



# Section 3406 (b)(1)

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**and**

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**Bureau of Reclamation**

Habitat Restoration

Fish Passage

Habitat Assessments

Collaboration





# (b)(1) Program Goal



- “implement a program which makes all reasonable efforts to ensure that, by the year 2002, natural production of anadromous fish in Central Valley rivers and streams will be sustainable, on a long term basis, at levels not less than twice the average levels attained during the period of 1967-1991(Section 3406(b)(1) of the CVPIA).”
- AFRP Chinook Salmon Natural Production Targets

Central Valley	990,000
Fall Run	750,000
Late-Fall Run	68,000
Spring Run	68,000
Winter Run	110,000

- See AFRP website for more information  
<http://www.fws.gov/stockton/afrp/index.cfm>





# (b)(1) Objectives

- Improve habitat for all life stages of anadromous fish through provisions of flows of suitable quality, quantity, and timing, and improved physical habitat.
- Improve survival rates by reducing or eliminating entrainment of juveniles at diversions.
- Improve the opportunity for adult fish to reach their spawning habitats in a timely manner.
- Collect fish population, health, and habitat data to facilitate evaluation of restoration actions.
- Integrate habitat restoration efforts with harvest and hatchery management.
- Involve partners in the implementation and evaluation of restoration actions.





# Project Development



- Habitat Restoration Coordinators (HRCs) are assigned to geographic areas/watersheds where they work closely with watershed groups, river management teams, technical advisory committees, stakeholders, and agencies.
- HRCs focus on limiting factors (technical issues), habitat assessments, development of watershed management plans, and feasibility (other issues such as landowner/community support) to identify and propose projects with agency staff and partners.
- Collaboration and coordination with the State and other programs/efforts (i.e. ERP, Delta Science Program, BDCP).
- Planning and Permitting





# (b)(1) Project Prioritization

- Annually AFRP staff evaluate prioritization process and revise if needed
- HRCs receive input from watershed groups, agencies, NGOs, and other stakeholders
- AFRP discuss ongoing projects, current status and needs for the next year
- New projects/studies/monitoring are proposed, discussed, and prioritized by HRCs



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# (b)(1) Project Prioritization



- Each proposed project is scored by all HRCs following the AFRP prioritization criteria.
- Ongoing projects receive highest priority for funding.
- Scores are assigned to projects if they are in a 1) CVP stream, 2) watershed priority in the FRP, 3) doubling goal status, 4) limiting factor, 5) benefit ESA listed species, 6) permits and environmental documents are in place, 7) cost match, and 8) addresses a CPAR or PART action.
- An AWP of ranked projects/studies/monitoring is created for the next year.



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# Yuba River Hammon Bar Riparian Habitat Restoration

- Five acres were planted with cottonwood and willow pole cuttings to restore riparian habitat in the lower Yuba River (FRP Evaluation 4).
- Post-project monitoring (FY13 AWP Activity 2.8.2) to evaluate site inundation frequency and the survival and growth of the pole cuttings.
- Results will be used to inform the installation of future riparian restoration projects so as to provide the greatest value to juvenile salmonid rearing habitat.
- Project partners include SYRCL, Americorps, CDFW, YCWA, PG&E, BLM, and Western Aggregates.

