non-aquatic species.

Inclusion of an adjustable water control feature at the notch (similar to what is planned at Tisdale and Freemont Weirs) would allow for control of the water levels within the bypass to also maintain agricultural water supply and agricultural productivity.

➢ Potential Benefits

Potential project benefits include increased fish passage onto the floodplain; increased rearing habitat for fish species, increased riparian habitat, and increased agricultural water supply flexibility. The project will also be designed to maintain appropriate irrigation water surface elevations without impeding outflows during flood season.

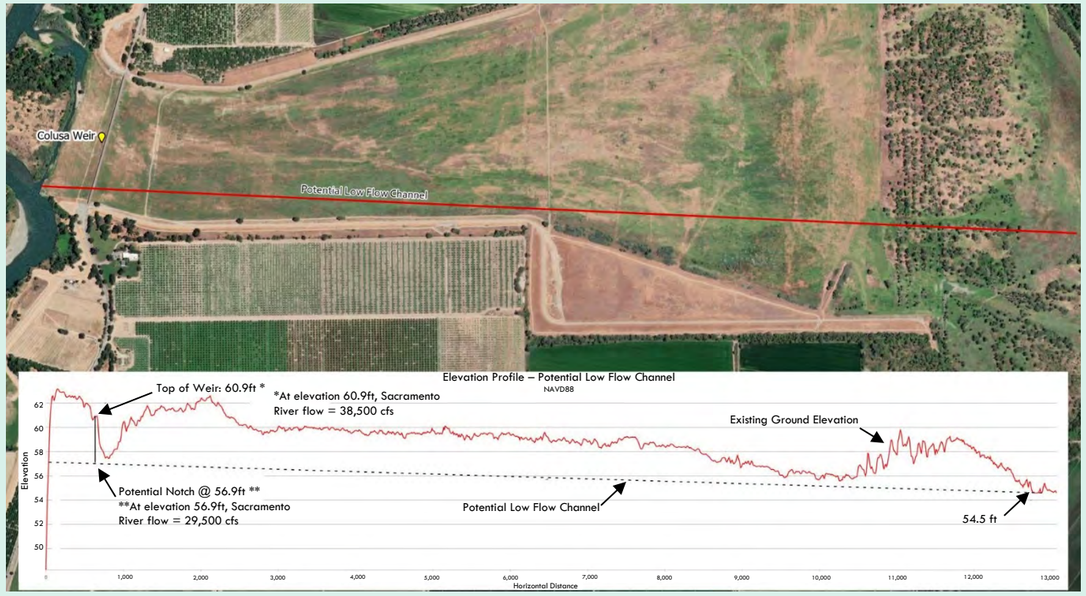
➢ Integration with other Projects

This project is consistent with the goals of the 2016 Central Valley Flood Protection Plan Conservation Strategy, including:

- Promoting natural dynamic hydrologic and geomorphic processes.
- Increasing and improving the quantity, diversity, and connectivity of riparian, wetland, floodplain, and riparian habitats, including the agricultural and ecological values of these lands.
- Promoting the recovery and stability of native species populations and overall biotic community diversity.

➢ Potential Constraints

Project is located in a flood channel and will need to comply with USACE Section 408 requirements.



OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]	●				Potential to increase rearing habitat in the Colusa Bypass area up to approximately 1,250 acres. Additional potential rearing areas within the Butte Sink, and the Sutter bypass up to approximately 5,600 acres.
	Fish Passage		●			Low-flow channel and notch will allow for volitional passage of fish back to the river.
	Fish Spawning				●	No direct fish spawning benefit is expected from the project, however indirect benefits may be achieved by providing additional resting places for fishing during their spawn.
	Agricultural (acres)[2]				●	
	Waterfowl (acres)[2]		●			Increased frequency and duration of inundation will provide additional waterfowl habitat in addition to fish habitat.
Secondary Benefit	Recreational				●	No recreational opportunities are expected as a result of the project.
	Educational				●	No educational opportunities are expected as a result of the project.
	Water supply		●			Increased frequency and duration of inundation has the potential to provide additional winter water to water users within the bypass system.
	Listed Species Benefit	●				Benefits to salmonids, waterfowl, and potential to benefit other species.
Feasibility Criteria	Landuse Compatibility	●				Consistent with the existing flood control landuse within the Colusa Bypass and provides for sustained agricultural production within the Sutter Bypass.
	Shovel Readiness			●		Would require design and environmental review.
	Cost[1]	●				
	Potential for State/Federal Funding					
	Potential for Local Match			●		
	Project Sponsor, Champion, Partners	●				

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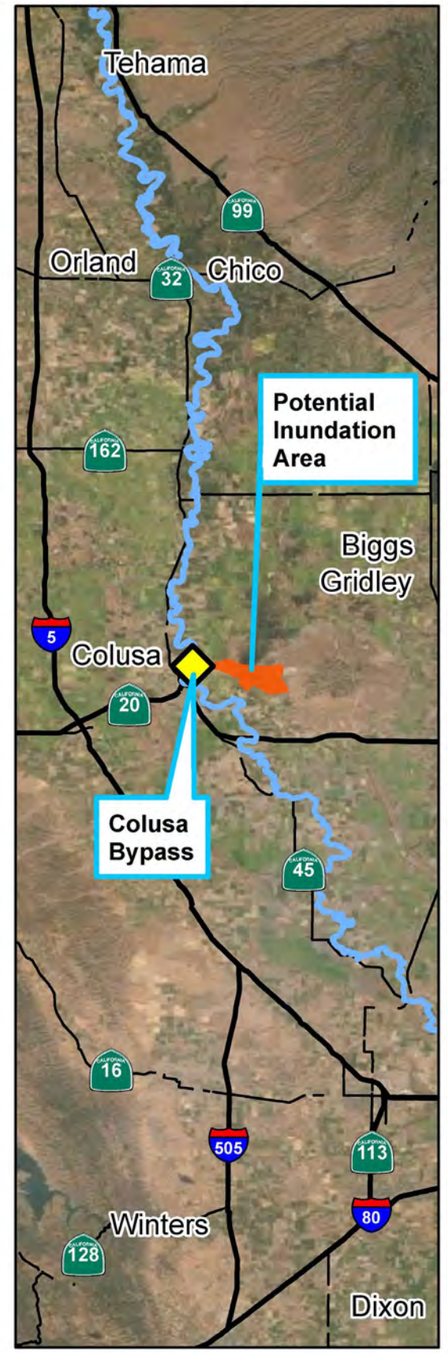

Upper Sacramento River Salmon Habitat Restoration Program

Project Details

➢ Location

Projects are located along the Sacramento River between the Shasta Dam and City of Orland. Multiple projects throughout this stretch of the River will be implemented under the Upper Sacramento River Salmon Habitat Restoration Program (SHRP). See the location map to the right.

➢ Recommendations

Create spawning, rearing, and non-natal salmonid habitat by constructing side channels; reconnecting floodplains; placing spawning gravel, and placing woody material, boulders, and other structures within the Sacramento River between the Shasta Dam and City of Orland.

➢ Proposal

The Sacramento River contains populations of Chinook salmon and steelhead trout, some of which are listed under the Endangered Species Act (ESA). Loss of spawning and rearing habitat has occurred over time due to loss of spawning gravel, flow regulation and stream channel manipulations.

There are nearly 20 individual project elements that will be implemented in as part of the Upper Sacramento River SHRP program. :

The projects will include:

- Creating new side channels and modifying existing side channels to create and improve rearing habitats for the juvenile life stages of anadromous salmonids in the Sacramento River and tributaries;
- Placing woody material, boulders, and other structures as appropriate, to provide habitat for salmonids;
- Creating and enhancing incrementally inundating floodplain habitat;
- Providing spawning habitat/coarse substrate;
- Providing passage to and from disconnected habitats;
- Conducting pre-and post-project site surveys and monitoring to document the effectiveness of projects at improving salmonid habitat; and
- Coordinating activities with an interagency restoration group consisting of agencies and local stakeholders.

➢ Potential Benefits

Potential benefits of the project include making a significant contribution to restoring, maintaining and improving Sacramento River Chinook Salmon and steelhead habitats consistent with the goals of Public Law (P.L.) 102-575, Title XXXIV, Central Valley Project Improvement Act, Sections 3406(b)(13), (b)(1), and 3407(e).

➢ Integration with other Projects

The program is being carried out under funding from the United States Bureau of Reclamation (USBR) as an integrated effort coordinated by multiple project proponents including the Sacramento River Settlement Contractors (SRSC) (including Reclamation District 108 (RD 108) and Glenn Colusa Irrigation District (GCID)), California State University Chico, and River Partners.

➢ Project Advocates

- SRSC
- RD 108
- GCID
- Anderson-Cottonwood Irrigation District
- River Garden Farms
- Natomas Mutual Water Company
- Sutter Mutual Water Company
- Provident Irrigation District
- Carte Mutual Water Company
- Princeton-Codora-Glenn Irrigation District
- Reclamation District No. 1004
- Tehama-Colusa Canal Authority (17 member districts)
- City of Redding
- American Rivers
- Resource Conservation District of Tehama County
- Sacramento Valley Ecological Restoration Foundation (SAVER)
- Conway Ranch
- Reclamation District No. 787 R
- California Department of Water Resources
- Westside Water District
- Orland-Artois Water District
- Maxwell Irrigation District
- River Partners
- Chico State

➢ Potential Constraints

Funding and timing of projects are still being finalized.

OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]		●			Will provide access to side channel and floodplain rearing habitat outside of the main river channel.
	Fish Passage			●		
	Fish Spawning	●				Spawning gravel will be place. Potential improved spawning habitat within side channels.
	Agricultural (acres)[2]			●		
	Waterfowl (acres)[2]			●		
Secondary Benefit	Recreational	●				Projects will provide for increased salmonid habitat which in turn has potential to increase recreational fishing/eco-tourism in the region.
	Educational			●		
	Water supply		●			Increased habitat within the Sacramento River System may provide opportunity for changing how flows out of the Shasta Dam are managed.
	Listed Species Benefit	●				Chinook and steelhead will benefit from increased habitat.
Feasibility Criteria	Landuse Compatibility	●				
	Shovel Readiness			●		
	Cost[1]	●				Projects currently have approximately $40M in funding.
	Potential for State/Federal Funding	●				USBR funding in process.
	Potential for Local Match		●			SRSC will provide match funding by means of providing labor.
	Project Sponsor, Champion, Partners	●				Multiple project partners/champions.

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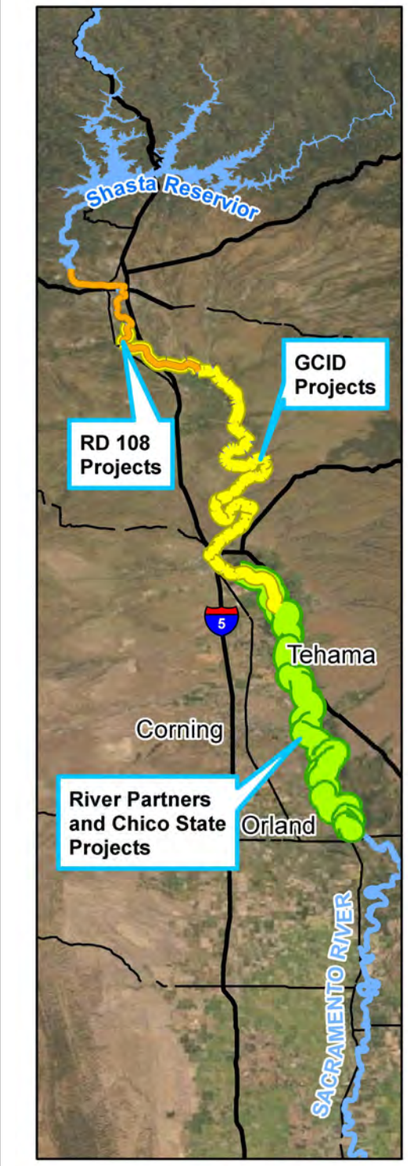

Missouri Bend Setback Levee

Project Details

➢ Location

This project is located along the right bank of the Sacramento River at approximately River Mile (RM) 4.0, approximately 3.5 miles north of Knights Landing, California.

➢ Recommendations

Restore approximately 16 acres of floodplain habitat between the remnant levee and new setback levee to be constructed by the US Army Corps of Engineers (USACE). This includes breaching the remnant levee, re-grading the area between the new setback levee and the remnant levee, and replanting the re-graded area and remnant levee with native vegetation. The project will be constructed with the goal of using the site to directly offset impacts from one or more flood system restoration/repair 'impact causing projects'.

➢ Proposal

Riverine floodplains are dynamic systems that play an important role in the function and ecology of rivers. Where floodplains are connected to a river and periodically inundated, interactions of land, water, and biology support natural functions that benefit river ecosystems and the species that depend upon them. Due to damage sustained during the 2017 storm season, the existing levee along Missouri Bend, originally constructed by local interests before 1915, is in need of replacement. Seepage, boils, and erosion have been reported along the levee. California Department of Water Resources (DWR), in cooperation with the Central Valley Flood Protection Board (CVFPB) and Sacramento River West Side Levee District (SRWSLD), requested that the USACE construct a setback levee repair which would afford DWR and SRWSLD an opportunity to construct in-river restoration by breaching the remnant levee and reconnecting a portion of the historical floodplain to the Sacramento River. USACE has completed the design and has selected a contractor. Construction of the setback levee and seepage berm will occur in 2021.

Construction of a setback levee at the site presents on opportunity to create a 16 acre on-river habitat restoration area by breaching the existing levee and allowing inundation to occur between the new setback levee and the remnant levee. DWR has expressed interest in using the site to offset impacts associated with other DWR projects in the region, and funded SRWSLD to conduct an evaluation of potential restoration alternatives at the site.

In the Sacramento Valley, most of the historical floodplains have been disconnected from their rivers by reclamation efforts and the construction of levees to prevent flooding. Opportunities to reconnect floodplains to rivers are rare because landowners are hesitant to convert their farmland to floodplains, and the cost to relocate levees and infrastructure can be very high. That is why the opportunity this proposed site presents is so rare. At this location there is a willing property owner and the levee relocation is necessitated due to flood risk reduction concerns, with the majority of the levee relocation costs being borne by the Federal government. In addition, its ecological benefits would provide an opportunity to generate mitigation credits to offset impacts of other flood system improvement projects, provide a supply of much needed levee fill material, and advance implementation of the CVFPP Conservation Strategy.

➢ Potential Benefits

Potential project benefits include increased floodplain inundation; increased rearing habitat for fish species, increased riparian habitat, and increased agricultural water supply flexibility. The project will also be designed to maintain appropriate irrigation water surface elevations without impeding outflows during flood season. The proposed project would also generate over 130,000 cubic yards of fill material which would be available for use in levee repair and improvement projects.

➢ Integration with other Projects

This project is consistent with the goals of the 2016 Central Valley Flood Protection Plan Conservation Strategy, including:

Promoting natural dynamic hydrologic and geomorphic processes.

Increasing and improving the quantity, diversity, and connectivity of riparian, wetland, floodplain, and riparian habitats, including the agricultural and ecological values of these lands.

Promoting the recovery and stability of native species populations and overall biotic community diversity.

➢ Potential Constraints

Project is located in a flood channel and will need to comply with USACE Section 408 requirements.

OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]			●		
	Fish Passage			●		
	Fish Spawning				●	
	Agricultural (acres)[2]			●		
	Waterfowl (acres)[2]			●		
Secondary Benefit	Recreational			●		
	Educational			●		
	Water supply	●				
	Listed Species Benefit	●				
Feasibility Criteria	Landuse Compatibility	●				
	Shovel Readiness		●			
	Cost[1]		●			
	Potential for State/Federal Funding	●				
	Potential for Local Match			●		
	Project Sponsor, Champion, Partners	●				

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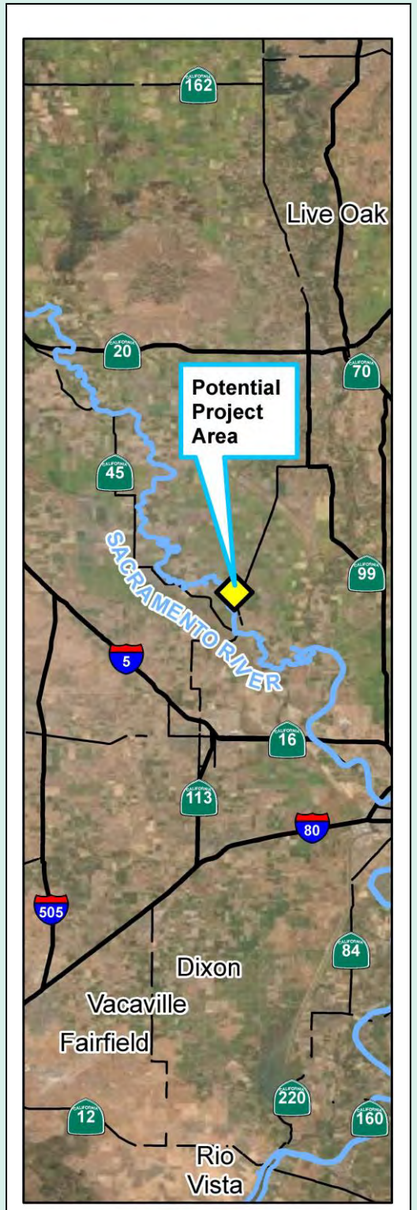

Tule Canal Riparian Restoration

Project Details

➢ Location

7.5 miles of the Tule Canal in the Lower Elkhorn Basin, Yolo Bypass

➢ Recommendations

Tule Canal runs along the west side of the Lower Elkhorn Basin Levee Setback Project, currently being undertaken by the California Department of Water Resources. State funds are being provided to set back the levee and reconnect 2,600 acres of floodplains within the Yolo Bypass. The Tule Canal is a primary fish passage through the area and it currently lacks suitable vegetative cover to support migrating salmon – lacking shade, fish food production, and cover from predation. This project would establish native riverside forests along 7.5 miles of the banks of the Tule Canal through planting and three years of cultivation. Estimated cost $25,000,000.

➢ Proposal

Riverside reforestation along the Tule Canal is designed and permitted as part of the larger Lower Elkhorn Basin Levee Setback project, currently being undertaken to improve flood management and ecosystem outcomes in the Yolo Bypass. Riverside reforestation would be undertaken using methods that have been developed in the Sacramento River watershed over the last 20 years. Reforestation typically results in accumulation of 50 metric tons of carbon within 30 years, and provides habitat for numerous other threatened and endangered species including songbirds, invertebrates, and other aquatic species.

➢ Potential Benefits

Wildlife habitat values for birds, pollinators, and other river-dependent wildlife along Tule Canal and the floodplains of the Yolo Bypass. Living wage jobs, education and outreach opportunities will be provided over a period of 4 years while the habitat restoration project is being planted and established.

