

FISHERIES
CHARTERS APPENDIX B

For the
2017 ANNUAL WORK PLAN
PUBLIC FINAL

CENTRAL VALLEY PROJECT IMPROVEMENT ACT
Title XXXIV of public law 102-575

Table of Contents

b1 Sutter Bypass Weir 1 Restoration	5
b1 - DCC GFFB at Deadhorse Cut	9
b1 AFRP Program Administration and Management	13
b1 Feather River Oroville Wildlife Area flood stage reduction	17
b1 Feather River Sunset Pumps Sturgeon and Salmon Passage	21
b1 Green Sturgeon Juvenile Investigation	27
b1 Impacts of Marijuana Activity on Fish	31
b1 Merced River Instream & Off-Channel Drought-Resilient Habitat Rehabilitation	37
b1 Migratory Corridor Rehabilitation	43
b1 Mill Creek Fish Passage - Upper Dam Project	49
b1 North Fork Battle Creek Natural Barrier Removal	55
b1 Sacramento River Tisdale Weir sturgeon and salmonid passage	59
b1 San Joaquin River Sturgeon Habitat Assessment	63
b1 Tuolumne River - River Mile 44 Spawning and Rearing Habitat Restoration	67
b1 Tuolumne River: Dos Rios Floodplain Restoration	71
b1 Yuba River Daguerre Point Dam Juvenile Salmon Outmigration Study	75
b1 Yuba River Hallwood Floodplain Restoration Project	79
b1 Yuba River Hammon Bar Velocity Validation	83
b1 Yuba River Narrows Restoration Project	87
b1 Yuba River Restoration Downstream of Highway 20	91
Battle Creek Winter run Chinook re-introduction and Battle Creek Coleman weir passage project	95
Central Valley: Sturgeon Spawning Survey and Habitat Mapping	99
Deer Creek Irrigation District Dam Fish Passage Project	105
Deer Creek: Fish Passage at SVRIC	109
Disease impact on Winter-run juvenile Chinook salmon survival in the Upper Sacramento River	113
Identifying and reducing impacts of riparian water diversions - Mokelumne River	115
Lower Mokelumne River Salmonid Spawning and Rearing Habitat Improvement Project ..	121
Reconfigure Breached Delta Levees	125
Recreate Shallow Water Habitat in the Delta Migration Routes	129
Yuba Upper Rose Bar Restoration	133
b12 Clear Cr Spawning Gravel Injection	137

b12 Clear Creek Adaptive Management.....	141
b12 Clear Creek Channel Maintenance Flows (aka EWP).....	147
b12 Clear Creek Flows.....	151
b12 Clear Creek Program Management.....	155
b12 Lower Clear Cr Aquatic Habitat and Mercury Abatement Project.....	159
b12 Replace Oak Bottom Temperature Control Curtain	163
b12 Clear Creek Stream Channel Restoration including Phase 3C	167
American River Salmonid Habitat Improvement at upper River Bend.....	175
b13 Administration	177
Natural and Artificial Rearing Structures in the Upper Sacramento	181
Restore Rearing and Spawning Side Channels in the Upper Sacramento River	187
Stanislaus River Salmonid Spawning and Rearing Habitat Restoration	191
American River rotary screw trap project.....	195
Assess Impacts of River Structure Lighting	199
b1 Sturgeon Population Dynamics and Demographics Evaluation	203
CAMP Internet data portal.....	207
CAMP Program Manager	211
CAMP rotary screw trap Platform enhancements	215
CVP watershed adult salmon escapement database.....	219
Delta Salmon Survival Study.....	223
Pacific States Marine Fishery Commission database support	227
Stanislaus River rotary screw trap monitoring.....	231
b2 administration	235
b2 operations	241
Anadromous Fish Screen Program (AFSP) Administration.....	245
Anadromous Fish Screen Program (AFSP) Projects	249
Instream Water Acquisition	251
CVPIA ARM Process	255

b1 Sutter Bypass Weir 1 Restoration

Rehabilitation of weir structure and fish ladder at Weir 1, Sutter Bypass-West Borrow

Classification: Improvement, Fish Passage
Location: 39.03478 -121.7436, Butte Creek
Funding Years: 2016 - 2021
Benefits Start Year: 2016
Priority: - This downstream-most weir blocks Spring-run Chinook adults from 90 miles of holding and spawning habitat.
Partners: CDFW, NMFS
Related Programs: NMFS-RPAs
Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	This site limits access to many upstream AFRP fish passage improvements in Butte Creek.

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Habitat	90	miles	Access to 90 miles of holding and spawning habitat will be restored.

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2021	Final Report

Narrative

Butte Creek is one of the most productive streams in the Sacramento River Valley for federal and state listed spring-run Chinook salmon (SRCS). SRCS migrate through the Sutter Bypass to Butte Creek, navigating past several water control structures on their way to spawning areas in the Upper Butte Creek system. Months later, the juvenile salmon reverse this route on their way to the Pacific Ocean. The migration of anadromous fish, which includes all runs (fall, late-fall, winter and spring) of Chinook salmon and Central Valley steelhead, is impeded by the last remaining historic weir and ladder structure at Weir 1, Sutter Bypass.

The Sutter Bypass, which is part of the Lower Butte Creek drainage system, is primarily a flood control facility designed in the early 1900s to alleviate excessive wintertime flood flows from Butte Creek, the Feather River, and the Sacramento River via the Tisdale Bypass, Colusa Weir, and Moulton Weir. Floodwaters are conveyed downstream to re-enter the Sacramento River near Verona, California. During the irrigation period, usually April to September, the water control structures are operated to provide water for nearby agricultural fields and the Sutter National Wildlife Refuge.

Five weirs were installed in the early 1900s. These structures were designed to hold upstream water levels at specific elevations for upstream diversions for agriculture and other uses. The Lower Butte Creek-Sutter Bypass West Side Channel Project (SCH#2002032149) included the rehabilitation of fish ladders and fish screens approved by California Department of Fish and Wildlife and National Marine Fisheries Service at the East-West Weir, Weir No.5, Weir No. 3, Guisti Weir and Weir No. 1 to improve the passage of anadromous fish. An addendum to the MND/IS (2004) was issued when Restoration of both the Guisti and Weir No. 1 structures was abandoned when rerouting of water delivery was designed and completed for the Guisti Farm. The original Weir No. 1 fish ladder structure remains, however design was completed by Montgomery Watson as part of the Lower Butte Creek –Sutter Bypass West Side Channel Project.

Since 1992, over \$50 million dollars has been spent on Butte Creek restoration projects. The Weir No.1 structure is the last structure to be restored, as part of the Lower Butte Creek Project. Rehabilitation of the Weir No. 1 site will improve adult and juvenile passage of anadromous fish species, in-stream water management, and ability of the USFWS Sutter National Wildlife Refuge to inundate Refuge lands for floodplain rearing habitat. Restoration of this site is vital to maintaining viable and sustainable populations of anadromous fish. The need for rehabilitation at this site was affirmed when 45 adult SRCS carcasses were discovered downstream in 2012 and 2013. A dilapidated fish ladder and non-operable weir structure impeded fish passage during critically dry water years. This number could have potentially been higher due to not observing other carcasses. In addition, a delay in SRCS migration at Weir 1 could have potentially caused the fish to stray to other systems. The project addresses AFRP Final Restoration Plan/CPAR and PART evaluation E9 and CPAR E4; evaluate alternatives to help fish passage, including the installation of a high water volume fish ladder on Sutter Bypass Weir #1 and evaluate operational alternatives and establish operational criteria for Sutter Bypass #1, respectively.

Explanation of fish population metrics:

Spring-run Chinook salmon: The loss of 45 adult Chinook salmon with a 50:50 female to male ratio could have produced, at a minimum, of 112,000 eggs to the Butte Creek system. Improvements to the weir can prevent delays in migration and reduce mortalities of adult spring-run Chinook salmon specific to water temperatures as was the case in 2008, 2009, and 2010 where nearly 500 adult spring-run arrived in late June late and subsequently died prior to spawning.

Data Management

www.fws.gov/redbluff/afrp.html

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
restore fish passage	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$318,000	\$0	\$318,000
2018	CVPRF	\$371,000	\$0	\$371,000
2019	CVPRF	\$1,272,000	\$0	\$1,272,000

Total Cost: \$1,961,000

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Design - An Engineering Feasibility, Analysis and Design will ascertain the specific environmental needs and constraints of fish passage at this site. Approx. \$300,000</i>					
Agreement	\$318,000	n/a	FWS	CVPRF	Financial assistance agreement or interagency agreement to work with CDFW and other agencies who are familiar with this site and the annual potential for spring-run migration delays or mortality.
2018					
<i>Environmental Compliance and Permitting - Approx. \$350,000</i>					
Agreement	\$371,000	n/a	FWS	CVPRF	Financial assistance agreement to complete compliance and permitting
2019					
<i>Implementation - \$1,200,000</i>					
Agreement	\$1,272,000	n/a	FWS	CVPRF	Financial assistance agreement to complete implementation and as-built performance monitoring at the site.

b1 - DCC GFFB at Deadhorse Cut

Electrical barrier to reduce straying through the Delta Cross Channel to the Sacramento system

Classification: Improvement, Diversion Screening
Location: 38°13'40.25'N, 121°29'39.06'W, Mokelumne River
Funding Years: 2016 - 2018
Benefits Start Year: 2017
Priority: - Project conceived by Golden Gate Salmon Association
Partners: Golden Gate Salmon Association
Related Programs: AFRP
Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Straying	0	N/A	Percentage of time the GFFB operates during the target period specified in the operations plan.
Straying	0	percentage of fish blocked	Number of fish passing the DCC Gates divided by the number of fish encountering the GFFB.

Deliverables

<u>Date</u>	<u>Title</u>
Jul. 2017	Barrier Installation
Aug. 2016	100% Design

Narrative

Quantitative/Temporal Estimate of Project Outcome:

We estimate that the barrier will block 100% of Mokelumne origin salmonids attempting to transit the Deadhorse cut on their way to the Delta Cross Channel gates. Reductions could occur due to outages of the system during planner periods of operation, as per the Operations plan included in the permit application(s). Reductions of 20-35% are tolerable in the interests of human safety and allowance for other fish species and wildlife interactions with the barrier. The barrier should be fully effective at the time of installation.

The Project will test a method to prevent possible straying of Mokelumne River adult salmon into the Sacramento River, through the Delta Cross Channel, during operation of the Delta Cross Channel gates. The proposed method consists of a temporary, low voltage, graduated field

electronic barrier, at the mouth of Dead Horse Cut, near the Southeast corner of Dead Horse Island, to redirect returning Mokelumne adult salmon to the main stem Mokelumne River in conjunction with pulse flows. GGSA with Smith-Root Company of Vancouver, WA, developed this proposal as Project A.1 within their eight 8 priority projects for implementation in 2013 and 2014. If successful, GGSA proposed subsequent installation of a permanent barrier.

The straying of Mokelumne River adult salmon is hypothesized to reduce the number of fish returning for natural spawning and hatchery production in the Mokelumne River. Fish that stray into the Sacramento River are believed to have a lower chance of spawning progeny that successfully survive to escapement. Stray Mokelumne fish also compete with and negatively impact the genetic fitness of Sacramento River stocks.

The goal of this Project is to test implementation of a graduated field electrical barrier to reduce potential straying of Mokelumne River adult salmon. Objectives include:

1. Identify the total costs for implementation of a barrier including environmental compliance, construction, operations, maintenance and monitoring. As of the date of this revised document, the construction cost to install a graduated field fish barrier has been approximated at \$2,1M. The driver for this cost which is significantly higher than originally estimated is the specialized equipment and site mobilization.
2. Identify potential impacts of a barrier on humans, fish (including salmonids), and wildlife. Submitted Design Reports discuss in depth the risks associated with using DC currents in waterways.
3. Identify the effectiveness of a barrier in redirecting fish.
4. Identify a pulse flow regime, in coordination with a barrier, to maximize the effectiveness.

This Project represents an experimental effort to test a method to reduce potential straying. Although the scope envisions installation and testing of the barrier in the field (along with a flow release and the monitoring of fish), the project may conclude at any time that implementation of a barrier is not a reasonable course of action.

Milestones describe the specific points for management review and approval on the Project and the proposed schedule.

1. August 2013 – Project Management Plan for implementation of the project that has undergone management review and stakeholder coordination.
2. October 2013 – Project Description
3. October 2017 – First year operation of a barrier for testing purposes.
4. March 2018 – Summary TM on first year results and proposed improvements for year 2.
5. October 2018 – Second year operation of a barrier for testing purposes
6. March 2019 – Summary TM on results through year 2, preliminary recommendations on a permanent installation, and proposed improvements for year 3.

7. October 2019 – Third year operation of a barrier for testing purposes

8. March 2020 – Final TM on results and recommendations on a permanent installation.

Data Management

Short-term Objective Specific:

The first year (2015) of data collection, efforts to capture and tag adult fall-run Chinook salmon in our study area were largely unsuccessful. Utilizing both fyke and trammel nets, between September 21 and October 30 (~ 155 combined sampling hours), one adult fall-run Chinook Salmon was captured and outfitted with an acoustic transmitter, and a total of six acoustically tagged Chinook Salmon were tracked throughout our study area. All six acoustically tagged Chinook salmon detected in our study area were tagged by California Department of Fish and Wildlife. New sampling equipment and methodologies will be proposed for the second year of baseline monitoring in an effort to increase sample size of acoustically tagged fish.

The primary Year 2 (2016) objectives of this study will continue to focus on collecting additional baseline data on adult salmon movement patterns in proximity of the DCC confluence with the Mokelumne River. Given the shortcomings of data collection efforts in 2015, new sampling gear and methodologies will be attempted in 2016.

Baseline data on more precise movement patterns of individual adult salmon, employing acoustic telemetry, will permit an estimation of the proportion of salmon from the north and south channels of the Mokelumne River that choose to move through the DCC (using either Snodgrass Slough or Dead Horse Island Cut) or stay in the mainstem Mokelumne River. Acoustic telemetry data compared before and after barrier installation will also permit an assessment of the e-barrier effects on adult salmon milling and migration timing, and if the e-barrier is re-routing adult salmon to other migratory paths aside from the mainstem Mokelumne River.

Long-term Trend Monitoring:

Straying rates detected at hatcheries will be monitored for changes following operation of the barrier.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
1.Inability to Satisfy Concerns to Human Health	1	3
2.Impact to Salmonids	3	1
3.Impacts to Non-Salmonids	2	2
4.Impacts to wildlife	1	2
5.Inconsistencies with the Operations Criteria Plan (OCAP)	1	1
6.Prohibitive Environmental Compliance and Permits	3	3
7.Stakeholder and Agency Availability	1	1
8.Insufficient Funding Partners	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$0	\$0	\$0

Total Cost: \$0

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Construction - Project management, technical support, env compliance, const/implementation, ops & monitoring, reporting, contingency</i>					
Agreement	\$0	n/a	BOR	CVPRF	total estimated cost

b1 AFRP Program Administration and Management

FY17 AFRP Program Administration, Management and Delivery. Includes all aspects of FY17 AFRP program except specific projects.

Classification: Administration, Administration

Location: Central Valley wide, Central Valley Project Improvement Act

Funding Years: 2016 - 2018

Benefits Start Year: 2016

Priority: 1 - Program Priority Comments: This is the highest priority for AFRP as it includes all aspects of program staffing, administration, management and delivery

Partners: No Data.

Related Programs: No Data.

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	This charter represents all FWS, Reclamation and CDFW staffing needs associated with the (b)(1) provision.

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
b1: Contribute towards Priority Actions	0	N/A	Work completed by FWS and Reclamation staff related to the management and delivery of the Anadromous Fish Restoration Program significantly contributes to advancing and completing priority actions.

Deliverables

<u>Date</u>	<u>Title</u>
Dec. 2016	Contributions to FY16 CVPIA annual accomplishment report
May. 2016	Submissions for FY17 projects, ongoing project updated needs and non-AFRP FWS staff time requests
May. 2017	Submissions for FY18 projects, ongoing project updated needs and non-AFRP FWS staff time requests
Dec. 2016	Contributions to FY16 CVPIA annual accomplishment report
Dec. 2017	Contributions to FY17 CVPIA annual accomplishment report

Narrative

Cost includes USFWS Program Lead, Assistant Program Manager, Habitat Restoration Coordinators, Assistant Habitat Restoration Coordinators and Hydrologist/Engineer stationed at the Lodi Fish and Wildlife Office (8.3 FTE); USFWS Habitat Restoration Coordinators stationed

at the Red Bluff Fish and Wildlife Office (2 FTE); USBR Program Lead stationed at the Northern California Area Office (0.11 FTE); USFWS CVPIA Program Lead (0.20 FTE) stationed at the Pacific Southwest Regional Office; and three full time senior level or equivalent biologists with CDFW. For additional specific details related to the duties and efforts of these staff please see the AFRP general program narrative.

Note: This is the current structure of the program, but may change as a result of the Implementation Plan for Fish Programs.

Data Management

All relevant data/information related to AFRP annual contributions to prior FY program accomplishments, current FY proposed projects and activities and future FY annual work plan development will be submitted to CVPIA when annual calls for these data are issued. The AFRP program manager and assistant program manager will also keep secure backups of all correspondence, data and additional information provided to the CVPIA program whenever possible.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
USFWS/USBR staffing limitations	2	2

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$3,013,374	\$21,887	\$2,991,487
2018	CVPRF	\$3,092,441	\$22,104	\$3,070,337

Total Cost: \$6,105,815

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Administration - This includes the USFWS and USBR Program Leads, USFWS Assistant Program Manager and USFWS CVPIA Program Manager.</i>					
Labor	\$487,771	2.00	FWS	CVPRF	FWS FTE rate is based on agreed upon FY16 rate for all FWS CVPIA staff plus 3%, due to estimated inflation rate and anticipated step increases, subject to change.
Labor	\$21,887	0.11	BOR	CVPRF	Based on FY16 FTE Rate plus 1%

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
<i>Planning and Analysis - Lodi and Red Bluff Fish and Wildlife Office HRCs, Assistant HRCs and Hydrologist/Engineer</i>					
Agreement	\$430,689	n/a	FWS	CVPRF	Managed as a cooperative agreement between USFWS and CDFW. These positions are staffed out of CDFW Regions 1, 2, and 4. Based on FY16 amount plus 1%
Labor	\$1,585,256	6.50	FWS	CVPRF	FWS FTE rate is based on agreed upon FY16 rate for all FWS CVPIA staff plus 3%, due to estimated inflation rate and anticipated step increases, subject to change.
Labor	\$487,771	2.00	FWS	CVPRF	FWS FTE rate is based on agreed upon FY16 rate for all FWS CVPIA staff plus 3%, due to estimated inflation rate and anticipated step increases, subject to change.
2018					
<i>Administration - This includes the USFWS and USBR Program Leads, USFWS Assistant Program Manager and USFWS CVPIA Program Manager.</i>					
Labor	\$501,978	2.00	FWS	CVPRF	FWS FTE rate is based on agreed upon FY16 rate for all FWS CVPIA staff plus 6% (3% for FY17 and 3% for FY18), due to estimated inflation rate and anticipated step increases, subject to change.
Labor	\$22,104	0.11	BOR	CVPRF	Based on FY17 FTE rate plus 1%
<i>Planning and Analysis - Lodi and Red Bluff Fish and Wildlife Office HRCs, Assistant HRCs and Hydrologist/Engineer</i>					
Agreement	\$434,954	n/a	FWS	CVPRF	Managed as a cooperative agreement between USFWS and CDFW. These positions are staffed out of CDFW Regions 1, 2, and 4. Based on FY17 amount plus 1%
Labor	\$1,631,428	6.50	FWS	CVPRF	FWS FTE rate is based on agreed upon FY16 rate for all FWS CVPIA staff plus 6% (3% for FY17 and 3% for FY18), due to estimated inflation rate and anticipated step increases, subject to change.

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
Labor	\$501,978	2.00	FWS	CVPRF	FWS FTE rate is based on agreed upon FY16 rate for all FWS CVPIA staff plus 6% (3% for FY17 and 3% for FY18), due to estimated inflation rate and anticipated step increases, subject to change.

b1 Feather River Oroville Wildlife Area flood stage reduction

b1 Feather River Oroville Wildlife Area flood stage reduction

Classification: Improvement, FloodPlain

Location: 39.423394,-121.623325, Feather River

Funding Years: 2017 - 2022

Benefits Start Year: 2018

Priority: - Large-scale project that currently has approximately 6.7M of the estimated 18.9M to implement. Permitting will be completed in FY16 and implementation can begin once funding is fully secured

Partners: CDFW, CDWR, Sutter Butte Flood Control Agency, American Rivers, California Wildlife Conservation Board

Related Programs: AFRP, CDFW, CDWR

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	~\$6.7M for the construction of the floodplain reconnection improvements

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Floodplain Habitat	150	acres	Acres of new seasonally-inundated floodplain rearing habitat
Off-Channel Habitat	12	acres	Acres of new perennial off-channel rearing habitat

Deliverables

<u>Date</u>	<u>Title</u>
Dec. 2018	Annual Report
Dec. 2019	Construction As-Built Drawing
Dec. 2019	Annual Report; Monitoring Report
Apr. 2018	Initial Construction Actions

Narrative

The Oroville Wildlife Area (OWA) FSR Project is located on the east side of the Feather River downstream of the City of Oroville in Butte County, California. The land is owned by California Department of Water Resources (DWR) and managed by the California Department of Fish and Wildlife (CDFW). The project area is ~1,500 acres and was one of the original borrow sites for the construction of Oroville Dam. Since that time, it has been hydraulically isolated from the main channel of the Feather River by constructed perimeter dikes. When high flows occur in the Feather River, water is diverted from the main channel into the OWA via an existing system of

inflow and outflow weirs. In addition to the flood control weir improvements, the project will degrade a section of the existing dike to reconnect the Feather River to its historic floodplain. The project incorporates invasive species removal, new riparian restoration plantings and floodplain grading modifications to enhance fish passage and to improve wetland and fish rearing habitat. The project was developed in coordination with and has the strong support of CDWR, CDFW, CVFPB, USFWS, NMFS, Butte County, SBFCA, American Rivers, and River Partners.

The project strongly aligns with the Core Team priorities for improving juvenile fish emigration, increasing rearing habitat, and reducing potential fish stranding for anadromous fish. The Project is supported by NMFS's 2014 recovery plan for Central Valley salmonids, specifically Feather River Recovery Actions FER-1.8 (implement projects that promote floodplain and riparian restoration), and FER-2.11 (evaluating pulse flow benefits). In regards to evaluating pulse flows for outmigration, the number of acres of new rearing habitat created with the project is directly tied to flow releases from Oroville and opportunity exists to coordinate or evaluate project actions with the potential benefits of pulse flows. The project also creates resiliency and refugia to help alleviate the sensitivity to low flow and warming stream conditions anticipated as part of future climate change. Monitoring efforts associated with the proposed Project will focus on (a) extent of floodplain inundation, (b) native fish use of the reconnected floodplain, and (c) control of both terrestrial and aquatic invasive plant species. The extent of reconnected floodplain will be analyzed using ortho-rectified aerial photography. Volitional access of native fish to the reconnected floodplain will be assessed by monitoring the numbers of native fish species entering and exiting the newly connected Project area. Native fish habitat usage monitoring will be conducted to characterize the abundance, occupancy patterns, and catch-per-unit-effort (CPUE) of native fish species throughout the reconnected floodplain in the Project area.

The OWA Project is scalable--depending on funding availability—and implementation is anticipated to begin in 2017 and conclude in 2019. The project will soon be 'shovel ready' with CEQA scheduled to be released for public review in summer 2016. AFRP will fund ~\$6.7M of the total \$18.9M Project cost. Approximately \$6.7M has been funded to date and construction funding is being pursued through various other programs. The Project has the ability to phase funding and some of the construction elements, if necessary.

Data Management

Tabular data associated with fish monitoring (e.g., area sampled, habitat type, and fish abundance), floodplain inundation (e.g., flood duration) and invasive species treatments (e.g., date of treatment) will be managed in relational databases by the Project Team. Spatial data associated with floodplain inundation (e.g., polygons of flood extents) and invasive species monitoring (e.g., polygons representing patches of invasive species) will be stored in an ArcSDE-based system. Copies will be made available to AFRP.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
This project has a very high likelihood of success (i.e., risk is low) because numerous agencies were directly involved in developing the details of the preferred project including: Sutter Butte Flood Control Agency, American Rivers, River Partners, CDWR, CDFW, CVFPB, NOAA Fisheries, and USFWS. The Project also has strong support from numerous other agencies including Butte County government and Golden Gate Fishermans Association.	1	1
The total cost of the Project is ~\$18.9M. About \$2.5M has been invested to-date by CDWR & WCB, and SBFCA has committed an additional \$4.2M towards the permitting and construction of the hydraulic elements. Probability of receiving additional funding is high (i.e., risk is low) due to the fact that all permitting and design efforts have been funded and the Project will soon be 'shovel-ready' for construction. The project team has experience in implementing large-scale civil improvement projects.	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$6,650,016	\$0	\$6,650,016
2018	CVPRF	\$109,604	\$0	\$109,604
2019	CVPRF	\$348,316	\$0	\$348,316

Total Cost: \$7,107,936

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Construction - Floodplain Reconnection and Improvements (3 independent tasks can be phased if necessary)</i>					
Agreement	\$1,805,498	n/a	FWS	CVPRF	Grading improvements to the existing OWA canals to maximize floodplain area and reduce fish stranding
Agreement	\$2,595,516	n/a	FWS	CVPRF	Construct new berm to prevent fish access/stranding in the southern part of the project area.

Type	Total	FTE	Agency	Fund	Description
Agreement	\$2,139,398	n/a	FWS	CVPRF	Degrade existing perimeter berm and reconnect OWA floodplain to the Feather River.
<i>Environmental Compliance and Permitting - Funding to support complete environmental compliance and permitting requirements for full project construction, monitoring and likely mitigation needs.</i>					
Agreement	\$65,720	n/a	FWS	CVPRF	Environmental permitting support during construction, monitoring, and mitigation.
<i>Management - Project Management</i>					
Agreement	\$43,884	n/a	FWS	CVPRF	Project management.
2018					
<i>Environmental Compliance and Permitting - Funding to support complete environmental compliance and permitting requirements for full project construction, monitoring and likely mitigation needs.</i>					
Agreement	\$65,720	n/a	FWS	CVPRF	Environmental permitting support during construction, monitoring, and mitigation.
<i>Management - Project Management</i>					
Agreement	\$43,884	n/a	FWS	CVPRF	Project management.
2019					
<i>Environmental Compliance and Permitting - Funding to support complete environmental compliance and permitting requirements for full project construction, monitoring and likely mitigation needs.</i>					
Agreement	\$65,720	n/a	FWS	CVPRF	Environmental permitting support during construction, monitoring, and mitigation.
<i>Management - Project Management</i>					
Agreement	\$43,884	n/a	FWS	CVPRF	Project management.
<i>Monitoring - Post-project Monitoring</i>					
Agreement	\$238,712	n/a	FWS	CVPRF	Monitoring efforts to measure project performance

b1 Feather River Sunset Pumps Sturgeon and Salmon Passage

Removal of Sunset Pumps Facilities and Improvements to Sutter-Butte Main Canal

Classification: Improvement, Fish Passage

Location: 39.247756 -121.636149, Feather River

Funding Years: 2017 - 2022

Benefits Start Year: 2018

Priority: 22 - Priority project that would provide fish passage for salmonids and sturgeon at a known passage barrier.

Partners: NMFS, Sutter Extension Water District, CDFW, CDWR

Related Programs: CDFW, CDWR

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	91.0%	\$2.75M over 5 or more years includes planning, design, permitting, and initial implementation and monitoring.
Administration	9.0%	CDWR has provided \$180K for project management including staff time and website services. SEWD has provided \$80K for initial designs. AFRP has provided \$20K for staff time and modeling. Future contributions from other sources totaling about \$18M are anticipated for full implementation.

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Habitat	28	miles	Access to this habitat will be increased.
Barrier Removal	1	number of improvements	One barrier will be removed.
Green Sturgeon	1	number of fish	Actually number of eggs. Large values will not save. See explanation in narrative.
Chinook Salmon	1	number of fish	Actually number of eggs. Large values will not save. See explanation in narrative.

Deliverables

<u>Date</u>	<u>Title</u>
Dec. 2018	Feasibility Study; Design Plans
Dec. 2019	Permits; Monitoring Reports
Dec. 2018	Annual Reports
Dec. 2022	Initial Construction Actions

Narrative

The Sunset Pumps dam (i.e., boulder weir) is operated by Sutter Extension Water District (SEWD) and spans the Feather River near Live Oak, California. It is a well-known, long-standing impediment to fish passage, most notably for spring-run Chinook salmon and green sturgeon. In addition to causing migratory delays to spring- and fall-run Chinook salmon adults and green sturgeon, acoustic tag data suggests that disorientation and predation near Sunset Pumps may decrease the survival of out-migrating juvenile Chinook salmon and steelhead. This multi-year project ultimately would entirely remove the Sunset Pumps facility (i.e., dam and pumps) from the Feather River, which is the best solution for improving fish passage as well as overall ecosystem function. In exchange, the capacity of the Sutter-Butte Main Canal would be increased, thereby maintaining SEWD's water supply.

Planning for this project has been ongoing since late 2014, with project management, modeling, and initial design and alternatives analyses facilitated or conducted by CDWR, USFWS, and SEWD staff. CDWR has established a SharePoint site to assist with project coordination. Initial modeling tasks addressing both the dam removal and canal modifications have been completed. A hydraulic model has been developed to provide an initial evaluation of sediment volume upstream of the dam, identify existing and post-project channel profiles, and determine effect on upstream diversions. Additionally, an analysis completed by GEI Consultants (contracted by SEWD) has conceptual-level recommendations that involve improving approximately 7.4 miles of canal. CVPIA funds are especially needed to complete planning, design, and permitting, and initiate monitoring and preliminary construction actions. Most of the construction and implementation costs are expected to be funded through large matching grants from the California Department of Fish and Wildlife Proposition 1 Restoration Fund and the Northern Sacramento Valley Integrated Regional Water Management Plan, which require significant matching funds and also that projects are 'shovel-ready' with designs and permits in hand. Implementation funding is also being pursued through the DWR Agricultural Water Use Efficiency, DWR IRWM, and DWR Water-Energy grant programs.

The removal of Sunset Pumps is specifically identified as a Core Team priority for both spring-run Chinook salmon and green sturgeon. This action would benefit these two listed species as well as other migratory fishes. The project addresses AFRP Final Restoration Plan/CPAR evaluation E5, 'Identify and remove physical and water quality barriers that impede access for white sturgeon and green sturgeon to spawning habitat or facilitate passage around these barriers.' The project is supported by NMFS's 2014 recovery plan for Central Valley salmonids, specifically Recovery Action FER-2.13, 'Modify Sunset Pumps to provide unimpeded upstream passage of adult steelhead and Chinook salmon (and sturgeon) and to minimize predation of juveniles moving downstream.' CDWR, CDFW, NMFS, USFWS, local water districts, and SEWD all enthusiastically support this project, which is the HRC's highest priority for the Feather River.

Explanation of fish population metrics:

Green Sturgeon: The number of females to successfully spawn is expected to increase by 100% (from 4 to 8). Average female has 142,000 eggs so an additional 568,000 green sturgeon eggs are expected to be produced per year.

Chinook salmon (spring- and fall-run combined): Pre-spawning mortality is expected to drop off by 50% from the average observed from the carcass surveys (from 20% to 10%). The 10% more spawning from an escapement of 48,000 is 4,800 male and female salmon, or 2,400 females x ~5,000 eggs/female = 12,000,000 additional salmon eggs are expected to be produced per year.

Data Management

Field data such as fish passage or count data, and data used for habitat assessment or hydrologic modeling will be recorded on data sheets or directly to a laptop computer, and later transcribed into a computer database or spreadsheet program. These data as well as model runs, project designs, permits, and reports will be stored on a computer hard drive and backed up on an agency or consulting firm server. Copies will be made available to AFRP.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
This project has a high likelihood of successful implementation (overall low risk) because multiple agencies (i.e., CDWR, CDFW, NMFS, and USFWS), local water districts, and the facility owner (SEWD) support it. The project does have a high cost, necessitating phased implementation. Potential adverse impacts related to e.g. flood control or sediment transport are expected to be minimal, and modeling should allow adjustment to the design or phasing of implementation to accommodate any concerns.	1	1
Full implementation will cost about \$20M and is expected to be funded through CDFW Prop 1 funds, the Northern Central Valley IRWMP, or the DWR Agricultural Water Use Efficiency, DWR IRWM, and DWR Water-Energy grant programs. Probability of funding is high (i.e., risk is low) because with the initial CVPIA funding, cost share and 'shovel-ready' requirements of these programs will be met.	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>	<u>DWR</u>
2019	CVPRF	\$657,200	\$0	\$657,200	\$0
2017	CVPRF	\$1,780,800	\$0	\$1,780,800	\$0
2018	CVPRF	\$657,200	\$0	\$657,200	\$0
2017		\$95,000	\$0	\$0	\$95,000
2018		\$95,000	\$0	\$0	\$95,000
2019		\$95,000	\$0	\$0	\$95,000

Total Cost: \$3,380,200

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Design - Feasibility Study and Design</i>					
Agreement	\$1,653,600	n/a	FWS	CVPRF	Feasibility study/alternatives assessment/draft and final designs for both removing the Sunset Pumps facility from the Feather River and modifying the Sutter-Butte Main Canal.
<i>Management - Project Management</i>					
Agreement	\$21,200	n/a	FWS	CVPRF	Supplemental project management funds.
In-Kind Labor	\$50,000	n/a	DWR		CDWR will provide funding to support project management and website services.
<i>Monitoring - Pre-project Monitoring</i>					
In-Kind Labor	\$45,000	n/a	DWR		CDWR pre-project fish monitoring--staff, boats, etc.
Agreement	\$106,000	n/a	FWS	CVPRF	Pre-project fish monitoring (acoustic tags and receivers).
2018					
<i>Environmental Compliance and Permitting - Environmental Compliance (CEQA, NEPA, etc.) and Permitting for Multiple Project Components</i>					
Agreement	\$530,000	n/a	FWS	CVPRF	Environmental compliance (CEQA, NEPA, etc.) and permitting for both

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
					removal of the Sunset Pumps facilities from the Feather River and improvements to the Sutter-Butte Main Canal.
<i>Management - Project Management</i>					
In-Kind Labor	\$50,000	n/a	DWR		CDWR will provide funding to support project management and website services.
Agreement	\$21,200	n/a	FWS	CVPRF	Supplemental project management funds.
<i>Monitoring - Pre-project Monitoring</i>					
Agreement	\$106,000	n/a	FWS	CVPRF	Pre-project fish monitoring (acoustic tags and receivers).
In-Kind Labor	\$45,000	n/a	DWR		CDWR pre-project fish monitoring--staff, boats, etc.
2019					
<i>Construction - Initial Construction Actions</i>					
Agreement	\$530,000	n/a	FWS	CVPRF	Start of initial modifications to Sutter-Butte Main Canal.
<i>Management - Project Management</i>					
Agreement	\$21,200	n/a	FWS	CVPRF	Supplemental project management funds.
In-Kind Labor	\$50,000	n/a	DWR		CDWR will provide funding to support project management and website services.
<i>Monitoring - Pre-project Monitoring</i>					
In-Kind Labor	\$45,000	n/a	DWR		CDWR pre-project fish monitoring--staff, boats, etc.
Agreement	\$106,000	n/a	FWS	CVPRF	Pre-project fish monitoring (acoustic tags and receivers).

b1 Green Sturgeon Juvenile Investigation

Green Sturgeon Juvenile Overwintering Migration Investigation (rev 4/16)

Classification: Reconnaissance, Reconnaissance
Location: , Sacramento Upper Mainstem
Funding Years: 2016 - 2021
Benefits Start Year: 2016
Priority: 6 - Very little is known about the early life history of green sturgeon so this project is a high priority. Collecting data will help to protect and recover this Threatened species.

Partners: USACE
Related Programs: NMFS-RP
Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	This initial study is meant to identify and characterize habitats used by juvenile green sturgeon so that potential habitat restoration actions can be developed to benefit the species, if possible. Long-term monitoring does not currently occur, but may be warranted depending on the outcome of this effort.

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Population Assessment	1	number of reports	

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2016	Annual Report
Sep. 2017	Annual Report
Sep. 2018	Annual Report
Sep. 2019	Final Report
Sep. 2015	Annual Report

Narrative

This information is critical to understanding the life-history and movement patterns of Green Sturgeon in the upper Sacramento River. Without this research, it is impossible to evaluate the potential effects of flow management and diversion operations. Additionally, this research will allow for assessment of potential habitat restoration to directly benefit Green Sturgeon and make progress toward achieving the doubling goal.

This project will help address one of the significant data gaps identified during the development of the sturgeon-specific decision support model. Anecdotal information suggests that juvenile green sturgeon may either migrate to the Bay/Delta within their first year of life or may remain higher in the Sacramento River for extended time periods. This study will document the occurrence and potentially the frequency and duration of these two different life-history strategies which will in turn provide significantly better estimates of survival and population dynamics to be incorporated into the modeling efforts. This information is critical to understanding the life-history and movement patterns of Green Sturgeon in the upper Sacramento River. Without this research, it is impossible to evaluate the potential effects of flow management and diversion operations. Additionally, this research will allow for assessment of potential habitat restoration to directly benefit Green Sturgeon and make progress toward achieving the doubling goal.

The primary objective is to determine if Sacramento River Green Sturgeon juvenile fish exhibit a secondary migration pattern during the fall to overwintering habitat lower in the river or in the Delta. RBFOW staff will determine when and where juvenile sturgeon migrate out of the upper Sacramento River and at what size. Data will result in the acquisition of critical life history information for population recovery planning and provide data to make better informed decisions on the effects of flow management, diversions and potential habitat restoration actions for a Threatened species. This pilot project will utilize the skills of 6 biologists/technicians working on this at a very small FTE each (i.e. 6 biologists/techs at two hours each day that sampling occurs). The staff will also be working on several other collateral monitoring efforts.

This project is considered a (b)(1) 'appropriate for project development' and meets Evaluation 10 for the Upper Sacramento River in the AFRP Final Restoration Plan. It is not a (b)(16) long-term research action. This pilot project would acquire gear and begin sampling in mid-August 2014. The FY 15 efforts resulted in data collection indicating feasibility of capturing juvenile green sturgeon that could be implanted with acoustic tags ranging from 60 to 365 days. This would allow in-river habitat use studies and overwintering migration study to be accomplished if similar sized individuals are captured in subsequent years. Throughout FY 15 to FY18, sampling of 'age 0' fish would occur. The Army Corps of Engineers may also become a supporter and collaborator. In the future, as a follow-up to this pilot project, additional funding sources may be sought.

Links to CVPIA Core Team FY17 priorities:

Green Sturgeon: Based on the priorities identified by the Sturgeon PWT and Sturgeon SAIL, the Core Team agrees that improving spawning and rearing habitat, reducing larval entrainment, and reducing diversions for adult green sturgeon are priorities for Green Sturgeon on the Sacramento, Yuba and Feather Rivers. - This charter represents data collection and analysis that will greatly inform future habitat improvement projects.

Data Management

Information developed by this charter will be stored at the USFWS Red Bluff Fish & Wildlife Office website: <http://www.fws.gov/redbluff/>

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Attaining research permits	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$274,195	\$0	\$274,195
2018	CVPRF	\$115,222	\$0	\$115,222
2019	CVPRF	\$111,127	\$0	\$111,127

Total Cost: \$500,544

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Research - Collecting data to learn more about the life history patterns of green sturgeon.</i>					
Labor	\$103,395	0.33	FWS	CVPRF	Based on RBFWO estimated FY16 FTE rate plus 2%. Will consist of small portions of time from multiple RBFWO staff
Equipment or Materials	\$170,800	n/a	FWS	CVPRF	Field equipment and additional support materials. Note: In April 2016, we added 132,000 for equipment purchase since NMFS did not fund this project in this year.
2018					
<i>Research - Collecting data to learn more about the life history patterns of green sturgeon.</i>					
Equipment or Materials	\$9,760	n/a	FWS	CVPRF	Field equipment and additional support materials
Labor	\$105,462	0.33	FWS	CVPRF	Based on RBFWO estimated FY17 FTE rate plus 2%. Will consist of small portions of time from multiple RBFWO staff

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2019					
<i>Research - Collecting data to learn more about the life history patterns of green sturgeon.</i>					
Labor	\$101,367	0.33	FWS	CVPRF	Based on RBFWO estimated FY16 FTE rate. Will consist of small portions of time from multiple RBFWO staff
Equipment or Materials	\$9,760	n/a	FWS	CVPRF	Field equipment and additional support materials

b1 Impacts of Marijuana Activity on Fish

A study that assesses the impact of marijuana cultivation on anadromous fish, with a focus on trespass grows, and develops quantifiable methods to document resource effects

Classification: Research, Reconnaissance

Location: 39.939085, -122.067342, Upper Sacramento and Tributaries

Funding Years: 2013 - 2019

Benefits Start Year: 2018

Priority: 5 - This project also addresses goals and objectives identified in the Anadromous Fish Restoration Plan (AFRP)(U.S. Fish and Wildlife Service 1995 and 2001), which is jointly implemented by USFWS and the Bureau of Reclamation. Actions and evaluations specifically addressed by this Project are as follows:

Central Valley-wide:

Action 2. Develop programs to educate the public about anadromous fish issues, such as the effects of poaching and environmental contaminants, especially contaminants in urban runoff.