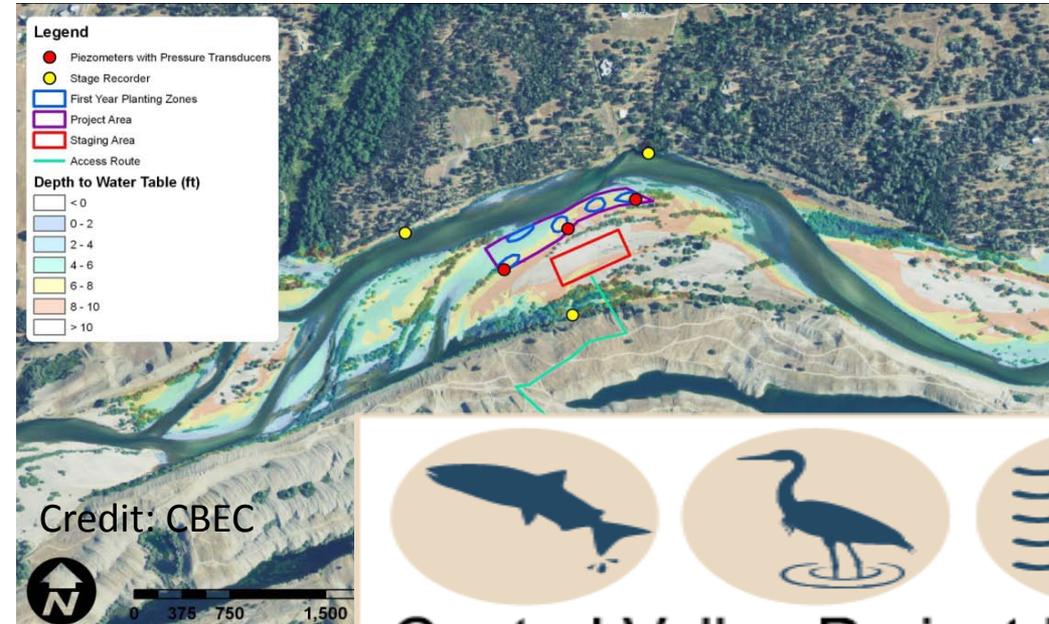


Photo: USFWS



# Yuba River Narrows Channel Restoration Project

- The Yuba River Narrows Channel Restoration Project will restore up to 0.5 miles of in-channel habitat by restoring and replenishing gravel and removing shot rock debris from the Narrows Reach. This project will benefit Fall- and Spring-run Chinook salmon and Steelhead (FRP Evaluation 4).
- FY13 AWP Activity 2.6.4 funds pre-project surveys for the Yuba River Narrows Channel Restoration Project.
- Results will be used to develop design alternatives that will provide the greatest value to improve salmonid spawning habitat.
- Project partners include YCWA, PG&E, USACOE, and CDWR.



Photo: USFWS



Photo: USFWS



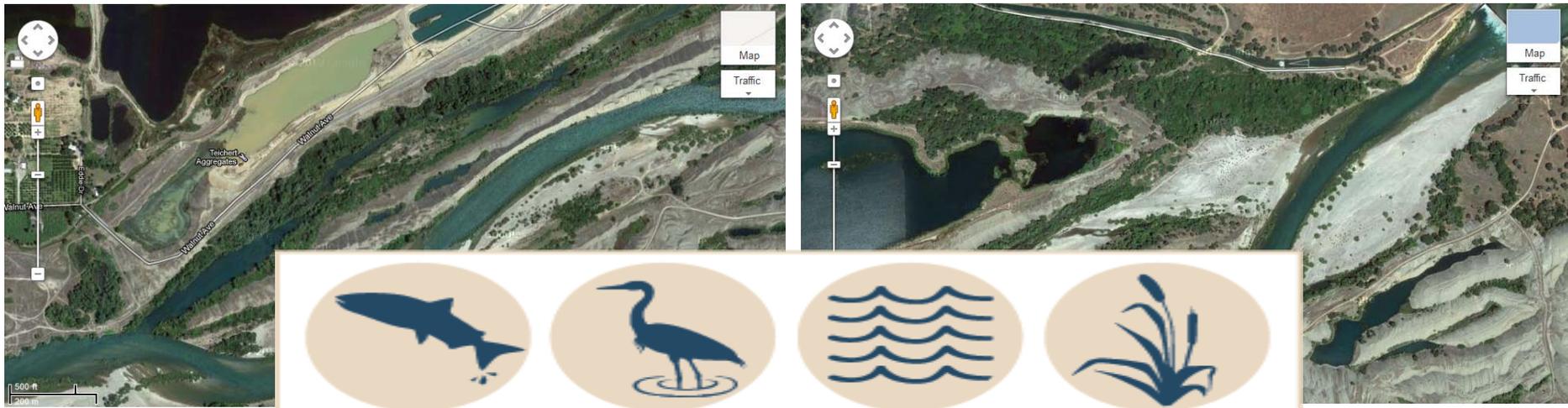
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# Yuba River Daguerre Alley Floodplain Restoration Project



- Yuba River Daguerre Alley Floodplain Restoration Project will restore up to 180 acres of floodplain habitat and approximately 2.5 miles of side channel habitat. This project will benefit steelhead and Chinook salmon (FRP Evaluation 4).
- FY13 AWP Activity 2.6.5 funds pre-project surveys and the development of a River2D model for the Daguerre Alley Floodplain Restoration Project .
- Results will be used to inform the design and feasibility as to provide the greatest value to juvenile salmonid rearing habitat.
- This project is a cooperative effort between the USFWS, CDFW, NMFS, USACOE, Yuba River Management Team, and Yuba County Water Agency.





# Merced River Ranch Floodplain Restoration



- Once completed in 2013, the Merced River Ranch Floodplain Enhancement Project will restore up to 6 acres of riparian floodplain and 1.23 miles of spawning habitat (FRP Action 3 and Evaluation 2).
- FY13 Activity funds the Reclamation Plan, complete implementation, and post-project monitoring (FY13 AWP Activity 2.4.3, 2.7.2, and 2.8.3) to determine if the project was installed according to the design standards. Hydrology, topography/bathymetry, sediment budget, and vegetation will be assessed.
- Complements the multi-phased restoration of the Merced River (ERP-02-P12-D).
- This project is a cooperative effort between the USFWS, CDFW, and ERP.