➢ Integration with other Projects

This project is aligned with projects and programs from regional to global scales:

- Regional Flood Management Plan and the Central Valley Flood Protection Plan and associated Conservation Strategy
- Central Valley Joint Venture Implementation Plan
- Riparian Bird Conservation Plan (Partners in Flight)
- USFWS Sacramento River National Wildlife Refuge Comprehensive Conservation Plan
- CDFW Sacramento River Wildlife Area Habitat Management Plan
- Recovery Plan for Chinook salmon and Central Valley Steelhead
- Upper Sacramento River Habitat Management Plan (Sac River Forum)
- California Water Action Plan / Water Resiliency Portfolio
- CDFW State Wildlife Action Plan
- Recovery Plan for Valley Elderberry Longhorn Beetle
- Recovery Plan for Least Bell's Vireo
- Recovery Plan for Yellow-billed Cuckoo
- Dozens of similar projects completed by private-public partnership since the 1980s

➢ Potential Beneficiaries

- Regional agricultural interests that rely upon robust populations of pollinators for continued production
- Water quality interests seeking to meet ambient water quality standards for regulatory compliance in Tehama and Glenn Counties

➢ Project Advocates

River Partners and California Department of Water Resources

➢ Potential Constraints

Funding.

OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]		●			
	Fish Passage		●			
	Fish Spawning				●	
	Agricultural (acres)[2]			●		
	Waterfowl (acres)[2]			●		
Secondary Benefit	Recreational		●			
	Educational		●			
	Water supply	●				
	Listed Species Benefit	●				
Feasibility Criteria	Landuse Compatibility	●				
	Shovel Readiness	●				
	Cost[1]	●				
	Potential for State/Federal Funding	●				
	Potential for Local Match			●		
	Project Sponsor, Champion, Partners	●				

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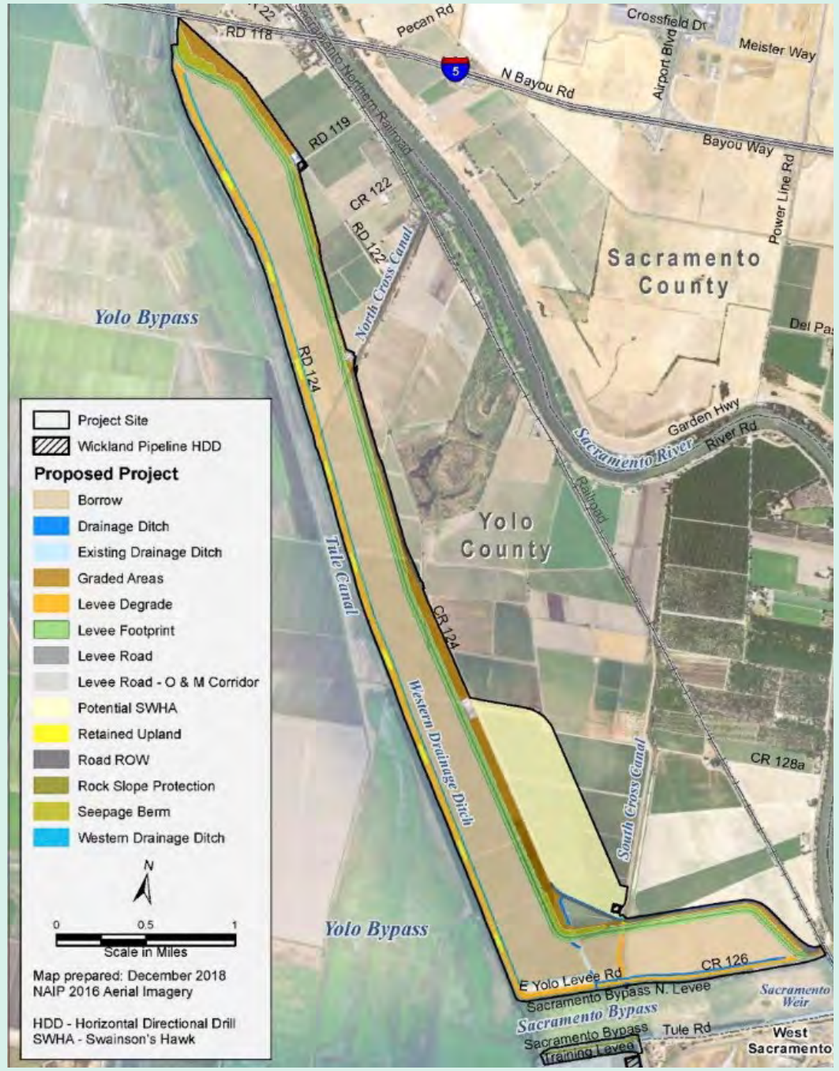

Blethen Island Side Channel Project

Project Details

Location
The project is located in a side channel along the left bank of the Sacramento River west of Hwy. 99 about 3 miles north of Vina, CA. The exact location is 39.964305, -122.084266.

Recommendations
Rehabilitate hydraulic connectivity of the Blethen Island side channel to restore perennial flows in high value rearing habitat and habitat connectivity with Toomes Creek, a tributary to the side channel. An estimated 2-3 acres of salmonid rearing habitat in the Blethen Island side channel and increased connectivity with existing rearing habitat in Toomes Creek will be created. The project is estimated at $1.2 million.

Proposal
Under existing conditions, the upstream end of the Blethen Island side channel is disconnected from the Sacramento River below approximately 6,000 cfs limiting availability of quality rearing habitat below these flows. Lack of perennial flow in the side channel also may limit access to non-natal rearing habitat in Toomes Creek which flows into the Blethen Island side channel The proposed project would involve the following 3 key components: (1) excavation of the side channel inlet to restore perennial flows to the side channel; (2) selective removal of aggraded sediment deposits and mechanical rehabilitation of more complex morphology, structure, and cover between the side channel inlet and outlet, including the mouth of Toomes Creek, and (3) adding large wood structure to the side and the outlet to increase habitat complexity for winter and summer rearing and adult holding.

Potential Benefits
This project will benefit salmonid populations in the Sacramento River watershed by increasing the quantity and quality of salmonid rearing habitat by restoring 5,760 feet of side channel habitat and providing improved access to Toomes Creek. Estimated benefits to rearing juvenile salmon include a 2.6 acre increase in suitable rearing habitat in the Blethen Island side channel equivalent to a rearing habitat carrying capacity increase of 194,322 fish. Improved access to non-natal rearing habitat in Toomes Creek are anticipated to further increase rearing habitat carrying capacity.

Integration with other Projects
This project is one of several projects funded by the Bureau of Reclamation Sacramento River Salmonid Habitat Restoration Program.

Project Advocates
Sacramento River Settlement Contractors, Resource Conservation District of Tehama County, California Department of Water Resources, American Rivers, Sacramento Valley Ecological Restoration

Potential Constraints
Project is located in a flood channel and will need to comply with USACE Section 408 requirements.

OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]			●		
	Fish Passage			●		
	Fish Spawning				●	
	Agricultural (acres)[2]				●	
	Waterfowl (acres)[2]				●	
Secondary Benefit	Recreational			●		
	Educational			●		
	Water supply				●	
	Listed Species Benefit			●		
Feasibility Criteria	Land use Compatibility	●				
	Shovel Readiness				●	
	Cost[1]			●		
	Potential for State/Federal Funding	●				Funding secured from Bureau of Reclamation
	Potential for Local Match				●	
	Project Sponsor, Champion, Partners	●				Existing partnership with SRSC

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2: L = less than 1,000 ac, M = 1,000 - 5,000 ac, H = More than 5,000 ac

Shaded River Corridor

Project Details

➢ Location

5 sites between RM 179 and RM 240 – all public ownership

➢ Recommendations

More than 4 miles of the banks of the Sacramento River are currently in public ownership for conservation and fish and wildlife management that host relict and obsolete bank revetment. Four miles of shaded riverine aquatic habitat can be established on these currently degraded banks through the mobilization of a restoration program aimed at recovering bank biological and physical dynamics. Allocthanous inputs (organic material derived from riverbank plants) to the Sacramento River including plant litter, insects, and fungus can enrich foraging for migrating salmon tremendously. In fact, lack of available food in the Sacramento River channel has been documented as a major stressor for salmon recovery by numerous studies over the last decade. This project would also promote the natural channel dynamics of erosion and deposition that maintain salmon habitat over time in the river on lands in which significant investment has already been made to preserve the lands as habitat areas. This project would also increase inundation frequency and duration across more than 1,200 acres of natural floodplains of the Sacramento River. Estimated cost is $9.81M.

➢ Proposal

For more than 3 decades, state and federal resource agencies have identified a major stressor to salmon recovery in the Sacramento River as fragmented and disconnected river and riparian habitat that is unable to provide the physical and biological needs for all life stages of chinook salmon. USFWS, NMFS, CDFW and CNRA have acquired many acres of riverside lands and developed habitat management plans for this river corridor that identify protection of floodplain lands and restoration of floodplain habitat function as high priority actions supporting salmon recovery. Obstacles to project delivery have included conflicts with flood management and irrigation delivery infrastructure and lack of funds.

Thanks to tremendous collaboration amongst state and federal water managers, alignment now exists to advance the river conservation goals of these agencies and initiatives. Through this project, River Partners proposes to restore riparian habitat function along 4miles of the banks of the Sacramento River through rock revetment removal, increasing channel meander, and establishment of native forest vegetation while simultaneously increasing the durability of salmon habitat needs by promoting channel meander dynamics on compatible lands in public ownership.

➢ Potential Benefits

This project will have significant benefits to in-stream flow in the Sacramento River including water quality, temperature, and food availability for salmon. The project will also significantly improve the timing and duration of floodplain inundation of lands already managed for fish and wildlife habitat. Additional study may also reveal a water storage improvement in the reconnected floodplain soils that is likely temporary in nature, but important to maintain appropriate water temperatures and river flows suitable to maintain habitat quality along the river corridor.

➢ Integration with other Projects

This project is aligned with projects and programs from regional to global scales:

- Regional Flood Management Plan and the Central Valley Flood Protection Plan and associated Conservation Strategy
- Central Valley Joint Venture Implementation Plan
- Riparian Bird Conservation Plan (Partners in Flight)
- USFWS Sacramento River National Wildlife Refuge Comprehensive Conservation Plan
- CDFW Sacramento River Wildlife Area Habitat Management Plan
- Recovery Plan for Chinook salmon and Central Valley Steelhead
- Upper Sacramento River Habitat Management Plan (Sac River Forum)
- California Water Action Plan / Water Resiliency Portfolio
- CDFW State Wildlife Action Plan
- Recovery Plan for Valley Elderberry Longhorn Beetle
- Recovery Plan for Least Bell's Vireo
- Recovery Plan for Yellow-billed Cuckoo
- Dozens of similar projects completed by private-public partnership since the 1980s

➢ Potential Beneficiaries

- Communities suffering from climate-change induced disasters like floods
- Air quality managers and those interested in sequestering carbon
- Irrigation districts seeking to recover salmon populations without reducing irrigation deliveries
- Flood system maintenance agencies seeking to reduce their residual risk and complexity of levee maintenance operations
- Regional agricultural interests that rely upon robust populations of pollinators for continued production
- Water quality coalitions seeking to meet ambient water quality standards for regulatory compliance

➢ Project Advocates

River Partners, U.S. Fish and Wildlife, Sacramento River Forum, U.S. Bureau of Reclamation, California Department of Fish and Wildlife

➢ Potential Constraints

Funding.

OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]			●		
	Fish Passage	●				
	Fish Spawning				●	
	Agricultural (acres)[2]			●		
	Waterfowl (acres)[2]			●		
Secondary Benefit	Recreational	●				
	Educational	●				
	Water supply			●		
	Listed Species Benefit	●				
Feasibility Criteria	Land use Compatibility	●				
	Shovel Readiness		●			
	Cost[1]		●			
	Potential for State/Federal Funding	●				
	Potential for Local Match			●		
	Project Sponsor, Champion, Partners	●				

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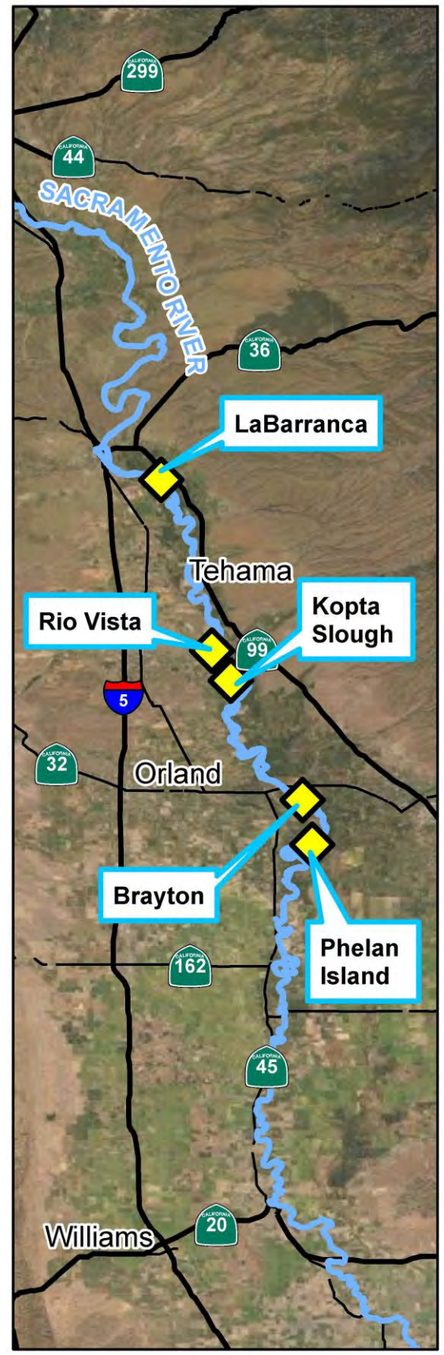


Riparian Sanctuary

Project Details

Location

The Riparian Sanctuary Project is located 15 miles southwest of Chico, California on the east bank of the Sacramento River between River Mile (RM) 176.5 and RM 178, along the borders of Butte and Glenn Counties.

Recommendations

The Riparian Sanctuary is a 950-acre unit of the US Fish and Wildlife Service's Sacramento River National Wildlife Refuge. Across the river, lies the Princeton-Codora-Glenn and Provident Irrigation District's (PCGID-PID) Pumping Plant and Fish Screen Facility. The Sacramento River Flood Control Project's western levee starts 7-8 miles upstream and the eastern project levee starts a mile downstream. The project lies just southwest of the last flood relief structure, Goose Lake Overflow, which directs high flows from the Sacramento River into the Butte Basin. The project combines measures to restore riparian habitat at the Riparian Sanctuary Unit and to protect the alignment of the Sacramento River at the PCGID-PID pumping plant and fish screen facility. The project recommends restoring 400 acres of riparian habitat, removing over 2,000 linear feet of degraded revetment on State land immediately upstream of the project area, while placing a similar amount of revetment on USFWS property to protect the plant. Removing the upstream revetment will allow the river to recapture a historic channel. This will create oxbow habitat and allow for improved river process upstream, while also protecting the fish screens, which are needed to provide water to 30,000 irrigated acres. Estimated cost is $11M.

Proposal

For more than 3 decades, state and federal resource agencies have identified a major stressor to salmon recovery in the Sacramento River as fragmented and disconnected river and riparian habitat that is unable to provide the physical and biological needs for all life stages of chinook salmon. USFWS, NMFS, CDFW and CNRA have developed habitat management plans for this river corridor that identify protection of floodplain lands and restoration of floodplain habitat function as high priority actions supporting salmon recovery. Obstacles to project delivery have included conflicts with flood management and irrigation delivery infrastructure and lack of funds.

Thanks to tremendous collaboration amongst state and federal water managers, alignment now exists to advance the river conservation goals of these agencies and initiatives. Through this project, River Partners proposes to restore floodplain function along 1.5miles of the Sacramento River through rock revetment removal, increasing channel meander, and establishment of native forest vegetation while simultaneously increasing the durability of the PCGID pumping plant by promoting channel meander dynamics that support continued operation.

Integration with other Projects

This project is aligned with projects and programs from regional to global scales:

- Regional Flood Management Plan and the Central Valley Flood Protection Plan and associated Conservation Strategy
- Central Valley Joint Venture Implementation Plan
- Riparian Bird Conservation Plan (Partners in Flight)
- USFWS Sacramento River National Wildlife Refuge Comprehensive Conservation Plan
- CDFW Sacramento River Wildlife Area Habitat Management Plan
- Recovery Plan for Chinook salmon and Central Valley Steelhead
- Upper Sacramento River Habitat Management Plan (Sac River Forum)
- California Water Action Plan / Water Resiliency Portfolio
- CDFW State Wildlife Action Plan
- Recovery Plan for Valley Elderberry Longhorn Beetle
- Recovery Plan for Least Bell's Vireo
- Recovery Plan for Yellow-billed Cuckoo

Dozens of similar projects completed by private-public partnership since the 1980s

Potential Benefits

- Continued water delivery to 30,000 acres of farms
  - Landowners within the Princeton-Codora-Glenn and Provident Irrigation Districts (PCGID-PID)
  - Managed wetlands that provide wintering waterfowl habitat
- Reconnect floodplain and create floodplain rearing habitat
- Restore natural river processes that support wildlife habitat niches
  - Increases natural channel complexity that increases rearing habitat for juvenile salmonids
  - Contributes to combination of exposed gravel bars, cut banks, and newly recruited large woody debris to the river channel
  - Potentially produces an oxbow feature that creates riparian and aquatic habitat diversity

Potential Beneficiaries

- Communities along the Sacramento River suffering from increased incidence of climate change-induced disasters such as floods and fires
- Air quality managers and those interested in carbon sequestration
- Sacramento River Irrigation districts seeking to recover salmon populations without reducing irrigation deliveries
- Flood system maintenance agencies seeking to reduce their residual risk and complexity of levee maintenance operations
- Regional agricultural interests that rely upon robust populations of pollinators for continued production
- Water quality coalitions seeking to meet ambient water quality standards for regulatory compliance

Project Advocates

River Partners, U.S. Fish and Wildlife, Princeton-Codora-Glenn and Provident Irrigation Districts (PCGID-PID), California Department of Fish and Wildlife

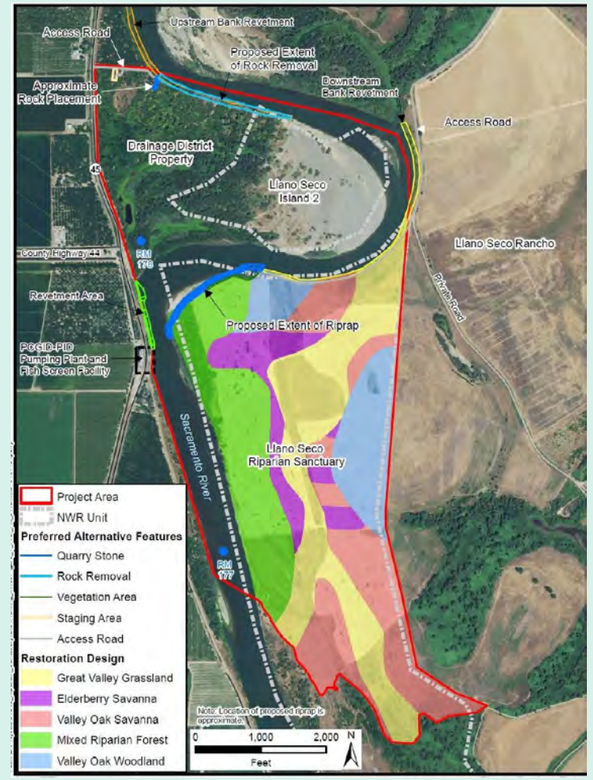
Potential Constraints

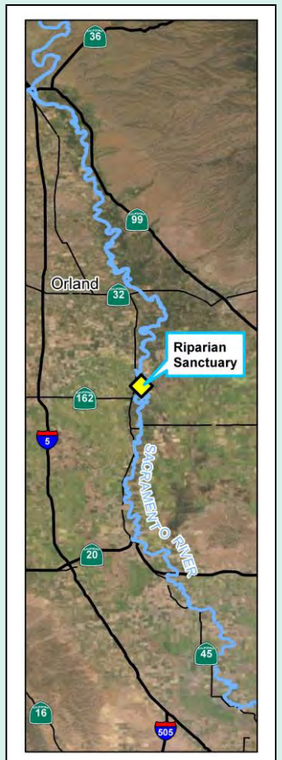
Major constraints that need resolution include identifying the process to remove rock revetment and determining entity responsible for maintaining downstream bank stabilization.

OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]			●		Will provide some access to rearing habitat outside of the main river channel.
	Fish Passage			●		
	Fish Spawning	●				Gravel augmentation project will increase spawning habitat.
	Agricultural (acres)[2]			●		
	Waterfowl (acres)[2]			●		
Secondary Benefit	Recreational	●				Projects will provide for increased salmonid habitat which in turn has potential to increase recreational fishing/eco-tourism in the region.
	Educational			●		
	Water supply		●			Increased habitat within the Sacramento River System may provide opportunity for changing how flows out of the Shasta Dam are managed.
	Listed Species Benefit	●				Chinook and steelhead will benefit from increased habitat.
Feasibility Criteria	Landuse Compatibility	●				
	Shovel Readiness			●		
	Cost[1]		●			Estimated that projects can be implemented for approximately $10M.
	Potential for State/Federal Funding	●				USBR funding in process.
	Potential for Local Match		●			GCID will provide match funding by means of providing labor.
	Project Sponsor, Champion, Partners	●				Multiple project partners/champions.

1: $ = less than $5m, $$ = $5-15M, $$$ = more than $15M
2: L = less than 1,000 ac, M = 1,000 - 5,000 ac, H = More than 5,000 ac





Sacramento River Floodplain Habitat: Salmon Rest Stops Phase 1

Project Details

➢ Location

5 sites between Chico and Knights Landing currently in private ownership, precise locations are not sharable at this time. Two additional sites are in development and will come into agreement in CY2021

➢ Recommendations

The first phase of this project seeks to realize 35% of the remaining fish habitat conservation goals of state and federal partners through the preservation through fee-title or easement acquisition of lands on the primary floodplain of the Sacramento River that are currently disconnected from overbank flooding by private berms and structures. All properties are in purchase agreement and have valid appraisals. All properties can be reconnected to overbank flooding under current hydrological conditions (i.e. without changes in flow regime or modification to the flood system). Upon acquisition, the properties will undergo a 6-month evaluation and planning process to develop site designs and permitting for optimal fish habitat restoration including grading and revegetation. Floodplain habitat reconnection will be completed within 18 months and habitat restoration within 4 years. If desired, properties may be given to the USFWS, CDFW or other appropriate land management agency for long term stewardship. Estimated project costs are described in the table below.

➢ Proposal

For more than 3 decades, state and federal resource agencies have identified a major stressor to salmon recovery in the Sacramento River as fragmented and disconnected river and riparian habitat that is unable to provide the physical and biological needs for all life stages of chinook salmon. USFWS, NMFS, CDFW and CNRA have developed habitat management plans for this river corridor that identify protection of floodplain lands and restoration of floodplain habitat function as high priority actions supporting salmon recovery. Obstacles to project delivery have included conflicts with flood management and irrigation delivery infrastructure and lack of funds.

Thanks to tremendous collaboration amongst state and federal water managers, alignment now exists to advance the river conservation goals of these agencies and initiatives. Through this project, River Partners proposes to conserve and reconnect floodplain habitat areas in 5 distinct locations providing strategic rest stops for migrating salmon and food and resting refuge for outmigrating juveniles. Two additional locations are under development currently.

Future phases of this project include additional floodplain acreage to be reconnected in strategically important migration corridors between Verona and Chico, and Chico to Red Bluff. Targets for habitat connectivity across the Sacramento River between Verona and Red Bluff vary by habitat management plan, however the Sacramento River National Wildlife Refuge full build-out requires an additional 4,000 acres of floodplains, and the CDFW Sacramento River Wildlife Area seeks additional habitat connections amongst its disconnected wildlife areas.

➢ Potential Benefits

This project will reconnect 1,400 acres of the Sacramento River's primary floodplain to frequent overbank flows at the appropriate time of year for salmon passage and rearing, increasing overall aquatic habitat availability by 10% in high water years. This project will enhance zooplankton production on the primary floodplain supporting outmigrating salmon growth and health. Vegetation restoration on reconnected floodplains (native forests, shrublands and grasslands) will super-charge the production of rich and reliable food resources as well as resting areas with low water velocities and cover from predation.

This project will have significant benefits to in-stream flow in the Sacramento River: models estimate that over 500 acre-feet of riparian water rights would become available for dedication to downstream uses or streamflow as a result of this work. Additional study may also reveal a water storage improvement in floodplain soils that is likely temporary in nature, but important to maintain appropriate water temperatures and river flows suitable to maintain habitat quality along the river corridor.

➢ Integration with other Projects

This project is aligned with projects and programs from regional to global scales:

- Regional Flood Management Plan and the Central Valley Flood Protection Plan and associated Conservation Strategy
- Central Valley Joint Venture Implementation Plan
- Riparian Bird Conservation Plan (Partners in Flight)
- USFWS Sacramento River National Wildlife Refuge Comprehensive Conservation Plan
- CDFW Sacramento River Wildlife Area Habitat Management Plan
- Recovery Plan for Chinook salmon and Central Valley Steelhead
- Upper Sacramento River Habitat Management Plan (Sac River Forum)
- California Water Action Plan / Water Resiliency Portfolio
- CDFW State Wildlife Action Plan
- Recovery Plan for Valley Elderberry Longhorn Beetle
- Recovery Plan for Least Bell's Vireo
- Recovery Plan for Yellow-billed Cuckoo
- Dozens of similar projects completed by private-public partnership since the 1980s

➢ Potential Beneficiaries

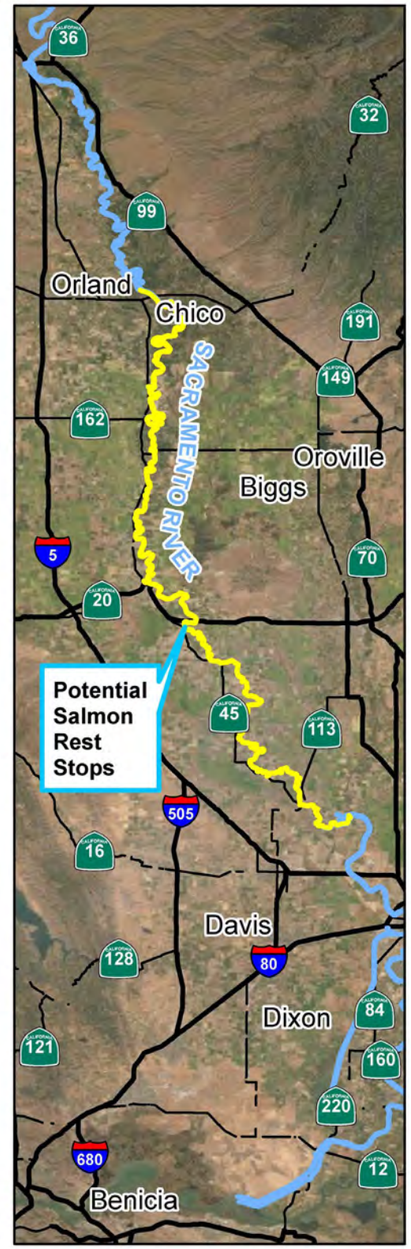
- Communities suffering from climate-change induced disasters like floods and fires
- Air quality managers and those interested in sequestering carbon
- Irrigation districts seeking to recover salmon populations without reducing irrigation deliveries
- Flood system maintenance agencies seeking to reduce their residual risk and complexity of levee maintenance operations
- Regional agricultural interests that rely upon robust populations of pollinators for continued production
- Water quality coalitions seeking to meet ambient water quality standards for regulatory compliance

➢ Project Advocates

River Partners, USFWS, CDFW, State Parks, private landowners, local businesses

➢ Potential Constraints

Funding is required to act quickly. Property transactions occur rapidly and public funding is relatively slow to take advantage of property opportunities.



OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]		●			
	Fish Passage	●				
	Fish Spawning				●	
	Agricultural (acres)[2]				●	
	Waterfowl (acres)[2]			●		
Secondary Benefit	Recreational	●				
	Educational	●				
	Water supply	●				
	Listed Species Benefit	●				
Feasibility Criteria	Landuse Compatibility	●				
	Shovel Readiness	●				
	Cost[1]	●				
	Potential for State/Federal Funding	●				
	Potential for Local Match			●		
	Project Sponsor, Champion, Partners	●				

1: $ = less than $5m, $$ = $5-15M, $$$ = more than $15M

2: L = less than 1,000 ac, M = 1,000 - 5,000 ac, H = More than 5,000 ac

Lower Stony Creek Fish Habitat Restoration

Project Details

➢ Location

The lower 20 miles of Stony Creek between Black Butte Dam and its confluence with the Sacramento River.

➢ Recommendations

Lower Stony Creek is a tributary to the Sacramento River that hosts the most dense infestations of invasive giant reed (*Arundo donax*) in California. This invasive plant provides no wildlife value and is not known to support invertebrate populations, nesting birds, or other river-obligate wildlife. Giant reed is also expected to transpire vast quantities of water through evapotranspiration, and is suspected of significantly impacting streamflow in small streams across California. The drought-inducing effects of giant reed infestations will become worse as our climate continues to change, and as precipitation patterns across the western US transition seasonally. Effective eradication of this invasive plant from our watersheds requires starting at the top and working downstream in combination with revegetation tactics that replace giant reed with aggressive native plants. Stony Creek stream flows are regulated from Black Butte Dam, Managed by the US Army Corps of Engineers. This project seeks to prioritize, remove, and replace invasive giant reed with native plants that are resistant to reinfestation and support native ecosystem values including enhanced water quality and quantity benefitting Sacramento River salmon. It also seeks to advance planning to revise the outflows in Stony Creek to benefit Sacramento River salmon runs. Estimated cost $20,000,000.

➢ Proposal

This project seeks to deliver the goals of the Recovery Plan for Chinook salmon and Central Valley steelhead in the Sacramento valley, particularly in Stony Creek where the vast majority of lands are in private ownership. River Partners would work from extensive weed mapping already completed by the California Invasive Plant Council to prioritize treatment locations and methods, then work with private landowners to develop plans for treatment. Additionally, this project would engage with the multiple overlapping agencies involved in salmon recovery in the watershed to develop new outflow targets from Black Butte Dam that benefit the continued removal of giant reed, the restoration of Stony Creek floodplains for salmon habitat values, and streamflow for salmon.

➢ Potential Benefits

The project will generate considerable water savings through the removal of invasive plants which have very high evapotranspiration rates.

Additionally, the project will create jobs for seasonally and permanently unemployed laborers in the region.
Salmon habitat along 20 river miles

Wildlife habitat values for birds, pollinators, and other river-dependent wildlife along Stony Creek and downstream along the Sacramento River

➢ Integration with other Projects

This project is aligned with projects and programs from regional to global scales:

- Regional Flood Management Plan and the Central Valley Flood Protection Plan and associated Conservation Strategy
- Central Valley Joint Venture Implementation Plan
- Riparian Bird Conservation Plan (Partners in Flight)
- USFWS Sacramento River National Wildlife Refuge Comprehensive Conservation Plan
- CDFW Sacramento River Wildlife Area Habitat Management Plan
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- California Water Action Plan / Water Resiliency Portfolio
- CDFW State Wildlife Action Plan
- Recovery Plan for Valley Elderberry Longhorn Beetle
- Recovery Plan for Least Bell's Vireo
- Recovery Plan for Yellow-billed Cuckoo
- Dozens of similar projects completed by private-public partnership since the 1980s

➢ Potential Beneficiaries

- Regional agricultural interests that rely upon robust populations of pollinators for continued production
- Water quality interests seeking to meet ambient water quality standards for regulatory compliance in Tehama and Glenn Counties

➢ Project Advocates

- River Partners
- California Invasive Plant Council
- Sacramento River Forum

➢ Potential Constraints

Funding.

OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]		●			
	Fish Passage		●			
	Fish Spawning				●	
	Agricultural (acres)[2]			●		
	Waterfowl (acres)[2]			●		
Secondary Benefit	Recreational		●			
	Educational		●			
	Water supply	●				
	Listed Species Benefit	●				
Feasibility Criteria	Land use Compatibility	●				
	Shovel Readiness		●			
	Cost[1]	●				
	Potential for State/Federal Funding	●				
	Potential for Local Match			●		
	Project Sponsor, Champion, Partners	●				

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Olney Creek Non-Natal Rearing Habitat

Project Details

➢ Location

The Olney Creek Tributary Project is located along Olney Creek, 2 miles from its confluence with the Sacramento River at river mile 89.5. The tributary watershed is located in the southern outskirts of Redding in Shasta County, California.

➢ Recommendations

The Olney Creek Project will restore access and improve functional habitat to Olney Creek above and below a partial fish barrier created by the Anderson-Cottonwood Irrigation District (ACID) main canal crossing of Olney Creek two miles above its confluence with the Sacramento River, increasing fish access to, and habitat quality of, over two and a half miles of rearing habitat in Olney Creek. The new siphon will be sized and installed to flow under the creek and include a turn-out to direct irrigation flows from the siphon to the creek at agreed upon ecologically recommended flows. Channel, bank and floodplain habitat above the canal will be restored to create high quality habitat for rearing juvenile chinook salmon and other native aquatic and riparian species.

➢ Proposal

Olney Creek is one of nine Sacramento tributaries just downstream of Keswick dam, where returning anadromous fish concentrate to spawn. The resulting young use the quiet cold waters in the upper Sacramento tributaries to rear. As indicated by the recent studies (Phillis et al. 2017 and Maslin et al. 1997, 1998, 1999), the importance of these non-natal tributary habitats is being increasingly recognized as a potential means of increasing availability of important rearing habitat for Chinook salmon (multiple runs) and steelhead. To this end, the Olney Creek Project will restore access and improve functional habitat to Olney Creek above and below a partial fish barrier created by the Anderson-Cottonwood Irrigation District (ACID) main canal crossing of Olney Creek two miles above its confluence with the Sacramento River. This project builds on past work to remove a full barrier two miles above the ACID canal just upstream of Texas Springs Road, thus increasing fish access to, and habitat quality of, over two and a half miles of rearing habitat in Olney Creek.

The 90-year-old concrete irrigation canal flume crosses Olney Creek at low relative elevation, acting as a local bottle neck in conveyance of moderate to high flows and creating a partial fish barrier. Moreover, high waters overtop the concrete flume, flowing out of the stream channel and onto the adjacent roadways and residential areas. Removal of the structure will improve fish passage to the reach above the canal crossing, thereby increasing the extent and quality of non-natal habitat while also reducing flood risk to adjacent underserved communities. The new siphon will be sized and installed to flow under the creek and include a turn-out to direct irrigation flows from the recommended flows. Channel, bank and floodplain habitat above the canal will be restored to create high quality habitat for rearing juvenile chinook salmon and other native aquatic and riparian species.

➢ Potential Benefits

A primary stream flow benefit of this Project is the reallocation of existing leakage flows from the ACID flume so that enhanced stream flows from the ACID main canal occur at a rate and with timing that is supportive of native aquatic species, including Chinook Salmon and Steelhead. Under existing conditions, the ACID main canal flume leaks irrigation water into Olney Creek throughout the summer months. This additional water in a creek that is naturally dry or nearly dry in the summer creates false attraction flows for out-migrating juvenile salmon. Juvenile salmon could become stranded in the reach below the ACID flume once the irrigation water leakage abruptly stops in mid-October, the end of the irrigation season. Project implementation includes directing **at least 362 and up to 1,810 acre-feet** from the ACID main canal to Olney Creek specifically to support native fish species. Within the irrigation season (April through October), the timing and volume of these enhancement flows to Olney Creek will be determined based on the UC Davis Environmental Flows Framework and in coordination with the Technical Advisory Committee developed through this project (see Task 2 of Work Plan). We expect that these enhanced stream flows, which could range from an additional 1 to 100 cfs based on the duration, will extend the time during which there is sufficient water of appropriate temperature in the creek for rearing juvenile Chinook Salmon and Steelhead. Several reports of juvenile Chinook and Steelhead in Olney Creek below the flume and as far up as Tadpole Creek above Texas Springs Road indicate that these areas are already supporting juvenile salmon. By increasing the duration of optimal flow conditions through the targeted stream flow enhancements, this project will result in more juvenile salmon rearing in this non-natal habitat, increasing both population size and phenotypic diversity.

Other tangible benefits associated with this Project include the biodiversity benefits of enhanced wildlife habitat, carbon sequestration, cooler water temperatures, and reduced flood impact in nearby areas. The proposed riparian planting will provide a continuous wildlife corridor for nearly 1.5 miles above the highway 273 over pass along Olney Creek. Increasing the extent and continuity of an intact and robust riparian corridor along Olney Creek will have biodiversity benefits by supporting riparian dependent bird species and wildlife that use the corridor for hunting and moving across the landscape. Overlapping ranges of valley, mountain and coast-associated species make the Shasta West watershed, in which Olney Creek is a major sub-watershed, a naturally rich place in terms of wildlife species diversity. Olney Creek watershed, along the southern border of Redding, offers extensive areas of wildlife habitat in the upper reaches, while the lower portion of the watershed includes a growing suburban population. Currently, however, the Olney Creek riparian corridor is fragmented and discontinuous. This Project will restore riparian forest to complete the landscape linkages along this vital corridor between the upper and lower portions of Olney Creek watershed.

The proposed species composition for the riparian forest planting on 1.0 hectare along Olney Creek will depend upon studies made of existing forests upstream and downstream of the Project area, but is likely to include a mix of native valley and live oak, Oregon ash, and willow. This species mix was used in the Carbon in Riparian Ecosystems Estimator for California (CREEC) developed under the auspices of the California Department of Conservation (2018) (https://creec.conservation.ca.gov/app/carbon#) to estimate net carbon accumulation for a riparian forest restored from grazed lands. Over a 50- and 100-year period, the CREEC tool indicates 95 to 133 Mg C will be sequestered, equivalent to pulling 105 cars off the road for a year (on-line EPA GHG equivalencies calculator).

The additional shade over the channel will help to maintain cool water temperatures later in the spring under current and future warmer conditions. The restored floodplain will accommodate flashy flows that could increase with climate change, slowing and lowering high waters that flow through the restored riparian floodplain forest, reducing likelihood and extent of flooding in nearby downstream communities.

➢ Integration with other Projects

This Project addresses many of the objectives stated in the California Water Action Plan (2016) as well as actions suggested in the State Wildlife Action Plan, The Central Valley Salmon and Steelhead Recovery Plan for Mainstem Sacramento River Migratory Corridor, and The Olney Creek Flow Enhancement and Riparian Restoration at Anderson Cottonwood Irrigation District Main Canal Project.

Project actions also address goals stated in regional and local plans, including the Shasta Watershed Management Plan (2006) and the Forest and Water Climate Action Plan for Shasta County (2013).