Action 3. Reduce toxic chemical and trace element contamination.

Action 4. Provide additional funding for increased law enforcement to reduce illegal take of anadromous fish, stream alteration, and water pollution and to ensure adequate protection for juvenile fish at pumps and diversions.

Evaluation 8. Evaluate the direct and indirect effects of contaminants on production of anadromous fish.

Mill Creek

Action 2. Preserve the habitat productivity of Mill Creek through cooperative watershed management and development of a watershed strategy.

Butte Creek

Action 19. Develop land use plans that create buffer zones between the creek and agricultural, urban, and industrial developments; and restore, maintain, and protect riparian and spring-run Chinook salmon summer-holding habitat along Butte Creek.

Project addresses SIT and Core Team priorities for addressing impacts to spring-run Chinook salmon; can be used in all watersheds and for other species/runs.

SIT and Core Team priorities for spring-run Chinook salmon
2014 NMFS Recovery Plan for restoring spring-run Chinook

FY2017 is the last anticipated year of funding needed for this ONGOING effort.

Partners: SWRCB, USFS, CDFW, NPS

Related Programs: NMFS-RP, CALFED, EWP

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Threat Assessment	1	number of reports	Assessment project of the risks imposed by marijuana growing on anadromous fish populations
Quantifiable Impacts Assessment	1	number of models complete	Develop quantifiable effect methods for LE to use in prosecutorial processes

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2018	GIS Map and Data of marijuana distribution
Oct. 2015	Monitoring Committee Info
Jul. 2016	QAPP and Monitoring Plan
Sep. 2018	Final Report
Jul. 2015	Bibliography on marijuana Impacts

Narrative

The purpose of this multi-year study is to determine the potential impacts, and/or the degree of impact, to northern California aquatic resources, specifically listed anadromous fish, posed by marijuana cultivation activities. This information can also be used to develop a plan to reduce and/or remove the negative effect of marijuana cultivation on natural resources and/or to allow law enforcement to be more effective in prosecuting civil and criminal cases. Impacts of marijuana cultivation is a very high priority as an issue CV wide. Identified as an issue in the NMFS Recovery plan. This project, along with similar efforts in the Coastal Range of California have led to a much better understanding of the scope and impact of marijuana cultivation on fish and aquatic resources. It is expected that AFRP will use the results to develop restoration

projects in heavily impacted tributaries and that this initial effort will be of great value to the larger fish and aquatic habitat management and restoration community. This project is comprised of multiple phases due to the need to most effectively develop a robust and defensible study plan to address the multi-faceted issue created by the problem of legal and illegal marijuana cultivation. The objectives of the first phase include developing a study plan; developing a multi-agency team to provide input on the study design and also to facilitate coordination amongst agencies involved with the problem; creating and maintaining information on the study area and the extent of marijuana growing on the landscape; identifying and prioritizing area(s) of study. Future phases include field data collection, analysis and interpretation. Once the threats are defined, including those threats relative to other land use practices, the next step is to provide law enforcement personnel with the tools needed to better qualify and quantify the level of impact from growing marijuana in watershed with anadromy. Protocols will be developed to use in this step, for the benefit of land use managers. Additional goals are to better understand the effect of marijuana growing on anadromous fish at a range and/or population scale; identify and prioritize areas to protect or restore; and to develop a process by which this impact can be managed over a longer term.

Although this evaluation and pilot project is not directly called out in the AFRP Final Restoration Plan, it has become an extremely important topic and area of concern in the last several years. This funding is designed to investigate the problem and develop a protocol and potential immediate solutions to limit the impacts to fish and aquatic habitats when these detrimental sites are found. The results of these efforts will provide a highly valuable process for partners throughout the Central Valley to deal with this emerging issue. Partners on the existing project include several programs within CDFW.

Additional Products of the study:

- A) Develop usable maps and other supporting material to identify and define the study area.
- B) Create and maintain information on the study area that clearly articulates the various processes that are occurring in the watershed(s) which are relevant to the issue of illegal marijuana cultivation.

This includes historical and present information on land uses; water quality; fish populations; fish habitat quality, condition, and changes; etc.

- C) Once the threats are defined relative to other land-use activities, the next step is to accompany law enforcement personnel to secured marijuana fields to measure water quality and physical habitat impacts using standardized procedures.

This project addresses the Core Team and SIT priorities as it relates to spring-run Chinook, SRCS streams

(Mill Creek, Deer Creek) and steelhead habitat/populations. This information can also be used to assess impact to fall-run Chinook at lower elevations.

Data Management

Information developed by this project will be housed in the Red Bluff FWO office, the Red Bluff Fisheries office of CDFW, and the GIS section of CDFW Region 1 in Redding, as appropriate. GIS products may also be shared with the State Water Resources Control Board.

This study will be gathering baseline information at established study locations, which can be revisited in the future to assess change. That will be coupled with reference study sites that have already had data collected at them as part of the Surface Water Ambient Monitoring Program (SWAMP) in years prior to this study. Fish population assessment has already been occurring in the same area for a number of years and will continue; the SWRCB will be initiating a long-term trend analysis of water quality parameters in these and adjacent watersheds, starting in 2017. All data collection efforts are being implemented in a statistically 'responsible' manner in that they are implemented with the assistance of statisticians within the state and federal government, along with academia.

Contacts:

Jim Harrington, CDFW

Tricia Bratcher, CDFW

Trey Sherrell, RWQCB

Literature compilation is extensive and is available upon request.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Landowner access permission	1	1
Exposure to hazardous materials and/or conditions	2	2

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2013	CVPRF	\$81,232	\$0	\$81,232
2014	CVPRF	\$86,491	\$0	\$86,491
2015	CVPRF	\$172,410	\$0	\$172,410
2016	CVPRF	\$116,388	\$0	\$116,388
2017	CVPRF	\$116,388	\$0	\$116,388

Total Cost: \$572,909

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2013					
<i>Monitoring - Monitoring in future phases</i>					
Agreement	\$81,232	n/a	FWS	CVPRF	Initial funds to start study; funds used for sci aide time, equipment, and pilot monitoring project. Funds to CDFW: \$72035
2014					
<i>Monitoring - Monitoring in future phases</i>					
Agreement	\$86,491	n/a	FWS	CVPRF	Funding added to implement full study portion. Funds to CDFW: 75976
2015					
<i>Monitoring - Monitoring in future phases</i>					
Agreement	\$86,206	n/a	FWS	CVPRF	New agreement; will be used to implement final phases of monitoring. Funds to CDFW 76723
Agreement	\$86,205	n/a	FWS	CVPRF	Funds to implement year 2 of study; funds to CDFW 76722
2016					
<i>Monitoring - Monitoring in future phases</i>					
Agreement	\$116,388	n/a	FWS	CVPRF	Continue ongoing agreement to refine monitoring and reporting protocols.
2017					
<i>Monitoring - Monitoring in future phases</i>					
Agreement	\$116,388	n/a	FWS	CVPRF	Continue ongoing agreement to refine monitoring and reporting protocols. Final Report.

b1 Merced River Instream & Off-Channel Drought-Resilient Habitat Rehabilitation

Large scale in-channel, floodplain and riparian habitat restoration project.

Classification: Improvement, Habitat Restoration

Location: 37.516533, -120.373430, Merced River

Funding Years: 2015 - 2020

Benefits Start Year: 2016

Priority: 16 - Program Priority Comments: ONGOING project follows the successful implementation of the Merced River Ranch and Henderson Park projects immediately downstream and has received initial funding for design and permitting under the California Drought Response funding opportunities.

Partners: Cramer Fish Sciences, MID, CDFW, CDWR

Related Programs: California Drought Response

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Stream Channel Restored	1	miles	0.66 miles of river channel (value is rounded up to 1, as decimals not possible to enter)
Floodplain/Off-Channel/Riparian Corridor Improvements	27	acres	26.7 acres of riparian and upland habitat (value is rounded up to 27, as decimals not possible to enter)

Deliverables

<u>Date</u>	<u>Title</u>
Jul. 2018	2018 Annual Post-Project Monitoring Report (Effectiveness & Validation Monitoring)
Jan. 2016	Permitting & Environmental/Regulatory Compliance
Jan. 2016	Project Designs (from alternate funding source: CA Drought Response)
Feb. 2016	Restoration Monitoring Plan (Implementation, Effectiveness, & Validation Monitoring)
Oct. 2016	Construction Summary Report (As-Built Surveys/Implementation Monitoring)
Jul. 2017	2017 Annual Post-Project Monitoring Report (Effectiveness & Validation Monitoring)

Narrative

Initial analysis and design for this project has been funded (approximately \$98,100) via California Drought Response Funding.

CVPIA Funding is requested in order to attain all necessary permitting requirements, and complete construction of this project, located just upstream of the Merced River Ranch Project (a recently completed, large-scale, AFRP project). Construction designs and all permitting requirements must be completed before onset of construction, which would occur in the summer of 2016. This project would rehabilitate spawning and rearing habitat for Chinook salmon and O. mykiss impacted by mining and other modifications to the natural geomorphological processes, and further exacerbated by the recent drought. To effectively meet these goals, this project will take into account the current managed flow regime of the lower river.

The Project goals are as follows:

- Augment, rehabilitate, and enhance productive Merced River juvenile salmonid rearing and adult spawning habitat that is resilient to drought conditions;
- Enhance juvenile salmonid access to historic floodplain habitat;
- Reduce main channel habitats potentially conducive to invasive fish species;
- Create additional flooding capacity, improving flood management in wet years
- Address goals of existing recovery plans and work synergistically with existing restoration efforts;
- Improve community opportunities to participate in, learn about, and support salmonid habitat restoration that is resilient to present and future drought conditions.

This project will generate a restoration design that will re-grade and rehabilitate approximately 26.7 acres of dredger tailings on the historic floodplain and 0.66 linear miles (13 acres) of in-channel salmonid spawning, incubation and rearing habitat in the lower Merced River. The floodplain will be graded and floodplain material will be screened to appropriate Chinook salmon and O. mykiss spawning size classes (¼ to 5 in. of round river rock, as per AFRP recommendations). The Project will create a variety of terrestrial and aquatic habitats, including oak grassland; floodplain; gravel bars; and side channels that function under a variety of flow conditions, including those that occurred over the recent drought period. These constructed features will support a variety of ecological services, including salmonid spawning and rearing habitats and improve water quality, including temperature and dissolved oxygen under low flow conditions.

Links to CVPIA Core Team FY17 priorities:

Fall-run Chinook: Based on the priorities identified by the SIT, the Core Team agrees that the following are priorities for fall-run Chinook salmon:

- Improve Juvenile Rearing Habitat - Sacramento, Yuba, Feather, American, Calaveras, Mokelumne, Merced, Tuolumne, Stanislaus and San Joaquin Rivers and the Delta;

Data Management

All data files and documents associated with permitting requirements, construction designs, agreements, etc., will be housed at USFWS Lodi Office.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Permitting related to surface mining (tailing pile processing) - should not be a significant issue as permitting process was worked out on Merced River Ranch project	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>	<u>DFW</u>
2016	CVPRF	\$312,912	\$0	\$312,912	\$0
2017	CVPRF	\$296,800	\$0	\$296,800	\$0
2018	CVPRF	\$296,800	\$0	\$296,800	\$0
2015		\$98,100	\$0	\$0	\$98,100

Total Cost: \$1,004,612

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2015					
<i>Planning and Analysis - CA Drought Funding for project analysis, design and initial permitting.</i>					
Agreement	\$98,100	n/a	DFW		Project received initial funding for analysis, design and initial permitting under CA Drought Funding initiative
2016					
<i>Implementation - Permit, construct, and monitor the project (Year 1 of implementation).</i>					
Agreement	\$312,912	n/a	FWS	CVPRF	Designs funded in 2015 through a California state grant (drought funding), and are already in place for the project. AFRP to fund the cost of permitting (presumably), construction of the project in 2016, and development of a Monitoring Plan. Likely to be State contributions (amount unknown).

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Implementation - Continued project implementation in Year 2 for the project (if necessary): any undated/additional project designs, planning/permitting requirements, or any additional construction for the project.</i>					
Agreement	\$212,000	n/a	FWS	CVPRF	If needed in Year 2 (2017) of the project: any additional designs, permits/environmental compliance, or construction associated with the project first implemented in 2016. All assumed reporting (deliverable) costs included here. Likely to be State contributions (amount unknown).
<i>Monitoring - Year 2 post-project monitoring</i>					
Agreement	\$84,800	n/a	FWS	CVPRF	Post-project monitoring (cont.) in Year 2 after the project was implemented (in 2016), and report on findings. Post-construction surveys, fish monitoring, and assessment of habitat quantity and quality. Likely to be State contributions (amount unknown).
2018					
<i>Implementation - Continued project implementation in Year 3 for the project (if necessary): any undated/additional project designs, planning/permitting requirements, or any additional construction for the project.</i>					
Agreement	\$212,000	n/a	FWS	CVPRF	If needed in Year 2 (2017) of the project: any additional designs, permits/environmental compliance, or construction associated with the project first implemented in 2016. All assumed reporting (deliverable) costs included here. Likely to be State contributions (amount unknown).
<i>Monitoring - Year 3 post-project monitoring</i>					
Agreement	\$84,800	n/a	FWS	CVPRF	Post-project monitoring (continued) in Year 3 (2018) after the project was implemented (in 2016), and report on findings. Post-construction surveys, fish monitoring, and assessment of habitat quantity and quality. Likely to be State contributions (amount unknown).

b1 Migratory Corridor Rehabilitation

Restore shallow water migratory habitat for juvenile salmonids in the Stanislaus River downstream of Riverbank.

Classification: Improvement, Habitat Restoration

Location: 37.742232, -120.942911, Stanislaus River

Funding Years: 2016 - 2024

Benefits Start Year: 2019

Priority: 15 - ONGOING AFRP would work in close coordination with the (b)(13) provision and other partners working further upstream in the Stanislaus River to expand high quality migratory habitat downstream of Riverbank and protect and enhance the natural production of salmonids in the system.

Partners: No Data.

Related Programs: No Data.

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	The actual design and implementation approach of these potential projects is yet to be determined and significant research and assessment into the condition of existing habitats, sites available to complete projects and specific needs of juvenile salmonids in these areas needs to be determined as part of the initial phase of this project. As projects are identified and designed, some specific sites may be most appropriately funded under the (b)(1) or (b)(13) provision in the future.

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
b1(other): Area of hab prot and rest (acres)	0	miles	placeholder until designs are complete
b1(other): Area of hab prot and rest (acres)	0	acres	placeholder until designs are complete

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2017	Preliminary conceptual designs
Jun. 2018	Final Design
Jun. 2018	Permits
Dec. 2021	Final Report

Narrative

Restore shallow water migratory habitat for juvenile salmonids on the Stanislaus River downstream of Riverbank. Potential sites have been identified, and landowners will be contacted to determine interest prior to submission of an RFP or RFQ. Projects will provide crucial rearing habitat for out-migrating juvenile salmonids before they enter the San Joaquin River and Delta.

Links to CVPIA Core Team FY17 priorities:

Fall-run Chinook: Based on the priorities identified by the SIT, the Core Team agrees that the following are priorities for fall-run Chinook salmon:

- Improve Juvenile Rearing Habitat - Sacramento, Yuba, Feather, American, Calaveras, Mokelumne, Merced, Tuolumne, Stanislaus and San Joaquin Rivers and the Delta;

Project will also benefit steelhead

Data Management

Data will be housed on the Lodi FWO server.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
landowner support/access	2	2

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$975,200	\$0	\$975,200
2016	CVPRF	\$381,600	\$0	\$381,600
2018	CVPRF	\$286,200	\$0	\$286,200

Total Cost: \$1,643,000

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2016					
<i>Design - Three conceptual designs</i>					
Agreement	\$106,000	n/a	FWS	CVPRF	A grant or cooperative agreement will be completed with a qualified entity to design juvenile salmonid habitat improvements at priority sites with

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
					willing landowners in the lower Stanislaus River (downstream of Riverbank).
<i>Environmental Compliance and Permitting - Acquire all necessary permits</i>					
Agreement	\$106,000	n/a	FWS	CVPRF	A grant or cooperative agreement will be completed with a qualified entity to complete necessary environmental compliance and permitting documents related to juvenile salmonid habitat improvements in the lower Stanislaus River (downstream of Riverbank).
<i>Inventory/Reconnaissance - Pre-project topographic and biological surveys.</i>					
Agreement	\$106,000	n/a	FWS	CVPRF	A grant or cooperative agreement will be completed with a qualified entity to complete pre-project surveys related to juvenile salmonid habitat improvements in the lower Stanislaus River (downstream of Riverbank).
<i>Management - Manage the project</i>					
Agreement	\$10,600	n/a	FWS	CVPRF	A grant or cooperative agreement will be completed with a qualified entity to identify willing landowners at priority sites, design and implement juvenile salmonid habitat improvements in the lower Stanislaus River (downstream of Riverbank).
<i>Outreach - Inform and solicit input from local residents and additional stakeholders.</i>					
Agreement	\$53,000	n/a	FWS	CVPRF	A grant or cooperative agreement will be completed with a qualified entity to perform local outreach and education related to juvenile salmonid habitat improvements in the lower Stanislaus River (downstream of Riverbank).
2017					
<i>Construction - Build the project.</i>					
Agreement	\$795,000	n/a	FWS	CVPRF	A grant or cooperative agreement will be completed with a qualified entity to implement juvenile salmonid habitat improvements in the lower Stanislaus River (downstream of Riverbank).

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
<i>Management - Manage the project</i>					
Agreement	\$21,200	n/a	FWS	CVPRF	A grant or cooperative agreement will be completed with a qualified entity to identify willing landowners at priority sites, design and implement juvenile salmonid habitat improvements in the lower Stanislaus River (downstream of Riverbank).
<i>Monitoring - Post-project assessments including: as-built surveys, flow measurement, vegetation measurement, biological surveys for salmonids and salmonid food species.</i>					
Agreement	\$106,000	n/a	FWS	CVPRF	A grant or cooperative agreement will be completed with a qualified entity to monitor and assess effectiveness of recently implemented juvenile salmonid habitat improvements in the lower Stanislaus River (downstream of Riverbank).
<i>Outreach - Inform and solicit input from local residents and additional stakeholders.</i>					
Agreement	\$53,000	n/a	FWS	CVPRF	A grant or cooperative agreement will be completed with a qualified entity to perform local outreach and education related to juvenile salmonid habitat improvements in the lower Stanislaus River (downstream of Riverbank).
2018					
<i>Management - Manage the project</i>					
Agreement	\$47,700	n/a	FWS	CVPRF	A grant or cooperative agreement will be completed with a qualified entity to identify willing landowners at priority sites, design and implement juvenile salmonid habitat improvements in the lower Stanislaus River (downstream of Riverbank).
<i>Monitoring - Post-project assessments including: as-built surveys, flow measurement, vegetation measurement, biological surveys for salmonids and salmonid food species.</i>					
Agreement	\$212,000	n/a	FWS	CVPRF	A grant or cooperative agreement will be completed with a qualified entity to monitor and assess effectiveness of recently implemented juvenile salmonid habitat improvements in the lower

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
					Stanislaus River (downstream of Riverbank).
<i>Reporting - Final project completion report including post-project assessment.</i>					
Agreement	\$26,500	n/a	FWS	CVPRF	A grant or cooperative agreement will be completed with a qualified entity to produce final reports related to juvenile salmonid habitat improvements in the lower Stanislaus River (downstream of Riverbank).

b1 Mill Creek Fish Passage - Upper Dam Project

New fish ladder & screen at Upper Dam on Mill Creek

Classification: Improvement, Fish Passage

Location: 40.054788, -122.031971, Mill Creek

Funding Years: 2016 - 2021

Benefits Start Year: 2016

Priority: 4 - This last phase, construction/implementation, of a three-phase project will meet the Core Team Priority to 'improve passage and survival of SCS adults and juveniles on Mill Creek'. It will finalize AFRP & interagency efforts since 2012 to design and permit this fish passage facility.

Partners: The Nature Conservancy (TNC)

Related Programs: NMFS-RPAs, AFRP, CDFW

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Water diverted and successfully screened	50	cfs	The metric of cfs is used for this fish screen. (Although improvements would be better quantified with 'number of juvenile fish successfully passing'.)
Fish passage barrier removed	1	number of improvements	The upstream fish passage barrier at the old fish ladder will be remedied with the new ladder. Each year, based on juvenile survival, ocean conditions, harvest, etc. a varying number of adult fish will migrate upstream an additional five miles at this new facility.

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2021	Final Report

Narrative

Mill Creek in Tehama County is one of three key watersheds for spring-run Chinook Recovery in the Central Valley. Its steelhead habitat is also considered important, as per the 2014 NMFS Recovery Plan, and it provides critical habitat for fall-run Chinook salmon. Many restoration actions have occurred to improve this watershed, due to the efforts of resources agencies and entities such as TNC, the Mill Creek Conservancy, DWR, and Los Molinos Mutual Water

Company. The need to address passage over dams is nearly complete; Upper Dam is the final diversion structure that requires a fish passage improvement solution. Funding is required for construction at this site.

This project directly addresses the CVPIA and AFRP goals of addressing fish passage and the CVPIA, AFRP, SIT, and the Core Team priorities of fish passage and the needs of listed species (spring-run Chinook, CV steelhead).

Upper Dam is a concrete structure and is located on Mill Creek about 5.4 miles upstream of its confluence with the Sacramento River. The primary deficiencies of the existing ladder and screen include inadequate freeboard on the fish way walls, and inadequate pool volume for energy dissipation. The proposed design will replace the existing fish way with a wider and longer half chute-and-pool fish way. The fish screen facility will be at an on-canal location about 50 feet downstream of the dam, and the juvenile bypass pipe will be replaced. The diversion channel will extend further upstream with a fish fence placed across the channel entrance to help prevent entrainment of adult salmonids. Designs and permits will be completed by September 2016.

The project directly addresses migration needs of anadromous salmonids. Specific performance metrics addressed all revolve around fish passage.

The prediction of project outcome is to provide unimpeded fish passage at all flow ranges, for all anadromous salmonids and their life stages.

The project costs are comparable to other local fish passage projects. It will be somewhat unique in that there are not many diversions with a Chevron screen design in northern California, so there is great potential for it to provide critical information on the success of that type of screening alternative. Costs are based upon a 90% design.

Other than administrative types of costs and monitoring, the funding all goes towards on--the-ground restoration.

It has high levels of community support.

One additional metric of measurement for this project beyond what is already identified elsewhere in the charter is the degree to which fall-run Chinook can access areas above this dam currently, as they are nearly completely blocked until irrigation diversion ceases in the late fall. The mode of measurement can be amount of suitable habitat used by fish in this context. The DSM model also contains information on the number of diversions in each watershed that somehow impede salmon; this is one of them that will be directly addressed, thereby improving the conditions for fish in this watershed and positively changing the DSM model.

The impacts of not doing the charter will be to damage the existing relationship between the diverters and resource agencies; much time and effort on the part of local coordinators went into getting to a final design and proceeding with the project. The larger impact will be continue impediment to multiple species/runs of anadromous fish, two of which are listed species.

There are no known objections to this project.

Data Management

The objective of the project is to improve passage. Short term monitoring includes as-built design, photo monitoring, and pre-project data collection of instream conditions and fish passage conditions at, above, and below the dam. Physical measurements include instream passage conditions through the new fish passage structure, which conceivably can be translated into fish passage accessibility (e.g. number of miles of habitat opened).

The project will be monitored over the long-term via maintenance commitments that Los Molinos Mutual Water Company (LMMWC) will make via the permitting process. In addition, CDFW monitors both above and below this location to assess spring-run and steelhead passage and fall-run Chinook spawning behavior, including use of a video monitoring system at Ward Dam, a downstream diversion site. The screens will likely be maintained by CDFW, thereby creating another mechanism to measure project success. Channel changes/fluctuations both above and below Upper Dam will be monitored via Mark Gard (USFWS/AFRP engineering support); data includes photo monitoring, longitudinal profiles, and cross section data.

Video monitoring could potentially be conducted in such a way as to assess any potential delay experienced by the fish as they encounter the new fish passage structure at this dam. This can be translated, via review of literature, into a quantified figure for fish numbers/number of spawning pairs/individuals.

The Memo from CVPIA Core Team on Priority Recommendations (March 8, 2016) clarifies that this project is a priority for Spring Chinook: 'Based on the priorities identified by spring-run Chinook salmon experts from NMFS and CDFW, the Core Team recommends that improving passage and survival for adults and juveniles on Deer, Mill, and Butte Creeks through increased flows and barrier reductions are all priorities for Spring-run Chinook Salmon.'

Of the six elements that the Core Team considers for Charters: the Mill Creek watershed: 1) is a watershed with an identified priority action; 2) the project would benefit multiple ESA listed species (e.g. Spring Chinook, steelhead); 3) the project would benefit multiple species (e.g. salmon, steelhead and lamprey); 4 and 5) there isn't a cost-share but there is a long-term partnership with the irrigation district and a lot of coordination with other restoration efforts; 6) This is also a project that address DSM modules identified as having high uncertainty.

In terms of a prediction of project outcome, a relationship of the number of out-migrating juvenile salmonids captured at the rotary screw trap near the project site could be enumerated, on an annual basis, and correlated to the number of adult fish returning three years later. The improvements for fish passage at this diversion site would show a correlation between improved juvenile fish passage (i.e. a shorter transit time in the irrigation ditch before returning to the stream channel). Also, ocean conditions and other sources of mortality throughout the life history of the fish would be taken into consideration. It will be difficult, but not impossible, to provide quantitative temporal predictions of expected project outcomes due to the three years between juvenile outmigration and future generation returns. An objective would be to see a 25% increase

in juvenile out-migrants three years after the management action is completed, i.e. the project construction is completed. In reality, due to fluctuations in ocean conditions, instream conditions, etc., at least three generations of cohorts (9 years) would need to be monitored to achieve this short-term objective by monitoring biological response to this management action.

The final report will be stored at www.fws.gov/redbluff/

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Willingness of owners	1	1
Env Permit Completion	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>	<u>DFW</u>
2017	CVPRF	\$3,000,000	\$0	\$3,000,000	\$0
2017		\$40,000	\$0	\$0	\$40,000
2018		\$40,000	\$0	\$0	\$40,000
2019		\$40,000	\$0	\$0	\$40,000
2020		\$40,000	\$0	\$0	\$40,000
2021		\$40,000	\$0	\$0	\$40,000

Total Cost: \$3,200,000

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Construction - This project is ready to implement as soon as funds for construction are received. The structure owner and adjacent landowner/s are amenable to this project being completed, the designs, permits and environmental compliance documents will be completed imminently - by Sept 2016.</i>					
Agreement	\$3,000,000	n/a	FWS	CVPRF	Implementation of this project at Upper Dam on Mill Creek is the culmination of several years of effort by AFRP staff, a Technical Team, and consultants who have worked through engineering alternatives analysis, selection and design concurrent with completion of environmental permitting/compliance.

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
<i>Monitoring - CDFW Fisheries Staff will perform pre- and post-project monitoring to assess adult Spring-run Chinook, steelhead and Fall run Chinook migration and spawning behaviors. Data from the CDFW video monitoring at Ward Dam fish ladder, a few miles downstream, will be assessed to extrapolate upstream passage estimates and timing of upstream passage.</i>					
In-Kind Labor	\$40,000	n/a	DFW		CDFW Fisheries Staff will perform pre- and post-project monitoring to assess adult Spring-run Chinook, steelhead and Fall-run Chinook migration and spawning behaviors.
2018					
<i>Monitoring - CDFW Fisheries Staff will perform pre- and post-project monitoring to assess adult Spring-run Chinook, steelhead and Fall run Chinook migration and spawning behaviors. Data from the CDFW video monitoring at Ward Dam fish ladder, a few miles downstream, will be assessed to extrapolate upstream passage estimates and timing of upstream passage.</i>					
In-Kind Labor	\$40,000	n/a	DFW		CDFW's annual fish passage, spawning surveys and behavior observations of salmon migrating in Mill Creek will serve as baseline information that can later be used to compare the differences with the new fish ladder in place.
2019					
<i>Monitoring - CDFW Fisheries Staff will perform pre- and post-project monitoring to assess adult Spring-run Chinook, steelhead and Fall run Chinook migration and spawning behaviors. Data from the CDFW video monitoring at Ward Dam fish ladder, a few miles downstream, will be assessed to extrapolate upstream passage estimates and timing of upstream passage.</i>					
In-Kind Labor	\$40,000	n/a	DFW		CDFW's annual fish passage, spawning surveys and behavior observations of salmon migrating in Mill Creek will serve as baseline information that can later be used to compare the differences with the new fish ladder in place.
2020					
<i>Monitoring - CDFW Fisheries Staff will perform pre- and post-project monitoring to assess adult Spring-run Chinook, steelhead and Fall run Chinook migration and spawning behaviors. Data from the CDFW video monitoring at Ward Dam fish ladder, a few miles downstream, will be assessed to extrapolate upstream passage estimates and timing of upstream passage.</i>					
In-Kind Labor	\$40,000	n/a	DFW		CDFW's annual fish passage, spawning surveys and behavior observations of salmon migrating in Mill Creek will

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
					serve as baseline information that can later be used to compare the differences with the new fish ladder in place.
2021					
<i>Monitoring - CDFW Fisheries Staff will perform pre- and post-project monitoring to assess adult Spring-run Chinook, steelhead and Fall run Chinook migration and spawning behaviors. Data from the CDFW video monitoring at Ward Dam fish ladder, a few miles downstream, will be assessed to extrapolate upstream passage estimates and timing of upstream passage.</i>					
In-Kind Labor	\$40,000	n/a	DFW		CDFW's annual fish passage, spawning surveys and behavior observations of salmon migrating in Mill Creek will serve as baseline information that can later be used to compare the differences with the new fish ladder in place.

b1 North Fork Battle Creek Natural Barrier Removal

North Fork Battle Creek Natural Barrier Removal

Classification: Improvement, Fish Passage

Location: 40.4253608, -121.91715596, Battle Creek

Funding Years: 2015 - 2019

Benefits Start Year: 2017

Priority: 13 - Identified as a winter Chinook priority in the CVPIA Core Team Priority Recommendations memo for 2017, Final Restoration Plan, NMFS Recovery Plan, part of RPA action I.2.6, highest priority for Battle Creek Working Group and received 2014 Emergency Drought Funding from State

Partners: Battle Creek Working Group

Related Programs: California Drought Response

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Fish Passage	2	number of improvements	Improvement of passage at the two barriers would greatly contribute to the restoration and recovery of listed salmonids
Fish Passage	100	percentage of fish	Improvement of passage at the two barriers would greatly contribute to the restoration and recovery of listed salmonids
b1 actions	1	number of actions	High Priority Action identified in Final Restoration Plan

Deliverables

<u>Date</u>	<u>Title</u>
Dec. 2016	Fish passage evaluation report
Dec. 2017	Permits acquired
Dec. 2019	Barriers Removed

Narrative

Large boulders in North Fork Battle Creek form natural barriers that impede upstream passage of salmon and steelhead. Although much effort has gone into improving fish passage in Battle Creek at several hydropower diversion dams (i.e. Wildcat Dam has been removed and Eagle Canyon dam and North Battle Creek Feeder Dam have new fish ladders & screens) fish are

unable to migrate upstream as envisioned for the Battle Creek Salmon and Steelhead Restoration Project (Restoration Project). The Adaptive Management Plan for the Restoration Project (RPA Action I.2.6) calls for the Resource Agencies to provide funding to monitor, evaluate and physically modify natural barriers. Of particular concern are the barriers on the North Fork of Battle Creek downstream of Eagle Canyon Dam (at River Mile 4.46 and RM 5.06), and a new barrier just upstream of Eagle Canyon Dam (at RM 5.41). These barriers prevent the access to the two new fish ladders. This action is particularly important during the drought which is resulting in high mortality of winter Chinook in the Sacramento River. The action would allow winter Chinook to access habitat required for re-introduction and eventually recovery.

Improving passage at natural barriers in Battle Creek is qualified as a winter-run Chinook priority in the CVPIA Core Team Priority Recommendations memo for 2017. Winter-run priorities in Battle Creek include: (1) improving fish passage, flow conditions, and water temperatures to provide suitable winter-run habitat in the North Fork; and (2) advancing efforts to reintroduce winter-run to the North Fork. This action works towards meeting both priorities. NMFS Recovery Plan, part of RPA action I.2.6, highest priority for Battle Creek Working Group, received 2014 Emergency Drought Funding from State. The action benefits multiple listed species, has cost sharing with the Restoration Project, ERP, Iron Mountain Mine Trustee Council, RPA monitoring funding from BOR and CDFW Drought Relief Funds. Part of a long-term partnership including a 1999 MOU between BOR, FWS, CDFW, NMFS and PG&E.

Drought relief funding received by the Department of Fish and Wildlife in 2015 will fund studies and designs to improve fish passage. A passage study using telemetry was funded by CVPIA in FY 2016. This request for funding is for permitting and implementation of barrier modifications.

The FWS is conducting natural barrier surveys as part of the long-term adaptive management process documented in the 2004 Battle Creek Restoration Project Adaptive Management Plan. Full life cycle modeling conducted for the Coleman National Fish Hatchery Adaptive Management Plan, found that improving passage at the natural barriers was essential to the success of winter Chinook reintroduction in Battle Creek. The quantitative target for the action is to provide 100% passage at the natural barriers as determined by telemetry studies planned to occur after the restoration project is complete. It is anticipated that many salmonids will volitionally remain downstream of the barriers.

Data Management

All data associated with the project will be stored at the Red Bluff Fish and Wildlife Office. Completed annual reports will be stored at: <http://www.fws.gov/redbluff/>

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Initial investigation by DFW may be delayed	2	2
Landowner may not permit access or permission to later barriers	2	2

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Geologic uncertainties	2	2

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>	<u>DFW</u>
2016		\$900,000	\$0	\$0	\$900,000
2017	CVPRF	\$106,000	\$0	\$106,000	\$0
2018	CVPRF	\$530,000	\$0	\$530,000	\$0
2016	CVPRF	\$123,471	\$0	\$123,471	\$0

Total Cost: \$1,659,471

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2016					
<i>Environmental Compliance and Permitting - After the project description is developed, the various environmental compliance and permitting documents will need to be pursued. For example NEPA/CEQA, ESA/CESA, Section 106 (cultural resources), Clean Water Act Section 401 and 404, and Flood Protection Board.</i>					
Agreement	\$900,000	n/a	DFW		Up to 900,000.00 of CDFW drought funding provided for Battle Creek is being used on this project to assess the existing situation and design restoration.
<i>Inventory/Reconnaissance - Geologic, hydraulic and radio telemetry evaluations of fish passage at various flows will need to occur as part of the design.</i>					
Labor	\$123,471	0.41	FWS	CVPRF	This includes multiple staff from the Red Bluff Fish and Wildlife Office. Staff will implement a radio telemetry study to evaluate fish passage alternatives at natural barriers in North Fork Battle Creek. Requires additional labor beyond what is currently funded via CVPIA admin for RBFWO staff.

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Environmental Compliance and Permitting - After the project description is developed, the various environmental compliance and permitting documents will need to be pursued. For example NEPA/CEQA, ESA/CESA, Section 106 (cultural resources), Clean Water Act Section 401 and 404, and Flood Protection Board.</i>					
Agreement	\$106,000	n/a	FWS	CVPRF	Contract for environmental compliance and permitting
2018					
<i>Implementation - Following receiving all of the necessary permits, the project will be implemented to allow upstream passage of adults and downstream passage of juvenile salmonids.</i>					
Agreement	\$530,000	n/a	FWS	CVPRF	Contract will implement fish passage improvements identified in 2015 CDFW contract for studies and designs.

b1 Sacramento River Tisdale Weir sturgeon and salmonid passage

Reducing or eliminating opportunities for fish to be stranded in the stilling basin and throughout Tisdale bypass

Classification: Improvement, Fish Passage
Location: 39.02489, -121.82191, Sacramento Lower Mainstem
Funding Years: 2017 - 2022
Benefits Start Year: 2018
Priority: -
Partners: CDFW, CDWR
Related Programs: AFRP, CDFW
Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	\$2.65M over 5 or more years includes planning, design, permitting, and construction.

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Habitat	4	miles	Improved access to the Sutter Bypass West Borrow and to the Sacramento River to eliminate adult and juvenile stranding.
Passage Barrier Improved	1	number of actions	

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2019	Designs and Permits
Dec. 2018	Feasibility Study
Dec. 2018	Annual Report

Narrative

Tisdale Weir overflowed multiple times each year from 1991-2005 except during 1994. Overflow events during those years were most common in January - March, but occurred as early as November and as late as June (ICF Jones & Stokes 2008). It is unlikely that upstream passage at the Tisdale Weir occurs during most flood events as a result of the physical dimensions of the weir (11 feet high) and inadequate hydraulic conditions below and above the weir. Spring-run and fall-run Chinook salmon, green sturgeon, Central Valley steelhead and Sacramento splittail, have been found trapped in Tisdale Weir's stilling basin following the flood recession. The method of entry into the weir's stilling basin has not been verified. A likely

scenario is confirmed by video footage showing an unidentified species being washed over the concrete overflow section from the Sacramento River. Another possible scenario is that fish swim upstream from the Sutter Bypass through the Tisdale Bypass and cannot pass the weir to return to the Sacramento River.

Isolated pools occur in the Tisdale Bypass for a period of time after flows recede. Stranding potential is the greatest between Tisdale Weir and the Reclamation Road Bridge. The Tisdale Bypass between the Reclamation Road Bridge and the Sutter Bypass has a low-flow channel on each side of the Bypass that connects to the West Borrow Canal of the Sutter Bypass. However, the potential stranding areas closest to the weir are not connected to these low-flow channels.

Reducing or eliminating opportunities for fish to be stranded in the stilling basin and throughout the bypass would reduce the potential for take of protected species. Improving fish passage at Tisdale Weir would also improve the viability of the green sturgeon population. Improving access through the Tisdale Bypass is identified as a Core Team priority for both spring-run Chinook salmon and green sturgeon. This action would benefit these two listed species as well as other migratory fishes. The project addresses AFRP Final Restoration Plan/CPAR non-structural action E15 for Butte Creek, 'Evaluate juvenile and adult chinook salmon stranding in Sutter Bypass and behind Tisdale, Moulton, and Colusa weirs during periods of receding flows on the upper mainstem Sacramento River.' The project also is supported by NMFS's 2014 recovery plan for Central Valley salmonids, specifically Recovery Action SAR-1.12, "In an adaptive management context, implement short- and long-term solutions to minimize the loss of adult Chinook salmon and steelhead in the Yolo bypass, and Colusa and Sutter-Butte basins".

Data Management

Field data such as fish passage or count data, and data used for habitat assessment or hydrologic modeling will be recorded on data sheets or directly to a laptop computer, and later transcribed into a computer database or spreadsheet program. These data as well as model runs, project designs, permits, and reports will be stored on a computer hard drive and backed up on an agency or consulting firm server. Copies will be made available to AFRP.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
This project has a high likelihood of successful implementation (overall low risk) because it is supported by CDFW. The project does have a high cost, necessitating phased implementation.	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>	<u>DFW</u>
2019	CVPRF	\$1,802,000	\$0	\$1,802,000	\$0
2018	CVPRF	\$1,060,000	\$0	\$1,060,000	\$0
2017		\$140,000	\$0	\$0	\$140,000
2017	CVPRF	\$477,000	\$0	\$477,000	\$0

Total Cost: \$3,479,000

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Implementation - Grading as part of O&M to benefit final construction of improved site.</i>					
In-Kind Labor	\$100,000	n/a	DFW		Grading as part of O&M to benefit final construction of improved site.
<i>Monitoring - CDFW monitoring and fish rescues at Tisdale Weir</i>					
In-Kind Labor	\$40,000	n/a	DFW		CDFW has contributed at least \$20K to date and will continue to contribute monitoring of fish presence and stranding at the site.
<i>Planning and Analysis - Feasibility Study</i>					
Agreement	\$477,000	n/a	FWS	CVPRF	Needed to compile all information and determine design and phasing needs/requirements.
2018					
<i>Design - Design of long-term passage solution at Tisdale Weir</i>					
Agreement	\$265,000	n/a	FWS	CVPRF	
<i>Environmental Compliance and Permitting - Compliance and permitting support needed to implement long-term passage solution at Tisdale Weir</i>					
Agreement	\$795,000	n/a	FWS	CVPRF	
2019					
<i>Construction - Implementation of final design for long-term passage solution at Tisdale Weir</i>					
Agreement	\$1,802,000	n/a	FWS	CVPRF	

b1 San Joaquin River Sturgeon Habitat Assessment

San Joaquin River Sturgeon Habitat Assessment.