Photo: Cramer Fish Sciences

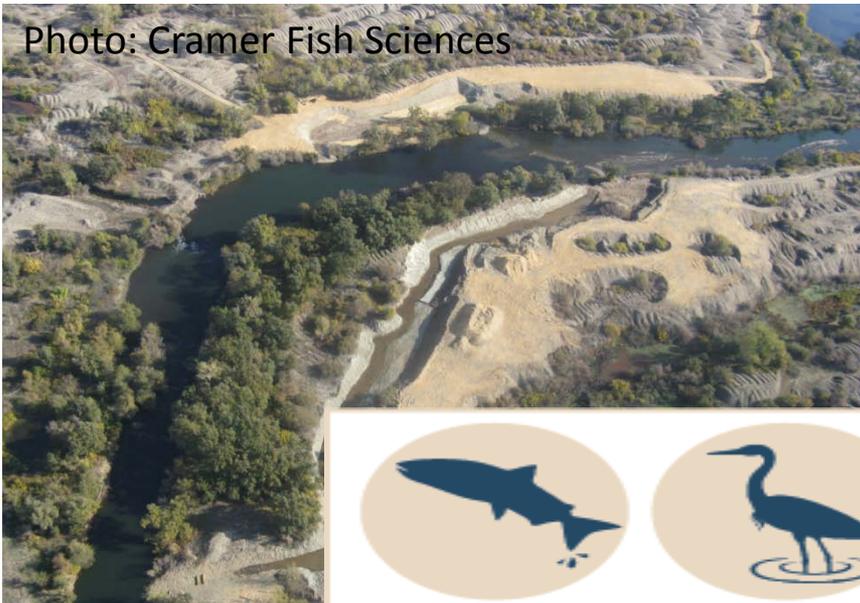


Photo: USFWS

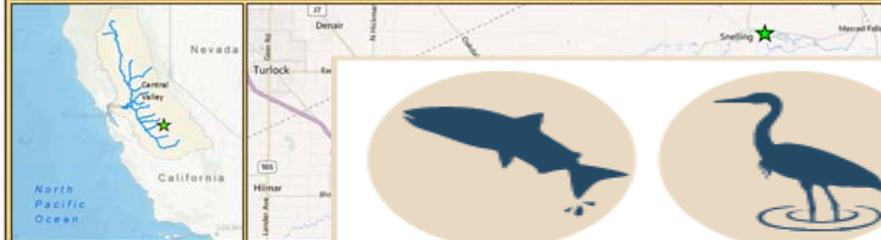
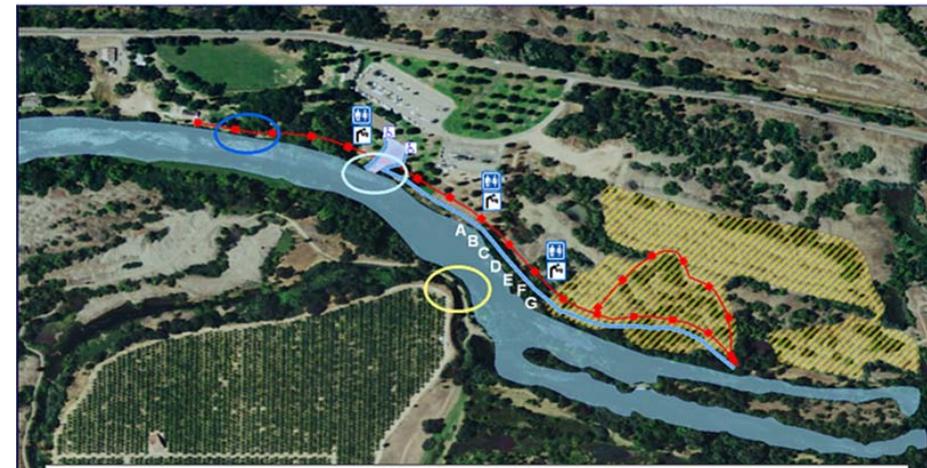


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# Merced River Snelling Channel and Floodplain Restoration

- The Merced River Snelling Channel and Floodplain Restoration Project at Henderson Park will restore up to 80 acres of riparian floodplain and 2 miles of in-channel spawning habitat (FRP Action 3 and Evaluation 2).
- FY13 AWP Activity 2.7.3 and 2.7.4 funds the first stage of construction and implementation.
- Complements the multi-phased restoration of the Merced River described in the Merced River Restoration Corridor Plan (ERP-02-P12-D).
- This project is a cooperative effort between the USFWS, Merced County, CDFW, and ERP.



for spawning habitat. Land could be re-graded and live trees and other vegetation etc.  
ove old concrete boat launch and restore  
with divers to provide sustainable divers ion  
oly and visually appealing to visitors to Henders on  
ees and other plants, perhaps background

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# Lower American River Floodplain Restoration

- Continue ongoing restoration at six gravel augmentation sites and three side channels at Nimbus Basin, Upper Sailor Bar, Lower Sailor Bar, Upper Sunrise, and River Bend Park (FRP Action 5) (FY13 AWP Activity 2.7.5).
- Project monitoring and development of a Structured Decision Making Model to assess limiting factors and restoration actions.
- This project is being co-implemented with the CDFW, the Sacramento Area Water Forum, Sacramento County Parks, CSU-Sacramento, and the 3406 (b)(13) program which provided FY 2012 funding of \$260,000 for ongoing gravel augmentation.