➢ Project Advocates

There is a history of widespread support for this Project from resource agencies, legislators, the public, local government and others. Proposals for this project were previously submitted by ACID (2007) and the Sacramento Watershed Action Group (2008). Both of these proposals garnered widespread support due to the various and significant benefits that will result from Project implementation. Please see the letters of support included as attachments. Our partners and other supporting entities include, but are not limited to:

Partners:

- Anderson-Cottonwood Irrigation District (ACID)
- American Rivers
- The McConnell Foundation
- Glen Colusa Irrigation District (GCID)

Other supporting entities:

- CDFW
- The City of Redding
- Shasta County
- The Northern California Water Association
- Sacramento River Settlement Contractors Non-profit Corporation (SRSC).

➢ Potential Constraints

Funding.

OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]		●			
	Fish Passage	●				
	Fish Spawning		●			
	Agricultural (acres)[2]				●	
	Waterfowl (acres)[2]			●		
Secondary Benefit	Recreational		●			
	Educational			●		
	Water supply			●		
	Listed Species Benefit	●				
Feasibility Criteria	Landuse Compatibility	●				
	Shovel Readiness			●		
	Cost[1]			●		
	Potential for State/Federal Funding	●				
	Potential for Local Match	●				
	Project Sponsor, Champion, Partners	●				

1: $ = less than $5m, $$ = $5-15M, $$$ = more than $15M
2: L = less than 1,000 ac, M = 1,000 - 5,000 ac, H = More than 5,000 ac

Dos Rios Project

Project Details

➢ Location

The Dos Rios Project (DRP) consists of 1500 acres of actively farmed floodplain and pristine riparian habitat. The site is located at the confluence of the Sacramento River, Feather River, and Butte Creek. DRP will provide rearing habitat and food production for all runs of salmon that spawn in the upper Sacramento River, Butte Creek spring run, as well as Feather River spring and fall runs. The site is also one of the highest impact winter run projects in the valley, as winter run juveniles out-migrating through the Sacramento River will be able to access the site in most years as the Sutter Bypass inundates from backwatering as well as weir overtopping. This location has been described as the "single best" opportunity for improving floodplain rearing habitat for salmon populations of the Butte Creek and Feather River watersheds, particularly in years of extensive winter and spring flooding. A compilation of research has demonstrated that seasonally inundated floodplain Bypass lands are highly productive in terms of providing critically important opportunities to influence salmon growth rates and aquatic food web resources, as well as important habitat for migratory birds.

In order to enhance floodplain habitat benefits for juvenile rearing, provide for volitional passage, and increase food web productivity and export, the DRP's primary period of operation is anticipated to take place October 1st to March 1st.

➢ Recommendations

The environmental documentation and permitting approach will be dependent on the assignment of a Lead Agency, and subsequent CEQA and permitting strategies associated with the DRP regulatory triggers, approvals, and assurances. The timeline for securing permits and approvals is dependent on the above-mentioned items but is anticipated to be 6-12 months with active agency collaboration.

➢ Proposal

DRP has the potential to demonstrate successful enhancement of ephemeral floodplain habitat through an early implementation-based project in the form of an agricultural conservation easement covering 1500 acres in a key location where natural flood processes occur for both salmon and migratory birds. DRP will serve as a multi-benefit model for future innovative water management, continued farming, salmon recovery efforts, and will provide additional benefits to migratory birds.

The project will provide practical solutions for future conservation planning efforts throughout California and will also promote collaborative partnership-based models among government agencies, nonprofit organizations, farmers, and private landowners. The DRP model is consistent with the goals set forth by Governor Newsom in Executive Order 2020-EO-82-20. This Order was drafted to address, and specifically combat, the biodiversity and climate crisis. DRP is a unique opportunity for The California Natural Resources Agency, state and federal agencies, NGO's, scientists, and landowners to develop and demonstrate a strategic pathway to success by the Governor's desired timeframe of February 1, 2022.

➢ Potential Benefits

- DRP will provide rearing habitat and food production for all runs of salmon that spawn in the upper Sacramento River, Butte Creek spring run, as well as Feather River spring and fall runs. The site is also one of the highest impact winter run projects in the valley, as winter run juveniles out-migrating through the Sacramento River will be able to access the site in most years as the Sutter Bypass inundates from backwatering as well as weir overtopping.
- The key features of DRP are designed to accommodate juvenile rearing on the agricultural floodplain as well as volitional passage off the floodplain.
- DRP has the potential to demonstrate successful enhancement of ephemeral floodplain habitat in a key location where natural flood processes occur for both salmon and migratory birds.
- DRP will serve as a multi-benefit model for future innovative water management, continued farming, salmon recovery efforts, and will provide additional benefits to shorebirds and migratory birds via depth, duration, and timing of flooding.
- The DRP easement structure promotes a working lands model for conservation by sustaining agricultural practices in the region (organic rice).
- DRP model will provide additional educational opportunities & scientific studies (data collection).

➢ Integration with other Projects

While DRP is not reliant on the operation of the Tisdale Weir Fish Passage Project or the Fremont Weir Big Notch project, it may be affected by both projects. The Tisdale Weir Fish Passage project is approximately 22 miles upstream of DRP and the Fremont Weir Big Notch project is approximately 2 miles downstream of DRP.

It is our understanding that the Tisdale Weir Fish Passage project will be operated post weir overtopping for river flows less than 48,000 cfs (i.e., below the weir crest) to accommodate adult fish passage from the Tisdale and Sutter Bypasses back to the Sacramento River. With operation of the Tisdale Weir Fish Passage project, the duration of inundation is anticipated to be extended under average annual conditions (DWR 2020) both before and after March 1st. Before March 1st, and within the DRP Flood Season, fish passage flows can help extend the duration of inundation, enhancing DRP floodplain residence time and food web resources.

Further, it is possible that the Tisdale Weir Fish Passage project could be re-operated prior to Tisdale Weir overtopping to enhance opportunities for entrainment of juvenile salmon into the Tisdale and Sutter Bypasses, especially for below normal and drier water years.

For example, two small flood events during the below normal 2018 water year inundated agricultural floodplain habitat in the Lower Sutter Bypass for 23 days during March and April when juvenile salmon were observed enroute to the Sutter Bypass during minimal overtopping of Tisdale Weir, which highlights potential access opportunities for juvenile salmon via modifications to weir infrastructure (Cordoleani et al. 2019).

Opportunities to re-operate the Tisdale Weir Fish Passage project may be explored as part of development of the Tisdale and Sutter Bypasses Flood and Multi-Benefit Strategy and Management Plan. Under this circumstance, the juvenile entrainment flows can help to further extend the duration of inundation on the fields at DRP, enhancing residence time and food web resources and providing significant floodplain foraging opportunities for a larger cross section of the juvenile salmon population.

➢ Potential Beneficiaries

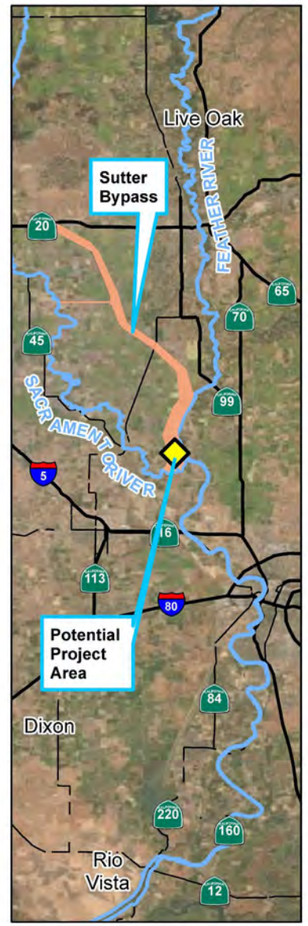
Resource (Salmon, migratory birds), agencies (easement -permanent protection of resource), landowners (continued farming and environmental stewardship), and scientist/NGO's who will be able to gather and use research to better science/help resource

➢ Project Advocates

DWR, USFWS, USBR, NMFS, CVJV, NCWA, Cal Trout

➢ Potential Constraints

Funding.



OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]		●			
	Fish Passage	●				
	Fish Spawning				●	
	Agricultural (acres)[2]		●			1500 acres organic rice
	Waterfowl (acres)[2]		●			1500 acres flooded habitat @ varying depths benefit (depth, duration of flooding, and timing considerations consistent with project design)
Secondary Benefit	Recreational		●			
	Educational	●				
	Water supply	●				
	Listed Species Benefit	●				All four runs of juvenile Chinook Salmon (based on genetic analysis)
Feasibility Criteria	Landuse Compatibility	●				
	Shovel Readiness	●				*Permitting (6-12 months)
	Cost[1]	●				
	Potential for State/Federal Funding	●				
	Potential for Local Match	●				
	Project Sponsor, Champion, Partners	●				CVJV, Floodplain Coalition (DU, Audubon, Cal Trout, NCWA, local RD's)

1: $ = less than $5m, $$ = $5-15M, $$$ = more than $15M
2: L = less than 1,000 ac, M = 1,000 - 5,000 ac, H = More than 5,000 ac

Goose Club Farms Project

Project Details

➢ Location

The project is located in the lower Sutter Bypass at the confluence of the Feather River and Butte Creek (Sutter Bypass East Borrow Canal).

➢ Recommendations

Enhance floodplain rearing habitat for salmonids within the Sutter Bypass by allowing for more frequent seasonal inundation of the floodplains on the Goose Club Property. Seasonal floodplain inundation, even during normal and dry years, provides highly productive rearing habitat and floodplain derived aquatic food webs to support salmon growth, as well as critical habitat for migratory water birds. This project also has the potential to provide for volitional passage of adult salmonids through the lower bypass system if implemented in conjunction with similar projects in the lower Sutter Bypass.

➢ Proposal

Notches or other means of access would be provided at key locations along the west borrow canal and lower Feather River to provide for volitional passage onto and off of the floodplain. A portion of flow from Nelson slough and the East Borrow of Butte Creek would be diverted through the property to seasonally inundate the lower elevation fields on the west side of the bypass. Enhancements to be made within the property to enhance seasonal inundation where natural flood processes occur, allowing for fish from the Feathers River, Butte Creek and access on and off of the floodplain along the property, provide increased fish food production, and create additional migratory bird habitat.

Create a Multi-benefit floodplain management plan that assures flood conveyance while enhancing annual benefits for fish, wildlife at lower flow stages.

➢ Potential Benefits

- Annual production of landscape-scale floodplain rearing habitat accessible to tens of millions of fish from Sacramento, Butte, Yuba and Feather Rivers means that this project can have population level effects for all runs of Sac Valley salmon.
- Create a multi-benefit management plan that assures flood conveyance while enhancing annual benefits for fish, wildlife at lower flow stages.
- Will provide rearing habitat and food production for salmon that spawn in the upper Sacramento River, Butte Creek, and Feather River.
- The project will be designed to provide juvenile rearing on the agricultural floodplain as well as volitional passage off the floodplain.
- Multi-benefit project that provides water management, continued farming, salmon recovery, benefits to shorebirds and migratory birds via depth, duration, and timing of flooding.

➢ Integration with other Projects

The Tisdale Weir Fish Passage Project is located upstream of the proposed project site, and is expected to extend the duration of inundation under average annual flow conditions within the bypass, which in turn has the potential to increase food production within the floodplains.

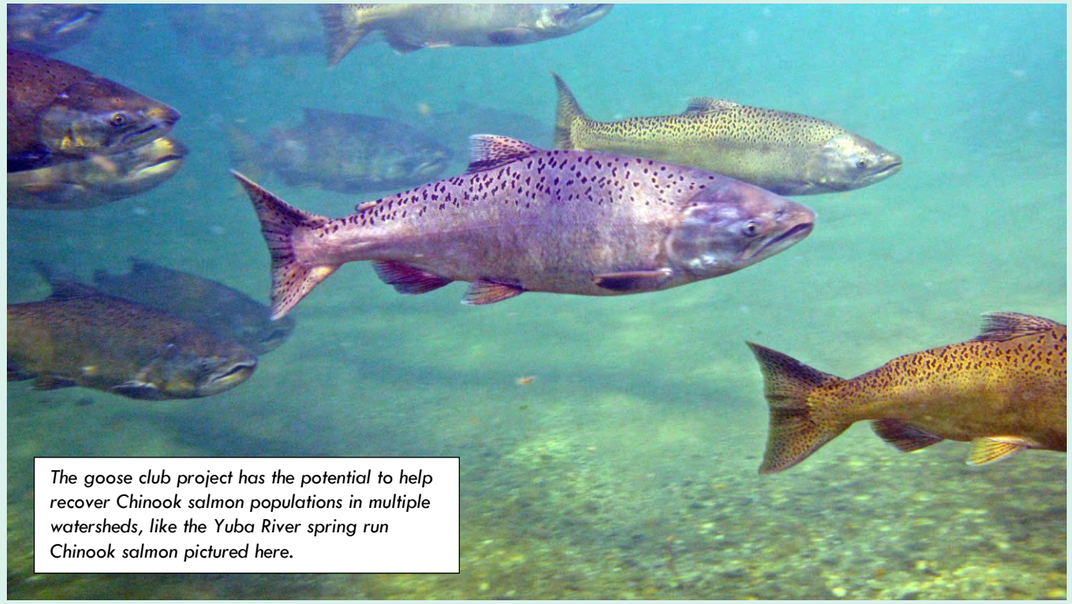
Located directly south of the proposed project is the Dos Rios property. There is a similar floodplain rearing habitat project being explored at this location which has the potential to provide an additional 1500 acres of contiguous floodplain habitat (see map).

➢ Project Advocates

Landowner, Conservation NGOs, flood maintenance districts, Water Contractors

➢ Project Constraints

Currently undergoing multi-stakeholder, publicly-funded design process.



The goose club project has the potential to help recover Chinook salmon populations in multiple watersheds, like the Yuba River spring run Chinook salmon pictured here.

OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]	●				Floodplain connection to Feather River, Butte Creek and Sacramento River
	Fish Passage		●			
	Fish Spawning				●	
	Agricultural (acres)[2]		●			4,000 acre working rice farm
	Waterfowl (acres)[2]		●			Multi-benefit fins and feathers management plan
Secondary Benefit	Recreational				●	
	Educational				●	
	Water supply				●	
	Listed Species Benefit		●			High impact and benefit to listed salmon runs and other endangered native fish
Feasibility Criteria	Landuse Compatibility	●				
	Shovel Readiness			●		Improves flood conveyance while enhancing fish and wildlife habitat and sustaining farming
	Cost[1]	●				High impact, landscape-scale investment
	Potential for State/Federal Funding	●				
	Potential for Local Match		●			
	Project Sponsor, Champion, Partners	●				

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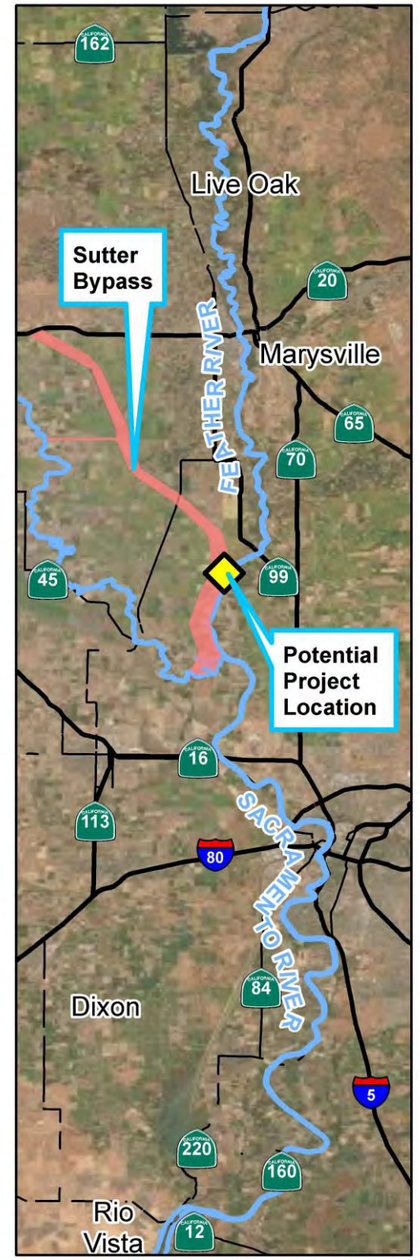

Flowage Easements and Acquisition Funds: Bypass Lands

Project Details

➢ Location
Sutter and Tisdale Bypass locations TBD

➢ Recommendations
Proposed modifications to the flood management infrastructure of the Sutter Bypass may create conditions that impact the continued viability of agricultural operations on bypass lands. Where willing sellers exist, this project seeks to connect potentially impacted landowners with fair market value flowage and habitat easements as well as fee title sale to suitable habitat managers in public and private sectors.

➢ Proposal
Strategic management of bypass lands in wetlands and other flood-compatible lands uses will benefit salmon recovery through provision of ideal rearing conditions, ample food, and water quality improvements. Existing state and federal easements programs managed by the US Fish and Wildlife Service, USDA Natural Resources Conservation Service, and California Department of Fish and Wildlife are all existing vehicles to deliver funds to potentially effected landowners. Additionally, funds administered through the USFWS Land and Water Conservation Fund are perfectly suited to this purpose. This project seeks to connect landowners with easement and acquisition program funding, which must be augmented over current and historic levels to support the magnitude of the need for salmon recovery. Estimated cost scales from $15M to $45M depending on landowner interest and fair market appraisal.

➢ Potential Benefits
This project will have significant benefits to in-stream flow in the Sacramento River including water quality, temperature, and food availability for salmon.

➢ Integration with other Projects
This project is aligned with projects and programs from regional to global scales:

- Regional Flood Management Plan and the Central Valley Flood Protection Plan and associated Conservation Strategy
- Central Valley Joint Venture Implementation Plan
- Riparian Bird Conservation Plan (Partners in Flight)
- USFWS Sacramento River National Wildlife Refuge Comprehensive Conservation Plan
- CDFW Sacramento River Wildlife Area Habitat Management Plan
- Recovery Plan for Chinook salmon and Central Valley Steelhead
- Upper Sacramento River Habitat Management Plan (Sac River Forum)
- California Water Action Plan / Water Resiliency Portfolio
- CDFW State Wildlife Action Plan
- Recovery Plan for Valley Elderberry Longhorn Beetle
- Recovery Plan for Least Bell's Vireo
- Recovery Plan for Yellow-billed Cuckoo
- Dozens of similar projects completed by private-public partnership since the 1980s

➢ Potential Beneficiaries
- Flood system maintenance agencies seeking to reduce their residual risk and complexity of levee maintenance operations
- Regional agricultural interests that rely upon robust populations of pollinators for continued production
- Water quality coalitions seeking to meet ambient water quality standards for regulatory compliance

➢ Project Advocates
- River Partners
- U.S. Fish and Wildlife
- Sacramento River Forum
- USDA NRCS
- California Department of Fish and Wildlife

➢ Potential Constraints
Funding.