Classification: Reconnaissance, Reconnaissance

Location: 37.747700 , -121.291183, San Joaquin Lower Mainstem

Funding Years: 2015 - 2017

Benefits Start Year: 2015

Priority: 7 - Combined charter covering all habitat assessment, adult tagging/tracking and juvenile monitoring sturgeon work. This work is providing baseline data for several proposed and potential future AFRP projects. No funding request beyond FY17

Partners: CDFW

Related Programs: CDFW

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	This project is specifically designed to assess the presence and habitat preferences of sturgeon in the San Joaquin Basin. The next step in these efforts is identifying, designing and implementing restoration projects.

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Habitat Assessment	1	number of reports	
Population Assessment	1	number of reports	
Acoustic tagged fish (10 yr tags)	20	number of fish	72 fish tagged to date, tag about 20 per year. This project has also documented spawning in 2011, 2012, and 2016.

Deliverables

<u>Date</u>	<u>Title</u>
Jul. 2016	2015 Annual monitoring report
Jul. 2017	2016 Annual monitoring report
Jul. 2018	2017 Annual Monitoring Report

Narrative

This effort provides information on the habitat use of spawning fish, response to environmental cues, and in conjunction with telemetry data, may help determine if White Sturgeon in the San

Joaquin River are a population independent of the one that occurs in the Sacramento River and if habitat protection and restoration within the San Joaquin River are needed to increase the abundance of this important species.

This is the final year of a larger 5-year effort to assess White Sturgeon presence, movement, recruitment and habitat in the San Joaquin River. To date, successful spawning events by White Sturgeon have been documented and linked to flow and environmental conditions. Future sampling for larval sturgeon may clarify if early life history survival is a factor limiting White Sturgeon production in the San Joaquin River and what, if any, management actions need to be taken to increase White Sturgeon abundance. This information will allow us to greatly improve DSM model inputs.

Research to date has demonstrated that White Sturgeon spawn in the San Joaquin River in some years (Gruber et al. 2012; Jackson and Van Eenennaam 2013) but not others (Faukner and Jackson 2014). Even relatively healthy White Sturgeon populations often experience recruitment failure (Parsley and Beckman 1994; Schaffter and Kohlhorst 1999) and suitable rearing habitat for larval and juvenile life history phases may be the limiting factor for White Sturgeon production (Coutant 2004). An early attempt at collecting larval sturgeon on the San Joaquin River (Miller 1972) and a recent effort (Faukner and Jackson 2014) failed to collect any specimens. The spring of 2013 was dry and discharge in the mainstem of the San Joaquin River was low, resulting in poor spawning conditions for sturgeon. Therefore it is not surprising that sampling efforts in the mainstem of the San Joaquin River failed to collect either White Sturgeon eggs or larvae (Faukner and Jackson 2014) during 2013. However, it remains unknown if larval White Sturgeon production occurs during years with favorable environmental conditions. Future sampling for larval sturgeon may clarify if early life history survival is a factor limiting White Sturgeon production in the San Joaquin River and what, if any, management actions need to be taken to increase White Sturgeon abundance.

Data Management

Data sheets, receiver files, and annual reports are stored at the Lodi Fish and Wildlife Office. Data is entered into Excel workbooks and an effort is being undertaken to develop an Access database for long-term storage. Receiver files are uploaded to the Hydra database currently in use by the California Fish Tracking Consortium. Annual reports are available on the Lodi Fish and Wildlife Office website.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Hiring delays	2	1
Unfavorable hydrology	2	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$287,953	\$0	\$287,953

Total Cost: \$287,953

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Inventory/Reconnaissance - Conduct spawning, larval migration, and adult telemetry surveys to inform design of restoration project to improve spawning habitat in the San Joaquin River.</i>					
Labor	\$236,877	0.82	FWS	CVPRF	Funding will cover one biologist and two technicians for conducting spawning, larval migration, and adult telemetry fieldwork, data entry and analyses, and report preparation.
Equipment or Materials	\$19,276	n/a	FWS	CVPRF	Fuel, nets, receivers and associated hardware, vessel repairs, and miscellaneous supplies.
Agreement	\$31,800	n/a	FWS	CVPRF	Analyses of egg, larval, and adult samples to conduct parentage and other analyses and inform understanding of environmental conditions that lead to successful spawning and rearing.

b1 Tuolumne River - River Mile 44 Spawning and Rearing Habitat Restoration

Tuolumne River - River Mile 44 Spawning and Rearing Habitat Restoration. Project will consist of floodplain grading, floodplain reconnection, gravel processing and in-channel gravel injection using processed floodplain material.

Classification: Improvement, Habitat Restoration

Location: 37.628169, -120.543097, Tuolumne River

Funding Years: 2015 - 2020

Benefits Start Year: 2016

Priority: 9 - This ONGOING project follows the successful Bobcat Flat restoration project immediately downstream and with the same project partners. The previous project has shown significant use by adult and juvenile salmonids during spawning and rearing periods and provides highly productive floodplain habitat for juvenile salmonids, which is an extremely important limiting factor for Tuolumne River natural production.

Partners: Tuolumne River Conservancy

Related Programs: NMFS-RP

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	Habitat restoration

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Floodplain Improvement	3	acres	Preliminary conceptual design indicates approximately 3 acres of improved floodplain habitat.
Juveniles utilizing reconnected floodplain rearing habitat	25	percentage of fish	We anticipate increasing floodplain access to 25% of the local production.
Adults utilizing improved spawning habitat	50	percentage of fish	We anticipate increasing spawning habitat availability by 25% and documenting a 50% increase in spawning use in the project reach.
Riparian Corridor Improvements	1	miles	Placeholder; awaiting designs

Deliverables

<u>Date</u>	<u>Title</u>
Jun. 2017	Environmental Documents and permits
Jun. 2017	Project Designs
Sep. 2018	Construction Summary Report

<u>Date</u>	<u>Title</u>
Sep. 2020	Annual Report

Narrative

Funding is requested to develop engineering plans and acquire necessary permits. Future funding will be requested to excavate an elevated floodplain to allow it to become inundated at river flows of 1,000 to 2,500 cfs. Excavated cobble will be screened on site to produce approximately 40,000 yds³ of coarse sediment mix of ¼ to 4 inch material to be placed in the river channel. The project will enhance floodplain and river connectivity, provide off-channel rearing habitat, promote sustainable riparian plant communities, and restore in-stream salmonid spawning and rearing habitat. Estimated increases in habitat resulting from this project include 3 acres of floodplain and four acres of in-stream spawning and rearing habitat.

This project has been developed based on the successful Bobcat Flat Restoration Project (immediately downstream) and is on property owned by the same entities. The landowners and local neighbors are extremely supportive of these efforts and are actively seeking additional funding and in-kind support to ensure high quality projects are completed and monitored.

Links to CVPIA Core Team FY17 priorities:

Fall-run Chinook: Based on the priorities identified by the SIT, the Core Team agrees that the following are priorities for fall-run Chinook salmon:

- Improve Juvenile Rearing Habitat - Sacramento, Yuba, Feather, American, Calaveras, Mokelumne, Merced, Tuolumne, Stanislaus and San Joaquin Rivers and the Delta;

Data Management

Data will be archived at Lodi FWO.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Environmental compliance related to riparian vegetation removal/restoration (same process that was permitted at Bobcat Flat will be proposed here)	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$626,163	\$0	\$626,163
2018	CVPRF	\$243,800	\$0	\$243,800
2016	CVPRF	\$137,800	\$0	\$137,800
2019	CVPRF	\$3,180	\$0	\$3,180

Total Cost: \$1,010,943

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2016					
<i>Design -</i>					
Agreement	\$62,010	n/a	FWS	CVPRF	Design concepts will be discussed among agreement recipient and CDFW partners in Region 4. Designs will be reviewed at various pre-arranged check-in points and will precede permit application submission.
<i>Environmental Compliance and Permitting -</i>					
Agreement	\$62,010	n/a	FWS	CVPRF	Permits will be obtained once designs are sufficiently advanced.
<i>Management -</i>					
Agreement	\$13,780	n/a	FWS	CVPRF	Agreement Management and Deliverables
2017					
<i>Construction -</i>					
Agreement	\$602,080	n/a	FWS	CVPRF	First year construction activities including floodplain grading and gravel excavation, sorting, and in-stream installation.
<i>Management -</i>					
Agreement	\$24,083	n/a	FWS	CVPRF	Agreement Management
2018					
<i>Construction -</i>					
Agreement	\$212,000	n/a	FWS	CVPRF	Second and final year construction activities, barring unforeseen permitting

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
					delays or unfavorable environmental conditions.
<i>Management -</i>					
Agreement	\$31,800	n/a	FWS	CVPRF	Agreement Management
2019					
<i>Management -</i>					
Agreement	\$3,180	n/a	FWS	CVPRF	Agreement Management

b1 Tuolumne River: Dos Rios Floodplain Restoration

Floodplain and Riparian Restoration at River Partners' Dos Rios property.

Classification: Improvement, Off-Channel
Location: 37.609333, -121.166658, Tuolumne River
Funding Years: 2016 - 2017
Benefits Start Year: 2017
Priority: 8 - Program Priority Comments: ONGOING project site is at the confluence of the Tuolumne and San Joaquin rivers and provides potential benefits to existing AFRP priority watersheds as well as migrating salmonids from the SJRRP area; project also includes cost share >50%.
Partners: River Partners, CDWR, NRCS
Related Programs: NMFS-RP
Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Restored floodplain	15	acres	Total project acreage: 159 acres Acreage of earthwork: 15 acres Swales and benches, 5 acres bunny mounds

Deliverables

<u>Date</u>	<u>Title</u>
Jul. 2017	Annual construction report
Mar. 2018	Annual monitoring report
Mar. 2019	Annual monitoring report

Narrative

The project preliminary design involves 20 total acres where earthwork will occur; 15 acres of swales and floodplain benches would be excavated and designed to inundate under flood conditions and a portion would inundate under lower flow regimes for juvenile salmonid rearing and migratory habitat; 5 acres of higher ground would be created out of excavated materials in order to provide flood refugia for (ESA listed) riparian brush rabbits. The project footprint includes 159 acres of farm land at the confluence of the Tuolumne and San Joaquin rivers and benefits multiple watersheds (Tuolumne, Merced, and Mainstem SJR) and SJRRP efforts. The project is identified as a high priority in the Final Restoration Plan and with multiple CVPIA partners and stakeholders. Cost-match is greater than 50% and CVPIA funding in FY16 would

be put almost entirely toward implementation. NRCS and CDWR are contributing \$421,000 for planning, permitting, management, re-vegetation and monitoring.

Project benefits multiple watersheds (Tuolumne, Merced, and Mainstem SJR) and SJRRP efforts. Cost-match is greater than 50% and CVPIA funding in FY16 would be put almost entirely toward implementation. High priority in Final Restoration Plan and with multiple CVPIA partners and stakeholders.

Links to CVPIA Core Team FY17 priorities:

Fall-run Chinook: Based on the priorities identified by the SIT, the Core Team agrees that the following are priorities for fall-run Chinook salmon:

- Improve Juvenile Rearing Habitat - Sacramento, Yuba, Feather, American, Calaveras, Mokelumne, Merced, Tuolumne, Stanislaus and San Joaquin Rivers and the Delta;

White Sturgeon: Reducing diversions, reducing entrainment and increasing spawning and rearing habitat on the San Joaquin River are also priorities that will benefit White Sturgeon.

Data Management

Construction and monitoring data will be summarized in annual reports and archived at Lodi FWO. Data and reports will also be provided to CVPIA Fisheries for use in DSM refinement and testing.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Flood conditions (site can become saturated at relatively high SJR flows)	1	2

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>	<u>Local</u>
2016	CVPRF	\$447,320	\$0	\$447,320	\$0
2016		\$421,000	\$0	\$0	\$421,000
2017	CVPRF	\$26,500	\$0	\$26,500	\$0

Total Cost: \$894,820

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2016					
<i>Construction - Excavation of perched floodplains to create swales and floodplain benches; excess materials will be formed into mounds to serve as flood refugia for riparian brush rabbits.</i>					
Agreement	\$420,820	n/a	FWS	CVPRF	Construction activities associated with floodplain excavation.
<i>Implementation - Planning, Permitting, Project Management, Monitoring and Site Revegetation</i>					
Direct Contribution	\$421,000	n/a	Local		NRCS and CDWR are contributing \$421,000 for planning, permitting, management, re-vegetation and monitoring.
<i>Outreach - Community outreach including community work days to engage local folks in the restoration, Trekking the Tuolumne program outings for elementary school students, and the local SLEWS program.</i>					
Agreement	\$26,500	n/a	FWS	CVPRF	Funding for community outreach including community work days to engage local folks in the restoration, Trekking the Tuolumne program outings for elementary school students, and the local SLEWS program.
2017					
<i>Outreach - Community outreach including community work days to engage local folks in the restoration, Trekking the Tuolumne program outings for elementary school students, and the local SLEWS program.</i>					
Agreement	\$26,500	n/a	FWS	CVPRF	Funding for community outreach including community work days to engage local folks in the restoration, Trekking the Tuolumne program outings for elementary school students, and the local SLEWS program.

b1 Yuba River Daguerre Point Dam Juvenile Salmon Outmigration Study

Yuba River Daguerre Point Dam Juvenile Salmon Outmigration Study

Classification: Research, Fish Passage

Location: 39.202867, -121.451007, Yuba River

Funding Years: 2017 - 2022

Benefits Start Year: 2018

Priority: 26 - Project would provide needed information to determine the disposition and impacts of Daguerre Point Dam on juvenile outmigration. This is a needed step if an efficient and feasible solution is to be designed and implemented in the future.

Partners: Hallwood-Cordua Irrigation District, USACE

Related Programs: NMFS-RP

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	Habitat Restoration

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Population Assessment	1	number of reports	

Deliverables

<u>Date</u>	<u>Title</u>
Dec. 2018	Annual Report

Narrative

Although the AFRP Final Restoration Plan contains action A9, Facilitate passage of juvenile salmonids by modifying the dam face of Daguerre Point Dam, very little is known and considerable uncertainty exists regarding the effects of Daguerre Point Dam (DPD) on juvenile fish passage and survival. In particular, at present there are three pathways that juvenile salmonids may take to migrate downstream past DPD: 1) over the dam face, 2) through the two existing fish ladders, or 3) through the Hallwood-Cordua Diversion fish bypass pipe. Alteration of flow patterns and timing in the proximity of DPD may affect juvenile salmonid survival by changing the proportional use of the different pathways, levels of physical stress and abrasion, or changing exposure and vulnerability to predators. Obtaining information on juvenile salmonid passage and survival at DPD recently has increased in importance because two FERC license processes are underway in the lower Yuba River that may affect flow patterns at DPD; one of these also will affect DPD physical facilities. This project would involve using acoustic tags to track juvenile salmonid passage and survival at DPD.

Cost estimate is \$450,000 to purchase tags and set up receiver arrays upstream and downstream of DPD. Additional funding may be required to continue the study in out years. The project addresses AFRP Final Restoration Plan/CPAR structural action A6, Construct or improve the fish bypasses at Hallwood- Cordua and Brophy-South Yuba water diversion and A9, Facilitate passage of juvenile salmonids by modifying the dam face of Daguerre Point Dam because it would provide information to evaluate the need and potential design considerations associated with implementing either of these actions. The project also could be used to address AFRP Final Restoration Plan/CPAR evaluation 1, Evaluate the effectiveness of pulse flows to facilitate successful juvenile salmonid emigration if such pulse flows were implemented as a management action. This is a monitoring project that will provide data needed for management (e.g., information on survival during outmigration, flow-related outmigration patterns, etc.) and also may be used to develop protection, mitigation, and monitoring measures two new/updated FERC licenses. The Yuba River was identified as a CVPIA priority stream in the USFWS Fish Focus Group (FFG) process circa 2008, although it was not designated as a watershed priority in the Final Restoration Plan. Juvenile outmigration in the Yuba River was not identified as a primary or secondary limiting factor in the Final Restoration Plan, but juvenile outmigration was identified as a “stressed life stage” by the FFG. Landowners (e.g., Hallwood-Cordua Irrigation District) have provided access for fisheries-related activities in the recent past. New sampling permits will need to be obtained because this would be a new activity on the lower Yuba River.

This project will also provide valuable information to inform the CVPIA DSMs and future potential priorities for the Yuba River.

Data Management

All reports and monitoring data files will be saved on agency/grantee/contractor local computers and backed up on a server. Electronic copies will be provided to USFWS-AFRP.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Specific design considerations are unknown (e.g., exact number of receivers needed, etc.) but similar studies of juvenile salmon have been implemented in other Central Valley Rivers.	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$477,000	\$0	\$477,000
2018	CVPRF	\$265,000	\$0	\$265,000
2019	CVPRF	\$265,000	\$0	\$265,000

Total Cost: \$1,007,000

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Implementation - Acoustic tagging study.</i>					
Agreement	\$477,000	n/a	FWS	CVPRF	Procuring tags and acoustic receivers, tagging, receiver installation, and, tracking.
2018					
<i>Implementation - Acoustic tagging study.</i>					
Agreement	\$265,000	n/a	FWS	CVPRF	Procuring additional tags (if needed), tagging and tracking.
2019					
<i>Implementation - Acoustic tagging study.</i>					
Agreement	\$265,000	n/a	FWS	CVPRF	Procuring additional tags (if needed), tagging and tracking.

b1 Yuba River Hallwood Floodplain Restoration Project

Side Channel and Floodplain Restoration

Classification: Improvement, Side-Channel

Location: 39.202485, -121.451417, Yuba River

Funding Years: 2013 - 2019

Benefits Start Year: 2014

Priority: 2 - Program Priority Comments: High priority, ONGOING, large-scale restoration project that will benefit naturally produced juvenile salmonids in the Yuba River.

Partners: PG&E, South Yuba River Citizens League, Teichert Aggregates, Yuba River Management Team, cbec, inc., Cramer Fish Sciences

Related Programs: NMFS-RP

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	Habitat Restoration

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Juvenile Rearing Habitat	1	miles	
Riparian Habitat	10	acres	
Floodplain grading/restoration	40	acres	

Deliverables

<u>Date</u>	<u>Title</u>
Dec. 2016	Annual Reports
Mar. 2018	Designs and Permits

Narrative

Daguerre Alley” is a large (2.5-mile long x 0.1 mile wide) remnant Yuba River channel located downstream of Daguerre Point Dam, on lands which are part of the Teichert Hallwood Facility gravel operation. Fish habitat enhancement will be achieved through increased frequency of surface water connectivity between the main Yuba River channel and the existing small, intermittent channel and extensive floodplain of Daguerre Alley. Also, improved habitat features will be constructed and floodplain revegetation will be implemented to provide high quality, off-channel rearing habitat for juvenile Chinook salmon and steelhead which currently is very limited in the lower Yuba River. Initial site visits and baseline mapping and modeling were conducted by the Yuba River Management Team. A small (\$25,000) FY2012 grant from PG&E to cbec funded initial meetings with the landowner, hydrologic modeling, and habitat restoration

concept designs. Funding from AFRP (\$150K in FY2013 and \$150K in FY2014) is being used to complete an alternatives analysis and initial project design, continue discussions with the landowner, conduct pre-project fish and habitat monitoring (before-after-control-impact (BACI) design), and complete permitting. Implementation is expected to begin in FY2017. cbec is the AFRP grantee, but Cramer Fish Sciences and SYRCL will assist with fish monitoring and riparian planting, respectively.

Due to the size of the site, the project has the potential to be quite large, depending on funding; up to 150 acres of floodplain habitat and approximately 2.5 miles of side channel habitat could be restored. Work in FY2018 is expected to include extensive grading/floodplain lowering and riparian planting of approximately 40-50 acres of floodplain habitat, and modifying and extending the existing side channel by approximately 0.3 miles. The primary landowner is Teichert Aggregates, and the Teichert Hallwood Plant manager has enthusiastically provided access to the property for riparian and fish monitoring by various agencies and groups. Teichert does not have permits to mine in Daguerre Alley itself, but has expressed interest in participating in the project so as to gain access to the substrate removed from floodplain grading. Teichert's participation likely would reduce the cost of the project, but there is some uncertainty due to the need to coordinate with their anticipated mining activities. Fall- and spring-run Chinook salmon and steelhead will benefit from this project. The project directly addresses AFRP Final Restoration Plan/CPAR non-structural action E4, Evaluate the benefits of restoring stream channel and riparian habitats of the Yuba River, including the creation of side channels for spawning and rearing habitats for salmonids. The Yuba River was identified as a CVPIA priority stream in the USFWS Fish Focus Group (FFG) process circa 2008, although it was not designated as a watershed priority in the Final Restoration Plan. Similarly, juvenile rearing habitat in the Yuba River was not identified as a primary or secondary limiting factor in the Final Restoration Plan, but was identified as the primary limiting factor by the FFG.

Add on projects possibly funding graduate students will comprehensively evaluate the effects of this habitat restoration on water temperature and aerobic scope of one or more life stages of salmon.

Reference:

South Yuba River Citizens League. 2013. Hammon Bar Riparian Enhancement Project Report. Prepared for the U.S. Fish and Wildlife Service, Anadromous Fish Restoration Program. Nevada City, CA. 26 pages.

Links to CVPIA Core Team FY17 priorities:

Spring-run Chinook: Improving rearing habitat on the Yuba River

Fall-run Chinook: Based on the priorities identified by the SIT, the Core Team agrees that the following are priorities for fall-run Chinook salmon:

- Improve Juvenile Rearing Habitat - Sacramento, Yuba...

Data Management

All reports and monitoring data files including pre-and post- project monitoring which includes but not limited to topographic surveys, biological and physical environmental data, HEC-RAS model, ArcView GIS shapefiles and coverages, geodatabase, Computer Aided Design (CAD) drawing files, and all supporting information used for project design and permitting will be saved on computers located at the cbec, inc. office in West Sacramento and backed up on an offsite server. Electronic copies will be provided to USFWS-AFRP.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Additional coordination with the landowner(s) regarding their mining schedule, etc. is required.	2	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2015	CVPRF	\$1,272,000	\$0	\$1,272,000
2016	CVPRF	\$236,380	\$0	\$236,380
2017	CVPRF	\$424,000	\$0	\$424,000
2018	CVPRF	\$318,000	\$0	\$318,000
2019	CVPRF	\$318,000	\$0	\$318,000

Total Cost: \$2,568,380

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2015					
<i>Construction - 40-50 acres of floodplain grading and riparian planting, 0.3 miles of side-channel restoration.</i>					
Agreement	\$1,272,000	n/a	FWS	CVPRF	Work may extend into out years depending on the landowner's mining schedule.
2016					
<i>Monitoring - Pre- and post-project fish and habitat monitoring.</i>					
Agreement	\$24,380	n/a	FWS	CVPRF	Temperature sensors, transmitters, mounts etc. to monitor habitat temperatures specifically for bioenergetics modelling of juvenile salmonids to document project effectiveness.

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
Agreement	\$212,000	n/a	FWS	CVPRF	Monitoring will extend into out years and may include measurements of physical habitat parameters, invertebrate and fish abundance, and cage studies to examine fish growth.
2017					
<i>Monitoring - Pre- and post-project fish and habitat monitoring.</i>					
Agreement	\$212,000	n/a	FWS	CVPRF	Monitoring will extend into out years and may include measurements of physical habitat parameters, invertebrate and fish abundance, and cage studies to examine fish growth.
Agreement	\$106,000	n/a	FWS	CVPRF	Temperature/bioenergetics monitoring/modeling continued.
Agreement	\$106,000	n/a	FWS	CVPRF	Aerobic scope assessment of juvenile Chinook salmon.
2018					
<i>Monitoring - Pre- and post-project fish and habitat monitoring.</i>					
Agreement	\$53,000	n/a	FWS	CVPRF	Temperature/bioenergetics monitoring/modeling continued.
Agreement	\$212,000	n/a	FWS	CVPRF	Monitoring will extend into out years and may include measurements of physical habitat parameters, invertebrate and fish abundance, and cage studies to examine fish growth.
Agreement	\$53,000	n/a	FWS	CVPRF	Aerobic scope assessment of juvenile Chinook salmon continued.
2019					
<i>Monitoring - Pre- and post-project fish and habitat monitoring.</i>					
Agreement	\$212,000	n/a	FWS	CVPRF	Monitoring will extend into out years and may include measurements of physical habitat parameters, invertebrate and fish abundance, and cage studies to examine fish growth.
Agreement	\$53,000	n/a	FWS	CVPRF	Aerobic scope assessment of juvenile Chinook salmon continued.
Agreement	\$53,000	n/a	FWS	CVPRF	Temperature/bioenergetics monitoring/modeling continued.

b1 Yuba River Hammon Bar Velocity Validation

Yuba River Hammon Bar Velocity Validation

Classification: Performance Monitoring, Performance Monitoring
Location: 39.220711, -121.377265, Yuba River
Funding Years: 2015 - 2017
Benefits Start Year: 2016
Priority: 10 - Additional validation of recently completed pilot restoration project on the Yuba River.
Partners: South Yuba River Citizens League
Related Programs: NMFS-RP
Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Habitat Assessment	1	miles	
Habitat Assessment	1	number of reports	

Deliverables

<u>Date</u>	<u>Title</u>
Dec. 2016	Annual Report
Dec. 2017	Annual Report

Narrative

AFRP funded a riparian restoration pilot project (5 acres) on Hammon Bar in the lower Yuba River that was successfully implemented in 2011 and 2012. The purpose of this work is to assess the accuracy of the velocities simulated by the River2D model of the post second year plantings, created in FY-14. This will allow more accurate assessment of the value of the site as juvenile rearing habitat when it inundates. Timing of the work will be determined in response to the occurrence of high flows (greater than 2,000 cfs) required for inundation. Mean column velocities will be measured at two flows that inundate the Hammon Bar plantings with a wading rod and a Marsh-McBirneyR model 2000 velocity meter. Depth will be recorded to the nearest 0.1 foot and average water column velocity will be recorded to the nearest 0.01 ft/s. The horizontal location of each velocity measurement will be recorded with a survey-grade RTK GPS unit. Measurements will be made downstream of both pod and stinger plantings, with at least 100 measurements made for each type of planting at each of the two flows. The River2D model of the post second year plantings, created in FY-14, will be run at the two flows, and the measured velocities will be compared to the velocities simulated by River2D at the horizontal

locations recorded with the survey-grade RTK GPS unit. Cost estimate from FWS Staff is \$13,000 for FY2017. If the site does not inundate, the work will be delayed until FY2018.

This important monitoring effort will not only evaluate current project design and inform future projects, but will also provide valuable data for the CVPIA DSMs.

Links to CVPIA Core Team FY17 priorities:

Spring-run Chinook: Improving rearing habitat on the Yuba River and reducing juvenile entrainment in the Upper Sacramento are also Spring-run priorities.

Green Sturgeon: Based on the priorities identified by the Sturgeon PWT and Sturgeon SAIL, the Core Team agrees that improving spawning and rearing habitat, reducing larval entrainment, and reducing diversions for adult green sturgeon are priorities for Green Sturgeon on the Sacramento, Yuba and Feather Rivers.

Fall-run Chinook: - Improve Juvenile Rearing Habitat - Sacramento, Yuba, Feather, American, Calaveras, Mokelumne, Merced, Tuolumne, Stanislaus and San Joaquin Rivers and the Delta;

Data Management

Depth and velocity measurements will be entered into a laptop computer. The horizontal location of each velocity measurement will be recorded with a survey-grade RTK GPS unit. The existing River2D model for the study site will be run at the two flows, and the measured velocities will be compared to the velocities simulated by River2D at the horizontal locations recorded with the survey-grade RTK GPS unit. All reports and monitoring data files will be saved on local FWS computers and backed up on a server. Electronic copies will be provided to USFWS-AFRP.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
This project has a high likelihood of successful implementation (low overall risk) because it is post-project monitoring, and available FWS staff routinely performs this kind of work.	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$5,777	\$0	\$5,777

Total Cost: \$5,777

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Monitoring - Post-project monitoring of the AFRP-funded riparian restoration project on Hammon Bar.</i>					
Labor	\$5,777	0.02	FWS	CVPRF	Cost for AFRP staff is included in the AFRP Operations Charter budget. This cost is for Bay-Delta Fish and Wildlife Office staff that would help complete the survey work.

b1 Yuba River Narrows Restoration Project

Yuba River Narrows Restoration Project

Classification: Improvement, Spawning Gravel
Location: 39.23797, -121.27064, Yuba River
Funding Years: 2012 - 2019
Benefits Start Year: 2014
Priority: 3 - ONGOING, high-priority restoration of spawning and rearing habitat immediately downstream of Englebright Dam.
Partners: UC-Davis, USACE, Yuba River Management Team, Cramer Fish Sciences, ESA
Related Programs: NMFS-RP
Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	Restoration of high value spawning and rearing habitat which will contribute to doubling goal targets.

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Spawning Habitat	1	miles	
Side Channel Habitat	1	miles	

Deliverables

<u>Date</u>	<u>Title</u>
Dec. 2016	Annual Report
Sep. 2016	Final Designs
Mar. 2017	Permits

Narrative

The 2-mile reach of the lower Yuba River just downstream of Englebright Dam (the Englebright Dam/Narrows reach) comprises a canyon, and the substrate primarily is bedrock; consequently it is very different from the rest of the lower Yuba River, much of which has extensive gravel substrate due to legacy gold mining. Extensive mapping and hydrologic modeling of the reach has occurred both as part of this award and by the Yuba River Management Team and USACE (e.g., Brown and Pasternack 2014; both Brown (ESA/UC-Davis) and Pasternack (UC-Davis) are involved in this project). Also, a draft habitat restoration planning document for the Englebright Dam/Narrows reach already has been developed as part of this award, and will be finalized in FY2014, as will designs and permits for an initial project. ESA is the grantee, but Cramer Fish Sciences has been assisting with fisheries analyses and monitoring, and Greg Pasternack of UC-Davis has an advisory role. The project has the potential to be quite large, depending on funding,

although all 2 miles cannot be accessed by heavy equipment. As indicated by the planning document analysis, habitat restoration will primarily target restoration of spawning habitat for spring-run Chinook salmon, and likely involve some combination of gravel augmentation and channel contouring, gravel stockpiling (for free distribution at high flows), and the removal of “shotrock,” a remnant of dam construction. In the past, spring-run Chinook salmon have been observed attempting to spawn on the bedrock, and small gravel augmentation efforts by USACE (about 4000 cubic yards in 2010-11, 2012, and 2013) have quickly attracted spawners.

Cost estimate for implementation in FY2015 is \$1M, with an additional \$1M in FY2016 depending on the size and actions selected. Cost estimates are based on experience with habitat restoration in the lower American River, but transportation costs (e.g., for gravel or shotrock) are expected to be high for this project due to the canyon location. As an additional reference, the Final Habitat Expansion Plan for Central Valley spring-run Chinook salmon and California Central Valley steelhead (CDWR and PG&E 2010) estimates the cost of removing the majority of the shotrock from a key location (Sinoro Bar) in the Englebright Dam/Narrows Reach at approximately \$5.9M and a second project primarily involving gravel augmentation and grading at \$1.8M. For our project, shotrock will be removed on a trial basis. Spring-run Chinook salmon and steelhead will benefit from this project. The Yuba River was identified as a CVPIA priority stream in the USFWS Fish Focus Group (FFG) process circa 2008, although it was not designated as a watershed priority in the Final Restoration Plan. The project addresses AFRP Final Restoration Plan/CPAR non-structural action E4, Evaluate the benefits of restoring stream channel and riparian habitats of the Yuba River, including the creation of side channels for spawning and rearing habitats for salmonids. Spawning habitat in the Yuba River was not identified as a primary or secondary limiting factor in the Final Restoration Plan, but was identified as the secondary limiting factor by the FFG.

References

Brown, R.A., and G.B. Pasternack. 2014. Hydrologic and topographic variability modulate channel change in mountain rivers. *Journal of Hydrology* 510:551-564.

California Department of Water Resources and Pacific Gas and Electric Company. 2010. Habitat Expansion Agreement for Central Valley spring-run Chinook salmon and California Central Valley steelhead – Final Habitat Expansion Plan. November 2010. ICF J&S 00854.08. Sacramento, CA. November 2010.

Links to CVPIA Core Team FY17 priorities:

Spring-run Chinook: Improving rearing habitat on the Yuba River

Fall-run Chinook:

- Improve Juvenile Rearing Habitat - Sacramento, Yuba...

Data Management

All reports and monitoring data files including pre-and post- project monitoring which includes but not limited to topographic surveys, biological and physical environmental data, HEC-RAS

model, ArcView GIS shapefiles and coverages, geodatabase, Computer Aided Design (CAD) drawing files, and all supporting information used for project design and permitting will be saved on local ESA computers, and backed up on a server. Electronic copies of data files and electronic and hard copies of reports will be provided to USFWS-AFRP.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Landowner access is not 100% assured for this intensive project but has been provided in the past for fish habitat restoration and monitoring projects.	1	2

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2016	CVPRF	\$742,000	\$0	\$742,000
2017	CVPRF	\$324,837	\$0	\$324,837
2018	CVPRF	\$5,777	\$0	\$5,777

Total Cost: \$1,072,615

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2016					
<i>Construction - Gravel augmentation, channel grading, gravel stockpiling, and shotrock removal.</i>					
Agreement	\$742,000	n/a	FWS	CVPRF	Transportation costs are likely to be high due to canyon location.
2017					
<i>Construction - Gravel augmentation, channel grading, gravel stockpiling, and shotrock removal.</i>					
Agreement	\$1,060	n/a	FWS	CVPRF	Additional construction may occur in FY2017 with remaining funds.
<i>Monitoring - Pre- and post-construction fish and habitat monitoring. Includes as-built surveys by FWS Instream Flow Branch in FY2017 and FY2018.</i>					
Labor	\$5,777	0.02	FWS	CVPRF	As-built surveys. Cost for AFRP staff is included in the AFRP Operations budget. This cost is for non-CVPIA staff needed to complete surveys (Bay-Delta Office staff).

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
Agreement	\$318,000	n/a	FWS	CVPRF	Fish and physical habitat monitoring, which is likely to continue into out years.
2018					
<i>Monitoring - Pre- and post-construction fish and habitat monitoring. Includes as-built surveys by FWS Instream Flow Branch in FY2017 and FY2018.</i>					
Labor	\$5,777	0.02	FWS	CVPRF	Additional performance monitoring is likely to occur in 2018. Cost for AFRP staff is included in the AFRP Operations budget. This cost is for non-CVPIA staff needed to complete surveys (Bay-Delta Office staff).

b1 Yuba River Restoration Downstream of Highway 20

Juvenile Salmonid Rearing Habitat Restoration. Juvenile floodplain habitat restoration.

Classification: Improvement, FloodPlain

Location: 39.220711, -121.377265, Yuba River

Funding Years: 2016 - 2021

Benefits Start Year: 2017

Priority: 14 - ONGOING project will identify and build out at least one juvenile floodplain habitat on the Yuba River. This habitat type is widely recognized as severely lacking in this watershed. Additional partners and funding sources will be engaged once potential sites are identified

Partners: Western Aggregates, Yuba County Water Agency, cbec, inc., South Yuba River Citizens League

Related Programs: NMFS-RP

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	\$150K for design and permits plus \$1.6M for implementation. \$150K for monitoring.

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Floodplain Restored	10	acres	
Side Channel Restored	1	miles	
Main Channel Habitat Improved	1	miles	
Riparian Habitat Restored	10	acres	

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2017	All Permits
Aug. 2017	Final Designs
Dec. 2017	Annual Report

Narrative

High quality juvenile salmonid rearing habitat is lacking on the lower Yuba River. This project would create or improve rearing habitat primarily through side-channel, floodplain, or riparian restoration, or the installation of instream woody material. Specific sites and actions will be selected based on concepts presented in two habitat restoration planning documents for the lower Yuba River that were developed as deliverables for a recent AFRP award. One document (cbec 2010) identifies potential sites in the 4-mile reach from Parks to Hammon Bar, and the second (cbec 2013) addresses similar actions at selected sites for the 17-mile reach from Parks Bar to

Marysville, with particular emphasis on alternative flow scenarios that may be implemented under the new FERC license expected for the Yuba River Development Project in 2016. Partnerships already have been developed with key landowners (e.g., Western Aggregates, U.S. Bureau of Reclamation, etc.). As specific project sites and designs are developed and ongoing efforts to develop collaborative funding sources within the Yuba River mature, it is expected that many potential options for financial support from non-federal partners will arise and be pursued.

Cost estimate for FY2017 is \$150,000 to select a specific project or projects, and complete designs and permits. Implementation funding could be phased in FY17 and out years and range from \$300K to \$1.6M, depending on the size and number of projects chosen. Cost estimates are based on experience with habitat restoration in the lower American River. As an additional reference, the Appendix L of the Final Habitat Expansion Plan (CDWR and PG&E 2010) estimates the cost of implementing a suite of the projects identified in cbec 2010 as \$1.3M. Fall- and spring-run Chinook salmon and steelhead will benefit from this project. The Yuba River was identified as a CVPIA priority stream in the USFWS Fish Focus Group (FFG) process circa 2008, although it was not designated as a watershed priority in the Final Restoration Plan. The project addresses AFRP Final Restoration Plan/CPAR non-structural action E4, Evaluate the benefits of restoring stream channel and riparian habitats of the Yuba River, including the creation of side channels for spawning and rearing habitats for salmonids. Juvenile rearing in the Yuba River was not identified as a primary or secondary limiting factor in the Final Restoration Plan, but was identified as the primary limiting factor by the FFG. The project is supported by NMFS's 2014 recovery plan for Central Valley salmonids, specifically Yuba River Recovery Actions YUR-2.2 (Increase floodplain habitat availability in the lower Yuba River), and YUR-2.4 (Create and restore side channel habitats to increase the quantity and quality of off channel rearing and spawning areas in the Yuba River).

References available upon request. In addition to the previous AFRP-funded planning work, LIDAR data is being contributed for this effort by the Yuba RMT.

Links to CVPIA Core Team FY17 priorities:

Spring-run Chinook: Improving rearing habitat on the Yuba River

Green Sturgeon: improving spawning and rearing habitat, reducing larval entrainment, and reducing diversions for adult green sturgeon are priorities for Green Sturgeon on the Sacramento, Yuba and Feather Rivers.

Fall-run Chinook: Improve Juvenile Rearing Habitat - Sacramento, Yuba, Feather, American, Calaveras, Mokelumne, Merced, Tuolumne, Stanislaus and San Joaquin Rivers and the Delta;

Data Management

All reports and monitoring data files will be saved on grantee/contractor local computers and backed up on a server. Electronic copies will be provided to USFWS-AFRP.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
This project has a high likelihood of successful implementation (overall low risk) because substantial planning (hydrologic modeling and concept level designs) and establishment of landowner relationships have already occurred, and AFRP has funded and completed a pilot riparian restoration project in the lower Yuba River.	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2016	CVPRF	\$159,000	\$0	\$159,000
2017	CVPRF	\$1,749,000	\$0	\$1,749,000
2018	CVPRF	\$53,000	\$0	\$53,000
2019	CVPRF	\$53,000	\$0	\$53,000

Total Cost: \$2,014,000

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2016					
<i>Design - Final design(s) for one or more projects.</i>					
Agreement	\$26,500	n/a	FWS	CVPRF	Some hydrologic modeling and concept designs have been developed. This would fund final designs.
<i>Environmental Compliance and Permitting - Permit(s) for one or more projects.</i>					
Agreement	\$132,500	n/a	FWS	CVPRF	AFRP may assist with additional permitting needs if multiple sites are identified
2017					
<i>Implementation - Implementation of one or more projects (side-channel, floodplain, or riparian restoration, or the installation of instream woody material).</i>					
Agreement	\$1,696,000	n/a	FWS	CVPRF	Implementation funding could be split over multiple years and could be up to \$1.6M. If design and permitting are funded in FY17, other partners will be engaged in efforts to find additional non-CVPIA funding.

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
<i>Monitoring - Monitoring as needed to assess site-specific project performance and supplement the work of the Yuba RMT.</i>					
Agreement	\$53,000	n/a	FWS	CVPRF	Monitoring as needed to supplement the work of the Yuba RMT.
2018					
<i>Monitoring - Monitoring as needed to assess site-specific project performance and supplement the work of the Yuba RMT.</i>					
Agreement	\$53,000	n/a	FWS	CVPRF	Monitoring as needed to supplement the work of the Yuba RMT.
2019					
<i>Monitoring - Monitoring as needed to assess site-specific project performance and supplement the work of the Yuba RMT.</i>					
Agreement	\$53,000	n/a	FWS	CVPRF	Monitoring as needed to supplement the work of the Yuba RMT.

Battle Creek Winter run Chinook re-introduction and Battle Creek Coleman weir passage project

Design Phase for Winter run monitoring, trapping, holding, and sampling facilities needed to implement the North Fork Battle Creek Winter run chinook re-introduction plan, as well as design for infrastructure to provide volitional fish passage and monitoring to upper Battle Creek at Coleman weir to returning adult Winter, Spring, Fall and late-Fall chinook runs and CV steelhead.