Photo: USFWS



Photo: USFWS



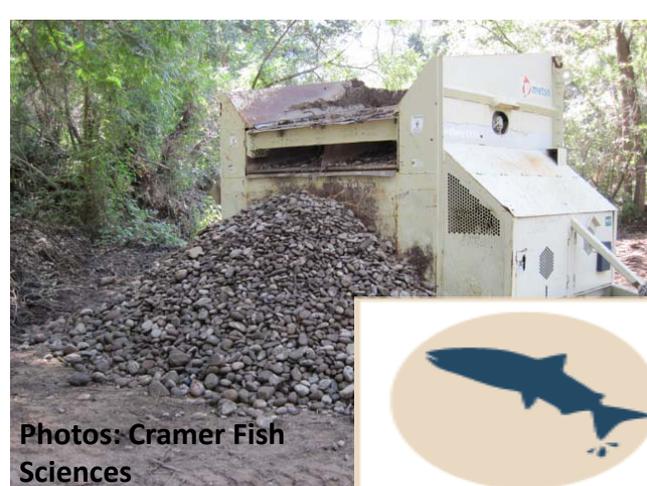
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# Stanislaus River Floodplain Restoration



- The Floodplain Restoration Project at Knights Ferry (FRP Action 2) will restore up to 1 acre of side-channel and floodplain habitat to benefit Chinook salmon and steelhead.
- FY13 AWP activities fund the environmental compliance, engineering designs, and pre-project monitoring (FY13 AWP Activity 2.4.1, 2.5.1 and 2.6.1).
- Addresses Action III.2.3 in NMFS OCAP BO
- This project is a cooperative effort between the USFWS, USBR, CDFW, and the USACOE.



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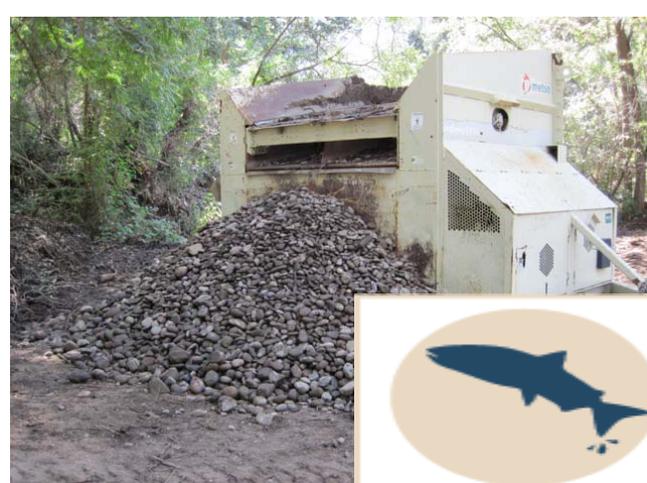
Photos: Cramer Fish Sciences



# Stanislaus River Floodplain Restoration



- The Floodplain Restoration Project at Buttonbush (FRP Action 2) will restore up to 18 acres of floodplain habitat and approximately 2,800 feet of side-channel habitat to benefit Chinook salmon and steelhead.
- FY13 AWP activities fund the engineering designs and pre-project monitoring (FY13 AWP Activity 2.5.2).
- Addresses Action III.2.3 in NMFS OCAP BO
- This project is a cooperative effort between the USFWS, USBR, CDFW, and the USACOE.



Central Valley Project Improvement Act

Photos: USFWS



# Stanislaus River Floodplain Restoration

- The Stanislaus River Floodplain and Side-channel Restoration Project at Lancaster Rd. (FRP Action 2) was completed in 2012 and restored 2 acres of floodplain habitat and approximately 640 feet of side-channel habitat to benefit Chinook salmon and steelhead.
- FY13 AWP activities fund the post-project monitoring (FY13 AWP Activity 2.8.1).
- Addresses Action III.2.3 in NMFS OCAP BO
- This project is a cooperative effort between the USFWS, USBR, and the USACOE.



Photos: USFWS



# South Fork Cottonwood Fish Passage Improvement Project



- South Fork Cottonwood Fish Passage Improvement Project will repair a fish passage barrier blocking five miles of high quality spawning and rearing habitat. Species to benefit include steelhead, Fall- and Spring-run Chinook salmon.
- This activity will fund pre-project monitoring and permitting at the Hammer Diversion hydropower dam (FY13 AWP Activity 2.4.2 and 2.6.2).
- This project is a cooperative effort between USFWS, CDFW, and NMFS.