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OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]	●				
	Fish Passage	●				
	Fish Spawning				●	
	Agricultural (acres)[2]			●		
	Waterfowl (acres)[2]			●		
Secondary Benefit	Recreational	●				
	Educational	●				
	Water supply			●		
	Listed Species Benefit	●				
Feasibility Criteria	Landuse Compatibility	●				
	Shovel Readiness		●			
	Cost[1]		●			
	Potential for State/Federal Funding	●				
	Potential for Local Match			●		
	Project Sponsor, Champion, Partners	●				

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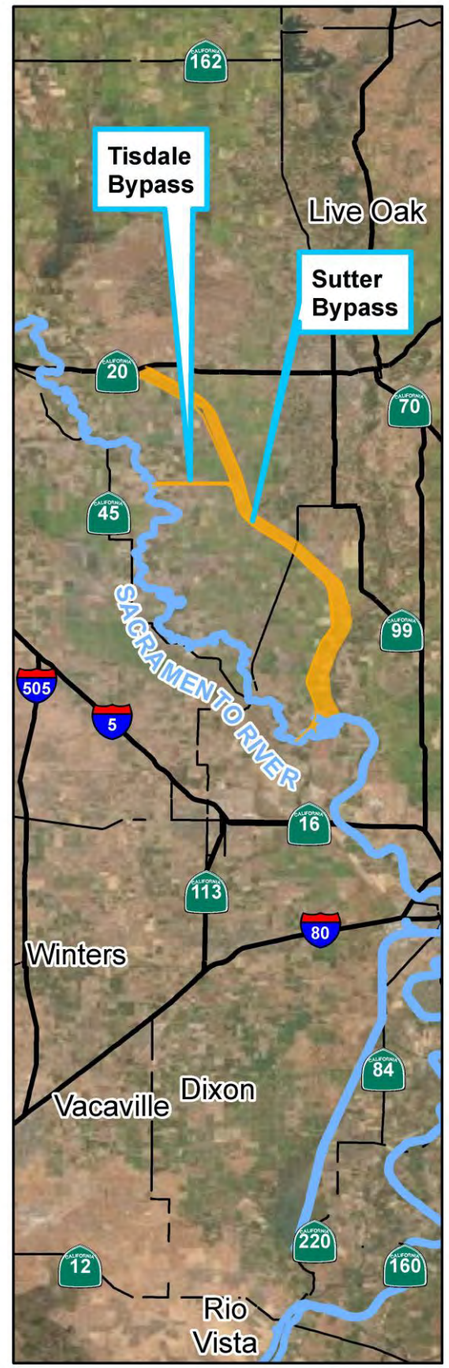

Lower Peters Pocket Multi Benefit Project

Project Details

➢ Location

Lower Peters Pocket is approximately 879 acres located in the Cache Slough Complex, where flood flows from the Yolo Bypass meet the Sacramento River just upstream of Rio Vista in the Sacramento San Joaquin Delta.

➢ Recommendations

This is a feasibility study to assess select Cache Slough Complex-scale cumulative effects of multiple local tidal restoration actions both planned, conceived, and theoretical (i.e., diked lands at intertidal and subtidal elevations), to review and inform feasibility assessment for restoration actions at Lower Peters Pocket, establish effective stakeholder participation process for Lower Peters Pocket project planning, to develop conceptual designs for restoring natural habitats to Lower Peters Pocket, and have in-hand the technical studies to support plan development, permitting, mitigation strategies as needed, and viable options for long-term land tenure and management. Estimated cost is $750,000.

➢ Proposal

Lower Peters Pocket is owned by the Chance family trust; two other landowners manage the properties to the north that comprise the entirety of Peters Pocket. Land elevations are currently suitable for establishment of tidal freshwater emergent marsh and could allow for their landward migration over time with sea level rise. There are known populations of target recovery species; and there is high connectivity to the lower end of the Yolo Bypass, a larger setting of grasslands, cattle pasture, row crops, and open space natural lands. Lower Peters Pocket presents unique and relatively low-cost opportunities for wetland, riparian, seasonal wetland, grassland, and floodplain enhancement and restoration. The property has federal project levees constructed as part of the Sacramento River Flood Control Project along its entire shoreline (approximately two-thirds of its perimeter), currently supports reclaimed agricultural lands, and is used primarily as irrigated summer pasture for cattle grazing. The entirety of the full Peters Pocket (Upper and Lower) is enclosed by federal project levees that hydrologically isolate the land from Haas and Cache Sloughs and prevent the land from inundating during high flows in the Yolo Basin and Sacramento River. Earthwork activities to achieve restoration potentials could include: (1) construction of a flood protection levee along the northern edge of the property (unless neighbors accept a flood easement instead of a setback levee), (2) excavation of tidal channels to connect restored tidal marsh to Hass and/or Cache sloughs, and (3) lowering and breaching of external levees along Hass and/or Cache sloughs.

The Feasibility Study for restoring native habitat to Lower Peters Pocket will include: 1. Stakeholder engagement 2. Cache Slough Complex Effects Analysis (hydrology, flooding and drainage, special status species), 3. Property restoration opportunities and constraints assessment (including agricultural economics of site, property rights and easements and on-site facilities), 4. Project Conceptual Design Alternatives (30%) and Roadmap to Implementation, Project Management (contracting, invoicing, and coordination).

➢ Potential Benefits

Implementation of a native habitat restoration project at Lower Peters Pocket will provide many ecological benefits through increasing the extent of native riparian and tidal wetlands, as well as potentially restoring native grassland and seasonal wetlands. This site is in the ecologically important Cache Slough Complex and the bottom of the Yolo Bypass, which are rich in restored natural habitats within a rural agricultural context, offering connectivity and scale available nowhere else in the Delta. Potential benefits to adjacent agricultural lands include improved irrigation and drainage structures on Peters Pocket and improved flood conveyance along Ulatis Creek that flows into Cache Slough opposite Lower Peters Pocket, and increased floodplain storage.

➢ Integration with other Projects

The Cache Slough Complex and lower Yolo Bypass host multiple restoration projects including past unrepaired levee failures (Liberty Island, Little Holland Tract, Little Hastings, Prospect Island West, Hall Island for a total of about 6,300 acres), past restoration projects (Calhoun Cut, Cache Slough Mitigation Area, Liberty Island Conservation Bank, Lower Yolo Ranch, Flyway Farms, Yolo Bypass Wildlife Area, Mound Slough for a total of about 4,000 acres), under construction restoration projects (Lookout Slough for about 3,100 acres), and planned restoration projects (Prospect Island, Little Egbert Tract for about 4,500 acres). The Feasibility Study will examine the incremental effects of Lower Peters Pocket on water flow, water quality, wildlife and fisheries, and local economic impacts and benefits in this landscape context.

➢ Project Advocates

American Rivers will be leading this project, funded by CNRA through Proposition 68 funding. We have communicated with and gotten commitment to engage on the Feasibility Study from the Lower Sacramento Delta North Regional Flood Management Program, which includes many of the local stakeholders associated with the Peters Pocket property and Cache Slough Complex.

➢ Potential Constraints

This is a feasibility study to Identify and develop plans to address any constraints which need to be resolved prior to implementation.

OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]	●				
	Fish Passage				●	
	Fish Spawning	●				
	Agricultural (acres)[2]	●				
	Waterfowl (acres)[2]	●				
Secondary Benefit	Recreational				●	
	Educational				●	
	Water supply			●		
	Listed Species Benefit	●				
Feasibility Criteria	Landuse Compatibility	●				
	Shovel Readiness				●	
	Cost[1]			●		
	Potential for State/Federal Funding	●				
	Potential for Local Match			●		
	Project Sponsor, Champion, Partners		●			

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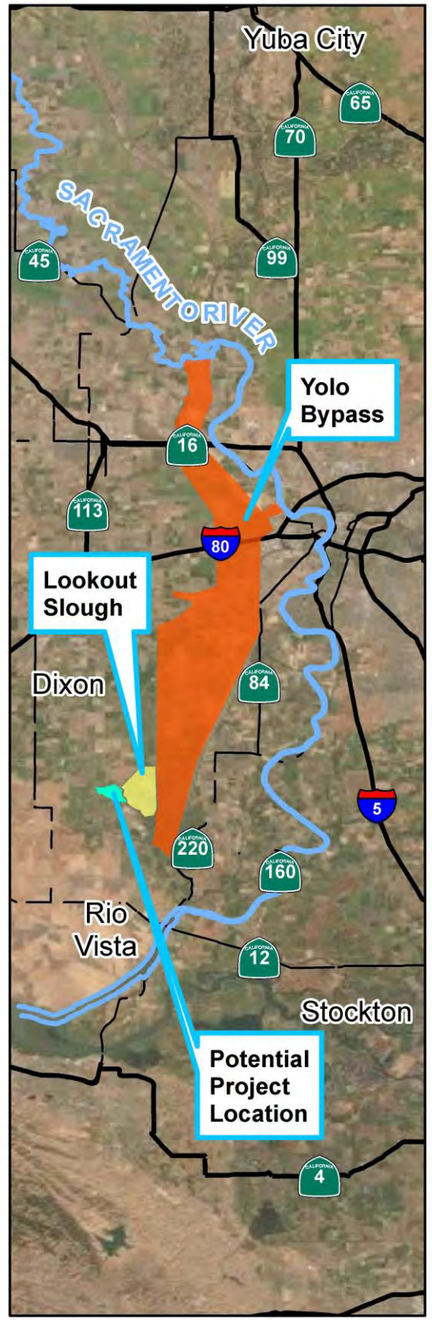


Integrating the Needs of Managed Wetlands and Wetland Owners in Floodplain Reactivation

Project Details

➢ Location

Sutter Bypass, Butte Sink, and Colusa Drain.

➢ Recommendations

Many of the managed wetlands in the Central Valley are located within historic floodplains. These wetlands provide important habitat for waterfowl, shorebirds, and other waterbirds, and most have long-term management commitments for avian species and are being managed for waterfowl hunting. The proposed project will identify and integrate the needs of managed wetlands, wetland owners, and waterfowl hunters and existing conservation commitments for managed wetlands in floodplain reactivation planning for the Sutter Bypass, Butte Sink, and Colusa Drain and assist in identifying reactivation scenarios that will provide multi-benefits. Specific tasks and deliverables that will be accomplished include the following:

1. Develop GIS base layer of managed wetlands within and adjacent to the Sutter Bypass, Butte Sink, and Colusa Drain floodplain project area. Adjacent wetlands that could have water delivery or drainage impacted by changes within the floodplain would be included. Existing management commitments on these properties (e.g., purchased with Lea Act funding or protected by USFWS wetland habitat easement) would be included on the base layer.
2. Develop GIS base layer of key internal water conveyance infrastructure within the project area.
3. Develop GIS base layer of key input and output conveyance infrastructure for major wetland systems within and adjacent to the project area.
4. Conduct outreach to public and private wetland owners to determine timing of wetland and water management needs for major wetland systems within and adjacent to the project area. Document this information on a GIS base layer.
5. Develop Waterfowl/Wetland Management and Waterfowl Hunter stakeholder groups for the project area and conduct outreach with these groups to further understand and document their concerns with floodplain reactivation.
6. Coordinate with floodplain reactivation planning efforts currently being conducted in the project area by RD 108, RD 1500, and others and work collaboratively with these entities to define various operations scenarios that will ultimately be assessed.
7. Serve as liaison for Waterfowl/Wetland Management and Waterfowl Hunter stakeholder groups and floodplain reactivation planning efforts to integrate the needs of managed wetlands, wetland owners, and waterfowl hunters and managed wetland-related GIS base layers in the assessment of various operations scenarios for floodplain reactivation in the Sutter Bypass, Butte Sink, and Colusa Drain.
8. Assist RD 108, RD 1500, and others in evaluating potential impacts (positive and negative) of various floodplain reactivation scenarios on waterfowl, shorebirds, and waterbirds as well as on waterfowl hunting in managed wetlands in the project area.

The project area consists of up to 200,000 acres which includes more than 40,500 acres of public and privately-owned managed wetlands. The estimated cost of this effort is $300,000.

➢ Proposal

There are an estimated 205,000 acres of managed wetlands in the Central Valley, many of which are located within historic floodplains. About 20% of those wetland acres are located within the Butte Sink, Sutter Bypass, and Colusa Drain. These managed wetlands provide vital habitat for waterfowl, shorebirds, waterbirds, and other wetland-dependent species. A tremendous investment in public funding has been made to protect, restore, and enhance these wetlands, usually with long-term commitments to maintain them for avian species. Two-thirds of the remaining wetlands in the Central Valley are privately-owned and most are being managed for waterfowl hunting. Public wetlands are also used extensively for waterfowl hunting. The Central Valley Joint Venture (CVJV) Implementation Plan specifically recognizes the importance of waterfowl hunting in wetland conservation and identifies hunters as one of four key stakeholder groups and an important focus of the CVJV's conservation strategy. There is a desire to improve floodplains for salmon in a way that will also benefit multiple bird groups and not adversely impact wetland management, long-term commitments for avian species, and waterfowl hunting. The details of how this could be accomplished need to be determined. The proposed project would identify and integrate the needs of managed wetlands, wetland owners, and waterfowl hunters and existing conservation commitments for managed wetlands in floodplain reactivation planning for the Sutter Bypass, Butte Sink, and Colusa Drain and assist in identifying reactivation scenarios that will provide multi-benefits.

➢ Potential Benefits

This project will benefit waterfowl, shorebirds, other waterbirds, and salmonids; managed wetland-associated special-status species (e.g., giant garter snake, greater sandhill crane, and white-faced ibis); and wildlife-oriented recreation. Beneficiaries include private landowners, users of public-owned wetlands, CVJV, U.S. Fish and Wildlife Service (USFWS), Natural Resources Conservation Service, California Department of Fish and Wildlife, California Wildlife Conservation Board (WCB), and North American Wetlands Conservation Council.

➢ Integration with other Projects

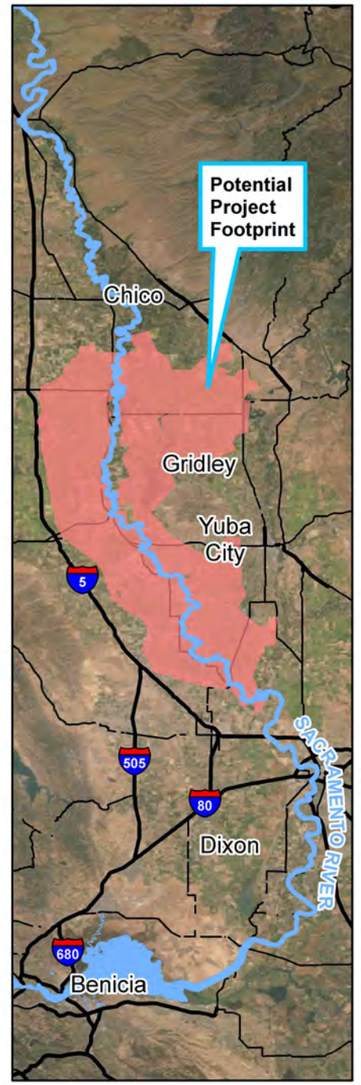
The proposed project is complimentary to and will be conducted in coordination with, other floodplain reactivation efforts planned or currently underway including RD 108's Landscape Scale Multi-Benefit Floodplain Feasibility Study, RD 1500's Tisdale/Sutter Bypass Project, and River Partner's Lower Sutter Bypass Anadromous Fish Habitat Management Planning Project.

➢ Project Advocates

Ducks Unlimited, Inc. is the project sponsor. Supporters and cooperators include RD 108, RD 1500, USFWS, WCB, CVJV, California Waterfowl Association (CWA), Butte Sink Waterfowl Association, Cal Trout, and River Partners.

➢ Potential Constraints

There are no major constraints to implementing this project. Work could begin immediately upon receipt of funding.



OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]	●				Project area is up to 200,000 acres.
	Fish Passage	●				Integrated with RD 108's Landscape Scale Multi-Benefit Floodplain Feasibility Study.
	Fish Spawning				●	
	Agricultural (acres)[2]				●	
	Waterfowl (acres)[2]	●				Project area includes over 40,500 acres of managed wetlands that provide critical waterfowl habitat
Secondary Benefit	Recreational	●				Project will integrate the needs of waterfowl hunters in floodplain reactivation planning
	Educational				●	
	Water supply	●				Floodplain reactivation could potentially improve water supply for managed wetlands in project area.
	Listed Species Benefit	●				Managed wetlands in project area provide important habitat for numerous special-status species.
Feasibility Criteria	Landuse Compatibility	●				Project will assist in identifying reactivation scenarios that do not adversely impact current uses of managed wetlands.
	Shovel Readiness	●				Project work can begin immediately upon receipt of funding.
	Cost[1]			●		Total project cost is $300,000
	Potential for State/Federal Funding	●				USFWS, WCB, and CVJV are potential funders.
	Potential for Local Match	●				DU will provide some match.
	Project Sponsor, Champion, Partners	●				DU, USFWS, WCB, CVJV, RD 108, CWA

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The Floodprint Project

Project Details

➢ Location

The Floodprint Project consists of two major land restoration sites in the Yolo Bypass. The *Tide's End* component at the bottom of the Yolo Bypass is the centerpiece for a ten-mile corridor of continuous wetland habitat stretching from the southern tip of Lookout Slough to the Vic Fazio Wildlife Area. This site at the fluvial-tidal interface is one of the most critical areas for smelt and salmonid habitat restoration in the Delta and provides long-term climate change and sea-level-rise resilience through the ability to provide for inland migration of tidal wetland habitat. The *Nigiri* component, located at the top of the Yolo Bypass between the Fremont Weir and the Interstate 5, can provide 3,200 acres of high-value seasonal floodplain habitat designed to meet the Managed Floodplain Design Criteria and Considerations.

➢ Recommendations and Proposal

The restoration at Tide's End can provide approximately 550 acres of tidal marsh and 970 acres of floodplain habitat designed to meet the Managed Floodplain Design Criteria (MFDC) described by CDFW and DWR for salmon recovery, and approximately 170 acres of floodplain riparian habitat through landscape modifications, new infrastructure, and operational actions. The restoration at Nigiri can provide 3,200 acres of high-value seasonal floodplain habitat designed to meet the MFDC. As proposed, Nigiri will divert water and fish from the Fremont Weir Notch and from the Knights Landing Ridge Cut over rice fields inside of a constructed berm with water control structures to hold a designed water surface elevation. This will allow early season flood-up and activation of the food web, management of the timing and duration of shallow, slow-moving waters, and volitional passage on and off the floodplain. The project will also include approximately four miles of riparian corridor enhancements along the Tule Canal to increase ecological function.

➢ Potential Benefits

By incorporating the restoration of floodplain processes at the top of the Bypass with the restoration of a receiving site at the tideline at the bottom, the Floodprint Project will maximize the benefits of Notch operation. Restoring residence time for floodwater will produce wet year type rearing benefits to juvenile salmonids and other native fish and bird species in virtually all conditions. Adding large-scale restoration to the operation of the Notch will enable salmon to gain access to high-quality inundated habitat during drier years 600% more often than the baseline condition (six times the 'wetted acre days'). Together, the Tide's End and Nigiri projects can play a major role in helping to move California out of unpredictable conditions that create water conflict, and towards a system with much-improved ecological function and stability.