Classification: Improvement, Fish Passage

Location: 40.4007, -122.1449, Battle Creek

Funding Years: 2016 - 2017

Benefits Start Year: 2016

Priority: 1 - CVPIA FY2017 Fish Program Priorities addressed -

Winter run: This project addresses both CVPIA Winter-run priorities in Battle Creek by providing infrastructure design to (1) provide volitional passage to restoration project at Coleman weir during the 6 months CNFH collects brood stock and to (2) implementing the Battle Creek Winter run re-introduction plan.

Spring run: This project will improve Spring run passage in Battle Creek by providing volitional passage at Coleman weir during 6 months of the year CNFH collects brood stock. Also, hatchery origin spring run chinook (likely from Feather River Hatchery) will be effectively trapped and if desired precluded from accessing upper Battle Creek.

Steelhead: monitoring, trapping and fish sampling infrastructure will be key to understanding the dynamics between resident and anadromous forms. Infrastructure will provide effective trapping of hatchery origin steelhead to prevent hatchery stock from interbreeding with natural origin steelhead in upper Battle Creek.

Partners: CDFW, NMFS, PG&E, USBR, Battle Creek Working Group, BOR
Technical Service Center, Denver

Related Programs: NMFS-RPAs, CDFW, NMFS-RP

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Construction Design Drawings	1	completion	Project will result in construction design drawings to provide WCS passage at Coleman weir and facilities to support Battle Creek WCS re-introduction (trapping, sampling and holding).

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2017	Complete Construction Design drawings

Narrative

CVPIA Fiscal Year 2017 Fish Program Priorities addressed by project:

Winter run: This project addresses both CVPIA Winter-run priorities in Battle Creek by providing infrastructure design to (1) provide volitional passage to restoration project at Coleman weir during the 6 months CNFH collects brood stock and to (2) implementing the Battle Creek Winter run re-introduction plan.

Spring run: This project will improve Spring run passage in Battle Creek by providing volitional passage at Coleman weir during 6 months of the year CNFH collects brood stock. Also, hatchery origin spring run chinook (likely from Feather River Hatchery) will be effectively trapped and precluded from accessing upper Battle Creek.

Steelhead: monitoring, trapping and fish sampling infrastructure will be key to understanding the dynamics between resident and anadromous forms. Infrastructure will provide effective trapping of hatchery origin steelhead to prevent hatchery stock from interbreeding with natural origin steelhead in upper Battle Creek.

Background: A MOU between PG&E, NMFS, CDFW, USFWS, and USBOR resulted in the Battle Creek Salmon and Steelhead Restoration Project. The project is a joint effort to re-introduce Winter run Chinook salmon, and restored Spring, Fall and late-Fall salmon, and Central Valley steelhead runs and their habitat in Battle Creek watershed using an adaptive management framework. The Battle Creek restoration project will re-open over 48 stream miles to salmon and steelhead when completed in 2020-21. One of the restoration plan goal, as well as NOAA's recovery plan, is to re-introduce Winter run chinook to Battle Creek. A draft North Fork Battle Creek Winter Run Chinook re-introduction plan has been developed by a multi-agency team and will be completed in CY 2016.

Need: (1) Based on the draft Battle Creek Winter run chinook re-introduction plan, returning adult Winter run Chinook will need to be monitored, trapped, sampled and held annually during Phase I and II of the plan (several years). Currently there is no infrastructure available to carry out Phase I and II. (2) Coleman weir is 5 miles from the main-stem Sacramento below the Battle

Creek restoration project. Currently there is not adequate infrastructure at Coleman weir to provide adequate (volitional) adult salmonid passage during 6 months of the year (while CNFH is collecting brood stock). During these 6 mo., access to the 48 miles of restored stream habitat is blocked at the Coleman weir and will delayed all natural migrating adult chinook and steelhead. (3) Lacking in BC is also infrastructure for extensive fish monitoring, trapping and sampling that will be required to implement the BC restoration project Adaptive Management Plan.

Project goals: The proposed project will provide construction design for infrastructure to (1) monitor, trap, collect samples, and hold Winter run Chinook Salmon, to (2) provide volitional passage to upper Battle Creek at Coleman weir for returning Winter run chinook, Spring run chinook, Fall and late Fall chinook and Central Valley steelhead spawners, and to (3) provide infrastructure for monitoring required for implementing the Battle Creek Adaptive Management Plan as well as to inform the Coleman NFH Adaptive Management Plan.

Phase I, Engineering analysis and feasibility study is nearing completion and a 99% draft report 'Coleman National Fish Hatchery Trapping and Sorting Facility Alternatives Analysis' is available. Phase I was carried out by McMillen and Jacobs Associates (under contract) and a team of CDFW, NMFS, FWS, BOR, and BOR TSC engineers and biologists. The same team will work with an engineering company to implement Phase II (design).

Data Management

Final construction design drawings will be kept in electronic form at USFWS Engineering (Portland OR) and the USBOR Technical Science Center (Denver CO). A hard copy will be kept at CNFH and additional hard copies will be made available upon request. Metadata associated with developing construction design (meeting notes; requirements; reports, etc.) will be kept by USFWS in electronic form at the Red Bluff FWO, Regional Office in Sacramento or CNFH.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Funding might not be available for the project.	2	3

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$500,000	\$0	\$500,000

Total Cost: \$500,000

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Design - Phase II will be to design a facility at Coleman NFH Weir to allow volitional passage of Winter-run Chinook past the hatchery and into upper Battle Creek.</i>					
Agreement	\$500,000	n/a	FWS	CVPRF	

Central Valley: Sturgeon Spawning Survey and Habitat Mapping

Quantifying available spawning habitat for Green and White Sturgeon using habitat characteristics (water temp, depth, velocity, and substrate) identified through egg sampling.

Classification: Research, Reconnaissance

Location: 38.062519, -122.084245, Central Valley Wide

Funding Years: 2016 - 2021

Benefits Start Year: 2016

Priority: 28 - This effort will provide crucial information to begin defining the need and most effective locations for future habitat restoration and protection project for sturgeon.

Partners: USGS, CDFW, USACE

Related Programs: Interagency Ecological Program

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	Identifying habitat is key to direct habitat restoration efforts

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Spawning Habitat: WST	40	miles	San Joaquin River from Patterson to Manteca. Info on the amount of habitat within this reach is unknown.
Spawning Habitat: GST	1000	cubic yards	Sturgeon are broadcast spawners in the mainstem river. Info on the amount of habitat is unknown at this time.
Spawning Habitat: WST	1000	cubic yards	Sturgeon are broadcast spawners in the mainstem river. Info on the amount of habitat is unknown at this time.
Spawning Habitat: WST	55	miles	Sacramento River from Colusa to Verona. Info on the amount of habitat within this reach is unknown.
Spawning Habitat: GST	75	miles	Sacramento River from Anderson to GCID. Info on the amount of habitat within this reach is unknown.

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2017	Report on Green Sturgeon Spawning Habitat Assessment
Sep. 2018	Report on Sac R White Sturgeon Egg Sampling
Sep. 2019	2nd Report on Sac R White Sturgeon Egg Sampling

<u>Date</u>	<u>Title</u>
Sep. 2020	Final Report on Sac R White Sturgeon Egg Sampling
Sep. 2021	Annual Report on White Sturgeon Habitat Assessment within the Sac and San Joaquin R

Narrative

Sturgeon populations are of the most imperiled species throughout North America due to loss and alterations of habitat. Green and White Sturgeon spawning habitat has been identified within the Sacramento and San Joaquin Rivers. However Green Sturgeon use relatively few areas within the 75 mile reach and the spawning habitat characteristics for White Sturgeon remains largely unknown within either river system. Recovery and conservation plans for both species highlight the need to conserve, protect and restore spawning habitat within and outside of the Sacramento Rivers. Unfortunately the resolution on the quantity and quality of the existing habitat is poor and therefore can't guide these restoration efforts. The proposed project consists of three phases: Phase 1: Green Sturgeon Habitat Assessment (Year 1); Phase 2: White Sturgeon Egg Sampling (Years 2-4); Phase 3: White Sturgeon Habitat Assessment (Year 5). The below narratives identifies the details for each project phase.

Phase1: Green Sturgeon Habitat Assessment

In the first phase of the project the amount and location of the existing Green Sturgeon Spawning habitat within the upper Sacramento River will be identified using a habitat suitability model developed based on 264 egg and 5 post hatch larval samples collected over a five year spawning investigation study conducted by the Red Bluff Fish and Wildlife Service. Spawning habitat assessments will be assessed based on river temperature, depth, velocity, and substrate using a river temperature model, ADCP and side scan sonar. Suitable spawning habitat will be evaluated within the known aggregation sites throughout the species spawning reach and quantified in terms of hectares of suitable spawning habitat.

Phase 2: White Sturgeon Egg Sampling

Three years of egg sampling would be conducted within potential spawning areas on the Sacramento River to identify the exact location where spawning is occurring. Sampling will be directed prior adult telemetry studies and side scan sonar imagery. The location of positive egg samples will be stored via GPS coordinates for future habitat assessments.

Phase 3: White Sturgeon Habitat Assessment

The third phase of the project will use side scan sonar to identify amount and location of the existing White Sturgeon spawning habitat within the lower Sacramento and the San Joaquin River using a habitat suitability model developed based on eggs collected during Phase 2 of the project. Like phase 1 the habitat will be assessed based on river temperature, depth, velocity, and substrate. Suitable habitat will be quantified in terms of hectares of suitable spawning habitat.

Links to FY17 Core Team Priorities:

The purpose of this project is to expand our knowledge on spawning habitat usage by each of these species to guide resource allocations for the protection, conservation and recovery of Green and White Sturgeon.

Green Sturgeon: Based on the priorities identified by the Sturgeon PWT and Sturgeon SAIL, the Core Team agrees that improving spawning and rearing habitat, reducing larval entrainment, and reducing diversions for adult green sturgeon are priorities for Green Sturgeon on the Sacramento, Yuba and Feather Rivers, Yuba River (Daguerre Point Dam).

White Sturgeon: Based on the priorities identified by the Sturgeon PWT and Sturgeon SAIL, the Core Team agrees that improving spawning and rearing habitat, reducing larval entrainment, and reducing diversions for adult green sturgeon are priorities for Green Sturgeon on the Sacramento, Yuba and Feather Rivers, Yuba River (Daguerre Point Dam).

Data Management

All data produced as part of this charter will be provided to CVPIA Fish staff for incorporation into the improvement and parameterizing of Decision Support Models. Additionally, data management, retention and sharing with CVPIA will be included in any grants or cooperative agreements as deliverables for this charter.

Reports could also be accessed at the www.fws.gov/redbluff/ website

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Permitting for monitoring	1	1
Site permission access not needed	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$124,216	\$0	\$124,216
2018	CVPRF	\$124,216	\$0	\$124,216
2019	CVPRF	\$153,103	\$153,103	\$0
2020	CVPRF	\$153,103	\$0	\$153,103
2021	CVPRF	\$57,775	\$0	\$57,775

Total Cost: \$612,413

Activities and Resources

Type	Total	FTE	Agency	Fund	Description
2017					
<i>Inventory/Reconnaissance - Phase 2: Three years (3 of 3) of White Sturgeon egg sampling from Colusa to Verona on the Sacramento River is needed to develop a White Sturgeon spawning habitat criteria. FY2020 funds needed for Phase 2=\$125,000 for staffing and equipment.</i>					
Labor	\$124,216	0.43	FWS	CVPRF	Phase 1 of this project would quantify the available spawning habitat for Green Sturgeon within the Sacramento River between GCID and the mouth of Cow Creek using information derived from RBFOW egg sampling. Funds needed for Phase 1 =\$100,000 (FY2017) for equipment and labor.
2018					
<i>Inventory/Reconnaissance - Phase 2: Three years (3 of 3) of White Sturgeon egg sampling from Colusa to Verona on the Sacramento River is needed to develop a White Sturgeon spawning habitat criteria. FY2020 funds needed for Phase 2=\$125,000 for staffing and equipment.</i>					
Labor	\$124,216	0.43	FWS	CVPRF	Phase 2: Three years (1 of 3) of White Sturgeon egg sampling from Colusa to Verona on the Sacramento River is needed to develop a White Sturgeon spawning habitat criteria. FY2018 funds needed for Phase 2=\$125,000 for staffing and equipment.
2019					
<i>Inventory/Reconnaissance - Phase 2: Three years (3 of 3) of White Sturgeon egg sampling from Colusa to Verona on the Sacramento River is needed to develop a White Sturgeon spawning habitat criteria. FY2020 funds needed for Phase 2=\$125,000 for staffing and equipment.</i>					
Labor	\$153,103	0.53	BOR	CVPRF	Phase 2: Three years (2 of 3) of White Sturgeon egg sampling from Colusa to Verona on the Sacramento River is needed to develop a White Sturgeon spawning habitat criteria. FY2019 funds needed for Phase 2=\$125,000 for staffing and equipment.
2020					
<i>Inventory/Reconnaissance - Phase 2: Three years (3 of 3) of White Sturgeon egg sampling from Colusa to Verona on the Sacramento River is needed to develop a White Sturgeon spawning habitat criteria. FY2020 funds needed for Phase 2=\$125,000 for staffing and equipment.</i>					
Labor	\$153,103	0.53	FWS	CVPRF	Phase 2: Three years (3 of 3) of White Sturgeon egg sampling from Colusa to Verona

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
					on the Sacramento River is needed to develop a White Sturgeon spawning habitat criteria. FY2020 funds needed for Phase 2=\$125,000 for staffing and equipment.
2021					
<i>Inventory/Reconnaissance - Phase 2: Three years (3 of 3) of White Sturgeon egg sampling from Colusa to Verona on the Sacramento River is needed to develop a White Sturgeon spawning habitat criteria. FY2020 funds needed for Phase 2=\$125,000 for staffing and equipment.</i>					
Labor	\$57,775	0.20	FWS	CVPRF	Phase 3 of this project would quantify the available spawning habitat for White Sturgeon on the Sacramento and San Joaquin Rivers based on egg collections during Phase 2 of this project. Funding needed for Phase 3=\$45,000 (FY2021) for staffing.

Deer Creek Irrigation District Dam Fish Passage Project

This project is to improve upstream and downstream passage at the Deer Creek DCID Dam via construction of a roughened channel while meeting DCID's irrigation needs

Classification: Improvement, Fish Passage
Location: 40.011333, -121.954442, Deer Creek
Funding Years: 2013 - 2018
Benefits Start Year: 2018
Priority: 11 - Core Team Priority: Address spring-run Chinook passage on Deer Creek

Core Team: Addresses multiple species/runs

2014 NMFS Recovery Plan High priority for Deer Creek

AFRP Final Rest. Plan Action 3. Improve spawning habitats in lower Deer Creek for fall and late-fall-run Chinook salmon (will greatly improve access to habitat)

AFRP Final Rest. Plan actions regarding improved passage, use of bypassed flows, watershed management.

Partners: DCID, NMFS, CDFW, CDWR

Related Programs: NMFS-RP, AFRP, CVPIA b1

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Stream Miles fully opened	20	miles	Creation of 20 miles of unimpeded access; currently, this is a temporal barrier

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2016	Design
Dec. 2017	Env Documents and Permits
Dec. 2018	New fish passage structure and screen
Sep. 2017	Annual Report
Sep. 2018	Annual Report
Dec. 2018	Final Report

Narrative

The need to restore and maintain salmonid passage in Deer Creek is identified in AFRP and ERP goals, objectives, and targets. Both of these programs prioritize establishment, restoration, and maintenance of anadromous fish habitat quality on this stream. Providing unimpeded fish passage and maintaining suitable water quality are also of paramount importance. In the AFRP Final Restoration Plan, "...improving the opportunity for adult fish to reach their spawning habitats in a timely manner" is one of six objectives identified in achieving the AFRP program goal of doubling the natural production of anadromous fish in Central Valley rivers and streams on a sustainable and long-term basis."

Deer Creek is one of the few streams in California that is not altered by a major storage dam and is one of the three key streams for spring-run Chinook. However, due in part to naturally occurring low flows and diversions by Deer Creek Irrigation District (DCID or District) and Stanford Vina Ranch Irrigation Company (SVRIC), the upstream migration of spring-run Chinook salmon adults or downstream migration of juvenile spring-run Chinook salmon may be impeded or blocked during April, May, June and October. Similarly, fall-run Chinook (*Oncorhynchus tshawytscha*) and Central Valley steelhead (*Oncorhynchus mykiss*) adult and juvenile passage may be impeded or blocked during the same timeframes as well as Pacific lamprey (*Entosphenus tridentatus*). Associated projects are the Lower Deer Creek Falls Fish Passage Project and the proposed fish passage project at the Stanford Vina Ranch Irrigation Company dam, which is located downstream.

This project specifically addresses the Core Team priority of spring-run Chinook fish passage on Deer Creek. Surface water is diverted from Deer Creek at the DCID Diversion Dam, which is located approximately 10 miles upstream of the confluence with the Sacramento River. The DCID Diversion Dam is an old concrete structure that has vertical I-beams that constitute check board slots. The project includes lowering the existing diversion ditch elevation, installing new diversion head works, installing a new fish screen/bypass system and remote flow measurement device. To address passage over the dam, a rock ramp is proposed to be constructed below the dam face to raise the water surface below the dam face.

Designs are nearly complete during phase 1; funding for env. documents and permits are needed for Phase 2, and funding for construction is also needed. The project directly addresses migration needs of anadromous salmonids. Specific performance metrics addressed all revolve around fish passage. The prediction of project outcome is to provide unimpeded fish passage at all flow ranges, for all anadromous salmonids and their life stages.

The project costs are comparable to other local fish passage projects. It will be somewhat revolutionary in that there are not many roughened channel-type of fish passage structures associated with a diversion dam in California, so there is great potential for it to provide critical information on the success of that type of fish passage alternative. Costs are based upon a 65%

design. Other than administrative types of costs and the costs of permits, the funding all goes towards on--the-ground restoration. It has high levels of community support. The impacts of not doing the charter will be to damage the existing relationship between the diverters and resource agencies; much time and effort on the part of local coordinators went into getting DCID to the table and working cooperatively. The larger impact will be continue impediment to multiple species/runs of anadromous fish, two of which are listed species. There are no known objections to this project.

Data Management

All reports and raw data will be stored at the USFWS Red Bluff Office.

Short term monitoring includes as-built design, photo monitoring, and pre-project data collection of instream conditions and fish passage conditions at, above, and below the dam. Physical measurements include instream passage conditions through the roughened channel, which conceivably can be translated into fish passage accessibility (e.g. number of miles of habitat opened).

Monitoring specific to the success of using the roughened channel approach will go far in sharing information on this type of restoration, which is not common in California.

The project will be monitored over the long-term via maintenance commitments that DCID will make via the permitting process. In addition, CDFW monitors both above and below this location to assess spring-run passage and fall-run Chinook spawning behavior. The screen will likely be maintained by CDFW, thereby creating another mechanism to measure project success. Channel changes/fluctuations both above and below the DCID will be monitored via Mark Gard (USFWS/AFRP support); data includes photo monitoring, longitudinal profiles, and cross section data.

Performance metrics are derived from SIT priorities, as well as the data associated with the Course Resolution Model effort.

Citations: 2014 CDFW Fish Habitat Restoration Manual

2013 NMFS Fish Passage Manual.

Re-Establishing Fish Passage between 119,000 Acres of the

Milwaukee River Watershed and the Milwaukee Area of

Concern/Lake Michigan

Final Report to National Oceanic and Atmospheric Administration

Andrew T. Struck, Matt Aho, Ryan McCone, Luke Roffler, Thomas J. Dueppen, and Lisa

Haselow (Ozaukee County – Planning and Parks Department)

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Stakeholder support of project	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2013	CVPRF	\$106,000	\$0	\$106,000
2017	CVPRF	\$2,549,300	\$0	\$2,549,300

Total Cost: \$2,655,300

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2013					
<i>Design -</i>					
Agreement	\$106,000	n/a	FWS	CVPRF	Prepare 100% designs.
2017					
<i>Environmental Compliance and Permitting -</i>					
Agreement	\$111,300	n/a	FWS	CVPRF	Complete env. documents and permits. Need may be proposed to cover with FY15 AFRP carryover or FY16 project funds as this project is very time sensitive. Any updates on funding need will be conveyed to CVPIA management asap.
<i>Implementation - Construction of structure and associated monitoring</i>					
Agreement	\$2,438,000	n/a	FWS	CVPRF	Construction of structure and associated monitoring

Deer Creek: Fish Passage at SVRIC

This project will improve upstream and downstream passage at the SVRIC Dam via construction of a fish passage improvement project while also meeting SVRIC's irrigation needs

Classification: Improvement, Fish Passage
Location: 39.96323, -122.034273, Deer Creek
Funding Years: 2017 - 2021
Benefits Start Year: 2020
Priority: 18 - Core Team Priority: Address spring-run Chinook passage on Deer Creek

Core Team: Addresses multiple species/runs

2014 NMFS Recovery Plan High priority for Deer Creek

AFRP Final Rest. Plan Action 3. Improve spawning habitats in lower Deer Creek for fall and late-fall-run Chinook salmon (will greatly improve access to habitat)

AFRP Final Rest. Plan actions regarding improved passage, use of bypassed flows, watershed management.

Partners: NMFS, Stanford Vina Ranch Irrigation Company, Trout Unlimited, USBR, CDFW, CDWR

Related Programs: CALFED, CVPIA b1, NMFS-RP, NMFS-RPAs, AFRP, AFSP b21

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	

Metrics

No Data.

Deliverables

<u>Date</u>	<u>Title</u>
Dec. 2018	Feasibility Analysis and Report
Sep. 2018	Annual Report
Sep. 2019	Annual Report

Narrative

The need to restore and maintain salmonid passage in Deer Creek is identified in AFRP and ERP goals, objectives, and targets. Both of these programs prioritize establishment, restoration, and maintenance of anadromous fish habitat quality on this stream. Providing unimpeded fish

passage and maintaining suitable water quality are also of paramount importance. In the AFRP Final Restoration Plan, "...improving the opportunity for adult fish to reach their spawning habitats in a timely manner" is one of six objectives identified in achieving the AFRP program goal of doubling the natural production of anadromous fish in Central Valley rivers and streams on a sustainable and long-term basis." Deer Creek is one of the few streams in California that is not altered by a major storage dam and is one of the three key streams for spring-run Chinook. However, due in part to naturally occurring low flows and diversions by Deer Creek Irrigation District (DCID or District) and Stanford Vina Ranch Irrigation Company (SVRIC), the upstream migration of spring-run Chinook salmon adults or downstream migration of juvenile spring-run Chinook salmon may be impeded or blocked during April, May, June and October. Similarly, fall-run Chinook (*Oncorhynchus tshawytscha*) and Central Valley steelhead (*Oncorhynchus mykiss*) adult and juvenile passage may be impeded or blocked during the same timeframes as well as Pacific lamprey (*Entosphenus tridentatus*). Associated projects are the Lower Deer Creek Falls Fish Passage Project and the ongoing fish passage project at the Deer Creek Irrigation District dam, which is located upstream. This project specifically addresses the Core Team priority of spring-run Chinook fish passage on Deer Creek.

Surface water is diverted into two diversion ditches from Deer Creek at the SVRIC Diversion Dam, which is located approximately 4 miles upstream of the confluence with the Sacramento River. The SVRIC Dam is an old concrete structure that has had multiple issues with fish passage maintenance over the last 10 years. Phase 1 will include a feasibility study to assess various alternatives to address unimpeded upstream and downstream passage. After selecting a preferred alternative, future phases will include 100% design, env. documents and permits, construction, and monitoring.

The prediction of project outcome is to provide unimpeded fish passage at all flow ranges, for all anadromous salmonids and their life stages. The project costs are comparable to other local fish passage projects. Other than administrative types of costs and the costs of permits, the funding all goes towards on--the-ground restoration. It has high levels of community support.

One metric of measurement for this project is the degree to which fall-run Chinook can access areas above this dam currently, as they are nearly completely blocked until diversion ceases in the late fall. The mode of measurement can be amount of suitable habitat used by fish in this context. The DSM model also contains information on the number of diversions in each watershed that somehow impeded salmon; this is one of them that will be directly addressed, thereby improving the conditions for fish in this watershed and positively changing the DSM model. The impacts of not doing the charter will be to damage the existing relationship between the diverters and resource agencies; much time and effort on the part of local coordinators went into getting DCID to the table and working cooperatively. The larger impact will be continue impediment to multiple species/runs of anadromous fish, two of which are listed species. There are no known objections to this project.

Data Management

All data and reports will be housed at the Red Bluff Fish and Wildlife Office.

The objective of the project is to improve passage. Short term monitoring includes as-built design, photo monitoring, and pre-project data collection of instream conditions and fish passage conditions at, above, and below the dam. Physical measurements include instream passage

conditions through the new fish passage structure, which conceivably can be translated into fish passage accessibility (e.g. number of miles of habitat opened).

The project will be monitored over the long-term via maintenance commitments that SVRIC will make via the permitting process. In addition, CDFW monitors both above and below this location to assess spring-run passage and fall-run Chinook spawning behavior, including use of a video system. The screens will likely be maintained by CDFW, thereby creating another mechanism to measure project success. Channel changes/fluctuations both above and below the SVRIC Main Dam will be monitored via Mark Gard (USFWS/AFRP support); data includes photo monitoring, longitudinal profiles, and cross section data.

Video monitoring could be conducted in such a way as to assess any potential delay experienced by the fish as the encounter the new fish passage structure at this dam. This can be translated, via review of literature, into a quantified figure for fish numbers/number of spawning pairs/individuals. It is known that this structure did impede 20 SRCS in 2010, who died below the structure after failing to migrate past it.

Performance metrics are derived from SIT priorities, as well as the data associated with the Course Resolution Model effort.

Citation: 2014 CDFW Fish Habitat Restoration Manual

2013 NMFS Fish Passage Manual.

Re-Establishing Fish Passage between 119,000 Acres of the Milwaukee River Watershed and the Milwaukee Area of Concern/Lake Michigan

Final Report to National Oceanic and Atmospheric Administration

Andrew T. Struck, Matt Aho, Ryan McCone, Luke Roffler, Thomas J. Dueppen, and Lisa Haselow (Ozaukee County – Planning and Parks Department)

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
project	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2018	CVPRF	\$196,100	\$0	\$196,100
2019	CVPRF	\$3,180,000	\$0	\$3,180,000
2017	CVPRF	\$79,500	\$0	\$79,500

Total Cost: \$3,455,600

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Planning and Analysis - Feasibility Study and Report</i>					
Agreement	\$79,500	n/a	FWS	CVPRF	Grant agreement for Phase 1
2018					
<i>Design - Up to and including 100%</i>					
Agreement	\$79,500	n/a	FWS	CVPRF	
<i>Environmental Compliance and Permitting - Including pre project monitoring</i>					
Agreement	\$116,600	n/a	FWS	CVPRF	
2019					
<i>Implementation - Project Implement and Post-Project monitoring</i>					
Agreement	\$3,180,000	n/a	FWS	CVPRF	

Disease impact on Winter-run juvenile Chinook salmon survival in the Upper Sacramento River

Disease impact on Winter-run juvenile Chinook salmon survival in the Upper Sacramento River

Classification: Research, Water Operations
Location: 40.607615, -122.446198, Upper Sacramento and Tributaries
Funding Years: 2016 - 2021
Benefits Start Year: 2016
Priority: -
Partners: OSU Barthomew Lab
Related Programs: Interagency Ecological Program, NMFS-RP
Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	Unsure of most appropriate CVPIA provision, TBD.

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Disease assessment and report with management recommendations	1	number of reports	

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2021	Final report

Narrative

From Dr. J. Scott Foott, USFWS, CA-NV Fish Health Center:

Hypothesis: Stable flows in the upper Sacramento River (Keswick to Red Bluff) are associated with multifocal, high density polychaete (*Manayunkia speciosa*) habitat. Winter pulse flows will disrupt such polychaete habitat in upper Sacramento and reduce *Ceratonova shasta* infection of juvenile Winter-run Chinook salmon and thus improve salmon survival. The polychaete is the invertebrate host for the salmon pathogen *Ceratonova shasta*.

Management Action: Provide specific variable flow regimes, such as pulse flows with precipitation events, to disrupt high density polychaete (*Manayunkia speciosa*) habitat within reaches used by Sacramento River Winter-run Chinook for initial rearing (rkm 440 – 480) and/or reduce transmission of myxospores from adult Fall/Spring and Late-fall Salmon carcasses to polychaetes (October through February). CVPIA water management authorization tools such as

flow dedications in section b(2) and reoperation and conjunctive use in section b(3) could be used to facilitate these pulse flows.

Links to CVPIA Core Team FY17 priorities:

Winter-run Chinook: Based on the priorities submitted by the Winter-run PWT, the Core Team recommends that reducing water temperatures and flow fluctuations during egg incubation and rearing, reducing pathogens and understanding the factors that influence their impacts, reducing predation, improving juvenile fish emigration, increasing rearing habitat, and reducing adult entrainment into the Colusa Basin drain are all priorities for Winter-run Chinook Salmon in the Sacramento River.

Data Management

Data will be collected, analyzed and stored by the CA/NV Fish Health Center. Data will be made publicly available at www.fws.gov/redbluff/afrp.html

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
sci integrity	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$65,775	\$0	\$65,775

Total Cost: \$65,775

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Research - Total: \$52,500</i>					
<i>Consisting of: USFWS labor (CA/NV Fish Health Center) and materials and supplies for field and lab testing and analysis</i>					
Equipment or Materials	\$31,110	n/a	FWS	CVPRF	
Labor	\$34,665	0.12	FWS	CVPRF	

Identifying and reducing impacts of riparian water diversions - Mokelumne River

Development of a model that ranks lower Mokelumne River (LMR) diversions that warrant screening or modifications and identifies the target species at each location and the corresponding type of screening or modifications needed, resulting in the modification or screening of the three highest priority LMR diversions.

Classification: Improvement, Diversion Screening

Location: 38.22596, -121.02368, Mokelumne River

Funding Years: 2016 - 2021

Benefits Start Year: 2017

Priority: 29 - This project will be the first attempt to strategically identify, prioritize and begin remediation of small tributary diversions and will provide a model for all CVPIA watersheds with the 'screen all diversions' priority action from the Final Restoration Plan.

Partners: EBMUD

Related Programs: CDFW

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	Project will identify and begin remediation of high priority diversion screening projects on a non-CVP river. Possibly some (b)(21) funding if required match is available.

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Number of diversions identified and ranked by model	76	N/A	As of 2012, 76 water diversions exist on the LMR from Comanche Dam (rkm 103) to the town of Thornton (rkm 46, approximate end of LMR tidal influence). The model will quantify how many of these diversions reduce juvenile anadromous fish populations and rank them according to their estimated impact.
Technical Report re: Lower Mokelumne Diversions and Prioritization	1	number of reports	One technical report will be produced that describes the model development and output including objectives, methods and results.
Screened Diversions	3	number screened	The three highest priority LMR diversions (having landowner support) will be modified or screened with appropriate materials.

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2017	Finalized Model and Technical Report
Sep. 2021	Complete diversion screening or modification of 3 high priority sites

Narrative

Juvenile anadromous fishes may encounter up to 76 water diversions during their outmigration from the uppermost reaches of the LMR (rkm 90-103) to the tidally influenced LMR (rkm 46) (EBMUD, unpublished data). In addition, native fishes exhibiting non-migration-related movement may encounter a subset of these diversions in the LMR. Four of these diversions are operated by local irrigation districts, including a large gravity-fed canal managed by Woodbridge Irrigation District. The remaining diversions consist of small surface water pumps ranging from 3 to 16 inches in diameter. The majority of these pumps exist in the upper reaches of the LMR, above Lodi Lake (rkm 62), and many lack screens to prevent losses of fish. Although riparian water users may operate any time of the year, the highest volume of water is diverted from April through September. Juvenile outmigration and juvenile fish community data on the LMR demonstrate overlapping time frames between rearing, emigration, and the operation of riparian water diversions (Workman 2003; Merz and Saldate 2004; Bilski et al. 2010). However, variation in pump size, infrastructure, configuration, diversion timing, and location make it difficult to identify which diversions are most likely to have adverse impacts to native anadromous fishes on the LMR.

The goal of this project is to analyze recent and historic data from riparian diversions, hydraulic mapping, salmonid redd emergence timing, juvenile outmigration monitoring, and juvenile fish community surveys to identify and rank water diversions that may reduce native anadromous fish populations on the LMR. The study will also identify which species and life stages are the most vulnerable at each location as well as time frames when species are the most vulnerable. Focal species and life stages will include fall-run Chinook salmon fry and smolts, steelhead fry, parr, and smolts, and Pacific lamprey ammocetes and juveniles. Once sites are ranked and prioritized, the top three locations will be identified for modifications and/or screening.

For purposes of testing the CVPIA DSMs, completion of this charter is expected to reduce losses of native anadromous juvenile fish (Chinook, steelhead and Lamprey) directly due to entrainment by as much as 3-5%.

Links to CVPIA Core Team FY17 priorities:

Fall-run Chinook - Reduce Diversions and Juvenile Entrainment - Sacramento, Feather, Cosumnes, Calaveras, Mokelumne, Merced and San Joaquin Rivers and the Delta;

Projects will also benefit steelhead.

Data Management

1. Objective specific monitoring will assess the efficacy of each diversion modification with respect to juvenile fish losses and/or entrainment. Monitoring will be performed before and after each modification takes place.

2. Long-Term Trend monitoring (LTT) will continue on the lower Mokelumne River. Two rotary screw traps and one bypass smolt trap are operated by EBMUD on the LMR each season from approximately mid-December through June or July (water year type dependent). Juvenile salmonid catch and abundance data have been collected since 1990. Incidental species, including Pacific Lamprey, are also enumerated on a daily basis when the traps are in service.

All data collected and analyses completed as part of this charter will be maintained and securely stored by EBMUD and the USFWS-Lodi Fish and Wildlife Office. This information will also be provided to CVPIA Fisheries.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Site access for implementation. In addition to EBMUD's current relationships related to monitoring and other access, AFRP and AFSP have been working with EBMUD to begin a diversion screening effort in the watershed the last 2 years	2	1
Site access for monitoring/assessment. EBMUD maintains positive working relationships with landowners and irrigators who routinely allow access for annual monitoring.	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>	<u>Local</u>
2018		\$255,000	\$0	\$0	\$255,000
2018	CVPRF	\$169,600	\$0	\$169,600	\$0
2019	CVPRF	\$169,600	\$0	\$169,600	\$0
2020	CVPRF	\$169,600	\$0	\$169,600	\$0
2017	CVPRF	\$21,200	\$0	\$21,200	\$0
2017		\$17,800	\$0	\$0	\$17,800

Total Cost: \$802,800

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Inventory/Reconnaissance - LMR water diversion field surveys and data processing</i>					
Agreement	\$9,328	n/a	FWS	CVPRF	Financial assistance agreement to collect and process field data related to at least 76 LMR diversions.
In-Kind Labor	\$3,000	n/a	Local		EBMUD will provide Fish Biologist to assist in completing field surveys and data processing.
In-Kind Equipment or Materials	\$5,000	n/a	Local		EBMUD will provide high resolution GNSS unit, camera, and flow meter for survey work
<i>Management - Project overhead and management</i>					
In-Kind Labor	\$4,800	n/a	Local		EBMUD staff will provide project overhead and management
<i>Planning and Analysis - Spatial modeling to rank water diversion risks for anadromous juvenile fishes</i>					
In-Kind Labor	\$5,000	n/a	Local		EBMUD will provide Fish Biologist and/or other technical staff to assist in modeling and completion of technical report
Agreement	\$11,872	n/a	FWS	CVPRF	Financial assistance agreement to develop spatial model capable of ranking water diversions related to their risks for anadromous juvenile fishes.
2018					
<i>Environmental Compliance and Permitting - Environmental compliance and permitting related to implementing diversion modification/screening projects</i>					
In-Kind Labor	\$150,000	n/a	Local		EBMUD will complete environmental documentation and permitting for 3 sites to be improved under this charter. Will also pursue programmatic documents and permitting that would facilitate future efficiency.
<i>Implementation - Modification/screening of three high-priority LMR diversions</i>					
Agreement	\$169,600	n/a	FWS	CVPRF	Financial assistance agreement to complete implementation of diversion

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
					modification/screening. Assumes standard designs will be used requiring only minimal site-specific design work.
<i>Management - Project overhead and management</i>					
In-Kind Labor	\$30,000	n/a	Local		EBMUD will provide general project oversight and management for 3 implementation projects to be completed under this charter.
<i>Monitoring - Objective specific monitoring</i>					
Direct Contribution	\$75,000	n/a	Local		EBMUD will provide \$25,000/project for pre-project and post-project fisheries monitoring. Funding will include fish tags, fish traps, cameras, other monitoring equipment, and labor.
2019					
<i>Implementation - Modification/screening of three high-priority LMR diversions</i>					
Agreement	\$169,600	n/a	FWS	CVPRF	Financial assistance agreement to complete implementation of diversion modification/screening. Assumes standard designs will be used requiring only minimal site-specific design work.
2020					
<i>Implementation - Modification/screening of three high-priority LMR diversions</i>					
Agreement	\$169,600	n/a	FWS	CVPRF	Financial assistance agreement to complete implementation of diversion modification/screening. Assumes standard designs will be used requiring only minimal site-specific design work.

Lower Mokelumne River Salmonid Spawning and Rearing Habitat Improvement Project

The excavation and recontouring of the lower Mokelumne River stream bank to provide seasonal floodplain habitats for juvenile salmonid rearing and to sort and harvest gravel and cobble (1/4"-5") from the excavated materials, which will be used to improve or expand nearby spawning habitats.

Classification: Improvement, FloodPlain
 Location: 38.22596, -121.02368, Mokelumne River
 Funding Years: 2016 - 2021
 Benefits Start Year: 2017
 Priority: 4 - Next portion of ONGOING and highly successful spawning/rearing habitat restoration between AFRP and EBMUD on the Mokelumne River.
 Partners: EBMUD
 Related Programs: NMFS-RP
 Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Restored Floodplain Habitat	10	acres	Depending on final site designs and constraints, 3-10 acres of floodplain habitat will be restored
Spawning Gravel	5000	cubic yards	Depending on final site designs and constraints, 1,000-5,000 cubic yards of gravel will be harvested from restored floodplain habitats and placed in-river.
Spawning habitat	3	acres	Depending on final site designs and constraints, up to 3 acres of additional in-river spawning habitat will be created

Deliverables

<u>Date</u>	<u>Title</u>
Dec. 2016	FY16 Mokelumne Spawning Gravel Project Annual Report
Dec. 2015	FY15 Mokelumne Spawning Gravel Project Annual Report
Dec. 2017	FY17 Mokelumne Spawning and Rearing Habitat Project Annual Report
Dec. 2018	FY18 Mokelumne Spawning and Rearing Habitat Project Annual Report
Dec. 2021	5-year Technical Report - Mokelumne Spawning and Rearing Habitat Project
Dec. 2020	FY20 Mokelumne Spawning and Rearing Habitat Project Annual Report

<u>Date</u>	<u>Title</u>
Dec. 2019	FY19 Mokelumne Spawning and Rearing Habitat Project Annual Report
Dec. 2021	FY21 Mokelumne Spawning and Rearing Habitat Project Annual Report

Narrative

The objectives of the proposed rearing habitat portion of the project are to incorporate juvenile salmonid rearing habitat with the long-term spawning habitat rehabilitation that has occurred on the Mokelumne River since 1990. The specific objectives include; improve juvenile survival by providing habitat that promotes primary production and macroinvertebrate production for food, provide shallow water habitat for protection from predation, and encourage freshwater rearing to a larger size, ultimately, increasing the survival of juvenile fall-run Chinook Salmon and steelhead trout in the Mokelumne River. Floodplain habitat will be designed to seasonally inundate under current flow regimes on the lower Mokelumne River to maximize effectiveness. Additionally, creating floodplain rearing habitat will produce materials for continued spawning habitat improvement and maintenance of the long-term progress made via the CVPIA & EBMUD-funded projects that have occurred to date (as other local commercial spawning gravel sources are no longer generally available).

The objectives of the proposed spawning habitat rehabilitation activities are to increase available and usable spawning areas by providing spawning gravels within the appropriate size range; increase use of spawning habitat; improve gravel permeability and intergravel water quality; decrease redd superimposition (Merz 1998); and, ultimately, increase the natural production of fall-run Chinook Salmon and steelhead trout in the Mokelumne River. Increased gravel substrate will also increase production of aquatic invertebrates (Ochikubo Chan 2003), the food base for juvenile salmonids.

For purposes of testing the CVPIA DSMs, completion of this charter is expected to increase available juvenile rearing habitat by 3-10 acres during crucial spring rearing periods and provide an additional 11,500 square meters of spawning habitat.