Photo: CDFW

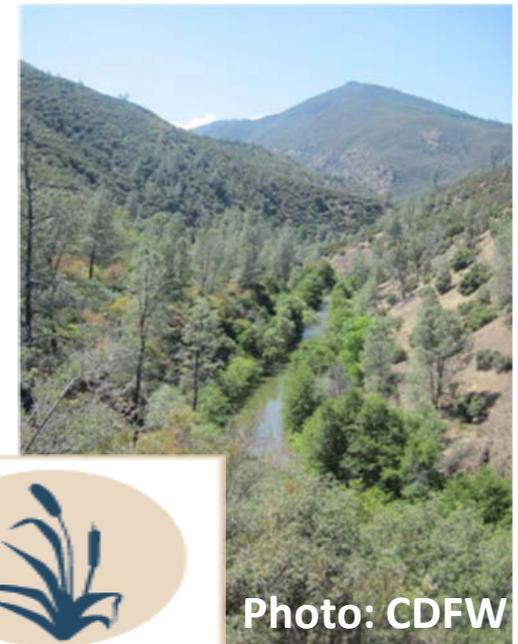


Photo: CDFW

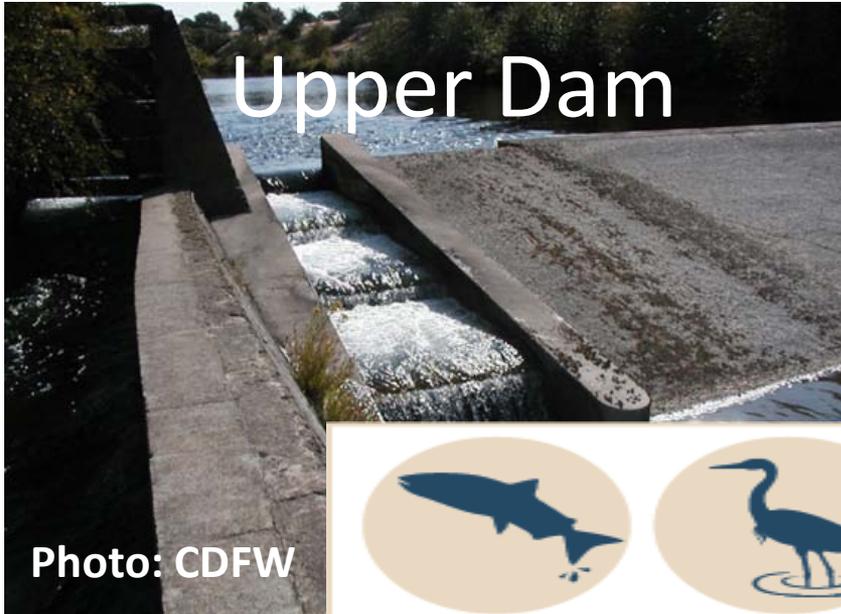


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# Mill Creek Fish Passage

- Mill Creek Fish Passage Phase 2 funds environmental compliance and pre-project monitoring to address fish passage at the Upper Dam and Ward Dam diversion structures in Mill Creek. This project will benefit Chinook salmon and steelhead and provide access to 44 miles of spawning habitat (FY13 AWP Activity 2.4.4 and 2.6.3).
- This project is a cooperative effort between USFWS, CDFW, and Los Molinos Mutual Water Company.



Upper Dam

A photograph showing a concrete dam structure with water flowing over it, creating white rapids. The dam is situated in a wooded area.

Ward Dam

A photograph showing a calm body of water reflecting the surrounding green trees and sky. A concrete structure is visible in the foreground on the right.

Photo: CDFW

Photo: USFWS



Central Valley Project Improvement Act



# Juvenile Fish Passage Improvement Project in Antelope Creek

- The juvenile fish passage improvement project will prevent out-migrating salmonids from becoming entrained in the two diversion canals in Antelope Creek. Although the diversions are screened, no bypass system was installed during construction due to site complexity (FRP Action 1).
- FY13 activities fund environmental compliance and additional design alternatives (FY13 Activity 2.4.5 and 2.5.3).
- This project is a cooperative effort between the USFWS, CDFW, NMFS, TCRCO, Los Molinos Mutual Water Company, and the landowner.



Photos: CDFW



# Tehama Wildlife Area Fish Passage Project

- Completed in 2012 and improved passage to 13 miles of spawning and holding habitat for spring run Chinook salmon in Antelope Creek (FRP Action 1).
- FY13 Activity 2.8.4 funds the post-project topographic surveys and monitoring.
- Addresses Action I.3.5 in NMFS OCAP BO
- This project is a cooperative effort between the USFWS, USBR, and the CDFW.