➢ Integration with other Projects

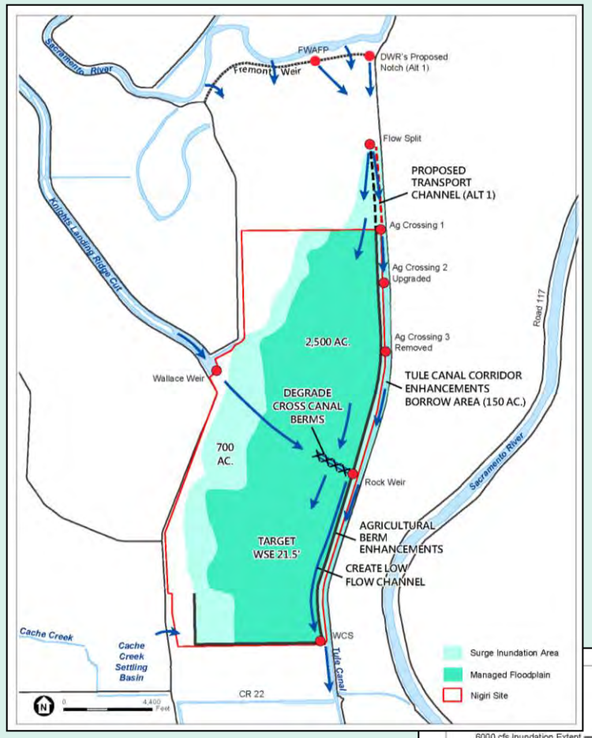
The Floodprint Project is part of a larger regional solution because it provides both food and habitat for salmon, smelt, and other native fish. The Nigiri site at a 21.5-foot water surface elevation, with its ability to prolong residence times of floodwaters, combined with the Tide's End site at a 3- to 6-foot ground elevation, allows the food web benefits accrued at the top of the Bypass to be leveraged again at the bottom in a controlled manner and then be propagated to Tide's End and distributed to the Delta and beyond. The ability to manage flows, dense with floodplain-derived food resources, in 'pulses' of 500 cubic feet per second will overcome the tidal energy at the Lisbon Weir in the southeast corner of the Vic Fazio Refuge. This in turn will deliver food and juvenile fish to the tidal prism activated on the 2,000-acre mosaic of protected and managed land at Tide's End, to the Flyway Farms, Yolo Ranch and Lookout Slough projects and then downstream priming the food web of the North Delta Arc.

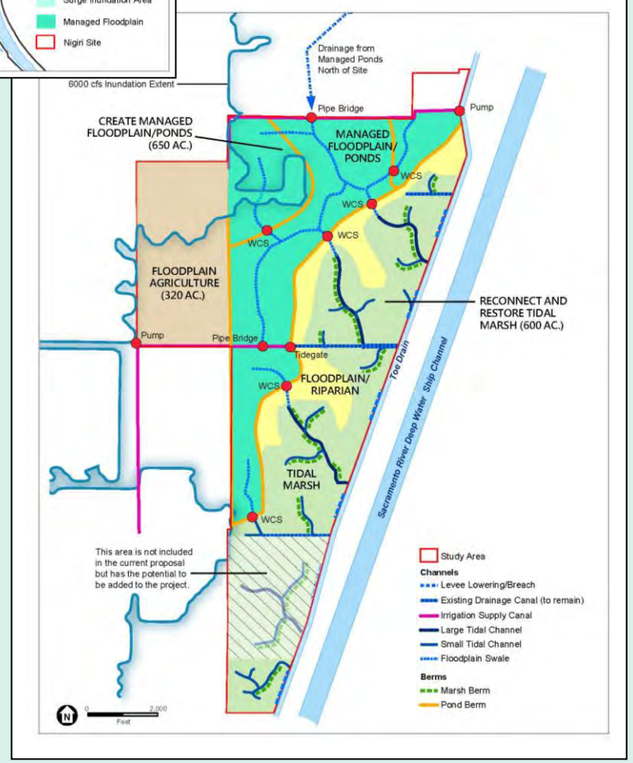
➢ Project Advocates

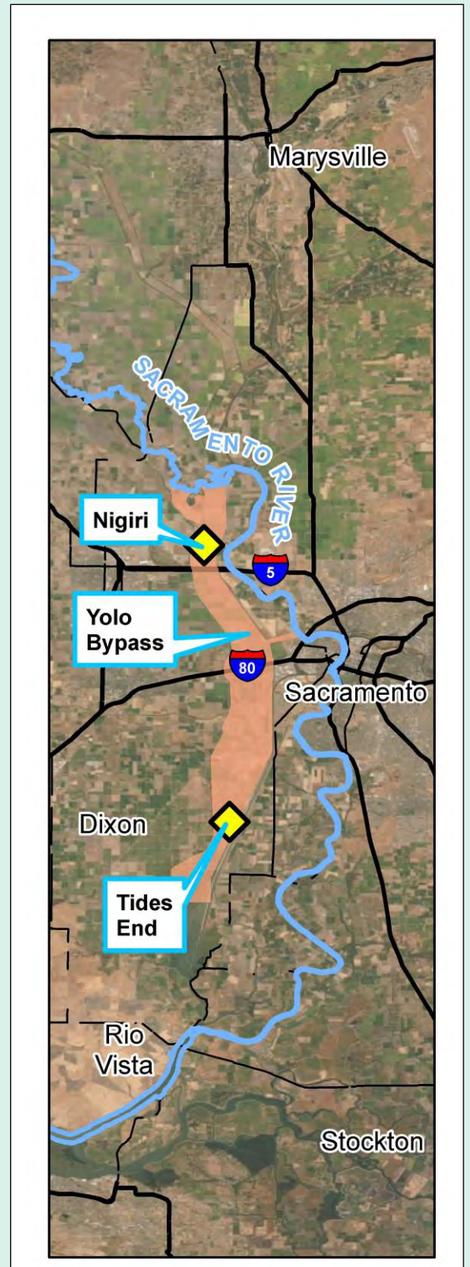
The Floodprint project is being proposed by Ecosystem Investment Partners, an ecological restoration company that uses private funds to deliver specific project outcomes to standards set by responsible government agencies. EIP is seeking to understand desired outcomes for restoration from the Floodprint project, and to develop contractual terms that would allow private investment in actions that would deliver these outcomes in order to earn payments after specific milestones are achieved. EIP is working on a project known as the Lookout Slough Tidal Restoration and Flood Improvement Project in the Cache Slough Region to deliver Delta smelt credits under a contract with the Department of Water Resources that makes use of similar terms.

➢ Potential Constraints

Project is located in a flood channel and will need to comply with USACE Section 408 requirements.







Landscape Scale Floodplain Enhancement Planning

Project Details

➢ Location

Two parallel floodplain regions in the Sacramento Valley that extend approximately 70 miles from just South-West of Chico to North-East of Woodland.

➢ Recommendations

Over the last century tremendous effort has been made to protect life and property from flooding in the Sacramento Valley. The channelization and leveeing of much of the Sacramento River in an attempt to tame it has resulted in cutting off of the historic floodplains from the river system, reducing available habitat for fish species including salmonids as well as reducing available habitat for migratory birds.

Multi-benefit water management efforts that restore floodplains, provide habitat for multiple species, and help rebuild the rivers food web all while improving food protection are key to securing the reliability of the regions water supply. These efforts can be 'kick-started' by execution of a portfolio of innovative habitat restoration and floodplain reactivation opportunities.

➢ Proposal

By landowners, scientists, water users, conservation organizations, and state and federal agencies collaborating to develop an approach to managing our floodplains, landscape scale implementation of floodplain habitat projects can take place. This project proposed to reactivate floodplains by designing and implementing projects in a way that respects and clearly accounts for and mitigates impacts to these land-uses.

Sacramento River Basin water users and conservation partners will develop an implementation strategy, schedule, and cost estimates for a comprehensive program of accelerated actions which can be completed promptly, efficiently, and effectively.

The key elements of the program are:

- Build partnerships needed to implement a successful early implementation program
- Facilitate stakeholder participation
- Facilitate interagency coordination to aid implementation of the actions identified
- Document existing conditions and develop system models to evaluate opportunities
- Develop and advance the opportunities for floodplain enhancements at the existing diversion locations and within the wetland footprint of each focus area.
- Provide technical resources to landowners for developing locally supported actions and impact mitigation solutions.
- Develop a program implementation strategy, timeline, and cost estimates, and propose financing options to complement and leverage local and State investments.

➢ Potential Benefits

Landscape scale floodplain and ecosystem enhancements will mimic the historic floodplains in the Sacramento Valley and provide benefits to fish and wildlife while providing the needed flood protection to maintain the urban and agricultural centers that the Sacramento Valley currently supports.

➢ Integration with other Projects

This effort integrates many of the projects envisioned within the Sacramento Valley for floodplain enhancement and has the potential to span fish, waterbird, agricultural, and water supply sectors.

This project is consistent with the goals of the 2016 Central Valley Flood Protection Plan Conservation Strategy, including:

- Promoting natural dynamic hydrologic and geomorphic processes.
- Increasing and improving the quantity, diversity, and connectivity of riparian, wetland, floodplain, and riparian habitats, including the agricultural and ecological values of these lands.
- Promoting the recovery and stability of native species populations and overall biotic community diversity.

➢ Project Advocates

RD 108, DWR, RD 1500, CalTrout, Trout Unlimited, Ducks Unlimited, Audubon, American West Conservation, River Partners, River Garden Farms, American Rivers, California Rice Commission

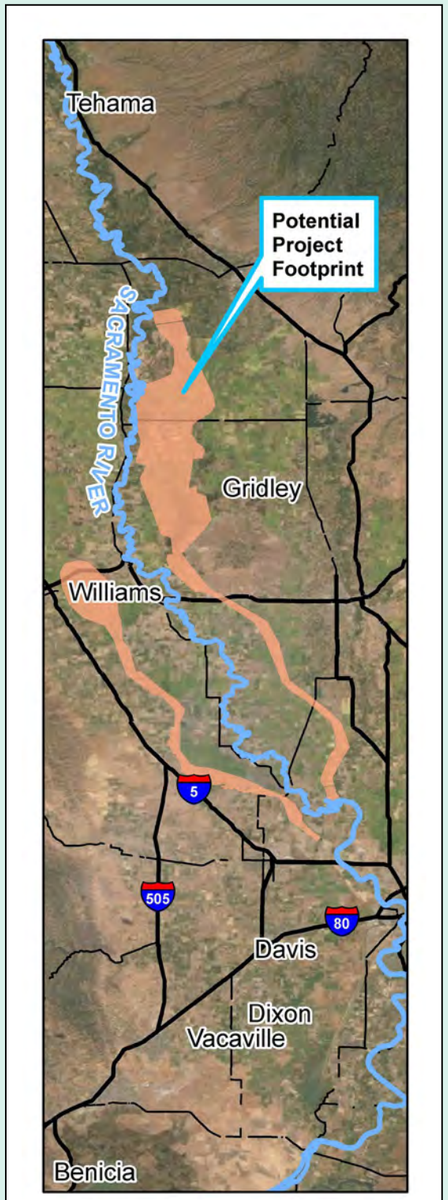
➢ Potential Constraints

Potential constraints include funding for further development of the projects and actions identified in the plan, advancing these from concept level to full-fledged designed projects.

OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]	●				
	Fish Passage				●	
	Fish Spawning				●	
	Agricultural (acres)[2]	●				
	Waterfowl (acres)[2]	●				
Secondary Benefit	Recreational	●				
	Educational	●				
	Water supply	●				
	Listed Species Benefit	●				
Feasibility Criteria	Landuse Compatibility	●				
	Shovel Readiness		●			
	Cost[1]		●			
	Potential for State/Federal Funding	●				
	Potential for Local Match	●				
	Project Sponsor, Champion, Partners	●				

1: $ = less than $5m, $$ = $5-15M, $$$ = more than $15M
2: L = less than 1,000 ac, M = 1,000 - 5,000 ac, H = More than 5,000 ac



RD 2035 Conaway Ranch Fisheries Floodplain Restoration Project

Project Details

➢ Location

Eastern portion of Conaway Ranch within the Yolo Bypass (roughly 38.37.32.86, 121.37.37.68)

➢ Recommendations

In a 5,775 acre, three-component proposal, 1, reconfigure rice farmland hydraulic structures to accommodate increased flooding of 2,675 acres of fields to attract and rear salmonid fry and smolts when water will flow into the Yolo Bypass through the new notch provided in the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project (Fremont Weir notch). Reconfigure water control structures to remove impediments to volitional travel by juvenile salmonids. 2. Reconfigure rice farmland hydraulic structures to provide 2,800 acres of seasonal salmonid food production and subsidy where fields would be flooded to propagate micro invertebrates to subsidize food production for the salmon rearing area and ultimately downstream habitats. 3. Restore and expand about 300 acres of riparian habitat along the Tule canal.

➢ Proposal

Restoring and enhancing 5,775 acres within the Yolo Bypass on the Conaway Ranch to maximize floodplain habitat value for chinook and steelhead as well as provide nutrient and zooplankton production value for other downstream species such as Delta Smelt. The project will be designed to maximize value of future flows provided through the Yolo Bypass Salmonid Habitat Restoration and Fish Passage project, and the selected alternative for modification of the Freemont Weir allowing for increased inundation in the Yolo Bypass.

➢ Potential Benefits

The project will provide seasonal rearing habitat for salmonids during their outmigration, providing better feeding opportunities leading to larger and more robust migrating fry and smolt, improving salmon survival through the Delta and into the ocean portion of their life cycle.

The project will also provide fish food benefits to the Delta, aiding feeding of salmonids and other fish species resident within and migrating through the Delta, as well as restored permanent wetland habitat for multiple aquatic and avian species. Beneficiaries include all constituencies interested in recovery of migrating salmonids native to the Sacramento Valley.

➢ Potential Benefits

The project will provide rearing habitat for salmonids during their outmigration, providing better feeding opportunities leading to larger and more robust migrating fry and smolt, improving salmon survival through the Delta and into the ocean portion of their life cycle. The project will also provide fish food benefits to the Delta, aiding feeding of salmonids and other fish species resident within and migrating through the Delta. Beneficiaries include all constituencies interested in recovery of migrating salmonids native to the Sacramento Valley.

➢ Integration with other Projects

The Project is integrated with the DWR/USBR project to improve floodplain flows in the Yolo Bypass – the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project by taking advantage of additional flows into the bypass and spreading them on suitable ground to provide for fish food production and salmonid rearing. The project is also complementary to similar projects upstream and downstream on the Sacramento River

➢ Project Advocates

RD 2035 and Conaway Preservation Group.

➢ Potential Constraints

Impediments at the current state are funding for planning/design and implementation funding.

OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

		Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit		Fish Rearing (acres)[2]		●			
		Fish Passage		●			
		Fish Spawning		●			
		Agricultural (acres)[2]	●				
		Waterfowl (acres)[2]	●				
Secondary Benefit		Recreational		●			
		Educational				●	
		Water supply		●			
		Listed Species Benefit	●				
Feasibility Criteria		Landuse Compatibility	●				
		Shovel Readiness			●		
		Cost[1]	●				
		Potential for State/Federal Funding	●				
		Potential for Local Match			●		
		Project Sponsor, Champion, Partners	●				

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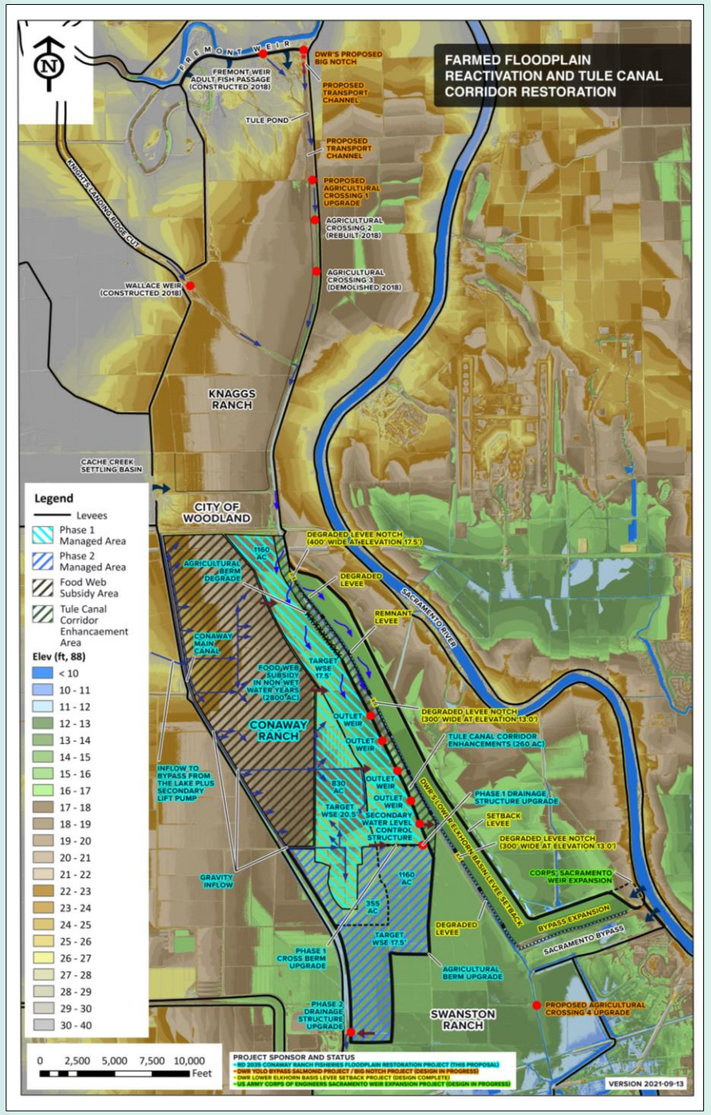

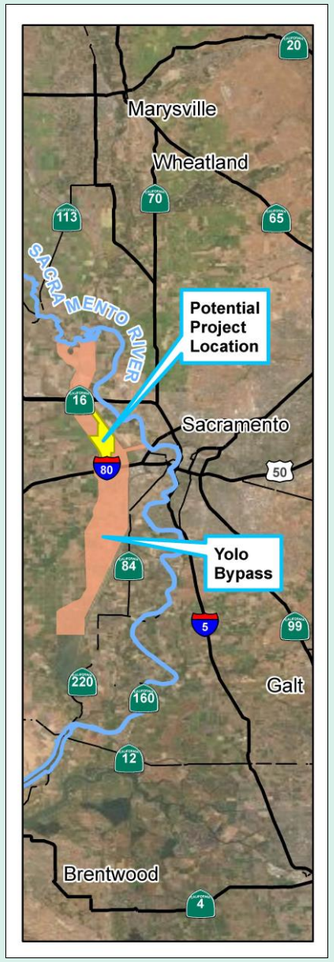

Fish Food Program

Project Details

➢ Location

Greater Sacramento Valley, between I-5 on the west and Marysville on the east. Spanning from north of Woodland up to approximately Chico.

➢ Recommendations

Hundreds of thousands of acres of rice ground in the Sacramento Valley are flooded in fall and early winter to aid in rice stubble decomposition (decomp). Inundated fields support physical conditions similar to the natural floodplain wetlands which once produced the aquatic food web resources that sustained the Sacramento Valley's pre-development populations of waterfowl and native fish. Under current agricultural practices, very little decomp water containing floodplain-derived "fish food" resources drains back to fish-bearing streams. However, if management practices are altered to actively drain floodplain waters back to the river there is potential to export these critically important floodplain-derived food web resources to the river where they may augment the aquatic ecosystem's depleted food webs and help recover endangered fish populations.

➢ Proposal

This pilot program seeks to build upon prior field level studies which have identified the mechanisms that drive floodplain fish food production. This pilot program will 'scale-up' those field level studies by inundating up to 20,000 acres during winter month over two years. This pilot program will guide future expansion of the program concept by refining practices which facilitate using large farmland acreages to export multiple flood-drain cycles of floodplain-derived food web resources to the river per season. Existing irrigation and flood protection infrastructure will be utilized to deliver waters containing floodplain-derived food web resources produced on intentionally inundated winter farm fields, to fish populations of conservation concern stuck inside leveed river channels.