Links to CVPIA Core Team FY17 priorities:

Fall-run Chinook

- Improve Juvenile Rearing Habitat - Sacramento, Yuba, Feather, American, Calaveras, Mokelumne, Merced, Tuolumne, Stanislaus and San Joaquin Rivers and the Delta;

Data Management

Objective specific monitoring will assess the function and biological use of restored floodplain habitats. Topography surveys, 2D hydrodynamic modeling, and juvenile fish monitoring will be performed before and after restoration takes place. To assess differences in primary production, benthic macroinvertebrate and fish diet samples will be taken and compared between in-channel and newly created floodplain habitats.

Long-Term Trend monitoring (LTT) will continue on the lower Mokelumne River. Salmonid redd surveys are conducted on a weekly basis throughout each spawning season (October through March). Chinook salmon and O. mykiss redds are enumerated and each spawning location is marked using a high resolution GNSS unit. Rotary Screw traps are monitored from December through June to assess number, timing and size of rearing and out-migrating juvenile salmonids.

EBMUD collects and manages all data related to this project and provides electronic copies to AFRP staff. Secure electronic data backups will be retained by EBMUD and USFWS. Additionally, data and analyses will be provided to CVPIA Fisheries.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Gravel availability. There is a potential that some of the floodplain areas will contain less appropriately sized gravel than modeling indicates. However, EBMUD has identified several other potential gravel sources on their property within the Mokelumne Watershed.	2	1
Obtaining permits. EBMUD and USFWS have recently completed permits associated with this work that remain valid through FY19. Renewing permits for work past FY19 will require some effort, but is not expected to slow any progress on this charter	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>	<u>Local</u>
2017		\$92,500	\$0	\$0	\$92,500
2017	CVPRF	\$53,000	\$0	\$53,000	\$0
2018	CVPRF	\$121,900	\$0	\$121,900	\$0
2018		\$62,500	\$0	\$0	\$62,500
2019	CVPRF	\$121,900	\$0	\$121,900	\$0
2019		\$62,500	\$0	\$0	\$62,500

Total Cost: \$514,300

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Implementation - Project will further develop local gravel sources and implement spawning gravel improvement.</i>					
In-Kind Labor	\$62,500	n/a	Local		
Agreement	\$53,000	n/a	FWS	CVPRF	Financial Assistance Agreement that will fund floodplain excavation, material sorting, contouring of restored floodplain habitat and in-channel placement of spawning gravel.
<i>Monitoring - Objective specific monitoring at all 3 sites</i>					
In-Kind Labor	\$30,000	n/a	Local		\$10,000/project for pre-project and post-project fisheries monitoring. Funding will include labor, fish tags, fish traps, cameras, and other monitoring equipment.
2018					
<i>Implementation - Project will further develop local gravel sources and implement spawning gravel improvement.</i>					
Agreement	\$121,900	n/a	FWS	CVPRF	Financial Assistance Agreement that will fund floodplain excavation, material sorting, contouring of restored floodplain habitat and in-channel placement of spawning gravel.
In-Kind Labor	\$62,500	n/a	Local		
2019					
<i>Implementation - Project will further develop local gravel sources and implement spawning gravel improvement.</i>					
Agreement	\$121,900	n/a	FWS	CVPRF	Financial Assistance Agreement that will fund floodplain excavation, material sorting, contouring of restored floodplain habitat and in-channel placement of spawning gravel.
In-Kind Labor	\$62,500	n/a	Local		

Reconfigure Breached Delta Levees

Project would assess, design and implement solutions for existing breached Delta levees and associated scour holes. Purpose is to reduce the number and extents of predator 'hot-spots.

Classification: Improvement, Other Habitat Restoration
Location: 38.239362, -121.684082, Sacramento-San Joaquin Delta
Funding Years: 2016 - 2021
Benefits Start Year: 2018
Priority: -
Partners: Golden Gate Salmon Association
Related Programs: Interagency Ecological Program
Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	Initial phased of project may lead to habitat restoration projects and is likely most appropriate under (b)(1)

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Assessment and design of Delta levee breach locations which may be negatively impacting juvenile fish	1	number of reports	Larger assessment will include evaluation of multiple sites to determine general disposition and potential impacts of those sites. More specific assessment and design would likely be developed for one specific site initially.

Deliverables

<u>Date</u>	<u>Title</u>
Dec. 2017	Initial assessment of Delta Levee Breach sites and assessment/design of individual site

Narrative

There have likely been significant adverse, unintended consequences of breaching levees in the Delta. There is a high probability that site-specific conditions at the breaches have resulted in hazards for juvenile anadromous fish through the creation of favorable predator habitats. The breaches have changed the tidal prisms in the Delta and can change the degree in which juvenile fish are advected back and forth with the tides. Additionally, many of the breaches were narrow which have created deep scour holes favoring predatory fish. The existing breaches at Liberty Island are just a few examples where hazards are posed to juvenile fish in the Delta; many other areas exist. Once those areas are identified, the levees would be reconfigured and scour holes filled to provide wider breaches and more laminar flow thereby reducing opportunities for

predation. It is anticipated that this project will significantly improve the survival of juvenile salmon (all runs) through decreased predation.

The intent of this charter initially is to identify potential sites where these issues may be occurring and design a potential solution at least 1 site (likely Liberty Island). Existing information related to juvenile fish presence within and surrounding Liberty Island is being provided by the USFWS-Delta Juvenile Fish Monitoring Program.

Links to FY17 Core Team Priorities:

Winter-run priorities in the Delta include improving rearing and floodplain habitat and improving water operations to reduce migration delays and reduce predation losses.

Fall-run - Reduce Predator Encounters - Sacramento and San Joaquin Rivers and Delta; Projects would also benefit spring-run.

For reference, this charter was developed based on discussion with multiple project partners and Golden Gate Salmon Association's proposed project D.14.

Data Management

All data produced as part of this charter will be provided to CVPIA Fish staff for planning/design purposes and incorporation into the improvement and parameterizing of Decision Support Models. Additionally, data management, retention and sharing with CVPIA will be included in any grants or cooperative agreements as deliverables for this charter.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Obtaining design approvals and permits is likely to be more difficult within the Delta. However, designs can build upon other typical actions within the Delta (e.g. channel dredging, levee maintenance) to reduce this concern.	2	2

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$111,300	\$0	\$111,300
2018	CVPRF	\$275,600	\$0	\$275,600

Total Cost: \$386,900

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Design - Design of at least 1 site.</i>					
Agreement	\$15,900	n/a	FWS	CVPRF	Engineered design of at least 1 restoration site
<i>Environmental Compliance and Permitting - Environmental compliance and permitting of at least 1 site.</i>					
Agreement	\$15,900	n/a	FWS	CVPRF	Compliance and permitting for at least 1 site. Programmatic options will also be pursued, as appropriate.
<i>Inventory/Reconnaissance - Initial study to identify and determine the general nature of existing sites.</i>					
Agreement	\$79,500	n/a	FWS	CVPRF	Literature and data review, spatial analysis and some field work to complete initial assessment of potential sites.
2018					
<i>Implementation - Implement restoration project at 1 site.</i>					
Agreement	\$265,000	n/a	FWS	CVPRF	Construction of at least 1 restoration site. Assumes site can be implemented using standard practices for channel dredging and/or levee maintenance in this area.
<i>Monitoring - Monitoring of initial implementation site</i>					
Agreement	\$10,600	n/a	FWS	CVPRF	Monitoring of implementation sites to include hydraulic performance, predator presence, juvenile native fish presence and likely some additional factors TBD once final design is complete and implemented.

Recreate Shallow Water Habitat in the Delta Migration Routes

Project proposes to create shallow water habitats within the Delta along the migratory route of Juvenile salmonids. An initial pilot would create shallow-water rearing habitats in several locations as large-scale demonstration projects to be evaluated for effectiveness.

Classification: Improvement, FloodPlain
Location: Delta, exact locations TBD, Sacramento-San Joaquin Delta
Funding Years: 2016 - 2021
Benefits Start Year: 2018
Priority: -
Partners: Golden Gate Salmon Association
Related Programs: NMFS-RPAs
Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	Habitat Restoration, likely best funded under (b)(1)

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Data Review and Field Assessment Report	1	number of reports	Data Review and Field Assessment of potential sites for recreating shallow-water habitats in the Delta.
Site Design	1	number of reports	Conceptual design of at least one candidate site for implementation of shallow-water rearing habitat improvement.

Deliverables

<u>Date</u>	<u>Title</u>
Dec. 2017	Data review and Initial Site Assessment Report for Delta shallow-water rearing habitat improvements
Dec. 2017	Conceptual design for at least 1 Delta shallow-water rearing habitat improvement project

Narrative

Chinook salmon fry survival in the Delta is lower than survival from fry rearing in the upper Sacramento River. Ultimately, minimizing exposure to potentially lethal factors in the Delta will provide a major complement to ongoing efforts to save emigrating salmonids in upstream areas of the Sacramento River basin. The rearing of fry-sized fish in the Delta remains vital but is most likely limited by loss of shallow-water rearing habitats. This project proposes to initially create shallow-water rearing habitats in several locations as large-scale demonstration projects to be evaluated for effectiveness. If the initial habitat restoration projects are successful as determined through monitoring, the creation of additional shallow-water rearing habitats would be

significantly expanded. The first phase of this project would be to evaluate existing data the USFWS has collected during the agency's multi-year, regular beach seining program to monitor the relative abundance and distribution of juvenile salmon and other species in the north and central Delta and data collected from other research or monitoring programs. All the historical data collected would be evaluated to determine those physical habitat attributes favored by juvenile salmon. Once the design characteristics for the creation of new shallow-water rearing habitats are determined, candidate sites in the north and central Delta must be located. Some of the physical attributes examined at each site may include: cross-sectional and longitudinal channel bathymetry, channel and thalweg sinuosity, streambed substrates, nearby fish habitats, presence or absence of terrestrial and aquatic vegetation, adjacent landowner considerations, boating traffic safety, water velocities, tidal sheer forces, and wave action that may erode the sites, proximity to the principal salmon migration corridors, proximity to predator habitats, flood control, and other variables. This project is intended to expand the quality and quantity of juvenile salmon shallow water rearing habitats at appropriate locations in the Delta.

Links to FY17 Core Team Priorities:

Winter-run priorities in the Delta include improving rearing and floodplain habitat and improving water operations to reduce migration delays and reduce predation losses.

Fall-run Chinook: Based on the priorities identified by the SIT, the Core Team agrees that the following are priorities for fall-run Chinook salmon:

- Improve Juvenile Rearing Habitat - Sacramento, Yuba, Feather, American, Calaveras, Mokelumne, Merced, Tuolumne, Stanislaus and San Joaquin Rivers and the Delta
- Reduce Predator Encounters - Sacramento and San Joaquin Rivers and Delta;

For reference, this charter was developed based on discussion with multiple project partners and Golden Gate Salmon Association's proposed project D.15.

Data Management

All data, assessments and designs created and reviewed as part of this charter will be provided to the USFWS - Lodi FWO. Additionally, data will be provided to CVPIA Fisheries. Financial Assistance Award will also require grantee to maintain records in a secure format.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Site Access. May be an issue at individual sites but initial assessment stages can likely be completed with limited on the ground access.	2	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2018	CVPRF	\$159,000	\$0	\$159,000
2019	CVPRF	\$1,086,500	\$0	\$1,086,500
2017	CVPRF	\$318,000	\$0	\$318,000

Total Cost: \$1,563,500

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Inventory/Reconnaissance - Field Surveys and spatial assessment of potential sites</i>					
Agreement	\$265,000	n/a	FWS	CVPRF	Financial Assistance Agreement to complete assessment of specific candidate sites for Delta shallow-water rearing habitat improvement projects. Also includes conceptual design of at least 1 candidate site.
<i>Planning and Analysis - Data review and initial analysis of target areas for candidate restoration sites</i>					
Agreement	\$53,000	n/a	FWS	CVPRF	Financial Assistance Agreement to complete data review and initial analysis of target areas in the Delta where shallow-water rearing habitat projects would be most effective and appropriate.
2018					
<i>Design - Design of at least 1 Delta shallow-water rearing habitat improvement project</i>					
Agreement	\$106,000	n/a	FWS	CVPRF	Financial Assistance Agreement to complete at least 1 site-specific engineered design for a Delta shallow-water rearing habitat improvement project.
<i>Environmental Compliance and Permitting - Programmatic or site-specific environmental compliance and permitting documentation for at least 1 site</i>					
Agreement	\$53,000	n/a	FWS	CVPRF	Financial Assistance Agreement to complete programmatic or site-specific environmental compliance and

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
					permitting for at least 1 Delta shallow-water rearing habitat improvement project.
2019					
<i>Implementation - Complete construction at 1 site</i>					
Agreement	\$1,060,000	n/a	FWS	CVPRF	Very preliminary estimate of potential construction cost of implementing 1 Delta shallow-water rearing habitat improvement site
<i>Monitoring - Monitoring of Delta shallow-water rearing habitat improvement and tracking of individual fish that utilized the site through their life-cycle</i>					
Agreement	\$26,500	n/a	FWS	CVPRF	Financial Assistance Agreement to monitor effectiveness of Delta shallow-water rearing habitat improvements. Monitoring would include site-specific elements and tracking of individual fish that utilized the site through time.

Yuba Upper Rose Bar Restoration

Yuba Upper Rose Bar Restoration

Classification: Improvement, In-Channel

Location: 39.2205, -121.29526, Yuba River

Funding Years: 2017 - 2022

Benefits Start Year: 2018

Priority: 19 - Project would build upon previous work by AFRP and PG&E to identify limiting factors and needed restoration in this reach of the Yuba River.

Partners: South Yuba River Citizens League, CDFW, PG&E

Related Programs: NMFS-RP

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(1) AFRP	100.0%	\$250K for design and permits plus \$1.6M for implementation. \$150K for monitoring.

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Spawning Habitat	3	acres	See details in narrative.
Rearing Habitat	1	acres	

Deliverables

<u>Date</u>	<u>Title</u>
Jun. 2018	Final Designs
Mar. 2019	Permits
Dec. 2018	Annual Reports

Narrative

There is an established need for augmentation of salmonid spawning gravels in the bedrock canyon below Englebright Dam in the lower Yuba River. This condition extends about 2 miles downstream from the dam to the area called "Rose Bar," where smaller sediment sizes enter the river from the Blue Point Mine drainage on the south side of the canyon. The proposed action would be a spawning gravel augmentation project at Upper Rose Bar, combined with side channel construction, riparian restoration, and/or large woody material installation to enhance rearing habitat. Gravel would be obtained adjacent to the site as part of an effort to stabilize a series of ephemeral drainages that have eroded through the accumulated hydraulic mining debris in the Blue Point Mine drainage. A feasibility and alternatives report (SYRCL 2015) and restoration concept development report (ESA 2016) have been produced with funds from partners. Results indicate that both the sediment quality and mercury levels are acceptable for

habitat restoration activities. The project would improve the quality and quantity of spawning and rearing habitat for salmonids at Upper Rose Bar, including specific benefits to spring-run Chinook salmon and steelhead (SYRCL 2015). Recent gravel augmentation efforts nearer to Englebright Dam by USACE (about 4000 cubic yards annually since 2010) have quickly attracted spawners.

Cost estimate for design, permits, and implementation over 3 or more years is \$1.9M. This includes \$1.4M for processing 65,700 cy of material on site (SYRCL 2015); 20,000 cy would be placed in the river channel, and the remaining 45,700 cy would be stockpiled adjacent to the river channel to recruit into the river during high flows. The Yuba River was identified as a CVPIA priority stream in the USFWS Fish Focus Group (FFG) process circa 2008, although it was not designated as a watershed priority in the Final Restoration Plan. The project addresses AFRP Final Restoration Plan/CPAR non-structural action E4, Evaluate the benefits of restoring stream channel and riparian habitats of the Yuba River, including the creation of side channels for spawning and rearing habitats for salmonids. Spawning habitat in the Yuba River was not identified as a primary or secondary limiting factor in the Final Restoration Plan, but was identified as the secondary limiting factor by the FFG.

Metric details:

Using WUA and redd density estimates calculated by the Yuba RMT (2013), 3 acres would represent a 2% increase in spawning habitat capable of supporting 900 Chinook salmon redds.

References available upon request. Previous funding from AFRP and PG&E has completed initial assessment and conceptual designs that informs this effort.

Links to CVPIA Core Team FY17 priorities:

Spring-run Chinook: Improving rearing habitat on the Yuba River (project will provide spawning and in-channel rearing habitat)

Fall-run Chinook: Improve Juvenile Rearing Habitat - Sacramento, Yuba, Feather, American, Calaveras, Mokelumne, Merced, Tuolumne, Stanislaus and San Joaquin Rivers and the Delta;

Project will also benefit steelhead

Data Management

All designs, permits, reports, monitoring data, shape files, etc. will be saved on grantee/contractor local computers and backed up on a server. Electronic copies will be provided to USFWS-AFRP.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
This project has a high likelihood of successful implementation (i.e., low risk) because it involves a willing landowner to provide access to the river channel for project implementation	1	1

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
and to allow for the utilization of on-site hydraulic mining sediments to create suitable spawning substrates. Also, the project could be phased with emphasis placed on different components (e.g., riparian restoration) as needed; this flexibility will increase the likelihood of creating a functional project.		
Gravels/cobbles would be harvested as part of an effort to stabilize a series of ephemeral drainages that have eroded through the accumulated hydraulic mining debris in the Blue Point Mine drainage. This would reduce the potential impact of pollutants (e.g., mercury) to ecological systems downstream and contribute to the stability of the restoration site (i.e., low risk of adverse impacts).	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$318,000	\$0	\$318,000
2018	CVPRF	\$901,000	\$0	\$901,000
2019	CVPRF	\$901,000	\$0	\$901,000

Total Cost: \$2,120,000

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Design - Design for gravel augmentation, rearing habitat restoration and bank/drainage stabilization.</i>					
Agreement	\$106,000	n/a	FWS	CVPRF	Site assessment and project design
<i>Environmental Compliance and Permitting - Permits and CEQA etc. for gravel augmentation, rearing habitat restoration, and bank/drainage stabilization.</i>					
Agreement	\$159,000	n/a	FWS	CVPRF	All required permitting processes for restoration project
<i>Monitoring - Pre-project monitoring for juvenile and adult salmonids as needed to supplement the work of the Yuba RMT.</i>					
Agreement	\$53,000	n/a	FWS	CVPRF	Pre-project monitoring for juvenile and adult salmonids as needed to supplement the work of the Yuba RMT.

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2018					
<i>Implementation - Gravel augmentation, rearing habitat restoration, and bank/drainage stabilization.</i>					
Agreement	\$848,000	n/a	FWS	CVPRF	Gravel augmentation, rearing habitat restoration, and bank/drainage stabilization.
<i>Monitoring - Pre-project monitoring for juvenile and adult salmonids as needed to supplement the work of the Yuba RMT.</i>					
Agreement	\$53,000	n/a	FWS	CVPRF	Juvenile and adult salmonid monitoring as needed to supplement the work of the Yuba RMT.
2019					
<i>Implementation - Gravel augmentation, rearing habitat restoration, and bank/drainage stabilization.</i>					
Agreement	\$848,000	n/a	FWS	CVPRF	Gravel augmentation, rearing habitat restoration, and bank/drainage stabilization.
<i>Monitoring - Pre-project monitoring for juvenile and adult salmonids as needed to supplement the work of the Yuba RMT.</i>					
Agreement	\$53,000	n/a	FWS	CVPRF	Juvenile and adult salmonid monitoring as needed to supplement the work of the Yuba RMT.

b12 Clear Cr Spawning Gravel Injection

Augment spawning gravel into Clear Creek to provide spawning habitat for anadromous salmonids and to promote geomorphic processes.

Classification: Improvement, Spawning Gravel

Location: , Clear Creek

Funding Years: 2016 - 2017

Benefits Start Year: 2016

Priority: 2 - Ongoing project benefitting multiple species including two ESA listed species. This long-term program is tightly coordinated with flow actions on Clear Creek to use flows to move gravel into place. NMFS Recovery Plan action to implement a long-term gravel program in Clear Creek per RPA action I.1.3.

Partners: BLM, CDFW, CDWR, NPS

Related Programs: NMFS-RP, NMFS-RPAs

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(12) Clear Creek Flows	100.0%	The addition of gravel is part of the program of flows.

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
b12: Spawning gravel placed annually (tons)	25000	tons	Amount of gravel required per year to restore spawning gravel supply to amount pre-Whiskeytown Dam
b12: Area of spawning hab created annually	219490	square feet	Current value is 63% of target of 347,308 square feet of usable spawning habitat which is the amount available pre-Whiskeytown Dam construction

Deliverables

<u>Date</u>	<u>Title</u>
Dec. 2017	Project Completion Report

Narrative

The CVPIA (b)(12) program augments spawning gravel in Clear Creek to make up for gravels blocked by Whiskeytown Reservoir, meet the requirements of NMFS OCAP BO RPA Action I.1.3, and achieve the NMFS Recovery Plan. Since 1996, 57 gravel injection projects have added approximately 172,335 tons of spawning gravel into Clear Creek. The U.S. Fish and Wildlife Service has documented that gravel from these injections have created new spawning habitat for all runs of Chinook salmon (*Oncorhynchus tshawytscha*) and steelhead (*O. mykiss*). In

particular, monitoring has shown that gravel added to Clear Creek has created spawning habitat that is currently used by spring-run Chinook salmon, and steelhead; both are federally listed species under the Endangered Species Act. The project will also help to restore sediment transport processes, such as coarse bedload transport continuity and sediment deposition on floodplain surfaces.

This is an ongoing project benefitting multiple species including two ESA listed species. This long-term program is tightly coordinated with flow actions on Clear Creek to use flows to move gravel into place. A NMFS Recovery Plan action is to implement a long-term gravel program in Clear Creek per RPA action I.1.3. The Clear Creek Technical Team is looking for ways to address the needs of the DSM.

The Clear Creek Fish Restoration Program evaluates the amount of spawning habitat using potential spawning habitat mapping (PSAM) and Spawning Habitat Use (SHU). SHU maps all habitat actually used or disturbed during spawning in reaches used by FCS. PSAM maps areas meeting spawning habitat criteria of depth, velocity, and substrate for SCS, STT, LFC and FCS in the entire creek. Overall trends in spawning area can be detected with these methods as well as changes on a reach and site specific scale.

Quantitative predictions of the expected outcomes of the gravel additions include 1) a 5% increase in PSAM in the year following gravel addition. This estimate is based on increases and decreases measured since 2010 which is a relatively limited period of time for comparison. In the past 4 years the tonnage of gravel supplementation has decreased 50% compared to the preceding 16 years. During this same time PSAM in the upper reaches has decreased by 29% suggesting that an annual program will be required to maintain spawning gravels. 2) Based on previous increases we expect an increase of 16% SHU per year following gravel mobilization. 3) The percent of steelhead redds in injection gravel in the upper reaches of Clear Creek increased 50% from 2003 to 2014. Based on this rate of increase we expect a further increase of 5% per year, however this metric cannot increase indefinitely nor linearly. The program has averaged 32% of the target 25,000 tons per year of spawning gravel addition required to restore spawning gravel supply.

Data Management

Compliance and effectiveness monitoring for the project includes fish and geomorphology components. There are short- and long-term aspects of each of these components. Short-term, Objective Specific monitoring will include repeat topological surveys of the gravel projects as they change over time, and documentation of spawning use during year round spawning ground surveys. While the first physical and biological responses of the project will be detected with these methods, they will also provide Long-Term Trend Monitoring. Long-Term Trend Monitoring will also rely on the broader fisheries-oriented monitoring program of the Clear

Creek Restoration Program which includes extensive monitoring methods that can be categorized by scale:

Watershed Scale:

Longitudinal topographic surveys, LiDAR; Bedload transport and Sediment budget; Annual adult salmonid population estimates; Annual juvenile production estimates; Annual juvenile productivity estimates (juvenile production / adult escapement); InSALMO model output out-migrants per year; Temperature monitoring system of loggers

Spawning Reach Scale:

Topographical change, especially estimating volumes of gravel moving in and out of project sites; Salmonid spawning habitat suitability mapping

Salmonid spawning habitat use; Redd distribution surveys; Salmonid use of supplemental gravel;

Meso- and Micro-habitat Scale:

Spawning gravel evaluation: sediment size; Juvenile habitat use studies compare salmonid densities between: restored and control reaches, physical habitat treatments, habitat types, types or presence of riparian vegetation; Macro-invertebrate studies comparing gravel restoration types in treated and control areas

STOS monitoring quantitative predictions of the expected outcomes of the gravel additions include 1) a 5% increase in PSAM in the year following gravel addition. This estimate is based on increases and decreases measured since 2010 which is a relatively limited period of time for comparison. In the past 4 years the tonnage of gravel supplementation has decreased 50% compared to the preceding 16 years. During this same time PSAM in the upper reaches has decreased by 29% suggesting that an annual program will be required to maintain spawning gravels. 2) Based on previous increases we expect an increase of 16% SHU per year following gravel mobilization. 3) The percent of steelhead redds in injection gravel in the upper reaches of Clear Creek increased 50% from 2003 to 2014. Based on this rate of increase we expect a further increase of 5% per year, however this metric cannot increase indefinitely nor linearly. The program has averaged 32% of the target 25,000 tons per year of spawning gravel addition required to restore spawning gravel supply. LTT monitoring quantitative predictions include 1) an increase in PSAM to pre-dam conditions, 2) sustained increase in SHU to a carrying capacity value which has yet to be determined, 3) an increase in tons per year until the system has been recharged with sediment. 4) the size distribution of gravel in spawning areas will converge on the size distribution preferred by salmonids. Another important metric for LTT monitoring is the number of juveniles produced per female salmonid.

The Clear Creek Technical Team has discussed metrics to study to see how our monitoring may help inform the DSM process. According to the DSM, spawning gravel is not a primary limiting

factor for Chinook and steelhead in Central Valley streams. Our information may help support or modify the DSM. The methods we have considered following up on include gravel size specifications, out-migrants per year from InSALMO model, Potential Spawning Area Mapping, watershed-wide bulk sediment sampling, macro-invertebrate abundance and species richness and Juvenile Habitat Use. The gravel projects could serve as experiments to test assumptions of the DSM model.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Funding reductions	1	3
High fuel costs	2	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$298,698	\$298,698	\$0
2018	CVPRF	\$300,830	\$300,830	\$0
2019	CVPRF	\$300,000	\$300,000	\$0

Total Cost: \$899,528

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Implementation - Gravel augmentation projects at multiple sites in Clear Creek</i>					
Agreement	\$298,698	n/a	BOR	CVPRF	Gravel projects towards CVPIA target of 25,000 tons per year
2018					
<i>Implementation - Gravel augmentation projects at multiple sites in Clear Creek</i>					
Agreement	\$300,830	n/a	BOR	CVPRF	Gravel projects towards CVPIA target of 25,000 tons per year
2019					
<i>Implementation - Gravel augmentation projects at multiple sites in Clear Creek</i>					
Agreement	\$300,000	n/a	BOR	CVPRF	Gravel projects towards CVPIA target of 25,000 tons per year

b12 Clear Creek Adaptive Management

Use monitoring and evaluation to improve restoration actions.

Classification: Performance Monitoring, Performance Monitoring
 Location: , Clear Creek
 Funding Years: 2016 - 2017
 Benefits Start Year: 2016
 Priority: 2 - Ongoing Actions, OCAP BO RPA actions, evaluates other priority actions, provides information to address DSM modules identified as having high uncertainty.
 Partners: BLM, CDFW, CDWR, NMFS, NPS, NRCS, Point Blue Conservation Science, Western Shasta Resource Conservation District
 Related Programs: CALFED, California Drought Response, CVPIA b2, EWP, NMFS-RP, NMFS-RPAs

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(12) Clear Creek Flows	100.0%	Activities provide for the release of flows.

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
b12: Spawning gravel placed annually (tons)	25000	tons	
b12: Area of spawning hab created annually	10000	square feet	This metric was originally a target of 347,288 square feet, not an annual target.
b12: Stream Channel restored (miles)	2	miles	CPAR goal was 2 miles for the entire program based on the length of the first stream channel restoration project proposal.
b12: Variable flow target	0	cfs	Variable depending on temperature control and pulse flow needs.
b12: Water Temperature Target	56	degrees	For spring Chinook spawning and incubation, 60 for holding
b1: Contribute towards Priority Actions	1	completion	

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2017	Annual summary of benthic macroinvertebrate bio sampling data

<u>Date</u>	<u>Title</u>
Oct. 2016	Recommendations to B2 Interagency Team
Aug. 2017	Report to OCAP Science Panel
Dec. 2017	Quarterly presentations to Clear Creek Technical Team
Sep. 2017	Annual report of juvenile spring Chinook production estimates
Sep. 2017	Annual report of spawning habitat estimates for fall and spring Chinook
Sep. 2017	Annual report of geomorphic monitoring or spawning gravel evaluation
Oct. 2016	Recommendations to Sacramento River Temperature Task Group
Oct. 2016	Provide technical assistance based on monitoring for gravel and stream channel restoration projects

Narrative

Adaptive management will be used to evaluate and improve restoration actions. Monitoring activities funded through other sources will be used in addition to the following actions in 2017. This is an ongoing project benefitting multiple species including ESA listed species spring Chinook and steelhead and fall and late-fall Chinook. This long-term program is coordinated through the Clear Creek Technical Team and the Sacramento River Temperature Task Group. Some actions are required monitoring in the NMFS OCAP RPA and some evaluate six RPA Actions. Otolith work and juvenile screw trapping address DSM modules identified as having high uncertainty related to behavioral dynamics in watershed (rearing), migration rate, adult survival to natal watershed, and juvenile growth and survival in the upper and lower Sacramento and the delta.

Estimates of juvenile spring Chinook production using rotary screw trapping are used to evaluate and guide flow management. CVP flow management is used to reduce summer water temperatures in Clear Creek. Warm water temperatures can lead to mortality of early life stages of Chinook, which is reflected in the juvenile production estimates. Production estimates can also reflect and guide the success of habitat restoration projects and can identify the negative impacts of fires, landslides and poor resources management. Action required by NMFS OCAP RPA page 585 items 7 and 8.

Spawning area mapping (for fall Chinook salmon) and potential spawning area mapping (for spring Chinook salmon and steelhead), are used to evaluate spawning habitat creation and maintenance. The two types of mapping are used to evaluate the effectiveness of gravel injections, stream channel restoration and flow management. These studies provide the metrics for the CVPIA PAR goal for square feet of spawning habitat restoration. Information from the mapping is used in gravel effectiveness evaluations required in the NMFS OCAP RPA section I.1.3.

Bulk sediment sampling is used to evaluate spawning gravel quality. Sediment size information can indicate if too much deleterious fine sediment is in salmon spawning area, or if the correct size gravel is being provided by gravel injections, stream channel restoration, and flow management. Excessive fine sediments can be managed through erosion control, channel

maintenance flows, pulse flows, and reduction in fuels for wildfire. Gravel effectiveness evaluations are required in the NMFS OCAP RPA section I.1.3. Channel maintenance flows, pulse flows and gravel supplementation are required in the NMFS OCAP RPA I.1.1, I.1.2, and I.1.3 respectively.

Otolith microchemistry is used to evaluate juvenile salmonid life history, survival, and migration rate. Funding would continue an adult Chinook microchemistry analysis performed by UC Santa Cruz by adding using adult Fall Chinook collected in 2010, 2011, and 2012. While the study would relate these parameters to restoration actions in Clear Creek, the information from rearing in the Sacramento River and Delta will provide information to address DSM modules identified as having high uncertainty related to behavioral dynamics in watershed (rearing), migration rate, adult survival to natal watershed, and juvenile growth and survival in the upper and lower Sacramento and the delta.

Data Management

Information for the charter including relevant protocols for understanding the information, will be permanently housed at Northern California Area Office of Reclamation and the Red Bluff Fish and Wildlife Office of the Service.

This action is part of a fisheries-oriented monitoring program of the Clear Creek Restoration Program which includes extensive monitoring methods that can be categorized by scale:

Watershed Scale:

Longitudinal topographic surveys, LiDAR; Bedload transport and Sediment budget; Annual adult salmonid population estimates; Annual juvenile production estimates; Annual juvenile productivity estimates (juvenile production / adult escapement); InSALMO model output out-migrants per year; Temperature monitoring system of loggers

Spawning Reach Scale:

Topographical change, especially estimating volumes of gravel moving in and out of project sites; Salmonid spawning habitat suitability mapping

Salmonid spawning habitat use; Redd distribution surveys; Salmonid use of supplemental gravel;

Meso- and Micro-habitat Scale:

Spawning gravel evaluation: sediment size; Juvenile habitat use studies compare salmonid densities between: restored and control reaches, physical habitat treatments, habitat types, types or presence of riparian vegetation; Macro-invertebrate studies comparing gravel restoration types in treated and control areas

Risks

No Data.

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2016	CVPRF	\$253,509	\$0	\$253,509
2017	CVPRF	\$301,107	\$0	\$301,107
2018	CVPRF	\$358,641	\$0	\$358,641
2019	CVPRF	\$278,641	\$0	\$278,641

Total Cost: \$1,191,898

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2016					
<i>Monitoring - Salmon and steelhead monitoring</i>					
Agreement	\$9,434	n/a	FWS	CVPRF	Evaluate habitat restoration projects by comparing macroinvertebrate assemblages from 75 samples.
Labor	\$91,526	0.36	FWS	CVPRF	Spawning area mapping for fall Chinook salmon and potential spawning area mapping for spring Chinook salmon and steelhead. Evaluates program spawning gravel goals.
Labor	\$119,497	0.47	FWS	CVPRF	Estimate juvenile spring Chinook production using rotary screw trap
Labor	\$33,052	0.13	FWS	CVPRF	Bulk sediment sampling to evaluate spawning gravel quality.
2017					
<i>Monitoring - Salmon and steelhead monitoring</i>					
Labor	\$33,481	0.14	FWS	CVPRF	Bulk sediment sampling to evaluate spawning gravel quality.
Agreement	\$50,000	n/a	FWS	CVPRF	Adult fall Chinook otoliths obtained from 2010, 2011 and 2012 will be analyzed to evaluate juvenile life history, survival, and migration rate during rearing, and migration from Clear Creek the Sacramento River and the Delta. These

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
					parameters will be related to flow and habitat restoration actions.
Labor	\$93,269	0.39	FWS	CVPRF	Spawning area mapping for fall Chinook salmon and potential spawning area mapping for spring Chinook salmon and steelhead. Evaluates program spawning gravel goals.
Labor	\$124,358	0.52	FWS	CVPRF	Estimate juvenile spring Chinook production using rotary screw trap
2018					
<i>Monitoring - Salmon and steelhead monitoring</i>					
Labor	\$128,089	0.52	FWS	CVPRF	Estimate juvenile spring Chinook production using rotary screw trap
Labor	\$96,067	0.39	FWS	CVPRF	Spawning area mapping for fall Chinook salmon and potential spawning area mapping for spring Chinook salmon and steelhead. Evaluates program spawning gravel goals.
Labor	\$34,485	0.14	FWS	CVPRF	Bulk sediment sampling to evaluate spawning gravel quality.
Agreement	\$100,000	n/a	FWS	CVPRF	Geomorphic methods will be used in ongoing evaluations of CVPIA actions including pulse and channel maintenance flows, gravel supplementation, and stream channel restoration required in the NMFS OCAP RPA.
2019					
<i>Monitoring - Salmon and steelhead monitoring</i>					
Labor	\$96,067	0.39	FWS	CVPRF	Spawning area mapping for fall Chinook salmon and potential spawning area mapping for spring Chinook salmon and steelhead. Evaluates program spawning gravel goals.
Agreement	\$20,000	n/a	FWS	CVPRF	Evaluate habitat restoration projects by comparing macroinvertebrate assemblages from 75 samples.
Labor	\$34,485	0.14	FWS	CVPRF	Bulk sediment sampling to evaluate spawning gravel quality.
Labor	\$128,089	0.52	FWS	CVPRF	Estimate juvenile spring Chinook production using rotary screw trap

b12 Clear Creek Channel Maintenance Flows (aka EWP)

Plan and implement channel maintenance flows to create and maintain habitat for salmon and steelhead

Classification: Improvement, Water Operations

Location: , Clear Creek

Funding Years: 2015 - 2016

Benefits Start Year: 2015

Priority: 2 - EWP channel maintenance flows is an ongoing project benefitting multiple species including two ESA listed species. This long-term program began in 2003 and is a recovery plan action and OCAP RPA Action I.1.2. Most of the funding for the project has come from State cost sharing and has been a multi-agency effort involving FWS, BOR, CDFW, NMFS, CALFED and ERP. This project is important for maintaining the CVPIA investments made in the Stream Channel Restoration Project and the RPA required gravel program.

Partners: CDWR, ESA, NMFS, NPS, NRCS, Point Blue Conservation Science, Western Shasta Resource Conservation District, BLM, CDFW

Related Programs: NMFS-RP, NMFS-RPAs, CALFED, EWP

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(12) Clear Creek Flows	100.0%	

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
3,250 cfs mean daily flow for one day	1	number of actions	CVPIA goal for channel maintenance flows: 4 successful re-operations within 10 years, with a minimum target of 3,250 cfs mean daily flow for one day, and an optimal target of 5,000 cfs for 3 days. Metrics measured at Whiskeytown Dam.

Deliverables

<u>Date</u>	<u>Title</u>
Dec. 2017	Geomorphic evaluation report
Dec. 2017	Riparian vegetation evaluation report
Dec. 2017	Avian species evaluation report
Dec. 2017	Herpetofaunal species evaluation report
Dec. 2015	Operational Toolkit
Mar. 2016	Approval for pilot program from MP-RO, Dam Safety and Denver TSC
Dec. 2015	Revised Safety of Dams analysis
Sep. 2015	Final 6 Technical Memos

<u>Date</u>	<u>Title</u>
Dec. 2015	Geomorphic evaluation report

Narrative

Additional funding is not being sought in FY 2017. The construction of Whiskeytown Dam in 1963 blocked the natural movement of sediment, thereby reducing the amount of gravel for salmon and steelhead spawning habitat. Additionally, stream flows below Whiskeytown Dam have been highly modified and the regularly recurring higher flow level events have been curtailed. Stream flow magnitudes sufficient to promote geomorphic processes no longer occur as frequently prior to dam construction. The actions of this charter will promote more normative geomorphic processes to occur, resulting in channel maintenance flows, channel meander, mobilization of armored banks, gravel movement and re-deposition, and mobilization of fine sediments out of the system.

This charter is to re-operate Whiskeytown Dam to produce higher stream flows in Clear Creek, designed to create and maintain spawning and rearing habitat for salmon and steelhead. This action is required under NMFS OCAP BO RPA I.1.2. Costs are shared with a DFW ERP agreement with FWS for a pilot re-operation. This charter is separate from the Clear Creek flow charter which includes additional flow elements because 1) this charter is largely already funded by the State, 2) this charter has a separate and longer timeline from the Flow charter, 3) this charter has in the past been seen as a separate and stand-alone project.

EWP channel maintenance flows is an ongoing project benefitting multiple species including two ESA listed species. This long-term program began in 2003 and is a recovery plan action and OCAP RPA Action I.1.2. Most of the funding for the project has come from State cost sharing and has been a multi-agency effort involving FWS, BOR, CDFW, NMFS, CALFED and ERP. This project is important for maintaining the CVPIA investments made in the Stream Channel Restoration Project and the RPA required gravel program.

Data Management

Information for the charter including relevant protocols for understanding the information, will be permanently housed at Northern California Area Office of Reclamation and the Red Bluff Fish and Wildlife Office of the Service.

The final Clear Creek Environmental Water Program Core Monitoring and Adaptive Management Plan details numerous and specific geomorphological, fish, bird, herp, and vegetation metrics for the program. Some of the metrics are STOS (topological change) and other more LTT (population level responses).

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Funding reductions	2	3
Unanticipated stream impacts	1	2
Review of technical memos	3	3

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2018	CVPRF	\$288,160	\$0	\$288,160

Total Cost: \$288,160

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2018					
<i>Monitoring - Geomorphic and biological monitoring before, during and after flow events will be used to evaluate if flow events are achieving desired outcomes.</i>					
Agreement	\$100,000	n/a	FWS	CVPRF	Post flow-event monitoring of physical changes in stream and floodplain
Agreement	\$83,712	n/a	FWS	CVPRF	Herpetofaunna visual encounter surveys and habitat assessment to evaluate the impacts of flow program on special status species.
Agreement	\$58,232	n/a	FWS	CVPRF	Riparian vegetation monitoring to evaluate benefit of flows on reducing encroachment
Agreement	\$46,216	n/a	FWS	CVPRF	Avian monitoring to evaluate the impacts of flow program on special status species.

b12 Clear Creek Flows

Develop and implement a comprehensive flow program for salmon and steelhead in Clear Creek

Classification: Improvement, Water Operations

Location: , Clear Creek

Funding Years: 2016 - 2017

Benefits Start Year: 2016

Priority: 2 - Flows is an Ongoing Action required under CVPIA section (b)12, is listed in the NMFS Recovery Plan, is a recovery plan action, involves OCAP RPA Actions I.1.1, I.1.2, I.1.5 and I.1.6., involves multiple species including two ESA listed species and has been a long-term multi-agency effort involving FWS, BOR, CDFW, NMFS.