Photos: USFWS

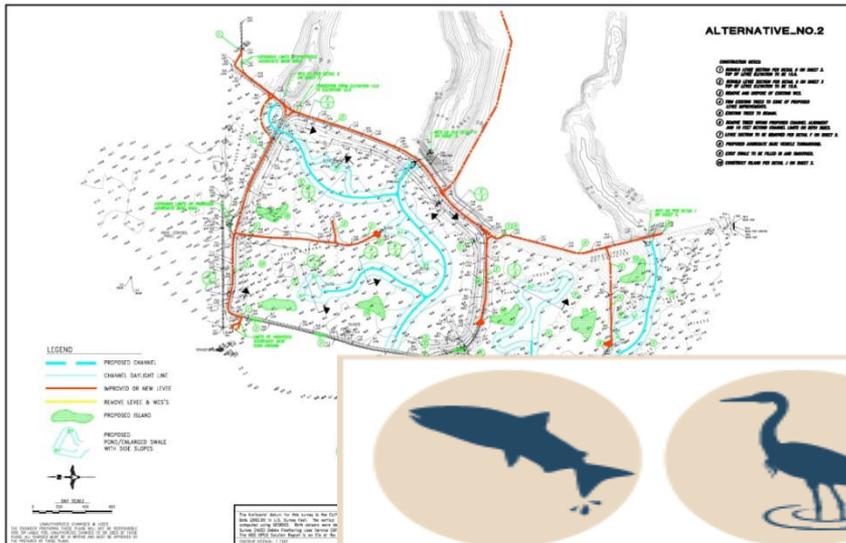
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# Cosumnes River and Delta Cougar Wetland Restoration



- This project will restore up to 85 acres of riparian and tidal shallow water habitat for Fall Chinook and Steelhead (FRP Delta Evaluations 4 and 6).
- The interagency project team has developed conceptual plans to reconnect historic tidal sloughs to the mainstem Cosumnes River and return this site to a flooded tidal marsh/oak woodland complex.
- This project is a collaborative effort between the USFWS, BLM, USACOE, CDWR, and Ducks Unlimited. Total project costs are estimated at \$800,000 and CVPIA has funded \$250,000 towards the implementation of this project.





# Research, Evaluations, Studies, Investigations



- San Joaquin River Sturgeon Acoustic Study (FY13 AWP Activity 4.2.1)
- San Joaquin River Sturgeon Habitat Assessment (FY13 AWP Activity 4.2.2 and 4.2.3)
- Identify sturgeon spawning habitat and use in the San Joaquin River system (FRP Evaluation 4).

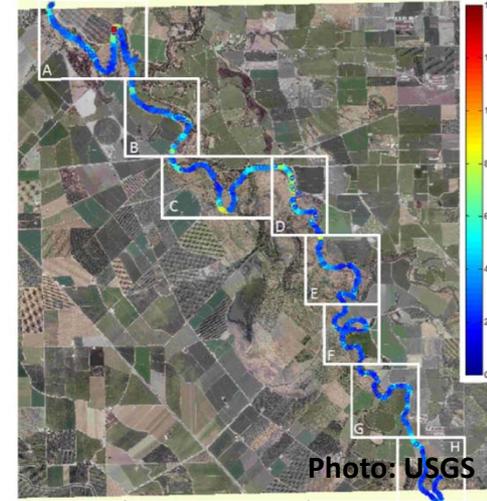
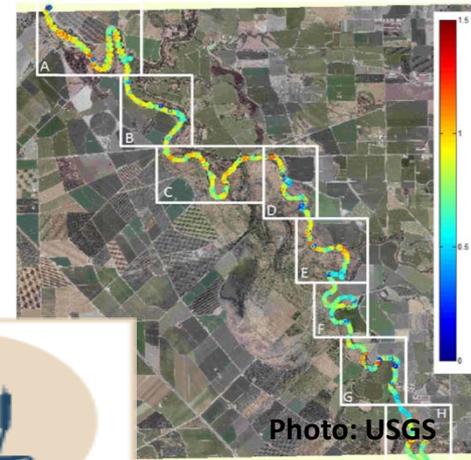
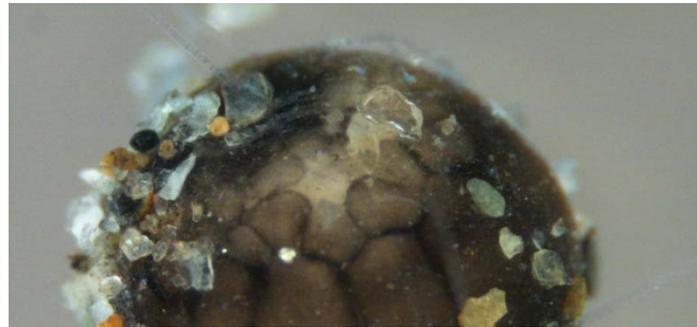


Figure 7 – ADCP depths (in meters) throughout the reach. Lettered windows refer to locations shown in figures 8 and 9.