RD108 will work with stakeholders to enroll landowners and tenants to participate in the program. The program objective is to enroll 20,000 acres each winter of the pilot program's duration. Participants will be paid a stipend for each acre which under goes a "flood/drain cycle", defined as an acre inundated to minimum depth of eight inches for a minimum of three weeks before being drained. All participating acres will need to be drained to the salmon-bearing Sacramento Valley Rivers through existing irrigation and drainage infrastructure. The goal is to conduct up to three inundation/drain cycles per acre enrolled.

Working with stakeholders the project will identify priority implementation areas within the Sacramento Valley where fish food is needed most. 'Practice standards' will also be developed to guide selection of enrolled lands, and define criteria which participants will be required to meet. These 'practice standards' will be used guide future expansion of the fish food program.

➢ Potential Benefits

Data collected from this study will be compiled and shared to assist in the development of a bio-energetic food web model to investigate the effect of enhancing habitat quality and food availability on Chinook salmon (Oncorhynchus tshawytscha) production in the Sacramento Valley via the augmenting in-river habitats with floodplain-derived food web resources.

➢ Integration with other Projects

The project is part of the larger "Landscape scale" effort for floodplain recovery and enhancement throughout the Sacramento Valley. The project will build on previous fish-food work conducted in the valley.

The project is consistent with the goals of the 2016 Central Valley Flood Protection Plan Conservation Strategy, including:

Promoting natural dynamic hydrologic and geomorphic processes.

Increasing and improving the quantity, diversity, and connectivity of riparian, wetland, floodplain, and riparian habitats, including the agricultural and ecological values of these lands.

Promoting the recovery and stability of native species populations and overall biotic community diversity.

➢ Project Advocates

RD 108, CalTrout, DWR, River Garden Farms

➢ Potential Constraints

Funding availability limits amount of acreage that can be included in the program. Increased funding would allow for increased acreage and increased ecological benefits.

OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]		•			Potential to add fish rearing as a later part of project.
	Fish Passage				•	
	Fish Spawning				•	
	Agricultural (acres)[2]	•				Maintains agricultural productivity in Sacramento valley.
	Waterfowl (acres)[2]	•				Potential to provide waterfowl habitat.
Secondary Benefit	Recreational		•			Potential increases recreational opportunity based on waterfowl habitat.
	Educational		•			Pilot program will provide valuable information future implementation.
	Water supply	•				Maintains water supply in Sacramento Valley.
	Listed Species Benefit	•				Would benefit listed fish species.
Feasibility Criteria	Landuse Compatibility	•				Maintains agricultural productivity in Sacramento valley.
	Shovel Readiness	•				Existing infrastructure will be used and is already in place.
	Cost[1]		•			Assumed to cost approx., $1M/ per 20,000 acres.
	Potential for State/Federal Funding	•				DWR funding in place.
	Potential for Local Match	•				Potential for local match.
	Project Sponsor, Champion, Partners	•				DWR, Local landowners, RD 108

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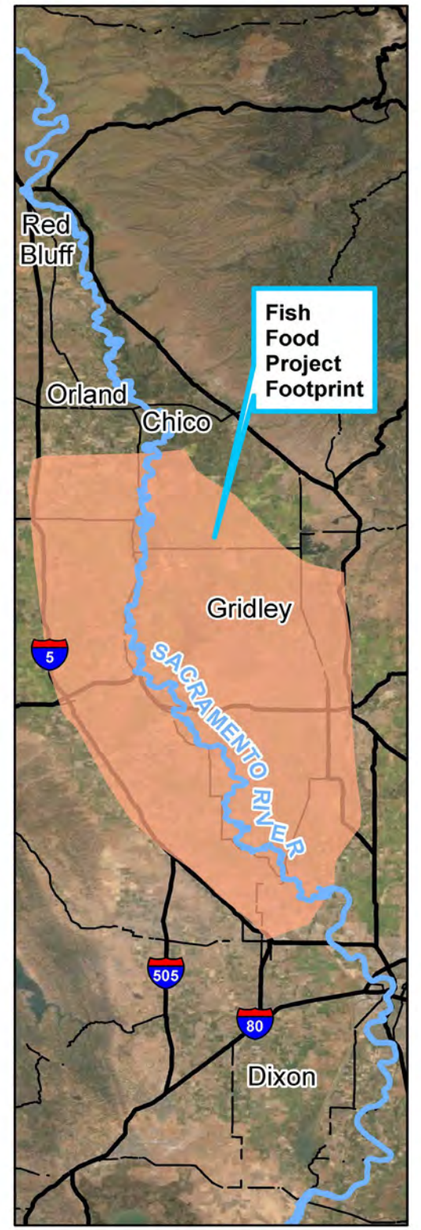

Floodplain Reactivation through GIS Decision Support Tool (DST) Development

Project Details

➢ Location

Outside levee (dry-side) areas of rice production in the Sacramento Valley.

➢ Recommendations

The need to provide native fish species with greater access to floodplain food resources has emerged as a conservation priority for the Central Valley. However, these floodplains are home to multiple stakeholders including; 1) agricultural producers, 2) water districts, 3) public agencies and NGOs involved in fish recovery, 4) waterfowl hunters who own duck clubs, rely on public lands, or lease rice fields within the floodplain, 5) public agencies and NGOs that provide habitat for waterfowl and other wetland dependent birds, and 6) public agencies responsible for flood control. Where and how we provide fish with greater access to floodplain food resources will need to consider these stakeholder objectives. Eventually, it is our intent to develop a DST that will help guide our floodplain reactivation efforts by incorporating these objectives.

➢ Proposal

As a first step, we propose developing the following data layers to be used in a future DST.

- Fish bearing streams adjacent to rice ground in the Sacramento Valley with special emphasis on winter-run chinook.
- Distribution of winter-flooded rice in the Sacramento Valley over the past four decades. We are looking for areas of rice production of below average winter-flooding and/or where winter-flooding appears to be declining. Fields that are not being winter-flooded are providing few wetland dependent bird benefits. Enrolling these fields in a multiple draw down program would provide fish food and at least some wetland dependent bird benefits…even if these benefits are not as large as traditionally winter-flooded fields.
- Develop GIS base layer of key internal water conveyance infrastructure within the project area
- The 2006 CVJV plan subdivided the Sacramento Valley into multiple drainage basins and assigned duck population objectives to each basin. However, the 2020 plan combined these drainage basins into a single planning unit…the Sacramento Valley planning unit. Within the original drainage basins, we can examine the current contribution that winter-flooded rice makes in meeting the food energy needs of the waterfowl population objective originally assigned to each basin (stepping back if you will). Basins that rely most heavily on winter-flooded rice to meet duck needs may suffer food deficits if large amounts of this winter-flooded rice are enrolled in a multiple drawdown program. We can model this if we have a data layer for each drainage basin for winter-flooded rice and managed wetlands. These model results can then be depicted as a data layer within the DST.

➢ Project Benefits and Beneficiaries

This project will benefit waterfowl, shorebirds, other waterbirds, and salmonids. Beneficiaries include private landowners, CVJV, Natural Resources Conservation Service, California Department of Fish and Wildlife.

➢ Integration with other Projects

The proposed project is complimentary to and will be conducted in coordination with, other dry-side floodplain reactivation efforts planned or currently underway.

➢ Project Advocates

Ducks Unlimited, Inc. is the project sponsor. Supporters and cooperators include RD 108, RD 1500, CVJV, California Waterfowl Association (CWA), California Rice Commission, California Department of Fish and Wildlife and Cal Trout.

➢ Potential Constraints

There are no major constraints to implementing this project. Work could begin immediately upon receipt of funding.

OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]	●				Project area is up to 550,000 acres.
	Fish Passage				●	
	Fish Spawning				●	
	Agricultural (acres)[2]	●				Identify rice lands well suited for fish food production and help target programs that subsidize the cost of winter-flooding.
	Waterfowl (acres)[2]	●				Project area includes nearly all the rice growing region of the Central Valley, an estimated 550,000 acres
Secondary Benefit	Recreational	●				Project will integrate the needs of waterfowl hunters in floodplain reactivation planning.
	Educational				●	
	Water supply	●				Project could identify surface water supplies used for winter-flooding of rice to maximize benefits for fish and wetland dependent birds.
	Listed Species Benefit	●				Listed fish and other wetland-dependent special-status species.
Feasibility Criteria	Landuse Compatibility	●				Project will assist in identify areas for fish food production that recognize the needs of other floodplain stakeholders.
	Shovel Readiness	●				Project work can begin immediately upon receipt of funding.
	Cost[1]			●		Total project cost is $40,000
	Potential for State/Federal Funding	●				CVJV is a potential funder.
	Potential for Local Match	●				DU will provide some match.
	Project Sponsor, Champion, Partners	●				DU, CalTrout, California Rice Commission, California Department of Fish and Wildlife, CVJV, RD 108, RD 1500, and CWA.

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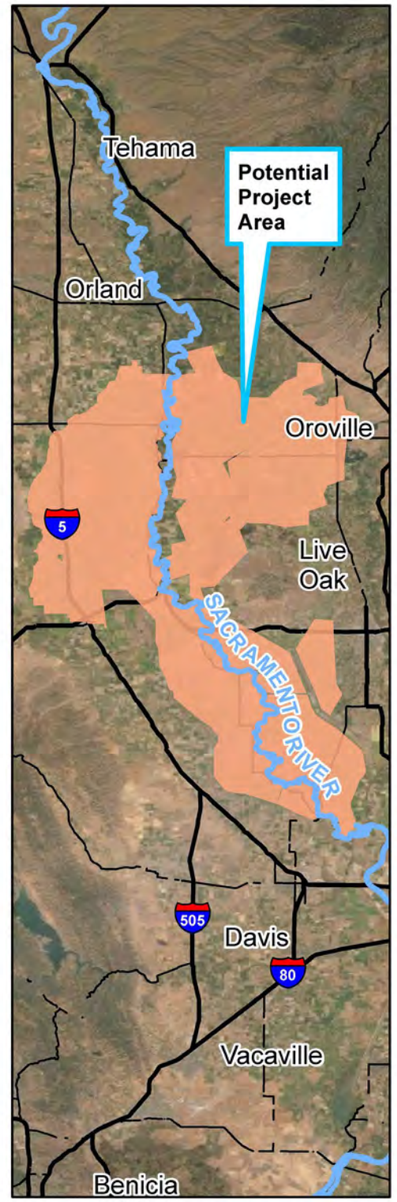

California Ricelands Salmon Project

Project Details

Location

In order to provide volitional passage on and off of project sites, fields will have to be located within the Sacramento Valley bypasses. These are large geographic basins that are not separated from the river by levees or can be hydrologically connected to the river, generally at high water level stages, by a feature in the levee called a "weir." Weirs allow water to flow over the structures or through specialized notches for regional flood protection and floodplain habitat enhancement. This connection to the river will enable juvenile salmon (and other fishes) to volitionally ingress into rice fields.

Proposal and Recommendations

Starting each Fall, the selected farms will "pre-flood" the fields to an average of at least five inches in order to initiate the start of the highly nutritious food web development. Then, the fields will remain flooded until they are fully submerged by bypass flooding, often in the December-January timeframe, which will also result in the introduction of the juvenile salmon into the fields through volitional passage. Once the floodwaters recede, specialized water flow control structures (with special pass-through holes and notches) will be installed which will allow for fish to volitionally pass out of the fields if/when they desire. After installation of these features, a water depth of at least 10-12 inches must be maintained, through March 1, at which time all the fields will be intentionally drained and all remaining salmon will be released into the Sacramento River watershed. It is roughly estimated that the annual cost to implement this seasonal management practice on the 14,500 acres of rice fields in the bypasses would be in the range of $3 million per year.

Potential Benefits

It is anticipated that this project could add over 14,000 acres of enhanced salmon rearing habitat that should increase outmigration success, especially in the most critical water years. Since it utilizes volitional passage of juvenile salmon onto the fields, it should benefit multiple runs of both salmon.

Integration with other Projects

This project would benefit from the notching projects be providing more consistent flooding of project acres.

Project Advocates

California Rice Commission, Natural Resources Conservation Service, Syngenta, State Water Contractors, Grow West, Corteva, Valent, S.D. Bechtel, Jr. Foundation, California Ricelands Waterbird Foundation, Northern California Water Association, American Commodity Company, California Almonds, Lundberg Family Farms, California Family Foods, California Rice Research Board, The Nigiri Project, California Trout, River Garden Farms, and NovoSource.

Potential Constraints

Project needs to be demonstrated to function at scale and ESA take and/or safe harbor provisions developed.

OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]	●				
	Fish Passage				●	
	Fish Spawning				●	
	Agricultural (acres)[2]	●				
	Waterfowl (acres)[2]	●				
Secondary Benefit	Recreational		●			
	Educational			●		
	Water supply				●	
	Listed Species Benefit	●				
Feasibility Criteria	Landuse Compatibility	●				
	Shovel Readiness	●				
	Cost[1]		●			
	Potential for State/Federal Funding		●			
	Potential for Local Match		●			
	Project Sponsor, Champion, Partners	●				

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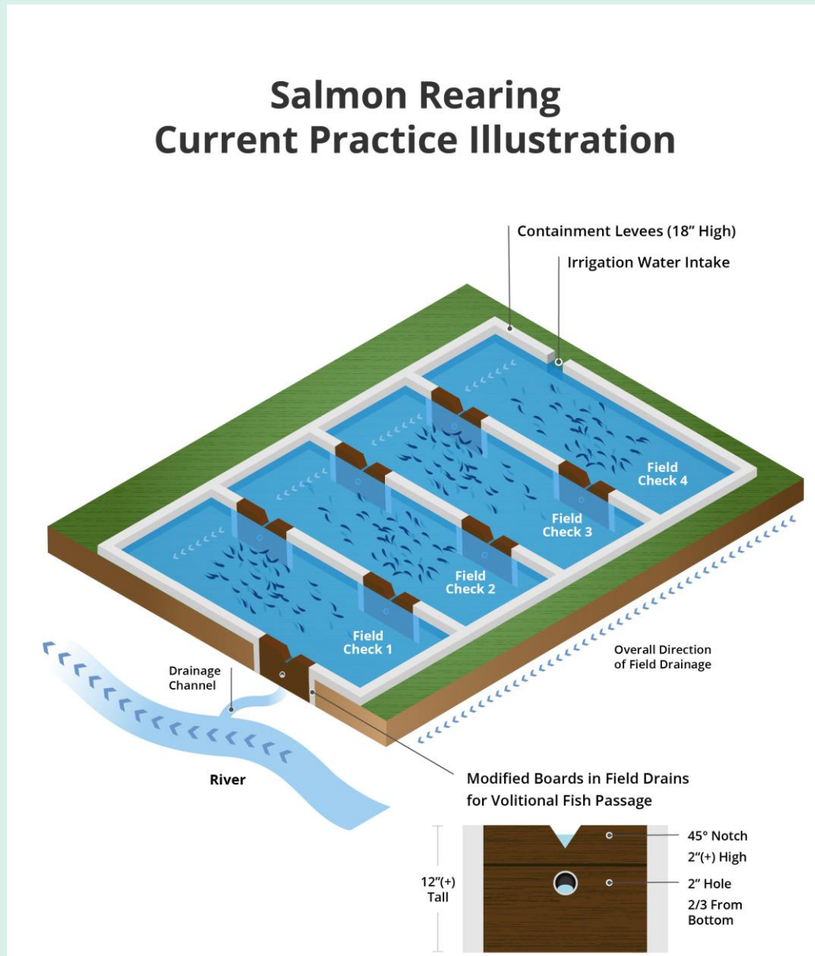

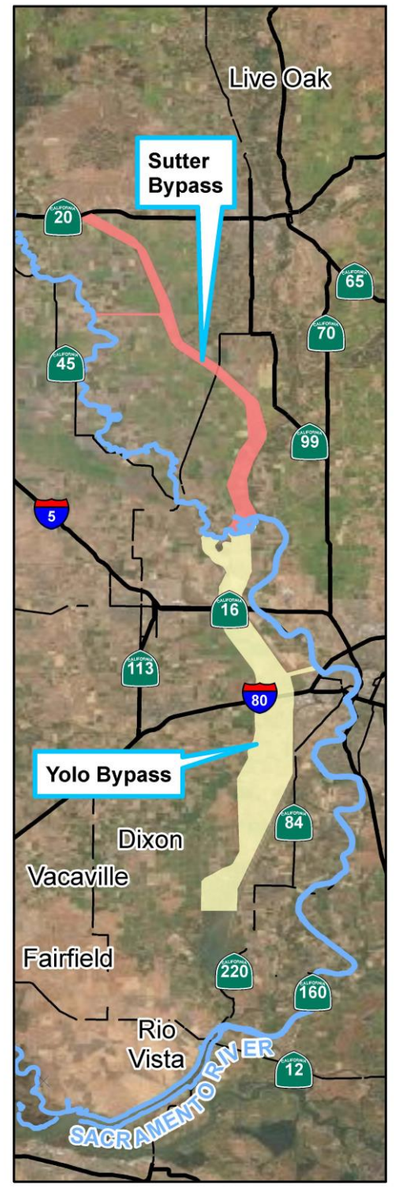

Jobs Creation through Floodplain Restoration

Project Details

➢ Location

70 sites between Colusa and Red Bluff – mostly public ownership

➢ Recommendations

More than 3,000 acres spanning 100 miles of the banks of the Sacramento River are currently in public or private ownership for conservation and fish and wildlife management AND host extensive stands of invasive weeds that degrade water quality and make aquatic and floodplain habitat areas inhospitable for salmon of all life stages. Public agencies own and manage moat of these lands, but they lack the resources (funds and staff) needed to treat the invasive plants strategically and effectively. Additionally, there are many private lands along the corridor that host source populations of invasive weeds that serve to repopulate treated areas if not part of a comprehensive treatment strategy. River Partners can coordinate with these agencies and private landowners along the river corridor to manage and operate a comprehensive weed management and jobs creation program that benefits salmon and people. This project would also increase inundation frequency and duration across more than 7,000 acres of natural side channels and oxbows of the Sacramento River that have been choked by aquatic invasives, rendering them unusable for salmon. Estimated cost is $21.8M for a 5-year comprehensive program.

➢ Proposal

California's Central Valley has chronically high rates of unemployment that have been exacerbated by the pandemic and natural disasters in 2020. Thankfully, floodplain habitat management can be developed and delivered in a way that puts people back to work while improving ecological conditions for salmon and communities. Agricultural workers and equipment operators can apply their skills to weed control, revegetation, and other habitat management activities with small time investments from specialized resource managers to plan, permit, oversee, and monitor the work. The result is public investment that yields ecosystem restoration and economic stimulus. The floodplains of the Sacramento River are a perfect location to mobilize this workforce for ecological restoration.

Through our "San Joaquin River Jobs Creation and Invasive Species Management Program" River Partners has been working since 2009 to manage similar issues along 150 river miles in the San Joaquin Valley, treating hundreds of acres and reducing infestations by 10 to 20% annually, delivering more than $14million in living wages to paid interns, workers and equipment operators, and assisting flood and irrigation managers by reducing their operations and maintenance costs, all the while improving floodplain habitat conditions for salmon. We have even found supportive partnership with workforce development programs across various Central Valley Counties to expand our impact in jobs creation.