Partners: BLM, CDFW, CDWR, ESA, NMFS, NRCS, Point Blue Conservation Science

Related Programs: b3, CALFED, CVPIA b2, EWP, NMFS-RP, NMFS-RPAs

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(12) Clear Creek Flows	100.0%	

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
b12: Variable flow target	0	acre-feet	B2 target
b12: Water Temperature Target	56	degrees	56 for spawning and 60 for holding SCS. Targets incorporates the number of days exceeding target.
3,250 cfs mean daily flow for one day	1	number of actions	CVPIA goal for channel maintenance flows: 3 successful re-operations within 10 years, with a minimum target of 3,250 cfs mean daily flow for one day, and an optimal target of 5,000 cfs for 3 days. Metrics measured at Whiskeytown Dam.

Deliverables

<u>Date</u>	<u>Title</u>
Dec. 2015	Operational Flow Management Plan Required by NMFS RPA #1.I.6
Mar. 2016	Comprehensive Flow Plan Required by CVPIA Section 3406(b)12
Dec. 2017	Channel Maintenance and Riparian Management Flow Recommendation
Apr. 2016	Spring Attraction Flow Annual Proposal
Dec. 2018	Adaptive Plan to Encourage Steelhead Anadromy within the Central Valley

<u>Date</u>	<u>Title</u>
Dec. 2016	Water Temperature Model Incorporating Trinity River, Sacramento River and Clear Creek Operations

Narrative

Funds for this charter are not being sought for FY 2017

Flows is an Ongoing Action required under CVPIA section (b)12, is listed in the NMFS Recovery Plan, is a recovery plan action, involves OCAP RPA Actions I.1.1, I.1.2, I.1.5 and I.1.6., involves multiple species including two ESA listed species and has been a long-term multi-agency effort involving FWS, BOR, CDFW, NMFS.

CVPIA is required to “develop and implement a comprehensive program to provide flows to allow sufficient spawning, incubation, rearing, and outmigration for salmon and steelhead from Whiskeytown Dam' Flows and temperatures must be provided and managed through releases from Whiskeytown Dam on a year-round basis to support the different life stages of salmon and steelhead in Clear Creek'. The amounts of water, considering timing, magnitude, and duration, and water temperature are controlled to meet this goal. Clear Creek Program objectives include: 1) provide minimum instream flows that create habitat that is at least 90 percent of the maximum possible, 2) provide temperature control flows to meet Igo gage water temperature criteria including 60°F from June 1 through September 15, and 56°F from September 15 through October 31, 3) provide annual adult attraction flows that result in 67 percent of adult spring Chinook being distributed upstream of the Igo gage and all being distributed upstream of the segregation weir, and 4) provide additional channel maintenance flows of 3,250 to 5,000 cfs in 3 years out of 10, to create and maintain the habitats upon which anadromous salmonids depend.

NMFS OCAP RPA I.1.6 requires that 'Reclamation will, in conjunction with the Clear Creek Technical Team, assess whether Clear Creek flows shall be further adapted to reduce adverse impacts on spring-run and CV steelhead and report their findings and proposed operational flows to NMFS'. The Clear Creek technical team plans to draft plans for adaptive management of steelhead anadromy in the Central Valley. BOR and FWS activities under this charter will be funded under the Clear Creek Program Management charter.

Data Management

Information for the charter including relevant protocols for understanding the information, will be permanently housed at Northern California Area Office of Reclamation and the Red Bluff Fish and Wildlife Office of the Service.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Very short timeline	3	2

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>	<u>DFW</u>
2018	CVPRF	\$9,874	\$0	\$9,874	\$0
2018	SIK	\$10,000	\$0	\$0	\$10,000

Total Cost: \$19,874

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2018					
<i>Planning and Analysis - Planning stream flows and temperatures required by CVPIA and NMFS OCAP RPA's</i>					
Labor	\$9,874	0.04	FWS	CVPRF	Technical assistance in writing and implementing plans
In-Kind Labor	\$10,000	n/a	DFW	SIK	Technical assistance in writing and implementing plan

b12 Clear Creek Program Management

The (b)(12) program management is comprised of administrative and technical support from BOR, FWS, CDFW, and CDWR.

Classification: Administration, Administration

Location: , Clear Creek

Funding Years: 2016 - 2017

Benefits Start Year: 2016

Priority: 1 - This is a high priority charter

Partners: CDFW, CDWR

Related Programs: CVPIA b2, EWP, Interagency Ecological Program, NMFS-RP, NMFS-RPAs, CALFED, California Drought Response

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(12) Clear Creek Flows	50.0%	Work on CVPIA flow prescription, EWP, SRRTG, temperature management, B2, temperature control device
(b)(12) Clear Creek Restoration	50.0%	Anticipated work on the Phase 3C Project, Cloverview Project, gravel projects

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
c1: Restore and maintain fish populations	0	N/A	Program management supports and manages the Clear Creek Restoration Program
b1: Contribute towards Priority Actions	0	N/A	Program management supports CVP OCAP RPA actions.

Deliverables

<u>Date</u>	<u>Title</u>
May. 2014	BOR Lead
May. 2014	FWS Co-Lead
May. 2014	CDFW Program Support
May. 2014	CDWR Program Support
May. 2014	BOR Administrative Support
May. 2014	FWS Administrative Support

Narrative

This charter covers the staffing costs of BOR and FWS personnel that are directly involved in the day-to-day business activities of the CVPIA (b)(12) Clear Creek Restoration program. The categories of staffing support are:

Program Lead (BOR) and Co-Lead (FWS), Administrative Regional Staff support (BOR and FWS), CDFW technical support, and CDWR technical support.

Data Management

The b12 Program Managers maintain related information in the Bureau of Reclamations Northern California Area Office, and the U.S. Fish and Wildlife Office in Red Bluff, CA

The financial information is maintained in the Reclamations Mid-Pacific regional office in Sacramento, CA, and the U.S. Fish and Wildlife Service's regional office, in Sacramento, CA. State of California Cost-share information is maintained in their respective regional offices, and in their local (Redding, CA, and Red Bluff, CA) field offices.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Program Management diminished	1	3
Funding reduction	2	3

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>	<u>DWR</u>	<u>DFW</u>
2017	WRR	\$99,016	\$99,016	\$0	\$0	\$0
2017	SIK	\$48,503	\$0	\$0	\$25,235	\$23,268
2017	CVPRF	\$95,660	\$0	\$95,660	\$0	\$0
2018	WRR	\$101,986	\$101,986	\$0	\$0	\$0
2018	CVPRF	\$98,530	\$0	\$98,530	\$0	\$0
2018	SIK	\$39,337	\$0	\$0	\$23,373	\$15,964
2019	WRR	\$104,957	\$104,957	\$0	\$0	\$0
2019	CVPRF	\$101,400	\$0	\$101,400	\$0	\$0
2019	SIK	\$49,915	\$0	\$0	\$25,970	\$23,945

Total Cost: \$739,304

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Administration -</i>					
Labor	\$24,500	0.10	BOR	WRR	
In-Kind Labor	\$10,094	n/a	DWR	SIK	
In-Kind Labor	\$15,141	n/a	DWR	SIK	
In-Kind Labor	\$15,512	n/a	DFW	SIK	
In-Kind Labor	\$7,756	n/a	DFW	SIK	
Labor	\$95,660	0.40	FWS	CVPRF	
Labor	\$74,516	0.40	BOR	WRR	
2018					
<i>Administration -</i>					
Labor	\$25,235	0.10	BOR	WRR	
Labor	\$98,530	0.40	FWS	CVPRF	
Labor	\$76,751	0.40	BOR	WRR	
Labor	\$7,791	0.03	DWR	SIK	
In-Kind Labor	\$15,582	n/a	DWR	SIK	
In-Kind Labor	\$15,964	n/a	DFW	SIK	
2019					
<i>Administration -</i>					
Labor	\$25,970	0.10	BOR	WRR	
Labor	\$101,400	0.40	FWS	CVPRF	
In-Kind Labor	\$15,964	n/a	DFW	SIK	
In-Kind Labor	\$7,982	n/a	DFW	SIK	
In-Kind Labor	\$15,582	n/a	DWR	SIK	
Labor	\$78,987	0.40	BOR	WRR	
In-Kind Labor	\$10,388	n/a	DWR	SIK	

b12 Lower Clear Cr Aquatic Habitat and Mercury Abatement Project

Mercury removal from historic mining tailings provides a long-term gravel supply to enhance spawning habitat in Clear Creek

Classification: Improvement, Spawning Gravel

Location: Redding area, Clear Creek

Funding Years: 2016 - 2017

Benefits Start Year: 2016

Priority: 2 - NMFS Recovery Plan action. Acquisition of a long term gravel supply, per RPA action I.1.3. Benefits multiple ESA species (SCS and STT, plus FCS, LFC) with a \$4.6 million cost share from the State

Partners: CDWR, NMFS, NRCS, Point Blue Conservation Science, Western Shasta Resource Conservation District, BLM, CDFW

Related Programs: NMFS-RPAs, CALFED, NMFS-RP

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(12) Clear Creek Flows	100.0%	Long-term gravel supply as part of the flows program.

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
b12: Stream Channel restored (miles)	1	miles	Project will restore floodplain and stream channel. Length estimated from plan view of project site. Additional stream restoration value will be achieved with the material made available to the gravel injection program (not estimated here).
Gravel supplied	340000	tons	Project will provide long-term supply of gravel for injection into Clear Creek (NSR 2008).
Floodplain health	25	acres	Remove mining-legacy mercury from dredger tailings within the 100-year floodplain (acres estimated from plan view).

Deliverables

<u>Date</u>	<u>Title</u>
Dec. 2017	Wetland Design
Dec. 2018	Geomorphic Evaluation Report
Dec. 2018	Construction Compliance Report
Dec. 2018	Fish Habitat Evaluation Report
Dec. 2018	Revegetation Report

Narrative

Ongoing project designed and permitted by CVPIA and to be implemented by CDFW. NMFS Recovery Plan action. Helps achieve RPA action I.1.3 by acquiring a long term gravel supply. Benefits multiple species including ESA (SCS and STT) and others (FCS, LFC) with a \$4.6 million cost share from the State.

This project, formally known as the Lower Clear Creek Aquatic Habitat and Mercury Abatement Project, involves the reclamation and sequestration of mercury laden mining tailings along the streambanks and floodplain of Clear Creek, CA. Pockets of elemental mercury can be found within the fine sediments of the mine tailings, deposited there decades ago from mining operations. The project will remove contaminated sediment away from the 100-year flood plain. The remaining gravel will be stockpiled for future use in Clear Creek spawning gravel augmentation projects.

CVPIA provided funding for feasibility studies, designs and permits. The Ecosystem Restoration Program is providing \$4.6M for implementation. CVPIA may cost share revegetation, wetlands creation, monitoring and evaluation of the project depending upon remaining ERP funds and the amount of remaining work. The project will be mitigated and monitored in accordance with regulatory agency monitoring requirements. Project implementation will begin in FY 2017, and continue through FY 2019.

REFERENCES:

North State Resources, Inc. (NSR). 2008. Long-term Clear Creek spawning gravel source feasibility study data report. Prepared for U.S. Bureau of Reclamation, Shasta Lake, CA. 190 pp.

Data Management

The information developed by this Charter will be housed at Reclamations Northern California Area Office (Shasta Dam, CA), the U.S. Fish and Wildlife Services Red Bluff Fish and Wildlife Office (Red Bluff, CA), the Bureau of Land Management Field Office in Redding, CA, and at the California Department of Fish and Wildlife Regional Headquarters in Redding, CA.

Project has geomorphic, avian, vegetation, wetland, and mercury objectives and monitoring. STOS include surveys post project (and pre-project in some cases), tons of gravel produced and similar LTT's. The tie to fish production depends on the intermediary projects that use the gravel for restoration projects.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Funding reductions	1	3

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>	<u>DFW</u>
2017	CVPRF	\$40,000	\$40,000	\$0	\$0
2017	SC	\$2,250,000	\$0	\$0	\$2,250,000
2018	WRR	\$63,000	\$63,000	\$0	\$0
2018	CVPRF	\$100,000	\$100,000	\$0	\$0
2019	CVPRF	\$49,684	\$25,000	\$24,684	\$0
2019	WRR	\$43,500	\$43,500	\$0	\$0
2020	WRR	\$437,500	\$437,500	\$0	\$0
2020	CVPRF	\$100,000	\$100,000	\$0	\$0

Total Cost: \$3,083,684

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Implementation - Construction of restoration project resulting in mercury removal and spawning gravel creation</i>					
Labor	\$40,000	0.16	BOR	CVPRF	Engineering, survey, and geology assistance during implementation including some construction oversight.
In-Kind Agreement	\$2,250,000	n/a	DFW	SC	1st year of implementation including mobilization, grubbing, excavation and processing of materials.
2018					
<i>Implementation - Construction of restoration project resulting in mercury removal and spawning gravel creation</i>					
Labor	\$28,000	0.14	BOR	WRR	Develop revegetation and monitoring plans.
Labor	\$35,000	0.14	BOR	WRR	Assistance in project implementation from Reclamation staff.
Agreement	\$50,000	n/a	BOR	CVPRF	Revegetation of uplands and riparian areas including surveys and designs.
Agreement	\$50,000	n/a	BOR	CVPRF	Provide wetlands construction designs including field surveys, and /

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
					or provide partial funding for implementation.
2019					
<i>Implementation - Construction of restoration project resulting in mercury removal and spawning gravel creation</i>					
Labor	\$24,684	0.10	FWS	CVPRF	Post-project fish habitat monitoring to evaluate changes in stream habitat.
Labor	\$37,500	0.15	BOR	WRR	Engineering, survey, and geology assistance during construction.
Agreement	\$25,000	n/a	BOR	CVPRF	Post-project geomorphic monitoring and evaluation
Labor	\$6,000	0.03	BOR	WRR	Project monitoring per regulatory agency requirements. Year 1 of 5 for wetland; year 1 of 10 for riparian.
2020					
<i>Implementation - Construction of restoration project resulting in mercury removal and spawning gravel creation</i>					
Labor	\$400,000	2.00	BOR	WRR	Project monitoring per regulatory agency requirements. Year 2 of 5 for wetland; year 2 of 10 for riparian.
Labor	\$37,500	0.15	BOR	WRR	Engineering, survey, and geology assistance during contingency.
Placeholder	\$100,000	n/a	BOR	CVPRF	Funding to fix problems with project (2% of overall \$5M cost).

b12 Replace Oak Bottom Temperature Control Curtain

Improve water temperatures in Clear Creek, Trinity and Sacramento R. with new curtain in Whiskeytown

Classification: Improvement, Other Habitat Restoration

Location: Whiskeytown Lake, Clear Creek

Funding Years: 2016 - 2018

Benefits Start Year: 2016

Priority: 3 - CVPIA Core Team priorities: winter run reducing water temperatures, spring run improving flows on Clear Creek for juvenile emigration, benefits to ESA listed species (WCS, SCS, STT) and other multiple species (LFC, FCS), cost share with BOR O&M funding, long term partnership with SWRCB, NMFS, CDFW, BOR and FWS, coordinated with restoration through Sacramento River Temperature Task Group and Clear Creek Technical Team. OCAP RPA BO action I.1.4 Replace the Spring Creek Temperature Control Curtain. Ongoing action required of BOR by SWRCB Order.

Partners: NMFS, SWRCB, CDFW, CDWR

Related Programs: NMFS-RPAs

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(12) Clear Creek Flows	100.0%	

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Temperature reduction of WHI source for Clear Creek and Sac R	3	degrees	Improved control of cold water in Whiskeytown Lake will improve CVO ability to meet Sacramento River and Clear Creek temperature targets. Evaluation of the curtain in the early 90's based on limited data concluded the Spring Creek and Oak Bottom curtains together reduced Spring Creek release temperatures to the Sacramento River by 3 to 5 degrees F (Vermeyen 1997).

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2018	Evaluation of New Oak Bottom Temperature Control Curtain

Narrative

CVPIA Core Team priorities: winter run reducing water temperatures, spring run improving flows on Clear Creek for juvenile emigration, benefits to ESA listed species (WCS, SCS, STT) and other multiple species (LFC, FCS), cost share with BOR O&M funding, long term partnership with SWRCB, NMFS, CDFW, BOR and FWS, coordinated with restoration through Sacramento River Temperature Task Group and Clear Creek Technical Team. OCAP RPA BO action I.1.4 Replace the Spring Creek Temperature Control Curtain. Ongoing action required of BOR by SWRCB Order.

Whiskeytown Lake receives cold water from the Trinity River basin, through the Francis Carr Tunnel. The Oak Bottom Curtain (OBC) was designed to work in conjunction with the Spring Creek Temperature Control Curtain. The curtains minimize the mixing of the cold Trinity River water with the warmer surface water of Whiskeytown Lake and help to maintain a supply of cold water for the Sacramento River to protect salmonids, especially winter-run Chinook salmon. The cold water also benefits Clear Creek anadromous fish restoration and helps to meet Clear Creek temperature objectives (RPA Action I.1.5). Functional curtains increase CVO's ability to meet temperature targets in the Sacramento River, Clear Creek, and Trinity River.

The original OBC eventually deteriorated and no longer served its intended purpose. National Park Service staff were concerned about the OBC as a safety hazard. The curtain was removed from Whiskeytown in 2015 and a replacement is undergoing construction and install in the spring of 2016. The removal and replacement was funded outside of the Restoration Fund.

The new curtain should be evaluated to insure it is operating correctly and to its best ability. Previous evaluations have improved operation of temperature control curtains, potentially reducing the amount of water required for temperature control and increasing compliance with temperature control criteria.

REFERENCE:

Vermayan, T. 1997. Use of temperature control curtains to control reservoir release water temperatures. Technical Report R-97-09. Bureau of Reclamation Technical Service Center, Denver, CO. 53 pages.

Data Management

Information for the charter including relevant protocols for understanding the information, will be permanently housed at Northern California Area Office of Reclamation.

CVPIA Core Team priorities: winter run reducing water temperatures, spring run improving flows on Clear Creek for juvenile emigration, benefits to ESA listed species (WCS, SCS, STT) and other multiple species (LFC, FCS), cost share with BOR O&M funding, long term

partnership with SWRCB, NMFS, CDFW, BOR and FWS, coordinated with restoration through Sacramento River Temperature Task Group and Clear Creek Technical Team. OCAP RPA BO action I.1.4 Replace the Spring Creek Temperature Control Curtain. Ongoing action required of BOR by SWRCB Order.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Replacement will not work	1	2

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$15,000	\$15,000	\$0
2018	CVPRF	\$10,000	\$10,000	\$0
2019	CVPRF	\$25,000	\$25,000	\$0

Total Cost: \$50,000

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Monitoring - Evaluate new temperature control curtain to optimize its performance and insure that it is working as intended.</i>					
Labor	\$15,000	0.06	BOR	CVPRF	Write and implement investigation plan
2018					
<i>Monitoring - Evaluate new temperature control curtain to optimize its performance and insure that it is working as intended.</i>					
Labor	\$10,000	0.10	BOR	CVPRF	Maintain thermistor strings up and down-reservoir of curtains. Conduct ADCP operations if identified in investigation plan
2019					
<i>Monitoring - Evaluate new temperature control curtain to optimize its performance and insure that it is working as intended.</i>					
Labor	\$15,000	0.06	BOR	CVPRF	Summarize and report
Labor	\$10,000	0.10	BOR	CVPRF	Maintain thermistor strings up and down-reservoir of curtains. Conduct ADCP operations if identified in investigation plan

b12 Clear Creek Stream Channel Restoration including Phase 3C

Improve stream channel, floodplain and associated habitats to provide increased spawning and rearing habitat for salmonids

Classification: Improvement, Habitat Restoration

Location: , Clear Creek

Funding Years: 2016 - 2017

Benefits Start Year: 2016

Priority: 2 - Ongoing Action listed in the NMFS Recovery Plan, required under CVPIA section(b)12, benefiting RPA action I.1.3, CVPIA Core team priorities for: multiple (FCS, LFC) and listed species (SCS, STT), involving a long-term partnership since 1995, coordinated with other Clear Creek habitat and flow restoration actions and addressing DSM modules identified as having high uncertainty.

Partners: BLM, CDFW, CDWR, NMFS, NPS, NRCS, Point Blue Conservation Science, Western Shasta Resource Conservation District

Related Programs: CALFED, NMFS-RP, NMFS-RPAs

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(12) Clear Creek Restoration	100.0%	One-time modification of the channel.

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
b12: Stream Channel restored (miles)	2	miles	CPAR goal was 2 miles for the entire program based on the length of the first stream channel restoration project proposal in 1999.Subsequent and projects currently under consideration could exceed metric value
b12: Area of spawning hab created annually	10000	square feet	This metric was originally a target of 347,288 square feet, not an annual target. Need to update spawning area metric with new contemporary methodology.
Larger out-migrants	20	percentage of fish	InSALMO modeling suggests that Phase 3C project would greatly increase the number and proportion of larger out-migrant Chinook.
Juvenile Chinook density	2	number of fish	Predict habitat use of habitats built for salmon rearing would have densities 2X of controls
Juvenile Chinook density	1	number of fish	Predict habitat use of restored reach would not be significantly lower than controls

Deliverables

Date	Title
Dec. 2017	Phase 3C Design, Estimating, and Construction and Value Engineering reviews
Dec. 2018	Environmental documents and permits for Gorge Spawning Curve
Mar. 2017	Phase 3C juvenile fish habitat evaluation
Sep. 2017	Phase 3C riparian and avian evaluations
Dec. 2017	Phase 3C designs and bid documents
Apr. 2018	Phase 3C Environmental documents and permits
Dec. 2020	Inventory riparian encroachment and restoration opportunities

Narrative

The Clear Creek Stream Channel Restoration project is a construction project designed to eliminate gravel extraction pits, restore a functional floodplain, and increase salmonid spawning and juvenile rearing habitat in a two-mile section of creek significantly degraded by gold and aggregate mining. Completion of the project is a significant milestone for the Clear Creek Restoration Program, allowing CVPIA to prioritize funds based more on the proposed Implementation Plan, the ARM process and the DSM model.

Phase 3C is an Ongoing Action listed in the NMFS Recovery Plan, required under CVPIA section (b)12, benefiting RPA action I.1.3, and a CVPIA Core team priority for: multiple (FCS, LFC) and listed species (SCS, STT), involving a long-term partnership since 1995, coordinated with other Clear Creek habitat and flow restoration actions and addressing DSM modules identified as having high uncertainty.

Phase 3C would create floodplain and stream channels in the lowest part of the reach and would provide juvenile rearing habitat for most of the salmonids spawned in Clear Creek. Phase 3C is the last phase of the Lower Clear Creek Floodplain and SCRCP described in the Clear Creek Conceptual Plan (McBain and Trush et al 1999a) and Clear Creek Technical and Design Document (McBain and Trush et al 1999b). The SCRCP primary goals were to improve salmonid spawning and rearing habitat, reduce fish stranding and improve fish passage. Estimated cost for Phase 3C is \$6.6M. Objectives for the project include: 1. Create spawning habitat for fall and late-fall Chinook and steelhead; 2. Protect the existing restoration efforts from erosion and channel degradation at the Phase 3C site. 3. Provide a stronghold where Chinook salmon and other listed fish species can thrive even when the Sacramento River experiences drought conditions. 4. Create additional rearing habitat for Clear Creek fish populations including listed spring Chinook and Steelhead; 5. Integrate with other existing and planned restoration work on Clear Creek, CA. and 6. Reduce the potential for mercury methylation or contamination.

Performance metrics include a predicted 5% increase in Spawning Habitat Use (SHU) and an 8% increase in Potential Spawning Habitat Mapping, a 20% increase in the percentage of larger juvenile salmonids (including spring Chinook and steelhead) produced based on InSALMO

modeling, and an as yet undetermined reduction in mercury contamination. While previous phases have proven that the approach has been cost-effective relative to its complexity, regulatory environment, and potential ecological and community benefits, we anticipate the more recent learning will produce an even more successful project. Previous phases have met predicted increases in SHU and weighted usable area. Previous phases have exceeded or met predictions of juvenile habitat use in measures of the fish density. Evaluation of the project through juvenile habitat use studies will benefit the ARM process and DSM model by addressing DSM modules identified as having high uncertainty

Not implementing phase 3C would: lose the opportunity to greatly increase production of larger juvenile salmonids, lose the opportunity to create or improve spawning, rearing, wetland, riparian and other terrestrial habitat, leave a source of methyl mercury in the environment, and fail to finish the stream channel restoration mandated by CVPIA with attendant impacts on stakeholders including those paying into the CVPIA Restoration fund.

Please see Data Management section for information that would not fit on this page related to proposed Phase 3B Project Completion Project.

Data Management

Additional information that would not fit on the Narrative page: Phase 3B of the stream channel restoration project was not completed because the contract was not extended past 8 years after delays in implementation. Funding was insufficient due to the State Bond Crisis of 2008 which halted construction requiring re-mobilization, and new plant stock, permits and staff. Work includes revegetation, road removal and re-alignment, and wetlands creation and modification needed to meet agency commitments and permit requirements. Metrics include riparian vegetation % canopy cover, % survival, and tree height, and wetland metrics of acreage, wetland type and persistence. Vetted through the Clear Creek Technical Team and Ecosystem Restoration Program, there are no stakeholder objections. Funding is for on-the-ground work and permits that need updating.

Impacts of not completing the action include: 1) not meeting agency commitments and permit requirements which may make permitting future Central Valley projects more difficult, 2) leaving large areas un-vegetated creating habitat fragmentation, reduce terrestrial habitat, and reduced terrestrial inputs of food, large wood that support the salmonid populations, and 3) reducing backwater and side-channel wetlands used by rearing salmonids.

Data Management information: Compliance and effectiveness monitoring for the project includes fish, geomorphology, avian, and vegetation components. There are short- and long-term aspects of each of these components. Short-term, Objective Specific monitoring will include as built drawings of the project, pre and post project geomorphic, avian, and vegetation surveys and pre and post project salmonid juvenile habitat use evaluations. While the first physical and biological responses of the project will be detected with these methods, they will also provide long-term trend monitoring for non-fish production metrics.

The phase 3C project will create a new floodplain and stream channel focusing on increasing the amount of juvenile rearing habitat. The quality and quantity of juvenile habitat will be assessed with direct observation of fish density. Specific predictions include 1) juvenile fish density will not be significantly less in treatment reaches than control reaches in the first 3 years post construction, and will be significantly greater than control reaches after the first 3 years post construction. 2) Juvenile fish density will be 2 times higher in habitat features built for juvenile habitat than in control reaches after construction. Overall the increase in rearing habitat is predicted to lead to a 20% increase in the percentage of larger juvenile salmonids produced based on InSALMO modeling. The InSALMO modeling uses relatively long data-sets collected in Clear Creek for flow, temperature, weighted usable area, escapement, juvenile production (rotary screw trapping since 1998), spawning area use, and juvenile habitat use observations. The project will also create spawning habitat. Performance metrics include a predicted 5% increase in Spawning habitat Use (SHU) and an 8% increase in Potential Spawning Habitat Mapping, a 20% increase in the percentage of larger juvenile salmonids (including spring Chinook and steelhead) produced based on InSALMO modeling. Evaluation of the project through juvenile habitat use studies will benefit the ARM process and DSM model by addressing a high uncertainty DSM module, behavioral dynamics in the water (rearing), identified in the SIT memo.

The Long-Term Trend Monitoring will rely on the broader fisheries oriented monitoring program of the Clear Creek Restoration Program.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Unable to acquire Phase 3C private property	1	2
Prohibitive environmental compliance	1	3
Availability of State Cost Share	1	2

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$4,397,469	\$3,899,639	\$497,830
2018	CVPRF	\$276,811	\$276,811	\$0
2019	CVPRF	\$321,988	\$271,288	\$50,700
2020	CVPRF	\$345,796	\$345,796	\$0
2021	CVPRF	\$215,335	\$163,200	\$52,135
2022	CVPRF	\$75,000	\$25,000	\$50,000
2018	WRR	\$50,000	\$50,000	\$0
2019	WRR	\$50,000	\$50,000	\$0

Total Cost: \$5,732,399

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Construction - Design, permit, construct and monitor Phase 3C of Stream Channel Restoration Project</i>					
Labor	\$25,653	1.00	BOR	CVPRF	
Labor	\$47,830	0.20	FWS	CVPRF	Pre-project juvenile salmon habitat use study to evaluate the effectiveness of the project and inform critical uncertainties of DSM.
Labor	\$50,000	1.00	BOR	CVPRF	
Agreement	\$2,700,000	n/a	BOR	CVPRF	Design build construction contract
Labor	\$275,986	1.00	BOR	CVPRF	Includes design and value engineering costs
Agreement	\$225,000	n/a	FWS	CVPRF	Pre- and post-project avian surveys to evaluate the effectiveness of the entire project and to document progress towards mitigation requirements.
Agreement	\$180,000	n/a	BOR	CVPRF	Agreement with BLM to acquire private property in project footprint required for construction.
Placeholder	\$500,000	n/a	BOR	CVPRF	Contingency of approximately 20% for construction of Phase 3C
Agreement	\$225,000	n/a	FWS	CVPRF	Pre- and post-project vegetation surveys to evaluate the effectiveness of the entire project and to document

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
					progress towards mitigation requirements.
Labor	\$18,000	1.00	BOR	CVPRF	
<i>Construction - Complete construction tasks associated with Phase 3B Stream Channel Restoration Project including revegetation, wetlands creation, and road removal.</i>					
Agreement	\$150,000	n/a	BOR	CVPRF	Complete work including revegetation, road removal and re-alignment, and wetlands creation and modification that was not completed in Phase 3B due to lapse in contract.
2018					
<i>Construction - Design, permit, construct and monitor Phase 3C of Stream Channel Restoration Project</i>					
Labor	\$106,495	1.00	BOR	CVPRF	
Labor	\$120,316	1.00	BOR	CVPRF	
Labor	\$50,000	1.00	BOR	CVPRF	
<i>Construction - Design, permit and construct Gorge Spawning Curve Channel Realignment Project.</i>					
Labor	\$50,000	1.00	BOR	WRR	Provide 30% design and permits for design build contract
2019					
<i>Construction - Design, permit, construct and monitor Phase 3C of Stream Channel Restoration Project</i>					
Labor	\$50,700	0.20	FWS	CVPRF	Post-project juvenile salmon habitat use study to evaluate the effectiveness of the project and inform critical uncertainties of DSM.
Labor	\$120,316	1.00	BOR	CVPRF	Design support during construction, construction management, and procurement admin.
Labor	\$25,000	1.00	BOR	CVPRF	
Labor	\$50,972	1.00	BOR	CVPRF	
<i>Construction - Design, permit and construct Gorge Spawning Curve Channel Realignment Project.</i>					
Agreement	\$50,000	n/a	BOR	WRR	Implement Gorge Spawning Curve Channel Realignment Project based on plans and permits developed in 2018

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
<i>Construction - Permit and construct Paige Bar Floodplain Lowering Project.</i>					
Labor	\$75,000	1.00	BOR	CVPRF	Conceptual designs provided under previous contract. Existing programmatic NEPA and ESA would need supplemental compliance.
2020					
<i>Construction - Design, permit, construct and monitor Phase 3C of Stream Channel Restoration Project</i>					
Labor	\$120,796	1.00	BOR	CVPRF	Design support during construction, construction management, and procurement admin.
Labor	\$25,000	1.00	BOR	CVPRF	
<i>Construction - Permit and construct Paige Bar Floodplain Lowering Project.</i>					
Agreement	\$200,000	n/a	BOR	CVPRF	Floodplain lowering and gravel augmentation project implementation using gravel processing onsite for cost savings.
2021					
<i>Construction - Design, permit, construct and monitor Phase 3C of Stream Channel Restoration Project</i>					
Labor	\$25,000	1.00	BOR	CVPRF	
Labor	\$138,200	1.00	BOR	CVPRF	Design support during construction, construction management, and procurement admin.
Labor	\$52,135	0.20	FWS	CVPRF	Post-project juvenile salmon habitat use study to evaluate the effectiveness of the project and inform critical uncertainties of DSM.
2022					
<i>Construction - Design, permit, construct and monitor Phase 3C of Stream Channel Restoration Project</i>					
Labor	\$25,000	1.00	BOR	CVPRF	
Labor	\$50,000	1.00	FWS	CVPRF	Final reporting / review

American River Salmonid Habitat Improvement at upper River Bend

The project includes excavating material from the floodplain to create side channel habitat for juvenile rearing. The excavated material would be sorted and placed into the river to improve substrate conditions for spawning at and downstream of the site. The project continues the partnership with the Sacramento Water Forum, City of Sacramento, and Sacramento County Parks.

Classification: Improvement, Side-Channel
Location: (38.606484, -121.313027), American River
Funding Years: 2016 - 2018
Benefits Start Year: 2017
Priority: 1 -
Partners: CDFW, Sacramento Water Forum
Related Programs: AFRP
Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(13) Gravel	100.0%	

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Juvenile Rearing Habitat	15	acres	Amount of new and improved habitat provided.

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2017	Construction Completed

Narrative

The project includes excavating material from the floodplain to create side channel habitat for juvenile rearing. The excavated material would be sorted and placed into the river to improve substrate conditions for spawning at and downstream of the site. The project continues the partnership with the Sacramento Water Forum, City of Sacramento, and Sacramento County Parks.

This continues the habitat improvement work that has been occurring annually in the American River since 2008.

The site would be monitored along with the ongoing monitoring of past projects in the American River. Monitoring objectives include: Determine project effectiveness by documenting the use

of site by juvenile and adult fish, comparing habitat conditions pre/post project at treatment and reference sites, monitoring juvenile and adult production from the American River.

Project location is at the upper and of River Bend Park/downstream end of Ancil Hoffman Park/golf course area. Alternate location is the west/south side of the river at lower El Manto, between El Manto and San Juan Rapids.

Addresses SIT priority for the American River of juvenile rearing habitat for fall-run Chinook.

Data Management

Data will be housed at the USBR Bay Delta Office and USFWS office.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Permits not obtained	2	2
Neighbors concerned about effects	2	2

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$600,000	\$600,000	\$0

Total Cost: \$600,000

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Construction - Cooperative Agreement with Sacramento Water Forum for design and construction.</i>					
Agreement	\$600,000	n/a	BOR	CVPRF	Cooperative agreement with city of Sacramento for survey, design, construction, and monitoring work. Reclamation staff leads the permitting work.

b13 Administration

Spawning and Rearing Habitat Restoration Program Admin

Classification: Administration, Administration

Location: ,

Funding Years: 2014 - 2017

Benefits Start Year: 2014

Priority: 1 - Program Priority Comments:

Partners: NMFS, CDFW, CDWR

Related Programs: AFRP, CAMP

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(13) Gravel	100.0%	

Metrics

No Data.

Deliverables

<u>Date</u>	<u>Title</u>
Dec. 2014	Aerial photography completed on the American and Sacramento Rivers
Jul. 2015	2015 Permits completed for projects on Sacramento, American, and Stanislaus Rivers
Sep. 2015	2015 Projects completed on the Sacramento, American, and Stanislaus Rivers
Jul. 2016	2016 Permits completed for projects on Sacramento, American, and Stanislaus Rivers
Sep. 2016	2016 Projects completed on the Sacramento, American, and Stanislaus Rivers

Narrative

This is the administration of the b13 Spawning and Rearing Habitat Restoration Program. This includes the salaries of the Reclamation and USFWS co-leads and activity managers and other technical specialists who assist in environmental compliance, engineering, and construction oversight tasks.

Data Management

Information generated from the charter is archived at Reclamation's Bay-Delta Office, regional office and Northern California Area Office, as well as USFWS's Bay-Delta Office.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Program funding in light of drought conditions	1	1

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Office priorities in light of flood and drought conditions	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2015	CVPRF	\$260,000	\$160,000	\$100,000
2016	CVPRF	\$225,000	\$135,000	\$90,000
2017	CVPRF	\$320,000	\$220,000	\$100,000
2015	WRR	\$0	\$0	\$0

Total Cost: \$805,000

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2015					
<i>Administration - Program management</i>					
	\$160,000	n/a	BOR	CVPRF	Staff position from Bay Delta Office and Northern California Area Office
	\$100,000	n/a	FWS	CVPRF	funds this position at 0.44 FTE capacity
<i>Environmental Compliance and Permitting -</i>					
	\$0	n/a	BOR	WRR	funds Mid Pacific and Bay-Delta Office environmental specialists and archaeologists
<i>Inventory/Reconnaissance - Aerial Photography</i>					
	\$0	n/a	BOR	CVPRF	American and Sacramento Rivers
<i>Management - Technical support for engineering, construction and surveys</i>					
	\$0	n/a	BOR	WRR	funds technical support at 0.35 FTE
2016					
<i>Administration - Program management</i>					
	\$135,000	n/a	BOR	CVPRF	funds this position at 0.85 FTE capacity
	\$90,000	n/a	FWS	CVPRF	funds this position at 0.40 FTE capacity
<i>Environmental Compliance and Permitting -</i>					
	\$0	n/a	BOR	CVPRF	funds Mid Pacific and Bay-Delta Office environmental specialists and archaeologists

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
<i>Inventory/Reconnaissance - Aerial Photography</i>					
	\$0	n/a	BOR	CVPRF	American and Sacramento Rivers
<i>Management - Technical support for engineering, construction and surveys</i>					
	\$0	n/a	BOR	CVPRF	funds technical support at 0.2 FTE
2017					
<i>Administration - Program management</i>					
Labor	\$100,000	1.00	BOR	CVPRF	
Labor	\$100,000	1.00	FWS	CVPRF	
<i>Environmental Compliance and Permitting -</i>					
Labor	\$100,000	1.00	BOR	CVPRF	Technical support for projects on the American, Stanislaus, and Sacramento Rivers. Covers natural resource specialists, biologists, engineers, archaeologists.
<i>Inventory/Reconnaissance - Aerial Photography</i>					
Agreement	\$20,000	n/a	BOR	CVPRF	Aerial photography for projects as needed - American River annually, potential others.

Natural and Artificial Rearing Structures in the Upper Sacramento

Project would add natural and/or artificial rearing structures, including large woody structures, in the Upper Sacramento River within the first 10 river miles downstream of Redding. Initially the project would be implemented as a pilot project and would monitor actions to determine feasibility and potential benefit of expanding project to full 10-mile river section. Purpose of project elements is to provide velocity and predation refugia and improved feeding areas for salmonid fry.

Additionally, a spatial assessment will be completed for the Sacramento River from Keswick (RM 302) to Colusa (RM 144) to determine potential for additional implementation sites.

Classification: Improvement, Refugia
Location: 40.607615, -122.446198, Upper Sacramento and Tributaries
Funding Years: 2016 - 2021
Benefits Start Year: 2017
Priority: -
Partners: Golden Gate Salmon Association
Related Programs: NMFS-RP, AFRP, CVPIA b13
Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(13) Gravel	100.0%	most appropriate provision is likely (b)(13) as this is a juvenile rearing habitat project on a CVP river

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
miles of instream rearing habitat improved	10	miles	Priority areas in up to 10 miles of the upper Sacramento River will be improved via that addition of instream rearing habitat improvements.

Deliverables

<u>Date</u>	<u>Title</u>
Mar. 2017	Preliminary assessment of high priority sites for implementation of rearing habitat improvements
Sep. 2017	Completion of at least 1 rearing habitat improvement project
Sep. 2018	Initial monitoring report from at least 1 rearing habitat improvement site
Sep. 2020	Completion of multiple rearing habitat improvement sites associated with this charter
Dec. 2021	Completion of final report with summary of sites, monitoring report and assessment of future sites

Narrative

There are indications that the mainstem Sacramento River channel may not provide adequate rearing areas for juvenile salmon especially during increased flow events. Much of the main river channel is devoid of structural complexity necessary for fry rearing and, due to the channel morphology and relatively high flows released from Shasta Dam during the primary rearing period, the best habitats are on the channel fringes. This proposed action will increase natural and artificial rearing structures in the upper mainstem Sacramento River in the approximate river reach from the City of Redding to 10 miles downstream where the majority of optimal spawning habitats exist. It is anticipated that implementation of this action will result in major gains in juvenile salmon survival from reduced predation and improved rearing habitat conditions. Specific sites will be selected and corresponding improvements will be designed to maximize increased rearing habitat, increased velocity refugia at extremely high flows in the upper Sacramento River, reduce predation and decrease premature emigration of juvenile salmonids.

Proposed project consists of 1-year of planning and permitting to identify potential locations for rearing habitat improvements and up to 5 years of implementation at 1-2 sites per year. Natural materials will be incorporated into designs as much as possible, depending on exact site conditions and greatest estimated benefit to target species and conditions.

Sites will be monitored to assess performance and fish use at a wide-variety of flows. Additionally, individual juvenile salmonids that occur in improved sites may be captured, assessed and tagged to determine initial and future benefits related to growth and survival versus estimates of growth and survival of fish that did not access improved areas.

Links to FY17 Core Team Priorities:

Winter-run Chinook: Based on the priorities submitted by the Winter-run PWT, the Core Team recommends that reducing water temperatures and flow fluctuations during egg incubation and rearing, reducing pathogens and understanding the factors that influence their impacts, reducing predation, improving juvenile fish emigration, increasing rearing habitat, and reducing adult entrainment into the Colusa Basin drain are all priorities for Winter-run Chinook Salmon in the Sacramento River.