Project activities include:

1. Field work and mapping to prioritize floodplain habitat restoration locations and methods
2. Managing large labor crews (dozens of workers per site) to restore prioritized locations
3. Performing monitoring and reporting to inform future years' work
4. Outreach and coordination with riverside landowners to engage on strategic acres

➢ Potential Benefits

This project will have significant benefits to in-stream flow in the Sacramento River by reducing high rates of evapotranspiration from invasive vegetation, and improving water quality in side-channel and floodplain aquatic habitat areas. We anticipate significant measured improvements to water quality, temperature, and food availability for salmon in the Sacramento River and all habitat downstream as a result of this work. Additional study may also reveal measurable water storage improvement in the reconnected floodplain soils that is likely temporary in nature, but important to maintain appropriate water temperatures and river flows suitable to maintain habitat quality along the river corridor.

➢ Integration with other Projects

This project is aligned with projects and programs from regional to global scales:

- Regional Flood Management Plan and the Central Valley Flood Protection Plan and associated Conservation Strategy
- Central Valley Joint Venture Implementation Plan
- Riparian Bird Conservation Plan (Partners in Flight)
- USFWS Sacramento River National Wildlife Refuge Comprehensive Conservation Plan
- CDFW Sacramento River Wildlife Area Habitat Management Plan
- Recovery Plan for Chinook salmon and Central Valley Steelhead
- Upper Sacramento River Habitat Management Plan (Sac River Forum)
- California Water Action Plan / Water Resiliency Portfolio
- CDFW State Wildlife Action Plan
- Recovery Plan for Valley Elderberry Longhorn Beetle
- Recovery Plan for Least Bell's Vireo
- Recovery Plan for Yellow-billed Cuckoo
- Dozens of similar projects completed by private-public partnership since the 1980s

➢ Potential Beneficiaries

- Unemployed or underemployed residents in the Sacramento Valley
- Levee Maintenance Agencies and other infrastructure maintainers who suffer damages from invasive plant growth in and around pumps, levees, canals, and drains
- Air quality managers and those interested in sequestering carbon
- Irrigation districts seeking to recover salmon populations without reducing irrigation deliveries
- Flood system maintenance agencies seeking to reduce their residual risk and complexity of levee maintenance operations
- Regional agricultural interests that rely upon robust populations of pollinators for continued production
- Water quality coalitions seeking to meet ambient water quality standards for regulatory compliance

➢ Project Advocates

River Partners, U.S. Fish and Wildlife, Sacramento River Forum, U.S. Bureau of Reclamation, California Department of Fish and Wildlife, California State Parks

➢ Potential Constraints

Funding and some instances of permitting can be project obstacles. Work in and around waterbodies requires regulatory approval from 6 or more agencies, which can be time consuming to attain.

OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]			●		
	Fish Passage	●				
	Fish Spawning				●	
	Agricultural (acres)[2]			●		
	Waterfowl (acres)[2]			●		
Secondary Benefit	Recreational	●				
	Educational	●				
	Water supply		●			
	Listed Species Benefit	●				
Feasibility Criteria	Landuse Compatibility	●				
	Shovel Readiness	●				
	Cost[1]	●				
	Potential for State/Federal Funding	●				
	Potential for Local Match			●		
	Project Sponsor, Champion, Partners	●				

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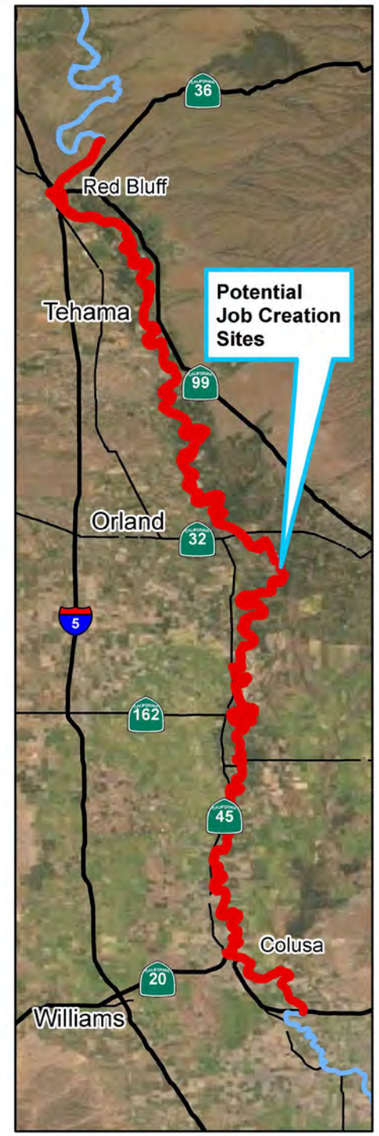


Annual Waterbird Surrogate Habitat

Project Details

➢ Location
Sacramento Valley, primarily in rice footprint

➢ Recommendations
Create surrogate waterbird habitat on agricultural land through a series of annual practices that include early spring or fall flooding of fields, wetland restoration, widening berms to create nesting habitat, installing nesting islands, varying drawdown of decomposition water, leaving nesting cover, and passively capturing and holding water through field management. Previous investment of $10 million created 100,000 acres of habitat over 5 years at a fraction of the cost to permanently protect and secure that same acreage.

➢ Proposal
Over the last 200 years, the 90 percent of the natural habitat in the Sacramento Valley has been converted to cities and agricultural. The loss of natural wetlands, riparian areas and floodplains has led to large declines in bird population levels – particularly migratory birds which rely heavily on the Sacramento Valley as part of their migration along the Pacific Flyway. The remaining wetland habitat provided by wildlife refuges and private duck clubs is not sufficient to provide the food and resting habitat needed by the millions of migratory waterbirds that rely on the Central Valley.

Applied research has shown that there are a suite of on-farm practices that can be done to mimic historic habitat at critical times of the year to fill some of the missing habitat and food resources needed by migratory birds. These practices are captured in the Natural Resources Conservation Service Waterbird Habitat Enhancement Program, which over the last decade has created roughly 400,000 acres of habitat for shorebirds and other species. These annual practices include early spring or fall flooding of fields, wetland restoration, widening berms to create nesting habitat, installing nesting islands, varying drawdown of decomposition water, nesting cover, and passively capturing and holding water through field management.

Each of these practices have a different cost per acre but at the peak of this program roughly 20% or 100,000 acres annually were enrolled in these practices. Continuation and expansion of the financial and technical support to implement these practices annually is an important piece of protecting the Pacific Flyway.

➢ Potential Benefits
The current annual cultivation of roughly 550,000 acres of rice supports nearly 230 wildlife species including 50 species of waterbirds. In fact, the ricelands and wetlands of the Sacramento Valley have been designated as internationally important for shorebirds by the Western Hemisphere Shorebird Reserve Network and the National Audubon Society. Despite the significant habitat contribution provided by ricelands and other farmland, there are more opportunities to manage agricultural fields in ways that can enhance their ability to support a greater diversity of wildlife. Working together, the rice industry, conservation scientists and the NRCS developed set of practices in the Waterbird Habitat Enhancement Program that targets specific species needs including fall and spring migratory shorebird habitat, nesting islands, winter shorebird habitat and nesting cover. These annual practices benefit a suite of declining shorebird species along with waterbirds more generally. They also benefit farmers in providing financial and technical support in their efforts to manage their lands for birds and other wildlife.

➢ Integration with other Projects
This project integrates with ongoing agricultural production in the Sacramento Valley and has the potential to be paired and combined with fish focused on-farm practices.

➢ Project Advocates
Audubon California, California Rice Commission, California Waterfowl Association, Ducks Unlimited, Point Blue Conservation Science, The Nature Conservancy

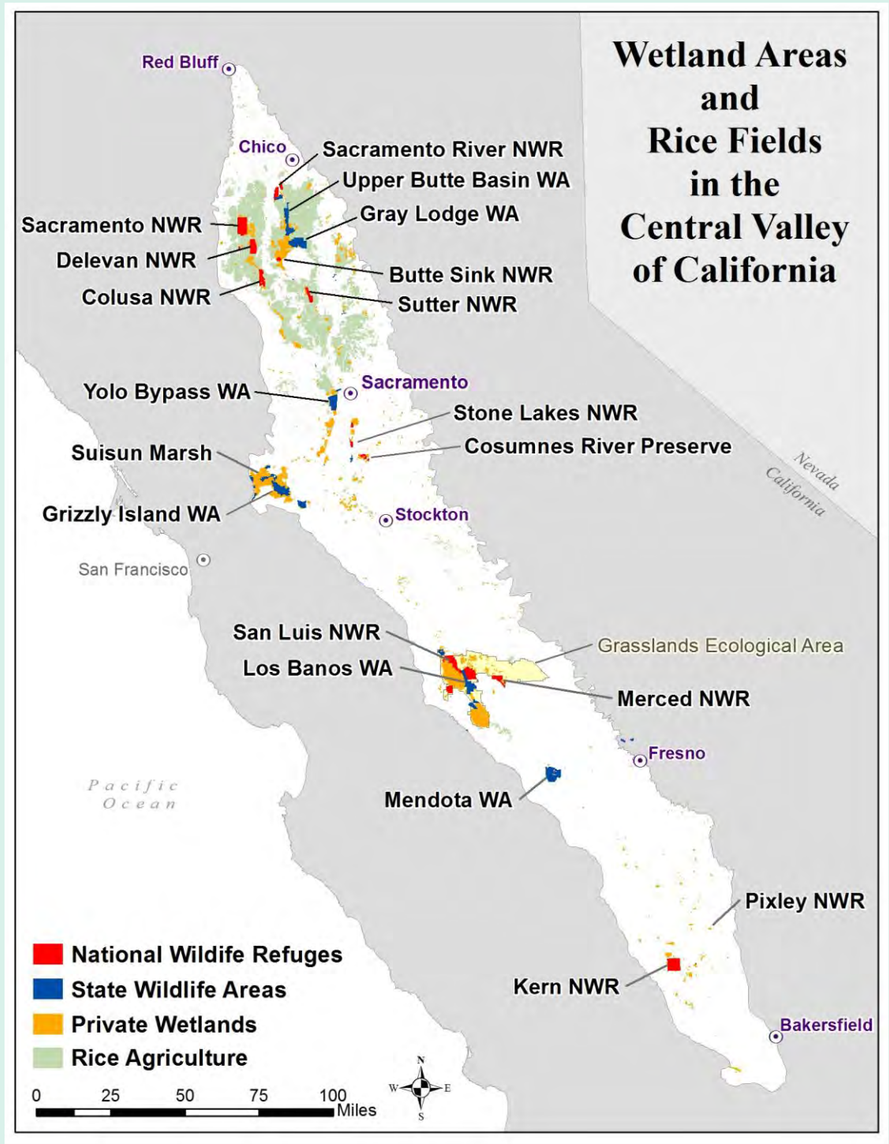
➢ Potential Constraints
Annual implementation of these practices requires ongoing funding and technical assistance.

OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]				●	
	Fish Passage				●	
	Fish Spawning				●	
	Agricultural (acres)[2]	●				
	Waterfowl (acres)[2]	●				
Secondary Benefit	Recreational	●				
	Educational	●				
	Water supply	●				
	Listed Species Benefit	●				
Feasibility Criteria	Landuse Compatibility		●			
	Shovel Readiness	●				
	Cost[1]		●			
	Potential for State/Federal Funding	●				
	Potential for Local Match	●				
	Project Sponsor, Champion, Partners	●				

1: $ = less than $5m, $$ = $5-15M, $$$ = more than $15M

2: L = less than 1,000 ac, M = 1,000 - 5,000 ac, H = More than 5,000 ac



Weir 1 (Sutter Bypass West Borrow Canal)

Project Details

Location
Weir 1 is located in the West Borrow Canal (WBC) of the Sutter Bypass, just north of where the Sutter and Tisdale Bypasses converge.

Recommendations
Replace the existing weir structure with a roughened channel to allow for fish passage without impacting surrounding agricultural diversions.

Proposal
Weir 1 currently poses an impediment to adult fish passage in theWBC for ESA threatened Spring Run Chinook trying to make their way up the canal from the Sacramento River to Butte Creek. This impediment can occur during drought conditions as well as during certain times of the year due to simultaneous agricultural diversions from the WBC. These conditions do not allow for adequate flows through the existing fish ladder. Additionally, there is a natural bedrock shelf that poses a threat to fish passage and has left fish stranded on the rocks. The proposed project would replace the existing weir and fish ladder with a roughened channel rock ramp. This would allow for unimpeded fish passage up the WBC while maintaining the water surface elevations for upstream and downstream agriculture diversions.

Potential Benefits
Potential project benefits include improved fish passage in the Sutter Bypass and into Butte Creek; maintaining agricultural diversions within the bypass, and maintaining benefits to the Sutter National Wildlife Refuge's unmanaged wetlands. The project will not impede outflows during flood season.

Integration with other Projects
This project is consistent with the goals of the 2016 Central Valley Flood Protection Plan Conservation Strategy, including:

- Promoting natural dynamic hydrologic and geomorphic processes.
- Increasing and improving the quantity, diversity, and connectivity of riparian, wetland, floodplain, and riparian habitats, including the agricultural and ecological values of these lands.
- Promoting the recovery and stability of native species populations and overall biotic community diversity.

Potential Constraints
Project is located in a flood channel and will need to comply with USACE Section 408 requirements.

OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]		●			
	Fish Passage	●				
	Fish Spawning	●				
	Agricultural (acres)[2]		●			
	Waterfowl (acres)[2]				●	
Secondary Benefit	Recreational				●	
	Educational				●	
	Water supply		●			
	Listed Species Benefit	●				
Feasibility Criteria	Landuse Compatibility	●				
	Shovel Readiness		●			
	Cost[1]			●		
	Potential for State/Federal Funding	●				
	Potential for Local Match			●		
	Project Sponsor, Champion, Partners	●				

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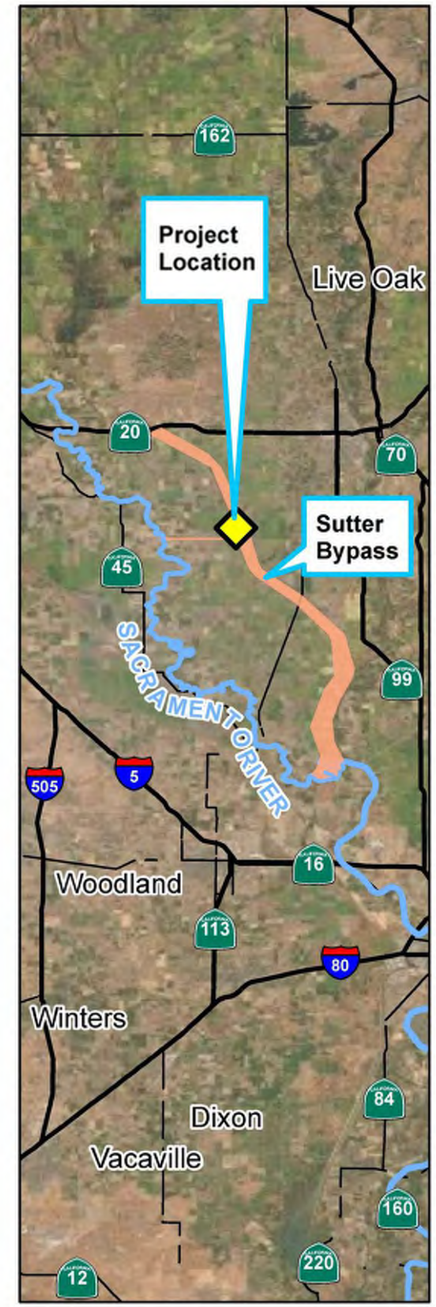

Invasive Aquatic Vegetation Removal

Project Details

➢ Location

Waterways and conveyance canals impacted by invasive vegetation but also potentially serving as fish habitat, such as the West and East Canals of the Sutter Bypass.

➢ Recommendations

Removal and direct management of invasive vegetation by means of chemical treatment (herbicides) and/or physical harvest (mastication and removal). Annual maintenance and active management will generally reduce effort over time.

➢ Proposal

California's waterways are highly altered and as a result, suffer from conditions adverse to aquatic species, as well as commercial and private needs. While attempting to maintain the balance between beneficial uses for the public interest and environmental concerns, focus has been placed on hot button issues such as water temperature, dissolved oxygen, turbidity, passage impediments to aquatic species, and overall habitat quality. A recent and growing concern has developed in an area that has generally received less public attention, but impacts all of these critical issues.

Invasive aquatic vegetation including primrose (*Ludwigia hexapetala*) and water hyacinth (*Eichhornia crassipes*) are quickly becoming a critical detriment to biological conditions for aquatic native species and commercial use in important waterways. Both plant species are represented by floating mats of dense aquatic invasive vegetation that can quickly spread. Primrose cover increased four-fold in the Delta over a 13-year period, changing significantly in the central Delta and Liberty Island region from 122 ha in 2004 to 471 ha in 2016 (Khanna et al 2018). Water hyacinth is considered one of the world's fastest growing plants and can double its coverage area in just two weeks. Anecdotal reports have found water hyacinth covering entire creeks in just one season.

Several impacts arise due to the aggressive spread of primrose and water hyacinth. Native aquatic species are unable to flourish, fish passage can become entirely encumbered as mats grow large, nutrient cycling becomes impaired, and water chemistry shifts as a result of poor light penetration and excessive oxygen consumption by the invasive plants. Semi-aquatic species such as western pond turtles or river otters can find themselves entangled in the dense mats, leading to energy depletion or mortality.

Water diversion and boating are dramatically impacted as well. Floating mats can aggressively invade canals, water ditches, and boating routes. Water diversion pumps are quickly fouled, negating the use of the facility, resulting in direct impacts to agriculture and livestock operations. Waterways clogged with mats of vegetation imperil prop and jet motors, resulting in limited and frustrating recreational issues. Active invasive vegetation removal is key to avoiding these impacts.

➢ Potential Benefits

Numerous benefits would be realized by managing the presence and spread of aquatic invasive vegetation. Suitable habitat would be maintained for aquatic and semi-aquatic species. Water diversions for agriculture and livestock would be protected from fouling. Also, recreational usage of waterways would be protected from impact.

➢ Integration with other Projects

This project integrates with ongoing agricultural production in the Sacramento Valley and has the potential to be paired and combined with current water management practices.

➢ Project Advocates

ED 108, RD 1500, Califorinia Rice Commision

➢ Potential Constraints

Annual implementation of these practices requires ongoing funding and technical assistance.

OPPORTUNITY EVALUATION CRITERIA, RANKING & NOTES

	Project Metric	High	Medium	Low	N/A	Comments
Primary Benefit	Fish Rearing (acres)[2]					
	Fish Passage	●				
	Fish Spawning					
	Agricultural (acres)[2]	●				
	Waterfowl (acres)[2]	●				
Secondary Benefit	Recreational	●				
	Educational		●			
	Water supply	●				
	Listed Species Benefit	●				
Feasibility Criteria	Landuse Compatibility	●				
	Shovel Readiness	●				
	Cost[1]		●			
	Potential for State/Federal Funding	●				
	Potential for Local Match	●				
	Project Sponsor, Champion, Partners	●				

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Top – Mat of primrose infested in an agricultural water and fish passage canal.

Middle – Water hyacinth clogging an agricultural water and fish passage canal.

Lower – Turtle found desiccated as a result of water hyacinth.

FLOODPLAIN FORWARD