Fall-run Chinook: Based on the priorities identified by the SIT, the Core Team agrees that the following are priorities for fall-run Chinook salmon:

- Improve Juvenile Rearing Habitat - Sacramento, Yuba, Feather, American, Calaveras, Mokelumne, Merced, Tuolumne, Stanislaus and San Joaquin Rivers and the Delta;

Projects will also benefit spring-run juveniles.

For reference, this charter was developed based on discussion with multiple project partners and Golden Gate Salmon Association's proposed project C.1.

Data Management

All data produced as part of this charter will be provided to CVPIA Fish staff for incorporation into the improvement and parameterizing of Decision Support Models. Additionally, data management, retention and sharing with CVPIA will be included in any grants or cooperative agreements as deliverables for this charter.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Permitting. Significant flow modeling and assurances are likely to be required to implement in-channel habitat modifications. This can likely be mitigated by following existing accepted restoration practices and guides.	1	2
Site access. Given the larger area proposed for potential sites in this charter, it is safe to assume that multiple sites can be secured	1	2

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$116,600	\$116,600	\$0
2018	CVPRF	\$84,800	\$84,800	\$0
2019	CVPRF	\$84,800	\$84,800	\$0
2020	CVPRF	\$84,800	\$84,800	\$0
2021	CVPRF	\$10,600	\$10,600	\$0

Total Cost: \$381,600

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Design - Site-specific designs for 1-2 sites per year</i>					
Agreement	\$15,900	n/a	BOR	CVPRF	Design of at least one site-specific project for FY17 implementation. Assumes that standard designs will be used and adapted for site-specific application.

Type	Total	FTE	Agency	Fund	Description
<i>Environmental Compliance and Permitting - Compliance and permitting for restoration sites</i>					
Agreement	\$10,600	n/a	BOR	CVPRF	Development of programmatic environmental documents and site-specific permitting
<i>Implementation - Construction of 1-2 restoration projects/sites per year</i>					
Agreement	\$42,400	n/a	BOR	CVPRF	Implementation of initial high-priority rearing habitat restoration site.
<i>Monitoring - Site-specific monitoring at sites completed as part of this charter and potentially nearby reference sites</i>					
Agreement	\$15,900	n/a	BOR	CVPRF	Development of a monitoring plan for evaluating potential restoration sites under this charter and monitoring of initial site.
<i>Planning and Analysis - Initial project planning, site assessment and conceptual design of habitat improvements</i>					
Agreement	\$21,200	n/a	BOR	CVPRF	Initial grant or cooperative agreement to assess sites, begin development of conceptual-level designs and produce a feasibility study with priority sites identified.
<i>Reporting - Annual and final reporting related to site selection, implementation and monitoring efforts</i>					
Agreement	\$10,600	n/a	BOR	CVPRF	First annual report containing information on site analysis, prioritization, implementation and monitoring of initial implementation project
2018					
<i>Design - Site-specific designs for 1-2 sites per year</i>					
Agreement	\$10,600	n/a	BOR	CVPRF	Assumes that standard designs have been researched in FY17 and at least one project is at an advanced design state or already implemented.
<i>Environmental Compliance and Permitting - Compliance and permitting for restoration sites</i>					
Agreement	\$5,300	n/a	BOR	CVPRF	Development of site-specific environmental documents and permitting. Assumes programmatic documents were completed in FY17.

Type	Total	FTE	Agency	Fund	Description
<i>Implementation - Construction of 1-2 restoration projects/sites per year</i>					
Agreement	\$53,000	n/a	BOR	CVPRF	Implementation of 1-2 priority restoration sites. Assumes standardized designs and implementation approaches are used.
<i>Monitoring - Site-specific monitoring at sites completed as part of this charter and potentially nearby reference sites</i>					
Agreement	\$10,600	n/a	BOR	CVPRF	Monitoring of all sites implemented under this charter to date and likely a limited number of nearby reference sites.
<i>Reporting - Annual and final reporting related to site selection, implementation and monitoring efforts</i>					
Agreement	\$5,300	n/a	BOR	CVPRF	Annual summary report of implementation and monitoring associated with this charter.
2019					
<i>Design - Site-specific designs for 1-2 sites per year</i>					
Agreement	\$10,600	n/a	BOR	CVPRF	Assumes that standard designs have been researched in FY17 and multiple projects are at an advanced design state or already implemented.
<i>Environmental Compliance and Permitting - Compliance and permitting for restoration sites</i>					
Agreement	\$5,300	n/a	BOR	CVPRF	Development of site-specific environmental documents and permitting. Assumes programmatic documents were completed in FY17.
<i>Implementation - Construction of 1-2 restoration projects/sites per year</i>					
Agreement	\$53,000	n/a	BOR	CVPRF	Implementation of 1-2 priority restoration sites. Assumes standardized designs and implementation approaches are used.
<i>Monitoring - Site-specific monitoring at sites completed as part of this charter and potentially nearby reference sites</i>					
Agreement	\$10,600	n/a	BOR	CVPRF	Monitoring of all sites implemented under this charter to date and likely a limited number of nearby reference sites.

Type	Total	FTE	Agency	Fund	Description
<i>Reporting - Annual and final reporting related to site selection, implementation and monitoring efforts</i>					
Agreement	\$5,300	n/a	BOR	CVPRF	Annual summary report of implementation and monitoring associated with this charter.
2020					
<i>Design - Site-specific designs for 1-2 sites per year</i>					
Agreement	\$10,600	n/a	BOR	CVPRF	Assumes that standard designs have been researched in FY17 and multiple projects are at an advanced design state or already implemented.
<i>Environmental Compliance and Permitting - Compliance and permitting for restoration sites</i>					
Agreement	\$5,300	n/a	BOR	CVPRF	Development of site-specific environmental documents and permitting. Assumes programmatic documents were completed in FY17.
<i>Implementation - Construction of 1-2 restoration projects/sites per year</i>					
Agreement	\$53,000	n/a	BOR	CVPRF	Implementation of 1-2 priority restoration sites. Assumes standardized designs and implementation approaches are used.
<i>Monitoring - Site-specific monitoring at sites completed as part of this charter and potentially nearby reference sites</i>					
Agreement	\$10,600	n/a	BOR	CVPRF	Monitoring of all sites implemented under this charter to date and likely a limited number of nearby reference sites.
<i>Reporting - Annual and final reporting related to site selection, implementation and monitoring efforts</i>					
Agreement	\$5,300	n/a	BOR	CVPRF	Annual summary report of implementation and monitoring associated with this charter.
2021					
<i>Reporting - Annual and final reporting related to site selection, implementation and monitoring efforts</i>					
Agreement	\$10,600	n/a	BOR	CVPRF	Final summary report of implementation and monitoring associated with this charter.

Restore Rearing and Spawning Side Channels in the Upper Sacramento River

Restoring side-channels to provide juvenile rearing habitat for salmon and steelhead in the Upper Sacramento River (Keswick Dam to Red Bluff). 13 potential projects have been identified by the (b)(13) program and this effort would aim to implement 3-4 sites per year for the next 4 years.

Classification: Improvement, Side-Channel

Location: Sac River Redding to Red Bluff, Upper Sacramento and Tributaries

Funding Years: 2016 - 2019

Benefits Start Year: 2017

Priority: 1 -

Partners: Glenn Colusa Irrigation District, Golden Gate Salmon Association, Sacramento River Forum, Western Shasta Resource Conservation District, City of Anderson, CA, City of Redding

Related Programs: CDFW, NMFS-RP

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(13) Gravel	100.0%	

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Juvenile Rearing Habitat	15	acres	10 - 15 acres of new and improved rearing habitat per year

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2019	13 completed side-channel rearing and spawning sites

Narrative

The project includes excavating material from floodplains to create side channel and more frequently inundated floodplain habitat for juvenile rearing. The excavated material would be sorted and placed into the river where appropriate, to improve substrate conditions for spawning at and downstream of the sites.

Anthropogenic actions (dam construction, channelization, regulated flows) in the Sacramento River have decreased habitat variability and have had detrimental effects on Chinook salmon. Constructing side channels in 13 previously identified locations, in a 58 mile reach below Keswick Dam, will help to increase productivity in the upper Sacramento River by increasing abundance (the number of emigrants per spawner), increasing the size of emigrants, and increasing the condition of out-migrating juveniles. This project proposes to develop and

implement three to four side channel restoration projects per year to increase recruitment and survival of juvenile salmon.

Links to FY17 Core Team Priorities:

Winter-run Chinook: Based on the priorities submitted by the Winter-run PWT, the Core Team recommends that reducing water temperatures and flow fluctuations during egg incubation and rearing, reducing pathogens and understanding the factors that influence their impacts, reducing predation, improving juvenile fish emigration, increasing rearing habitat, and reducing adult entrainment into the Colusa Basin drain are all priorities for Winter-run Chinook Salmon in the Sacramento River.

Fall-run Chinook: Based on the priorities identified by the SIT, the Core Team agrees that the following are priorities for fall-run Chinook salmon:

- Improve Juvenile Rearing Habitat - Sacramento, Yuba, Feather, American, Calaveras, Mokelumne, Merced, Tuolumne, Stanislaus and San Joaquin Rivers and the Delta;

Projects will also benefit Spring-run.

For reference, this charter was developed based on discussion with multiple project partners and Golden Gate Salmon Association's proposed project C.2.

Data Management

Data maintained at Reclamation Bay Delta Office, USFWS office, and CDFW Red Bluff office.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Permits not obtained	1	3
Variable Landowner cooperation	2	2

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$2,000,000	\$2,000,000	\$0
2018	CVPRF	\$3,000,000	\$3,000,000	\$0
2019	CVPRF	\$2,000,000	\$2,000,000	\$0

Total Cost: \$7,000,000

Activities and Resources

Type	Total	FTE	Agency	Fund	Description
2017					
<i>Implementation - Ongoing cooperative agreements with Western Shasta Resource Conservation District and Sacramento River Forum/Chico State are in place to cover the aspects of planning, permitting, design, construction, and monitoring that are not covered within the partner agencies and by Reclamation and FWS staff. GCID is denoting as much of the construction labor as they can take on.</i>					
Agreement	\$1,000,000	n/a	BOR	CVPRF	This agreement covers the work at project sites in Tehama County (Red Bluff area). Four Tehama County projects sites have been identified so far.
Agreement	\$1,000,000	n/a	BOR	CVPRF	This agreement covers implementation at the project sites in Shasta County (Redding area).
2018					
<i>Implementation - Ongoing cooperative agreements with Western Shasta Resource Conservation District and Sacramento River Forum/Chico State are in place to cover the aspects of planning, permitting, design, construction, and monitoring that are not covered within the partner agencies and by Reclamation and FWS staff. GCID is denoting as much of the construction labor as they can take on.</i>					
Agreement	\$800,000	n/a	BOR	CVPRF	A cooperative agreement with the RCD covers the aspects of permitting, design, construction, and monitoring that are not handled by USBR, FWS, or partner organization staffs. This is for the Shasta County (Redding) project sites.
Agreement	\$2,000,000	n/a	BOR	CVPRF	This cooperative agreement with the Forum covers the aspects of planning, permitting, design, construction and monitoring that are not covered by USBR, FWS, or partner organization staffs. Covers Tehama County. The bulk of this funding would be devoted to the Sand Slough side channel in Red Bluff.
Labor	\$200,000	1.00	BOR	CVPRF	Covers natural resource and biological support from BDO, and other natural resource specialist, engineering, and

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
					archaeological support from Reclamation.
2019					
<i>Implementation - Ongoing cooperative agreements with Western Shasta Resource Conservation District and Sacramento River Forum/Chico State are in place to cover the aspects of planning, permitting, design, construction, and monitoring that are not covered within the partner agencies and by Reclamation and FWS staff. GCID is denoting as much of the construction labor as they can take on.</i>					
Agreement	\$900,000	n/a	BOR	CVPRF	This cooperative agreement covers the aspects of planning, design, permitting, construction, and monitoring that are not covered by USBR, FWS, or partner staffs. This agreement is for Tehama County projects (Red Bluff area).
Agreement	\$900,000	n/a	BOR	CVPRF	Cooperative agreement covering Shasta County (Redding area) project sites. Covers the aspects of planning, design, permitting, construction, monitoring that are not covered by USBR, FWS, or partner organizations.
Labor	\$200,000	1.00	BOR	CVPRF	Covers technical support from BDO biologists and natural resource specialists and MP natural resource specialists, engineers, and archaeologists.

Stanislaus River Salmonid Spawning and Rearing Habitat Restoration

Implements annual spawning and rearing habitat restoration project on the Stanislaus River - Current locations are at Goodwin Rec area (gravel augmentation) and Two Mile Bar (side channel creation, floodplain enhancement and gravel augmentation).

Classification: Improvement, Habitat Restoration
Location: '37.85844, -120.63544, Stanislaus River
Funding Years: 2014 - 2018
Benefits Start Year: 2015
Priority: 1 -
Partners: South San Joaquin Irrigation District, CDFW, USACE, Mangante Livestock, Oakdale Irrigation District
Related Programs: NMFS-RPAs
Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(13) Gravel	100.0%	

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
b13: Stanislaus R: percentage of spawning salmonids using placed gravel	25	percentage of fish	
b13: Stanislaus R; Spawning gravel placed annually (tons)	3000	tons	Also, RPA action for steelhead
NMFS RPA criteria	8000	cubic yards	Annual value listed in 2009 NMFS RPA.

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2016	2016 Project Implemented
Sep. 2015	2015 Project Implemented
Sep. 2017	2017 Project Implemented

Narrative

Spawning and rearing habitat restoration in the Stanislaus are RPA Actions in the NMFS biological opinion on long term operations of the CVP and SWP. This funding would address the RPA requirements. The project implements spawning and rearing habitat improvement projects in the Stanislaus River. Current project locations are in Goodwin Canyon at the Goodwin Dam Recreation Area access and at Two mile Bar (two miles downstream of Goodwin Dam). The top priority action is the creation of side channel habitat, enhanced floodplain

habitat, and gravel augmentation at Two Mile Bar. The site is on private land where we have been working out the technical details with MP-400 realty specialist for a few years for an agreement with the landowner. Work would occur here if an agreement can be put in place. The fallback will be gravel augmentation at existing sites in Goodwin Canyon. Draft designs have been completed for Two Mile Bar for interagency review.

The Goodwin Canyon work overlaps with a similar charter submitted under b1 for a larger long-term gravel addition project.

This project includes all the permitting, design, implementation, and associated effectiveness monitoring. If the Two Mile Bar site is permitted then additional funding will be needed to fully implement a project at that site.

SIT priorities for Stanislaus River include juvenile rearing habitat for fall-run Chinook. The Two Mile Bar site would provide approximately three acres of side channel rearing habitat. The gravel addition at Goodwin Canyon provides downstream gravel bars and other alluvial features to enhance rearing habitat in the canyon where the river water is cooler than in the downstream reaches with more rearing habitat availability. The over summering Chinook salmon occur primarily in the Goodwin Canyon down through Two Mile Bar area to roughly Knights Ferry depending on the year.

Data Management

Data maintained by USBR and USFWS project managers and will be disseminated in annual reports. Contacts: John Hannon at USBR Bay-Delta Office; Julie Zimmerman at USFWS Bay-Delta Office.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Landowner agreements not worked out	2	2
Permitting not worked out with Corps parks office.	2	2
State cost share not worked out.	2	2

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2015	CVPRF	\$300,000	\$300,000	\$0
2016	CVPRF	\$300,000	\$300,000	\$0
2017	CVPRF	\$330,000	\$330,000	\$0

Total Cost: \$930,000

Activities and Resources

Type	Total	FTE	Agency	Fund	Description
2015					
<i>Implementation - Permit, design, implement, and monitor project effectiveness.</i>					
Labor	\$300,000	1.00	BOR	CVPRF	Cost covers gravel augmentation at existing sites in Goodwin Canyon accessed through the Goodwin Recreation area. Additional funding will be sought if Two Mile Bar is able to be implemented in 2015. Goodwin gravel project overlaps with a b1 charter for expanded gravel augmentation at Goodwin Rec
2016					
<i>Implementation - Permit, design, implement, and monitor project effectiveness.</i>					
Agreement	\$300,000	n/a	BOR	CVPRF	Cost covers gravel augmentation at existing sites in Goodwin Canyon accessed through the Goodwin Recreation area. Additional funding will be sought if Two Mile Bar is able to be implemented in 2016. Goodwin gravel project overlaps with a b1 charter for expanded gravel augmentation at Goodwin Rec.
2017					
<i>Implementation - Permit, design, implement, and monitor project effectiveness.</i>					
Agreement	\$330,000	n/a	BOR	CVPRF	Cost covers gravel augmentation at existing sites in Goodwin Canyon accessed through the Goodwin Recreation area. Additional funding will be sought if Two Mile Bar is able to be implemented in 2017.

American River rotary screw trap project

Quantify production of juvenile Chinook salmon and the abundance of juvenile steelhead in the American River using rotary screw traps.

Classification: Performance Monitoring, Performance Monitoring

Location: Watershed, American River

Funding Years: 2016 - 2017

Benefits Start Year: 2016

Priority: 1 - This charter gets a Program Priority = 1 value because the project generates data that will be used to collect data that addresses two of the FY 2017 Science Integration Team's American River watershed-level priorities. The project also provides data that addresses a Reclamation OCAP BO monitoring requirement.

Partners: CDFW, Pacific States Marine Fisheries Commission

Related Programs: No Data.

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(16) CAMP	100.0%	Comprehensive Assessment and Monitoring Program

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
SIT watershed attributes for the American River: number of juveniles produced per adult salmon spawner, and proportion of juvenile salmon in each size class leaving a watershed	2	number of fish	The rotary screw traps at Watt Avenue on the American River provide data reflecting the total number of juvenile salmon coming from the spawning grounds on the American River. As such, those traps provide data that can be used to quantify the number of juveniles produced per adult salmon spawner, and proportion of juvenile salmon in each size class emigrating past Watt Avenue.

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2017	annual American River rotary screw trap annual report and a database with data

Narrative

The rotary screw trap monitoring activities in the American River provide data that can be used to assess the biological response to habitat management activities in that watershed. As such,

they can be used to infer, at a watershed-level scale, how habitat restoration activities are affecting the number of juvenile Chinook salmon and steelhead in that river. The CAMP and its partner entities (California Department of Fish and Wildlife and Pacific States Marine Fisheries Commission) have an excellent record collecting high quality data and producing deliverables on a timely basis in 2013, 2014, and 2015. The 2013 and 2014 reports are currently available on the CAMP website at: http://www.fws.gov/sacramento/Fisheries/CAMP-Program/Documents-Reports/fisheries_camp-program_documents-reports.htm

Funding for the American River rotary screw trap project: (1) provides access to long-term trend monitoring data for multiple taxa in one of the four Central Valley project watersheds, i.e., one of the watersheds where the CVPIA's Science Integration Team (SIT) has identified priority actions, (2) ensures continuity in work that is feasible (and has been ongoing for four years), (3) will provide the data that are needed to accomplish the CAMP's performance metric of producing an annual report, (4) provides access to standardized data pertaining to three threatened or endangered fish taxa, (5) will lead to data that can be used to validate the accuracy of the SIT's decision support model, (6) generates data that will facilitate watershed-scale comparisons between the predicted and actual benefits of habitat restoration activities, and (7) addresses a 2009 NMFS OCAP biological opinion requirement that the Bureau of Reclamation conduct "...juvenile monitoring for spring-run, winter-run, and steelhead on the...American River...through...rotary screw trapping".

Relative to 2016, the American River rotary screw project in 2017 will be expanded to collect samples that can be used to quantify the growth rate of juvenile salmon emigrating from the river. Those growth data were identified as a priority by the SIT. To the extent practicable, the American River rotary screw project will also conduct activities that produce in-river survival probabilities between different points in the river.

Unlike other entities that wish to conduct rotary screw trap operations on the American River, the Pacific States Marine Fisheries Commission is able to conduct those operations at a markedly lower cost, and staff with that organization have required a much lower level of supervision from the CAMP Program Manager to ensure their data are properly recorded and entered into the CAMP rotary screw trap platform.

Data Management

The American River rotary screw trap data will be stored in the CAMP's rotary screw trap Platform which provides standardized data analyses and summaries. Data summaries from that database can be provided to CVPIA managers, stakeholders, the public, and the CVPIA's Science Integration Team on an as needed basis.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
low, unless funding distribution is delayed	1	2

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$226,100	\$0	\$226,100
2018	CVPRF	\$232,883	\$0	\$232,883
2019	CVPRF	\$235,211	\$0	\$235,211

Total Cost: \$694,194

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Monitoring - Collect and report monitoring data that can be used to assess abundance trends for juvenile salmonids in the American River.</i>					
Agreement	\$226,100	n/a	FWS	CVPRF	The 2017 project cost includes \$185,000 for PSMFC work, \$11,100 for the 6% USFWS overhead cost, and \$20,000 to cover work involving otolith and survival studies.
2018					
<i>Monitoring - Collect and report monitoring data that can be used to assess abundance trends for juvenile salmonids in the American River.</i>					
Agreement	\$232,883	n/a	FWS	CVPRF	The 2018 cost reflects the 2017 cost plus a 3% inflation rate.
2019					
<i>Monitoring - Collect and report monitoring data that can be used to assess abundance trends for juvenile salmonids in the American River.</i>					
Agreement	\$235,211	n/a	FWS	CVPRF	2019 cost assumes the 2018 cost plus 1% annual inflation.

Assess Impacts of River Structure Lighting

Project would assess the potential impacts of lighting on juvenile salmonid migratory success and predation risk. Initial assessment would build upon the work done at the Sundial Bridge in Redding, CA to determine potential thresholds for lighting that reaches and penetrates the water's surface.

Classification: Research, Reconnaissance
Location: 38.062519, -122.084245, Central Valley Wide
Funding Years: 2016 - 2021
Benefits Start Year: 2017
Priority: -
Partners: Golden Gate Salmon Association
Related Programs: CDFW
Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(16) CAMP	100.0%	unsure of most appropriate provision

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Assessment of impacts of River Structure Lighting in the Central Valley and Guidance to Reduce Impacts	1	number of reports	Report will include assessment of current situation, evaluation of potential solutions and guidance on lighting thresholds that will limit impacts to native juvenile fish.

Deliverables

<u>Date</u>	<u>Title</u>
Dec. 2018	Report on impacts of River Structure Lighting to juvenile fish and guidance to limit those impacts.

Narrative

Artificial night-time lighting at structures near water is believed to have adverse impacts on juvenile salmon by altering fish behavior and making the fish more prone to predation. For example, in 1984, the U.S. Fish and Wildlife Service and the California Department of Fish and Game (DFG) requested that the U.S. Bureau of Reclamation turn off large sodium vapor lights on top of the Red Bluff Diversion Dam on the Sacramento River to reduce the opportunities for Sacramento pike minnow predation on juvenile salmon passing the dam (Vogel and Smith 1984), a measure that was ultimately believed to be beneficial for salmon (Vogel et al. 1988). CDFW recently identified a potentially extremely severe problem with lighting on a pedestrian bridge (Sundial Bridge) over the Sacramento River in Redding and efforts to reduce the degree and impacts of light penetrating the water at this site have proven to be effective at reducing

migration delays for juvenile salmonids and likely the associated predation risk of those individuals.

This project would assess the potential impacts of lighting on juvenile salmonid migratory success and predation risk. Initial assessment would build upon the work done at the Sundial Bridge in Redding, CA to determine potential thresholds for lighting that reaches and penetrates the water's surface. This effort is intended to provide potential future guidance to facility owners and operators to retrofit existing or design new lighting installations at facilities throughout the Central Valley.

Links to FY17 Core Team Priorities:

Winter-run Chinook: Based on the priorities submitted by the Winter-run PWT, the Core Team recommends that reducing water temperatures and flow fluctuations during egg incubation and rearing, reducing pathogens and understanding the factors that influence their impacts, reducing predation, improving juvenile fish emigration, increasing rearing habitat, and reducing adult entrainment into the Colusa Basin drain are all priorities for Winter-run Chinook Salmon in the Sacramento River. Winter-run priorities in the Delta include improving rearing and floodplain habitat and improving water operations to reduce migration delays and reduce predation losses.

Fall-run

- Reduce Predator Encounters - Sacramento and San Joaquin Rivers and Delta;

For reference, this charter was developed based on discussion with multiple project partners and Golden Gate Salmon Association's proposed project D.6.

Data Management

All data produced as part of this charter will be provided to CVPIA Fish Program. Additionally, data management, retention and sharing with CVPIA will be included in any grants or cooperative agreements as deliverables for this charter.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Site access. Some operators may be hesitant to provide access. However, it is likely that only a small population of sites would need to be intensively assessed and owners/operators can be assured this is only an assessment to create future guidance.	2	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$183,000	\$183,000	\$0

Total Cost: \$183,000

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Inventory/Reconnaissance - Initial study to assess River Structure Lighting locations and potential impacts</i>					
Labor	\$91,500	1.00	BOR	CVPRF	If available, USBR research staff would conduct or oversee initial study to identify facilities with potential lighting impacts and complete initial coarse-scale impact assessment.
<i>Research - Literature review, data collection at specific sites, analysis and develop guidance</i>					
Labor	\$91,500	1.00	BOR	CVPRF	If available, USBR research staff would conduct or oversee literature review, data collection, data analysis and development of guidance/thresholds to identify and provide information related to reducing impacts of River Structure Lighting on juvenile fish.

b1 Sturgeon Population Dynamics and Demographics Evaluation

The purpose of the proposed research is to evaluate the population demographics and dynamics of White Sturgeon, develop an age-structured population model, evaluate different management and habitat restoration alternatives, and project a realistic timeline for achieving doubling.

Classification: Research, Reconnaissance

Location: 38.12437, -121.24662, Central Valley Wide

Funding Years: 2015 - 2018

Benefits Start Year: 2016

Priority: 12 - Program Priority Comments: This has been identified as an urgent need in order to inform doubling goal progress tracking and high-priority action implementation needs for meeting the doubling goal for White Sturgeon.

Partners: CDFW, USGS

Related Programs: Interagency Ecological Program

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(16) CAMP	100.0%	Both White and Green Sturgeons are included as anadromous species under CVPIA, with unique doubling goal targets and actions/evaluations in the Final Restoration Plan. However, limited resources have resulted in a highly limited understanding of the status of these populations and how we might recover them or manage their habitats. Beginning to understand some of the structure of these populations and how they are impacted by current management and the environment is needed to inform any future work that CVPIA and our partners may do with these fish.

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Doubling progress evaluation	1	number of reports	

Deliverables

<u>Date</u>	<u>Title</u>
Dec. 2017	Management implications report
Dec. 2016	Management implications annual report

Narrative

White Sturgeon are an anadromous fish species 'identified for restoration in the CVPIA' (Final Restoration Plan 2001). Accordingly, a doubling goal has been established and the Final

Restoration Plan for the Anadromous Fish Restoration Program includes six stated general objectives that need to be met to achieve the program goal. Two of those general objectives support the need for this project: collect fish population, health, and habitat data to facilitate evaluation of restoration actions; integrate habitat restoration efforts with harvest and hatchery management.

Information on the population demographics and dynamics of White Sturgeon is highly limited currently. This research will identify critical periods in the life history of these fish and provide an understanding to evaluate different management and habitat restoration alternatives by providing managers with current, system-specific data on White Sturgeon population demographics and dynamics in the Central Valley of California that should lead to achieving the doubling goal. Specifically, we will use data on the population demographics (e.g., age at maturity, sex ratio, spawning frequency) and dynamics (e.g., growth, mortality) to develop an age-structured population model. Research leading to an understanding of the complexities of White Sturgeon ecology is essential to achieve the doubling goal. The model will identify critical periods in the life history of White Sturgeon in the system and serve as a platform to evaluate different management and habitat restoration alternatives that should lead to achieving the doubling goal, as well as projecting a realistic timeline. This project will also result in scientifically defensible DSM model parameter estimates.

Data Management

Data and resulting reports will be archived at the Lodi FWO.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Permitting needed to conduct new research, if needed. Existing data is likely sufficient, so this is low risk, low impact.	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2016	CVPRF	\$121,900	\$0	\$121,900
2017	CVPRF	\$121,900	\$0	\$121,900

Total Cost: \$243,800

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2016					
<i>Research - Age-structured population model</i>					
Agreement	\$121,900	n/a	FWS	CVPRF	Funding graduate student project; year 1 of 2.

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Research - Age-structured population model</i>					
Agreement	\$121,900	n/a	FWS	CVPRF	Funding graduate student project; year 2 of 2.

CAMP Internet data portal

The project will create an Internet-based portal that distributes juvenile salmon production and life history generated by the CAMP's rotary screw trap platform.

Classification: Performance Monitoring, Performance Monitoring
Location: , Central Valley Wide
Funding Years: 2016 - 2017
Benefits Start Year: 2016
Priority: 2 - Program Priority = 2
Partners: CDWR, FWS, Pacific States Marine Fisheries Commission, EBMUD
Related Programs: No Data.
Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(16) CAMP	100.0%	Comprehensive Assessment and Monitoring Program

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
SIT watershed attributes: for example, number of juveniles produced by a watershed, and the proportion of juvenile salmon in each life stage category	10	number of fish	Juvenile salmon data from multiple Central Valley watersheds will be distributed by the Internet portal

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2017	data portal providing juvenile salmon data

Narrative

The Comprehensive Assessment and Monitoring Program's rotary screw trap Platform stores a wealth of juvenile salmon data that have been collected with rotary screw traps. At present, there is no efficient mechanism for distributing that data. This CVPIA funding charter will result in the creation of an Internet-based portal that will distribute that data via the CalFish website (<http://www.calfish.org/>). The CalFish website is the predominant website used to distribute Chinook salmon data and reports involving the Central Valley watersheds. The use of the CalFish website to distribute the juvenile salmon data therefore builds on a pre-existing portal that is familiar to, and commonly used by, stakeholders looking for watershed-based salmon data. As the programming code is developed to provide public access to the juvenile salmon data, that code would be designed to ensure that the data were machine readable. Machine readable formats include API, JSON, CSV, and other standard formats.

The proposed project would be conducted by the Pacific States Marine Fisheries Commission (PSMFC) and their subcontractor West, Inc. The PSMFC has extensive experience building modules on the CalFish Website. The West, Inc. staff have experience with the Program R programming code that would be used to distribute the juvenile salmon production estimates produced by the Platform.

Creating the Internet portal to distribute juvenile salmon data would: (1) provide access to long-term trend monitoring data for multiple taxa in several of the watersheds where the SIT has identified priority actions, (2) provide access to standardized data pertaining to multiple threatened and endangered species, (3) streamline the availability of juvenile salmon data that can be used to validate the accuracy of the SIT's decision support model, and (4) generate data that will facilitate watershed-scale comparisons between the predicted and actual benefits of habitat restoration activities.

Prior to data being distributed on the Internet, the collectors of a data set from a particular watershed (e.g., the East Bay Municipal Utility District that collects data on the Mokelumne River) would be contacted, and their expressed written approval for distributing data on the Internet would need to be provided before their data was posted on the CalFish website.

Data Management

The data made available through the new Internet portal would be stored in a Microsoft Access database which is part of the CAMP's rotary screw trap platform. The creation of the portal would make several years of historical juvenile salmon data immediately available to interested parties. On an annual basis, new rotary screw trap data that have been collected during the prior year would be uploaded to the portal where it would be available to portal users.

Risks

No Data.

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$129,139	\$0	\$129,139
2018	CVPRF	\$30,000	\$0	\$30,000

Total Cost: \$159,139

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Monitoring - Develop a mechanism to disseminate CAMP data summaries to stakeholders.</i>					
Agreement	\$129,139	n/a	FWS	CVPRF	Cost estimate includes the following charges: (1) PSMFC = \$32,280; (2) West

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
					Inc. = \$89,550; and 6% USFWS overhead cost = \$7,309.80.
2018					
<i>Monitoring - Develop a mechanism to disseminate CAMP data summaries to stakeholders.</i>					
Agreement	\$30,000	n/a	FWS	CVPRF	Cost estimate to finish completion of building the portal.

CAMP Program Manager

This charter provides funding to pay for the 3406(b)(16) CAMP Program Manager salary

Classification: Administration, Administration
Location: , Central Valley Wide
Funding Years: 2016 - 2017
Benefits Start Year: 2016
Priority: 1 - This charter gets a Program Priority = 1 value because the CAMP program manager is actively involved in several activities that relate to the CVPIA's Implementation Plan or Center for Data Management.
Partners: CDFW, CDWR
Related Programs: No Data.
Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(16) CAMP	100.0%	Comprehensive Assessment and Monitoring Program

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
CAMP annual report	1	number of reports	The CAMP annual report assesses the progress in meeting fish production targets established by the AFRP.
various documents	1	number of reports	The CAMP program manager will co-author or take the lead on developing one or more documents that support the CVPIA's Adaptive Resource Management process and the Science Integration Team.

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2017	2017 CAMP annual report
Sep. 2017	one or more Center for Data Management documents

Narrative

Program management activities in FY 2017 will include: (1) developing an annual report assessing and reporting overall (cumulative) effectiveness of restoration actions implemented pursuant to CVPIA Section 3406(b); (2) participating in planning exercises relating to the CVPIA's Adaptive Resource Management process and Science Integration Team; (3) managing contracts and/or cooperative agreements; (4) developing documents and working with partners in the context of the Center for Data Management to acquire, refine, synthesize, and distribute data that address the CVPIA Science Integration Team's needs; and (5) identifying new data collection activities necessary to ensure CVPIA program success.

The funds provided by this charter will support the CVPIA FY2017 SIT priorities because the CAMP Program Manager will produce adult and juvenile salmon data and documentation that will be incorporated into Valley-wide and watershed attributes relating to the SIT's decision support model. Funding for the CAMP Program Manager: (a) provides access to long-term trend monitoring data, (b) ensures continuity in work that is feasible (and has been ongoing for several years), (c) facilitates the preparation of one or more reports involving the CAMP's performance metric, and (d) provides access to data pertaining to threatened and endangered species.

Over time, it is expected that the Comprehensive Assessment and Monitoring Program will be incorporated into a larger program known as the Center for Data Management.

Data Management

The adult salmon data the CAMP acquires and synthesizes will be stored in one of two databases. These include: (a) a 'Chinookprod' database that provides summarized adult salmon production data, and (b) an adult salmon escapement database containing records with data for individual fish or surveys.

All of the juvenile salmon data the CAMP compiles will be stored in the CAMP's Rotary Screw Trap Platform.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
lack of CVPIA funding to pay for the CAMP Program Manager's salary	1	3

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$239,150	\$0	\$239,150
2018	CVPRF	\$241,542	\$0	\$241,542
2019	CVPRF	\$243,957	\$0	\$243,957

Total Cost: \$724,649

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Administration -</i>					
Labor	\$239,150	1.00	FWS	CVPRF	Uses a rate provided by Cesar Blanco on April 22, 2016.
2018					
<i>Administration -</i>					
Labor	\$241,542	1.00	FWS	CVPRF	Assumes 2017 CAMP Program Manager salary cost, plus 1% inflation. Includes the USFWS 22% administrative overhead cost.
2019					
<i>Administration -</i>					
Labor	\$243,957	1.00	FWS	CVPRF	2019 cost assumes the 2018 cost plus 1% annual inflation.

CAMP rotary screw trap Platform enhancements

Document, maintain, and enhance a computer application that stores and analyzes rotary screw trap data at several locations across the Central Valley

Classification: Performance Monitoring, Performance Monitoring

Location: , Central Valley Wide

Funding Years: 2016 - 2017

Benefits Start Year: 2016

Priority: 1 - This charter gets a Program Priority = 1 value because the CAMP rotary screw trap platform providing juvenile salmon abundance estimates will serve as one of the primary data sources that is needed to populate and validate the CVPIA's decision support model.

Partners: Pacific States Marine Fisheries Commission

Related Programs: No Data.

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(16) CAMP	100.0%	Comprehensive Assessment and Monitoring Program

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
data management	10	number of fish	The outputs from the CAMP rotary screw trap Platform have the unique advantage over other data storage systems because the CAMP platform standardizes a variety of juvenile Chinook salmon data, e.g., the calculation of juvenile salmon production estimates. That advantage facilitates the ability to compare and combine juvenile salmon data from different watersheds, and allows them to be combined in a synergistic fashion to answer questions that are pertinent at a Central Valley-wide scale.

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2016	Enhanced Platform with greater analytical and reporting capabilities

Narrative

The CAMP RST Platform provides a wide array of juvenile Chinook salmon data that were collected with rotary screw traps. The Platform is moving into a final phase of development, which is separate from the ongoing need to add new data to the Platform on a long-term annual basis. This CVPIA charter is being submitted to capture funds to: (1) conduct an independent

peer review of the platform with the goal validating the Platform’s analytical routines and detecting any potential underlying issues; (2) publish a journal article that establishes the standing of the platform within the scientific and academic arena; (3) develop a new juvenile salmon production report that produces outputs that align with the CVPIA’s Science Integration Team’s desire to have abundance estimates for small, medium, large, and very large salmon; (4) improves the accuracy/precision of the American River juvenile salmon abundance estimates by developing an enhanced trap efficiency model that takes advantage of environmental covariate data; and (5) provide assistance to resolve small-scale technical issues that arise on an as-needed basis.

The acquisition of funding to complete the development of the CAMP rotary screw trap Platform is a priority because that tool: (1) provides access to long-term trend monitoring data for multiple taxa in several of the watersheds where the CVPIA’s Science Integration Team (SIT) has identified priority actions, (2) will provide the data that are needed to accomplish the CAMP’s performance metric of producing an annual report, (3) provides access to standardized data pertaining to multiple threatened and endangered species, (4) will lead to data that can be used to validate the accuracy of the SIT’s decision support model, (5) generates data that will facilitate watershed-scale comparisons between the predicted and actual benefits of habitat restoration activities, and (6) facilitates collaborative data collection efforts among the agencies/field biologists that use the Platform on a long-term basis.

Data Management

The juvenile salmon data that have been collected with rotary screw traps from seven watersheds have been entered into the CAMP rotary screw trap platform. That product produces a large number of outputs that have been standardized across watersheds, and among salmon runs and life stages.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
low, unless funding distribution is delayed	1	2

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$134,214	\$0	\$134,214
2018	CVPRF	\$30,000	\$0	\$30,000
2019	CVPRF	\$30,000	\$0	\$30,000

Total Cost: \$194,214

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Monitoring - Maintain and enhance the capabilities of the CAMP Rotary Screw Trap Platform so it provides data that meets the CVPIA Core Team and Science Integration Team's needs.</i>					
Agreement	\$134,214	n/a	FWS	CVPRF	Cost includes: (1) \$112,832 West Inc subcontract cost, (2) 2 peer reviewers @\$6K each, (3) 1.43% PSMFC Admin cost = \$1,785, and (4) 6% USFWS overhead cost = \$7,597.
2018					
<i>Monitoring - Maintain and enhance the capabilities of the CAMP Rotary Screw Trap Platform so it provides data that meets the CVPIA Core Team and Science Integration Team's needs.</i>					
Agreement	\$30,000	n/a	FWS	CVPRF	Annual cost to resolve unforeseen technical issues with the CAMP rotary screw trap platform.
2019					
<i>Monitoring - Maintain and enhance the capabilities of the CAMP Rotary Screw Trap Platform so it provides data that meets the CVPIA Core Team and Science Integration Team's needs.</i>					
Agreement	\$30,000	n/a	FWS	CVPRF	Annual cost to resolve unforeseen technical issues with the CAMP rotary screw trap platform.

CVP watershed adult salmon escapement database

Develop a database containing the complete range of biological data for adult Chinook salmon that were collected during escapement surveys on the four Central Valley Project (CVP) watersheds since 1992

Classification: Performance Monitoring, Performance Monitoring

Location: , Central Valley Project Improvement Act

Funding Years: 2016 - 2017

Benefits Start Year: 2016

Priority: 1 - This charter gets a Program Priority = 1 value because the CVP watershed adult salmon database project facilitates the acquisition and distribution of adult salmon data needed by the CVPIA's Adaptive Resource Management process and the Science Integration Team.

Partners: CDFW, Pacific States Marine Fisheries Commission

Related Programs: No Data.

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(16) CAMP	100.0%	Comprehensive Assessment and Monitoring Program

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
SIT Valley wide and watershed attributes. For example, number of returning natural spawners, proportion of stray hatchery salmon, and proportion of natural spawners in a watershed	1	number of fish	A single database storing adult salmon escapement data would facilitate the ability to quickly and easily develop data summaries that could be incorporated into the SIT's decision support model.

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2017	database with adult salmon data from the four CVP watersheds

Narrative

Central Valley Project Improvement Act program managers and staff are currently involved in multiple efforts that require timely access to adult Chinook salmon data. Unfortunately, a single database providing access to the complete range of biological data pertaining to adult salmon collected during escapement surveys on the four Central Valley Project (CVP) watersheds since 1992 does not exist. Those four watersheds are the American River, Clear Creek, Sacramento River, and Stanislaus River.

The CAMP has initiated a partnership with state and federal biologists that conduct adult salmon escapement surveys, with the goal of consolidating adult salmon data that have been collected in the four CVP watersheds so it can be provided in a single, standardized database that is easily queried. Examples of the types of data that would be included in the database include location, demographic age, gender, and coded wire tag-related data.

Progress on this project will continue to rely on California Department of Fish and Wildlife (CDFW) staff's ability to share data and answer questions about those data and the way in which they were collected. The CAMP Program Manager has invested many hours building the collaborative foundation with CDFW staff to acquire their data, and those staff have generously provided several data files which are currently being migrated into a standardized database structure.

Funding for the CVP watershed adult salmon database project will: (1) consolidate non-standardized data that are widely dispersed among multiple individuals, data files, and data formats into a single database, (2) provide access to long-term, standardized trend monitoring data for multiple taxa in several watersheds where the CVPIA's Science Integration Team (SIT) has identified priority actions, (3) provide the data that are needed to accomplish the CAMP's performance metric of producing an annual report, (4) provide access to standardized data pertaining to threatened spring- and endangered winter-run Chinook salmon, (5) lead to data that can be used to validate the accuracy of the SIT's decision support model, and (6) generate data that will facilitate watershed-scale comparisons between the predicted and actual benefits of habitat restoration activities.

Data Management

A single database structure is being constructed to store the complete range of biological data that have been collected during adult salmon escapement surveys in the four CVP streams since 1992. Initially, the database structure is being built to hold carcass survey data, and when the development of that module is complete, biological data from the four watersheds will be migrated into the database. When that module is complete, the staff working on the adult database project will move to build additional modules containing hatchery, angler, video, and VAKI data. If feasible, the database will be expanded to store data from salmon that were harvested in the Pacific Ocean.

The database being developed will conform to the Center for Data Management's Best Management Practices in regards to data storage and data analysis.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Delays in fund acquisition could delay the project completion	2	3

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$350,000	\$0	\$350,000
2018	CVPRF	\$350,000	\$0	\$350,000
2019	CVPRF	\$100,000	\$0	\$100,000

Total Cost: \$800,000

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Monitoring - Acquire, organize, and standardize adult Chinook salmon data.</i>					
Agreement	\$350,000	n/a	FWS	CVPRF	The \$350,000 provides funds for: (1) one project lead/database specialist, (2) two data technicians, and (3) some of the funds needed to hire a contractor that will write the computer programming code needed to generate data summaries for the SIT's decision support model.
2018					
<i>Monitoring - Acquire, organize, and standardize adult Chinook salmon data.</i>					
Agreement	\$350,000	n/a	FWS	CVPRF	The \$350,000 provides funds for: (1) one project lead/database specialist, (2) two data technicians, and (3) some of the funds needed to hire a contractor that will write the computer programming code needed to generate data summaries for the SIT's decision support model.
2019					
<i>Monitoring - Acquire, organize, and standardize adult Chinook salmon data.</i>					
Agreement	\$100,000	n/a	FWS	CVPRF	Cost is a rough estimate to finish developing the CVP watershed adult salmon escapement database.

Delta Salmon Survival Study

Study to assess the survival of juvenile Chinook salmon through the Delta

Classification: Performance Monitoring, Performance Monitoring
Location: , Sacramento-San Joaquin Delta
Funding Years: 2014 - 2018
Benefits Start Year: 2015
Priority: 2 - Program Priority Comments:
Partners: USGS, CDWR, UC-Davis
Related Programs: NMFS-RP, San Joaquin River Restoration Program, BDCP, CDWR
Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(16) CAMP	100.0%	Analyzes the effectiveness of Head of Old River Barrier on survival. Determines the effectiveness of (b)(2) water operations and management of Stanislaus River and other SJR basin flows

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Annual survival report	1	number of reports	

Deliverables

<u>Date</u>	<u>Title</u>
Nov. 2018	2017 Delta Survival Study report
Nov. 2016	2015 Delta Survival Study Report
Nov. 2017	2016 Delta Survival Study Report

Narrative

Continuation of a study to assess the survival of juvenile salmon as they pass through the Delta, and how different water management actions affect juvenile salmon passage. Without a better understanding of how in-river flows impact survival and migration success, trying to implement projects or change operations to improve survival is unlikely to be effective. The data from the study can be used to manage river discharges so juvenile salmon are more successful in passing through the Delta as they migrate to the Pacific Ocean. Increased juvenile salmon passage through the Delta should, in turn, lead to greater numbers of adult salmon that return to their natal watersheds when they spawn. In years when the Head of Old River barrier is in place, this assessment can also be used to determine whether there are benefits of the barrier installation, or not. It will also help to determine how Delta survival may impact any improvements resulting from increased habitat and flows for rearing fish upstream and potentially identify improvements in survival due to habitat restoration or flow improvements in the Delta. It will also help to

adaptively manage the flow requirements identified in the State Water Resources Control Board's draft Water Quality Control Plan.

This study will change in 2017 from a VEMCO study to a JSATS study because USBR is no longer funding the VEMCO receiver array, as the 6 year steelhead study has ended. This study is now partnering with UCDavis, who is in the process of obtaining funding from Delta Science to fund a JSATS acoustic array between the mouth of the Merced River to Benicia. The proposed study in this charter will partner with UCDavis to leverage funds, and expand the JSATS acoustic array such that it is similar to that deployed in the Delta by USGS for USBR in the past for the 6 year steelhead study, so comparisons can be made with past data. DWR is providing some funds for the project (\$170,000). Restoration Fund will fund \$1,086,880 for 2017.

Data Management

Data is provided and tabulated in an annual report. Raw data is stored and maintained by the analyst and is made available to CVPIA staff as requested.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Hiring/staffing limitations within USFWS	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$1,191,571	\$0	\$1,191,571
2017		\$64,000	\$0	\$64,000
2018	CVPRF	\$1,080,425	\$0	\$1,080,425

Total Cost: \$2,335,995

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Research - Implementation of an acoustic tagging project estimating survival through the Delta and the potential impacts of various management or restoration actions (i.e., head of Old River barrier, flow augmentation).</i>					
Agreement	\$106,000	n/a	FWS	CVPRF	To conduct data analyses on results of 2017 study. Cost share from DWR
Agreement	\$192,582	n/a	FWS	CVPRF	For receiver array deployment, maintenance and retrieval of 30 receivers in Delta between February 1

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
					and May 15 and pre-processing and database support.
Labor	\$215,001	1.00	FWS	CVPRF	Based on expenditures in 2016, without any cost savings from USBR's 6 year steelhead study, as in the past. Costs for temporary, term and permanent staff to tag, transport and release tagged fish.
Equipment or Materials	\$440,088	n/a	FWS	CVPRF	Costs for 1356 JSATS tags; 1296 for study, 50 for tag life and 10 extra's for replacements if any are found to be defective.
Equipment or Materials	\$237,900	n/a	FWS	CVPRF	Purchase of 30 JSATS receivers to be deployed to estimate survival through the Delta similar to that done in 2015 and 2016. Receivers are estimated to cost \$6,500 each.
Labor	\$64,000	1.00	FWS		Cost share from DWR
2018					
<i>Research - Implementation of an acoustic tagging project estimating survival through the Delta and the potential impacts of various management or restoration actions (i.e., head of Old River barrier, flow augmentation).</i>					
Agreement	\$111,000	n/a	FWS	CVPRF	Based on FY17 cost estimate, plus 5% to account for inflation.
Agreement	\$122,000	n/a	FWS	CVPRF	Based on FY17 cost estimate, plus 5% to account for inflation.
Labor	\$310,000	1.00	FWS	CVPRF	Based on FY17 labor estimate, plus 2% to account for inflation.
Equipment or Materials	\$458,125	n/a	FWS	CVPRF	Based on FY17 estimated tag cost, plus 5% to account for inflation.
Equipment or Materials	\$79,300	n/a	FWS	CVPRF	Replace lost or damaged receivers

Pacific States Marine Fishery Commission database support

Provide database support to the CAMP program manager

Classification: Performance Monitoring, Performance Monitoring
Location: , Central Valley Wide
Funding Years: 2016 - 2017
Benefits Start Year: 2016
Priority: 1 - This charter gets a Program Priority = 1 value because the PSMFC database support facilitates the acquisition and distribution of juvenile salmon data that are needed by the CVPIA's Adaptive Resource Management process and the Science Integration Team.
Partners: Pacific States Marine Fisheries Commission
Related Programs: No Data.
Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(16) CAMP	100.0%	Comprehensive Assessment and Monitoring Program

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
SIT watershed attributes. For example, number of juveniles produced per adult salmon spawner, and proportion of juvenile salmon in each size class leaving a watershed	10	number of fish	The database specialist provides continuous support to the CAMP Program Manager, thereby facilitating the acquisition and distribution of high quality data sets in a timely fashion. For example, some data sets that have been acquired by the PSMFC database support staff have already been provided to staff working with the CVPIA's decision support model.

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2017	various databases

Narrative

The CAMP program manager requires staff assistance to collect and check the quality of new and existing rotary screw trap data collected by various partners. A database specialist that works for the Pacific States Marine Fisheries Commission (PSMFC) will provide that assistance. That person will also help to resolve outstanding data issues in historical rotary screw trap data. The database specialist may also provide support on other projects on an as needed basis, e.g., building database applications that standardize the storage of data that are collected by multiple

entities or at multiple sites, and working with other staff to develop a database application used to store adult salmon data.

The funds provided by this charter will support the CVPIA FY2017 SIT priorities because the PSMFC database specialist will produce juvenile salmon data and documentation that will be incorporated into watershed attributes relating to the SIT's decision support model.

Funding for the PSMFC database specialist: (1) provides access to long-term trend monitoring data for multiple taxa in several of the watersheds where the SIT has identified priority actions, (2) ensures continuity in work that is feasible (and has been ongoing for several years), (3) will provide the data that are needed to accomplish the CAMP's performance metric of producing an annual report, (4) provides access to standardized data pertaining to multiple threatened and endangered species, (5) will lead to data that can be used to validate the accuracy of the SIT's decision support model, (6) generates data that will facilitate watershed-scale comparisons between the predicted and actual benefits of habitat restoration activities, and (7) strengthens the partnerships among the Central Valley biologists and programs that are operating rotary screw traps in a standardized manner.

Data Management

The PSMFC database specialist will use the CAMP rotary screw trap platform (Platform) as she acquires and synthesizes juvenile salmon data from partners across the Central Valley. The specialist will use a 'QC database' they have built to check the quality and completeness of the data stored in the Platform. The QC database: (1) possesses complete metadata documentation, (2) provide mechanisms and tools for checking the quality and completeness of the data stored in the Platform, and (3) generates data summaries that can readily be incorporated into the CVPIA's decision support model.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
low, unless funding distribution is delayed	1	2

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$116,000	\$0	\$116,000
2018	CVPRF	\$117,160	\$0	\$117,160
2019	CVPRF	\$118,332	\$0	\$118,332

Total Cost: \$351,492

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Monitoring - Acquire database expertise so accurate and complete adult and juvenile salmon data can be provided to the CVPIA SIT and CAMP program manager in a timely fashion.</i>					
Agreement	\$116,000	n/a	FWS	CVPRF	2017 cost includes a USFWS 6% contract overhead cost.
2018					
<i>Monitoring - Acquire database expertise so accurate and complete adult and juvenile salmon data can be provided to the CVPIA SIT and CAMP program manager in a timely fashion.</i>					
Agreement	\$117,160	n/a	FWS	CVPRF	FY2018 costs uses FY2017 cost, adds a 1% inflation rate, and includes the 6% USFWS overhead cost.
2019					
<i>Monitoring - Acquire database expertise so accurate and complete adult and juvenile salmon data can be provided to the CVPIA SIT and CAMP program manager in a timely fashion.</i>					
Agreement	\$118,332	n/a	FWS	CVPRF	2019 cost assumes the 2018 cost plus 1% annual inflation.

Stanislaus River rotary screw trap monitoring

Quantify production of juvenile Chinook salmon and the abundance of juvenile steelhead in the Stanislaus River (Caswell State Park) using rotary screw traps.

Classification: Performance Monitoring, Performance Monitoring

Location: , Stanislaus River

Funding Years: 2016 - 2017

Benefits Start Year: 2016

Priority: 1 - This charter gets a Program Priority = 1 value because the project generates data that will be used to collect data that addresses two of the FY 2017 Science Integration Team's American River watershed-level priorities. The project also provides data that addresses a Reclamation OCAP BO monitoring requirement.

Partners: No Data.

Related Programs: No Data.

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(16) CAMP	100.0%	Comprehensive Assessment and Monitoring Program

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
SIT watershed attributes for the Stanislaus River: number of juveniles produced per adult salmon spawner, and proportion of juvenile salmon in each size class leaving a watershed.	2	number of fish	The rotary screw traps at Caswell State Park on the Stanislaus River provide data reflecting the total number of juvenile salmon emigrating from the Stanislaus River. As such, those traps provide data that can be used to quantify the number of juveniles produced per adult salmon spawner, and proportion of juvenile salmon in each size class emigrating past Caswell State Park.

Deliverables

<u>Date</u>	<u>Title</u>
Dec. 2016	annual Stanislaus River - Caswell State Park rotary screw trap report and a database with data

Narrative

The rotary screw trap monitoring activities in the Stanislaus River provide data that can be used to assess the biological response to habitat management activities in that watershed. As such,

they can be used to infer, at a watershed-level scale, how habitat restoration activities are affecting the number of juvenile Chinook salmon and steelhead in that river.

Funding for the Stanislaus River – Caswell State Park rotary screw trap project: (1) provides access to long-term trend monitoring data for multiple taxa in one of the four Central Valley project watersheds, i.e., one of the watersheds where the CVPIA's Science Integration Team (SIT) has identified priority actions, (2) ensures continuity in work that is feasible (and has been ongoing for 15+ years), (3) will provide the data that are needed to accomplish the CAMP's performance metric of producing an annual report, (4) provides access to standardized data pertaining to threatened steelhead, (5) will lead to data that can be used to validate the accuracy of the SIT's decision support model, (6) generates data that will facilitate watershed-scale comparisons between the predicted and actual benefits of habitat restoration activities, and (7) addresses a 2009 NMFS OCAP biological opinion requirement that the Bureau of Reclamation conduct "...San Joaquin River monitoring [that] shall include: Adult escapement and juvenile monitoring for steelhead on the Stanislaus River".

Data Management

The Stanislaus River rotary screw trap data will be stored in the CAMP Rotary Screw Trap Platform. Data summaries from the Platform can be provided to CVPIA managers, stakeholders and the public.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
low, unless funding distribution is delayed	1	2

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$220,922	\$0	\$220,922
2018	CVPRF	\$150,000	\$0	\$150,000
2019	CVPRF	\$151,500	\$0	\$151,500

Total Cost: \$522,422

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Monitoring - Collect and report monitoring data that can be used to assess abundance trends for juvenile salmonids in the Stanislaus River.</i>					
Agreement	\$220,922	n/a	FWS	CVPRF	The 2017 project cost includes non-recurring funding for new capital costs.

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
					The \$220,922 figure includes the 6% USFWS overhead cost.
2018					
<i>Monitoring - Collect and report monitoring data that can be used to assess abundance trends for juvenile salmonids in the Stanislaus River.</i>					
Agreement	\$150,000	n/a	FWS	CVPRF	Cost reflects a substantial savings over prior years. The \$150,000 cost includes the 6% USFWS overhead cost.
2019					
<i>Monitoring - Collect and report monitoring data that can be used to assess abundance trends for juvenile salmonids in the Stanislaus River.</i>					
Agreement	\$151,500	n/a	FWS	CVPRF	Assumes 2018 rate plus 1% annual inflation, and includes 6% USFWS overhead cost.

b2 administration

USBR and FWS oversight of CVP dedicated yield application towards annual goal of 800 TAF for fish and wildlife purposes.

Classification: Administration, Water Operations

Location: , Central Valley Wide

Funding Years: 2016 - 2017

Benefits Start Year: 2016

Priority: 1 - Priority 1 (admin) and priority 2(operations) are intertwined.

Partners: No Data.

Related Programs: No Data.

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(2) Dedicated Yield	100.0%	

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
salmonid doubling	-9999	number of fish	AFRP stream specific
CVP yield	800000	acre-feet	

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2017	Annual accomplishment report
Sep. 2017	Annual Narrative Summary
Sep. 2017	Annual Operations and Accounting presentation

Narrative

This charter is the base funding for administration of the (b)(2) program. It includes both FWS and USBR staff time for program oversight and management, budget and annual work plan development, litigation support, public outreach efforts, and preparation and presentation of annual summary documents.

Data Management

The (b)(2) Program generates both monthly and annual data products. On a monthly basis, Reclamation produces 12-month operational forecasts that include estimates of water year (b)(2) fishery actions and daily accounting of both (b)(2) and non-(b)(2) fishery actions. At the end of each water year, the Program also produces summary documents that include (b)(2) daily accounting, a narrative summary, and annual accounting summary tables. All of these data products are posted on the Reclamation Central Valley Office (CVO) website at the appropriate time of year:

<http://www.usbr.gov/mp/cvo/>

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
drought	2	2

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$82,874	\$23,678	\$59,196
2018	CVPRF	\$82,874	\$23,678	\$59,196
2019	CVPRF	\$82,874	\$23,678	\$59,196

Total Cost: \$248,621

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Environmental Compliance and Permitting - Legal Review and Preparation</i>					
Labor	\$11,839	0.05	FWS	CVPRF	Coordinate with DOI Solicitor's Office on legal review of documentation and litigation preparation
<i>Management - Dedicate and manage annually 800,000 acre-feet of CVP water for fish, wildlife, and habitat restoration purposes.</i>					
Labor	\$23,678	0.10	BOR	CVPRF	Program Co-Lead Dedicate and manage annually 800,000 acre feet of CVP water for fish, wildlife, and habitat restoration purposes.
Labor	\$23,678	0.10	FWS	CVPRF	Program Lead Dedicate and manage annually 800,000 acre feet

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
					of CVP water for fish, wildlife, and habitat restoration purposes.
<i>Outreach - Technical Work Group Participation</i>					
Labor	\$11,839	0.05	FWS	CVPRF	Participate in various interagency technical and modeling work groups (which may include public participation). Conduct 2 or more public presentations per year.
Labor	\$11,839	0.05	FWS	CVPRF	Participate in various interagency technical and modeling work groups (which may include public participation). Conduct 2 or more public presentations per year.
2018					
<i>Environmental Compliance and Permitting - Legal Review and Preparation</i>					
Labor	\$11,839	0.05	FWS	CVPRF	Coordinate with DOI Solicitor's Office on legal review of documentation and litigation preparation

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
<i>Management - Dedicate and manage annually 800,000 acre-feet of CVP water for fish, wildlife, and habitat restoration purposes.</i>					
Labor	\$23,678	0.10	FWS	CVPRF	Program Lead Dedicate and manage annually 800,000 acre feet of CVP water for fish, wildlife, and habitat restoration purposes.
Labor	\$23,678	0.10	BOR	CVPRF	Program Co-Lead Dedicate and manage annually 800,000 acre feet of CVP water for fish, wildlife, and habitat restoration purposes.
<i>Outreach - Technical Work Group Participation</i>					
Labor	\$11,839	0.05	FWS	CVPRF	Participate in various interagency technical and modeling work groups (which may include public participation). Conduct 2 or more public presentations per year.
Labor	\$11,839	0.05	FWS	CVPRF	Participate in various interagency technical and

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
					modeling work groups (which may include public participation). Conduct 2 or more public presentations per year.
2019					
<i>Environmental Compliance and Permitting - Legal Review and Preparation</i>					
Labor	\$11,839	0.05	FWS	CVPRF	Coordinate with DOI Solicitor's Office on legal review of documentation and litigation preparation
<i>Management - Dedicate and manage annually 800,000 acre-feet of CVP water for fish, wildlife, and habitat restoration purposes.</i>					
Labor	\$23,678	0.10	FWS	CVPRF	Program Lead Dedicate and manage annually 800,000 acre feet of CVP water for fish, wildlife, and habitat restoration purposes.
Labor	\$23,678	0.10	BOR	CVPRF	Program Co- Lead Dedicate and manage annually 800,000 acre feet of CVP water for fish, wildlife, and habitat restoration purposes.
<i>Outreach - Technical Work Group Participation</i>					
Labor	\$11,839	0.05	FWS	CVPRF	Participate in various interagency technical and modeling work groups (which may include public participation). Conduct 2 or more public presentations per year.
Labor	\$11,839	0.05	FWS	CVPRF	Participate in various interagency technical and modeling work groups (which may include public participation). Conduct 2 or more public presentations per year.

b2 operations

Develop operational products used to make b2 management decisions

Classification: Improvement, Water Operations
Location: , Central Valley Wide
Funding Years: 2016 - 2017
Benefits Start Year: 2016
Priority: 2 - Priority 1 (admin) and priority 2(operations) are intertwined.
Partners: No Data.
Related Programs: No Data.
Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(2) Dedicated Yield	100.0%	

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
CVP yield	800000	acre-feet	
Salmonid doubling	-9999	number of fish	AFRP stream dependent

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2017	Annual Accomplishment Report
Sep. 2017	Annual Narrative Summary
Sep. 2017	Annual Operations and Accounting Presentation

Narrative

This charter is the operational funding for implementation of the (b)(2) program. It includes both FWS and USBR staff time for interagency coordination and collaboration, technical workgroup participation, operational forecast development, hydrologic modeling support, and daily accounting procedures. The studies are necessary to determine operational requirements for CVP facilities and assess the effects on populations.

Data Management

The (b)(2) Program generates both monthly and annual data products. On a monthly basis, Reclamation produces 12-month operational forecasts that include estimates of water year (b)(2) fishery actions and daily accounting of both (b)(2) and non-(b)(2) fishery actions. At the end of each water year, the Program also produces summary documents that include (b)(2) daily accounting, a narrative summary, and annual accounting summary tables. All of these data products are posted on the Reclamation Central Valley Office (CVO) website at the appropriate time of year: <http://www.usbr.gov/mp/cvo/>

Risks

No Data.

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$333,863	\$101,816	\$232,046
2018	CVPRF	\$333,863	\$101,816	\$232,046
2019	CVPRF	\$333,863	\$101,816	\$232,046

Total Cost: \$1,001,588

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Implementation - Forecast/Accounting/Modeling</i>					
Labor	\$11,839	0.05	FWS	CVPRF	Hydrologic computer model simulations will be conducted on a monthly basis (CVP forecast model) to assess various (b)(2) implementation scenarios, and CALSIM II and ECOSYM modeling will be done on an as needed basis.
Labor	\$101,816	0.43	BOR	CVPRF	Develop CVP monthly forecasts, daily accounting
Labor	\$59,196	0.25	FWS	CVPRF	Develop CVP monthly forecasts, daily accounting
<i>Planning and Analysis - Interagency Collaboration</i>					
Labor	\$161,012	0.68	FWS	CVPRF	b2 Interagency

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
					Team meetings. Confer with project operators and biologists to determine when and where b2 water should be used.
2018					
<i>Implementation - Forecast/Accounting/Modeling</i>					
Labor	\$11,839	0.05	FWS	CVPRF	Hydrologic computer model simulations will be conducted on a monthly basis (CVP forecast model) to assess various (b)(2) implementation scenarios, and CALSIM II and ECOSYM modeling will be done on an as needed basis.
Labor	\$101,816	0.43	BOR	CVPRF	Develop CVP monthly forecasts, daily accounting
Labor	\$59,196	0.25	FWS	CVPRF	Develop CVP monthly forecasts, daily accounting
<i>Planning and Analysis - Interagency Collaboration</i>					
Labor	\$161,012	0.68	FWS	CVPRF	b2 Interagency Team meetings. Confer with project operators and biologists to determine when

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
					and where b2 water should be used.
2019					
<i>Implementation - Forecast/Accounting/Modeling</i>					
Labor	\$101,816	0.43	BOR	CVPRF	Develop CVP monthly forecasts, daily accounting
Labor	\$11,839	0.05	FWS	CVPRF	Hydrologic computer model simulations will be conducted on a monthly basis (CVP forecast model) to assess various (b)(2) implementation scenarios, and CALSIM II and ECOSYM modeling will be done on an as needed basis.
Labor	\$59,196	0.25	FWS	CVPRF	Develop CVP monthly forecasts, daily accounting
<i>Planning and Analysis - Interagency Collaboration</i>					
Labor	\$161,012	0.68	FWS	CVPRF	b2 Interagency Team meetings. Confer with project operators and biologists to determine when and where b2 water should be used.

Anadromous Fish Screen Program (AFSP) Administration

Project Management, Program and Technical Support for the AFSP

Classification: Administration, Diversion Screening

Location: ,

Funding Years: 2016 - 2017

Benefits Start Year: 2016

Priority: 1 - Program Priority Comments:

Partners: No Data.

Related Programs: No Data.

Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(21) AFSP	100.0%	

Metrics

No Data.

Deliverables

No Data.

Narrative

This action consists of project management, and program and technical support for the Anadromous Fish Screen Program. On-going fish screen projects that will need project management and technical support in FY 2017 will include the West Stanislaus Joint Use Intake Fish Screen Project, Antelope Creek Fish Passage Improvement Project and other on-going AFSP fish screen projects (Clover Creek-Millville; Hidden Valley Ranch, Oswald WC and Locke Ranch). Program support will also be needed for one or more additional fish screen projects expected to be initiated in FY 2017.

Funding for the AFSP maintains a core capability as we transition to the CVPIA Implementation Plan for Fisheries, and is consistent with CVPIA Section 3406 b(21) authority to assist the State of California in reducing the losses of juvenile anadromous fish from unscreened or inadequately screened diversions in the Central Valley of California.

CVPIA interim fishery priorities for FY 2017 as recommended by the CVPIA Science Integration Team and Fisheries Core Team provide direction on the specific watersheds where fish screening is a beneficial and priority action to protect the key out-migrating juvenile anadromous fish (i.e., Chinook salmon, steelhead, and green sturgeon). Fish screen project selection will be based on project benefits and costs, funding availability, project readiness, and the availability of cost-share partners. State and local sources typically provide the required

matching cost-share funds for AFSP projects. AFSP funds cannot exceed 50% of the total project costs.

Note: The RWSP Program Lead is also Reclamation's Co-Lead for the Anadromous Fish Screen Program (AFSP) whose time is shared between the two programs.

Data Management

Information resulting from activities funded by this charter, including all program reports, will be permanently housed at BOR's Mid-Pacific Regional Office in Sacramento, and FWS's Pacific Southwest Regional Office in Sacramento.

Risks

No Data.

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$665,182	\$413,400	\$251,782
2018	CVPRF	\$665,182	\$413,400	\$251,782
2019	CVPRF	\$665,182	\$413,400	\$251,782

Total Cost: \$1,995,545

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Administration - Program management, and program and technical support for the AFSP.</i>					
Labor	\$61,049	0.40	BOR	CVPRF	Provides program support for NEPA and ESA compliance and permitting.
Labor	\$15,000	0.12	FWS	CVPRF	Provides technical support for environmental compliance, permitting, design and project monitoring.
Labor	\$50,000	0.25	BOR	CVPRF	Provides technical assistance on evaluating and improving fish screen facilities.
Labor	\$45,786	0.30	BOR	CVPRF	Provides technical services support for design and construction activities, and project management.
Labor	\$236,782	1.00	FWS	CVPRF	Provides leadership and overall management of the AFSP including oversight of the AFSP Technical Team.
Labor	\$169,824	0.75	BOR	CVPRF	Provides NMFS technical engineering support for AFSP activities in FY 2018. Work to be

Type	Total	FTE	Agency	Fund	Description
					performed by NMFS Santa Rosa Office through interagency funding agreement.
Labor	\$10,000	0.10	BOR	CVPRF	Provides for execution and management of funding agreements.
Labor	\$1,000	0.01	BOR	CVPRF	Provides NEPA, ESA and Section 106 compliance.
Labor	\$2,000	0.01	BOR	CVPRF	Provides engineering support for design and construction activities.
Labor	\$73,741	0.40	BOR	CVPRF	Co-manages the AFSP including oversight of program budget and funding agreements.
2018					
<i>Administration - Program management, and program and technical support for the AFSP.</i>					
Labor	\$50,000	0.25	BOR	CVPRF	Provides technical assistance on evaluating and improving fish screen facilities.
Labor	\$169,824	0.75	BOR	CVPRF	Provides NMFS technical engineering support of AFSP activities in FY 2019. Work to be performed by NMFS Santa Rosa Office through interagency funding agreement.
Labor	\$1,000	0.01	BOR	CVPRF	Provides NEPA, ESA and Section 106 compliance.
Labor	\$236,782	1.00	FWS	CVPRF	Provides leadership and overall management of the AFSP including oversight of the AFSP Technical Team.
Labor	\$45,786	0.30	BOR	CVPRF	Provides technical services support for design and construction activities, and construction management.
Labor	\$10,000	0.10	BOR	CVPRF	Provides for execution and management of funding agreements.
Labor	\$2,000	0.01	BOR	CVPRF	Provides engineering support for design and construction activities.
Labor	\$73,741	0.40	BOR	CVPRF	Co-manages the AFSP including oversight of the program budget and funding agreements.
Labor	\$15,000	0.12	FWS	CVPRF	Provides technical support for environmental compliance, permitting, design and project monitoring.
Labor	\$61,049	0.40	BOR	CVPRF	Provides program support for NEPA and ESA compliance and permitting
2019					
<i>Administration - Program management, and program and technical support for the AFSP.</i>					
Labor	\$2,000	0.01	BOR	CVPRF	Provides engineering support for design and construction activities.

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
Labor	\$10,000	0.10	BOR	CVPRF	Provides for execution and management of funding agreements.
Labor	\$45,786	0.30	BOR	CVPRF	Provides technical services support for design and construction activities and project management.
Labor	\$15,000	0.12	FWS	CVPRF	Provides technical support for environmental compliance, permitting, design and project monitoring.
Labor	\$169,824	0.75	BOR	CVPRF	Provides NMFS technical engineering support of AFSP activities in FY 2020. Work to be performed by NMFS Santa Rosa Office through interagency funding agreement.
Labor	\$1,000	0.01	BOR	CVPRF	Provides NEPA, ESA, and Section 106 compliance.
Labor	\$236,782	1.00	FWS	CVPRF	Provides leadership and overall management of the AFSP including oversight of the AFSP Technical Team.
Labor	\$61,049	0.40	BOR	CVPRF	Provides program support for NEPA and ESA compliance and permitting.
Labor	\$50,000	0.25	BOR	CVPRF	Provides technical assistance on evaluating and improving fish screen facilities.
Labor	\$73,741	0.40	BOR	CVPRF	Co-manages the AFSP including oversight of the program budget and funding agreement.

Anadromous Fish Screen Program (AFSP) Projects

AFSP Fish Screen Projects

Classification: Improvement, Diversion Screening
Location: , Central Valley Wide
Funding Years: 2016 - 2017
Benefits Start Year: 2016
Priority: 1 - AFSP funding for one or more small screen projects.
Partners: NMFS, CDFW, CDWR
Related Programs: AFRP
Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(21) AFSP	100.0%	

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
Fish Screens	1	number screened	

Deliverables

<u>Date</u>	<u>Title</u>
Sep. 2017	Fish Screen Funding Agreement

Narrative

This action consists of funding for fish screen projects in Central Valley watersheds and the Sacramento-San Joaquin Delta. The funding will provide cost share funding for one or more projects. State and local sources typically provide the required matching cost-share funds for AFSP projects. AFSP funds cannot exceed 50% of the total project costs.

CVPIA interim fishery priorities for FY 2017 as recommended by the CVPIA Science Integration Team and Fisheries Core Team provide direction on the specific watersheds where fish screening is a beneficial and priority action to protect the key out-migrating juvenile anadromous fish (i.e., Chinook salmon, steelhead, and green sturgeon). Fish screen project selection will be based on project benefits and costs, funding availability, project readiness, and the availability of cost-share partners.

Data Management

Information resulting from activities funded by this charter, including all program reports, will be permanently housed at BOR's Mid-Pacific Regional Office in Sacramento, and FWS's Pacific Southwest Regional Office in Sacramento.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
AFSP funds for fish screen projects are allowable only if matching non-federal cost share funding is available.	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$750,000	\$0	\$750,000

Total Cost: \$750,000

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Construction - This action provides cost share funding by the AFSP towards Central Valley fish screen projects.</i>					
Agreement	\$750,000	n/a	FWS	CVPRF	This action provides cost share funding for AFSP fish screen projects including cost of environmental compliance, permitting, design and construction.

Instream Water Acquisition

Purchase of water for instream purposes

Classification: Improvement, Water Acquisition
Location: , Central Valley Project Improvement Act
Funding Years: 2016 - 2017
Benefits Start Year: 2016
Priority: 2 - Program Priority Comments:
Partners: FWS
Related Programs: No Data.
Authority

<u>Provision</u>	<u>Percentage</u>	<u>Comment</u>
(b)(3) Instream Flows	100.0%	

Metrics

<u>Name</u>	<u>Value</u>	<u>Units</u>	<u>Comment</u>
b3: Instream Flow;Suppl b2 water (acre-feet)	200000	acre-feet	

Deliverables

<u>Date</u>	<u>Title</u>
Jul. 2017	Negotiate and execute contracts for water

Narrative

The objective of the Instream Water Acquisition Program is to acquire water to supplement the 800,000 acre-feet of dedicated CVP yield for fisheries. The target for instream acquisitions is approximately 200,000 acre-feet per year, for use on the San Joaquin and Sacramento Rivers and their tributaries as described in the CVPIA PEIS/ROD.

This Program is in a transition phase, but important as water is thought to limit fish populations on a number of streams. The amount of project funding is a poor surrogate as many activities occur through partnerships with state, local, and private entities. Federal staffing provides technical support to frame and implement projects that leverage other funding sources. The Implementation Plan may change this Program in the future.

Data Management

Data for the Instream Water Acquisition Program is maintained in the Resources Division, MP410.

Risks

<u>Risk</u>	<u>Likelihood</u>	<u>Impact</u>
Adequate water may not be available for purchase	1	1

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$300,000	\$300,000	\$0
2018	CVPRF	\$300,000	\$300,000	\$0
2019	CVPRF	\$300,000	\$300,000	\$0

Total Cost: \$900,000

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Acquisition - Acquire water to supplement the quantity of water dedicated under (b)(2) for fish, wildlife and habitat restoration purposes. Acquisitions will focus on flows to support the Central Valley wide fish doubling goal.</i>					
Agreement	\$300,000	n/a	BOR	CVPRF	Acquire water to supplement the quantity of water dedicated under (b) (2) for fish, wildlife and habitat restoration purposes. Acquisitions will focus on flows to support the Central Valley wide fish doubling goal.
2018					
<i>Acquisition - Acquire water to supplement the quantity of water dedicated under (b)(2) for fish, wildlife and habitat restoration purposes. Acquisitions will focus on flows to support the Central Valley wide fish doubling goal.</i>					
Agreement	\$300,000	n/a	BOR	CVPRF	Acquire water to supplement the quantity of water dedicated under (b) (2) for fish, wildlife and habitat restoration purposes. Acquisitions will focus on flows to support the Central Valley wide fish doubling goal.

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2019					
<i>Acquisition - Acquire water to supplement the quantity of water dedicated under (b)(2) for fish, wildlife and habitat restoration purposes. Acquisitions will focus on flows to support the Central Valley wide fish doubling goal.</i>					
Agreement	\$300,000	n/a	BOR	CVPRF	Acquire water to supplement the quantity of water dedicated under (b) (2) for fish, wildlife and habitat restoration purposes. Acquisitions will focus on flows to support the Central Valley wide fish doubling goal.

CVPIA ARM Process

Funding for Jim Peterson to facilitate SIT team process and lead DSM model development

Classification: Administration, Administration

Location: , Central Valley Wide

Funding Years: 2017 - 2018

Benefits Start Year: 2017

Priority: 1 - The charter is classified as a high priority. That classification was based on the fact that the charter's proposed activities will generate data that will be used to: (1) assess restoration project success, and (2) guide the allocation of funds used to monitor fish resources.

Partners: Golden Gate Salmon Association, NMFS, USGS, CDFW, CDWR

Related Programs: AFRP, CAMP

Authority

Provision	Percentage	Comment
Administration	100.0%	

Metrics

No Data.

Deliverables

No Data.

Narrative

This CVPIA charter provides 1 - 2 years of funding that will be used to support the Adaptive Resource Management (ARM) process and Science Integration Team (SIT) described in the draft April 27, 2015, version of the Central Valley Project Improvement Act (CVPIA) Implementation Plan (Plan). The SIT provides technical recommendations to the Core Team for fisheries actions. The Core Team decides which projects receive funding. The Science Integration Team was open to participation by all stakeholders when the program was announced. The governance of the committee will be determined by the participants. Please contact Julie Zimmerman to be added to the notification lists.

The Plan and its associated processes for managing fisheries resources in the Central Valley are highly dependent on the collection, analysis, storage, and reporting of a wide range of fisheries data. At present, the CVPIA program does not have the capability needed to conduct these activities on a scale that meets the goals identified in the Plan. To address that deficiency, this charter requests funding that will be used to acquire data and information that will be used to:

1. Assess the success of habitat restoration activities and provide guidance that is used to adaptively manage future restoration projects so they are more successful,

2. Strategically allocate funds among the CVPIA staff that are engaged in work that addresses the CVPIA's core mission of restoring anadromous fish taxa, and
3. Formulate management and funding recommendations that are developed by the SIT and which are forwarded to Service and Reclamation managers for consideration and approval.

The funds derived from this charter will be used to acquire programmatic expertise to compile, store, and report high quality data in a timely fashion. Specifically, the funds associated with this charter will be used to pay for:

1. A facilitator that will work with a CVPIA Science Coordinator and SIT staff as the SIT engages with governmental and non-governmental partners to acquire and disseminate data,
2. Administrative support for that facilitator,
3. A database specialist that will acquire data from agencies and/or stakeholders, review and as needed address quality control issues in the data, and enter data into decision support models (DSMs) that will be used by the SIT and Department of the Interior managers, and
4. A database analyst that will identify appropriate uses of data, transform data into more useable forms that are more easily shared between entities and platforms, and perform various analyses with different DSMs.

An assessment of the relative effects of predation has been funded and could be used in refinement of the CVPIA Decision Support Model (DSM) to evaluate alternative management actions. A Charter has been created with the use of prior year funds and therefore reflects zero FY16 dollars. This assessment will use existing Sacramento River salmon survival data from recent years to conduct an analysis of high salmon smolt mortality areas that coincide with habitat features (sinuosity, depth, in-stream cover, etc.), as well as temporally dynamic variables such as temperature, velocity, turbidity, predator movements, and diversions (screened and unscreened) and other in-river structures. These evaluations could be used as a strategic planning tool for prioritizing project funding and/or designing field studies to target the likely causes of higher salmon mortality including predation.

Data Management

The data and information that are produced by the staff associated with this charter will be stored in a Center for Data Management (CDM) that is affiliated with the CVPIA's Comprehensive Assessment and Monitoring Program. The CDM will serve as centralized science and support program designed to collect, analyze, report, and disseminate anadromous fish data from a

variety of state, federal, and non-governmental partners with the goal of providing information that can be used to evaluate the biological response to habitat restoration activities, and provide actionable information that can be used to improve the success of future habitat restoration projects. As these tasks are undertaken, the work associated with these tasks will adhere to the following principals:

1. Data collection activities will be focused on the attributes and processes that are most likely to resolve important uncertainties in the context of the ARM process, or produce actionable insights into which habitat restoration activities are most beneficial.
2. The collection, analysis, and reporting of data will be standardized to the maximum extent practicable, thereby facilitating the ability to integrate data sets across larger geographic areas and infer regional- and watershed-level processes that influence and benefit salmonid populations.
3. Data summaries and annual reports that are based on field work will be produced in a timely fashion, i.e., before the start of the next field season, so those data are available and can be incorporated into the ARM process with minimal delay.
4. Data will be readily accessible and shared across Anadromous Fish Program projects and watersheds, thereby ensuring the widespread dissemination of data that can be used to evaluate the biological response to, and effectiveness of, completed habitat restoration projects. And,
5. The methods used to collect, analyze, and report different types of data will be described in a series of standard operating procedures (SOPs) that define the goals, methods, analytical approaches, and data summarization procedures used as data are acquired and processed. As such, the SOPs will provide a more rigorous, reproducible manner for collecting and analyzing data, thereby increasing the likelihood that changes in biological parameters can be detected and accurately correlated with changes in the biological or physical environment.

Risks

No Data.

Cost Estimate

<u>Year</u>	<u>Fund</u>	<u>Total</u>	<u>BOR</u>	<u>FWS</u>
2017	CVPRF	\$135,000	\$0	\$135,000

Total Cost: \$135,000

Activities and Resources

<u>Type</u>	<u>Total</u>	<u>FTE</u>	<u>Agency</u>	<u>Fund</u>	<u>Description</u>
2017					
<i>Management - Facilitator for public Science Integration Team Meetings</i>					
Agreement	\$135,000	n/a	FWS	CVPRF	