Photo: USFWS



ities (in meters per second) throughout the reach. Lettered windows in figures 11 and 12.



## Central Valley Project Improvement Act



# Research, Evaluations, Studies, Investigations



- Mill and Deer Creek Wild Juvenile Chinook Acoustic Tagging Investigation (FY13 AWP Activity 4.2.4)
- Juvenile spring- and fall-run Chinook salmon will be implanted with acoustic transmitters to evaluate the effects of natural and anthropogenic changes in flow and related water project operations on their survival and movement patterns within the Sacramento River and Delta (FRP Upper Mainstem Sacramento Evaluation 1).
- This activity provides funding for Year 2 of a 3 -year study with the NMFS Southwest Science Center. Cost share of \$1.7 million from ERP and CVPIA is funding \$450,000. Project partners include NMFS, CDFW, UC Davis, and UC Santa Cruz.

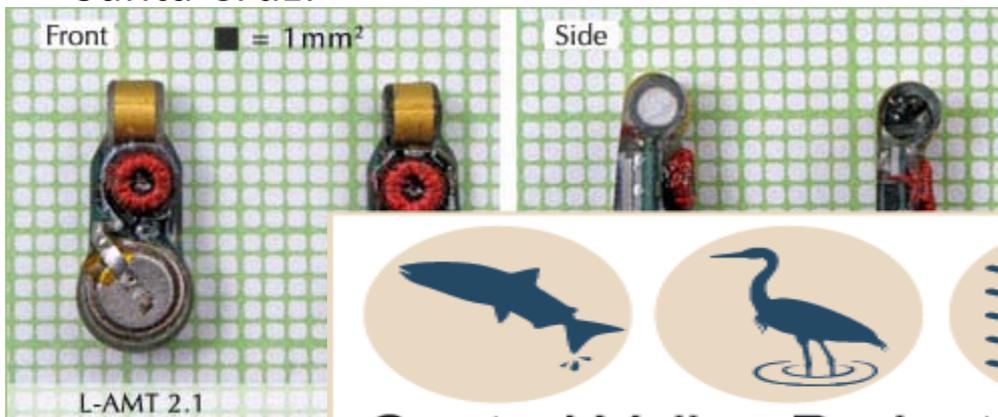


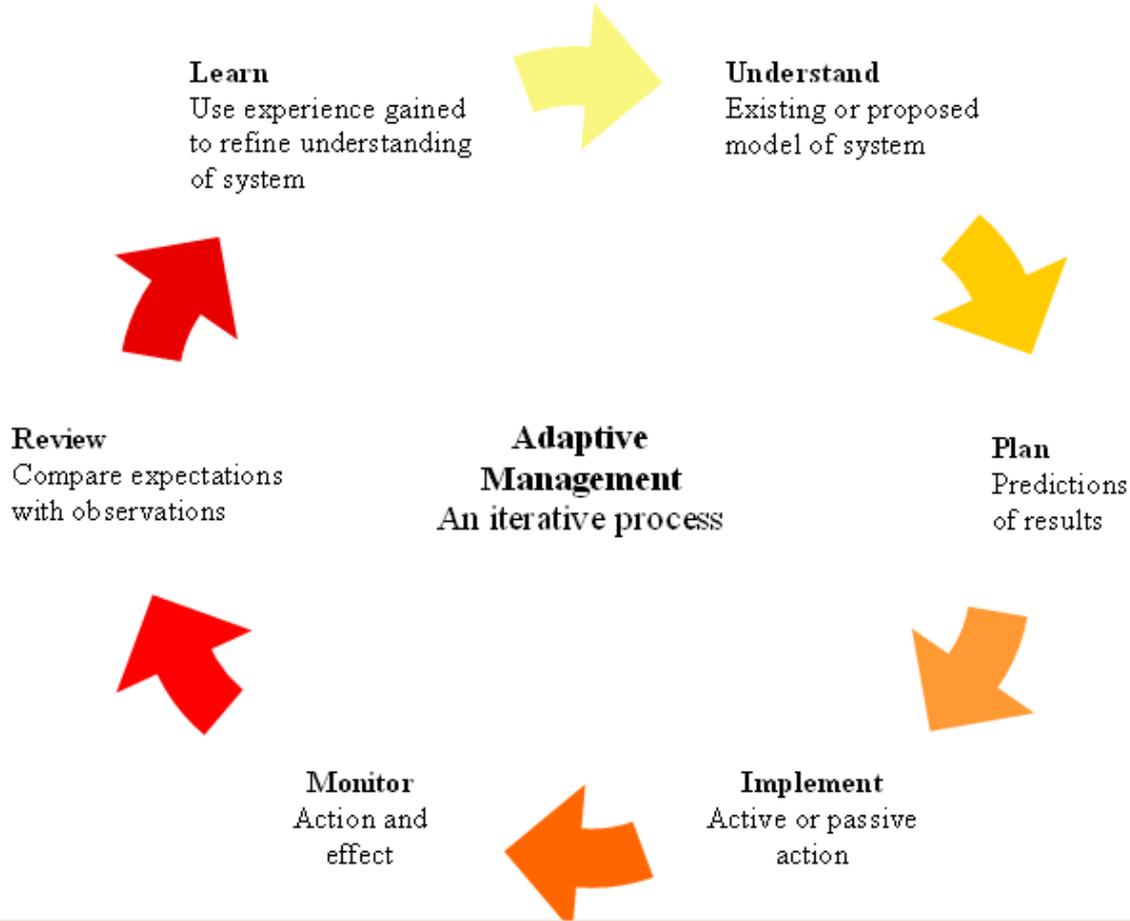
Photo: USFWS



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# Adaptive Management

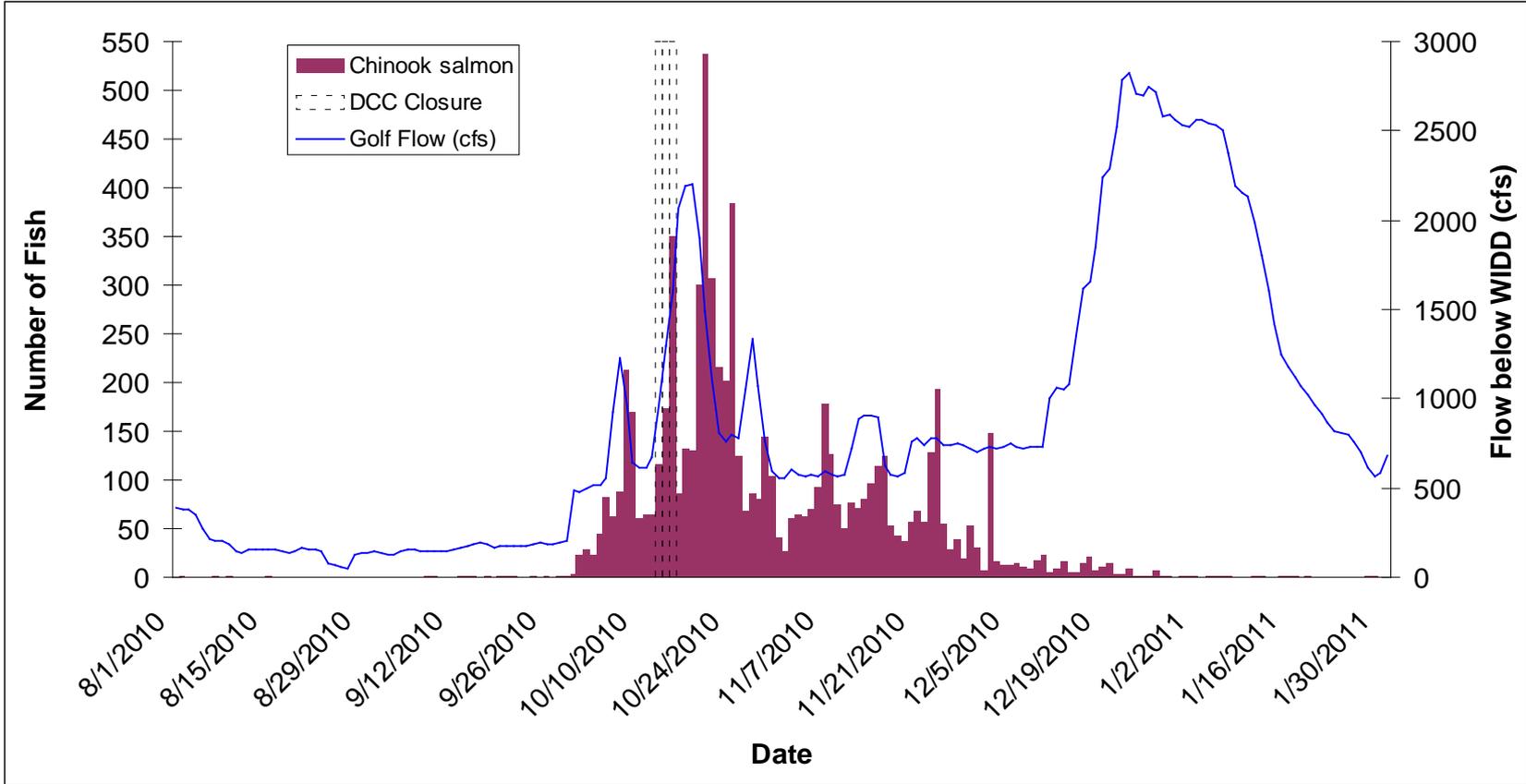




# Adaptive Management



2010-2011 Mokelumne River fall-run Chinook salmon escapement

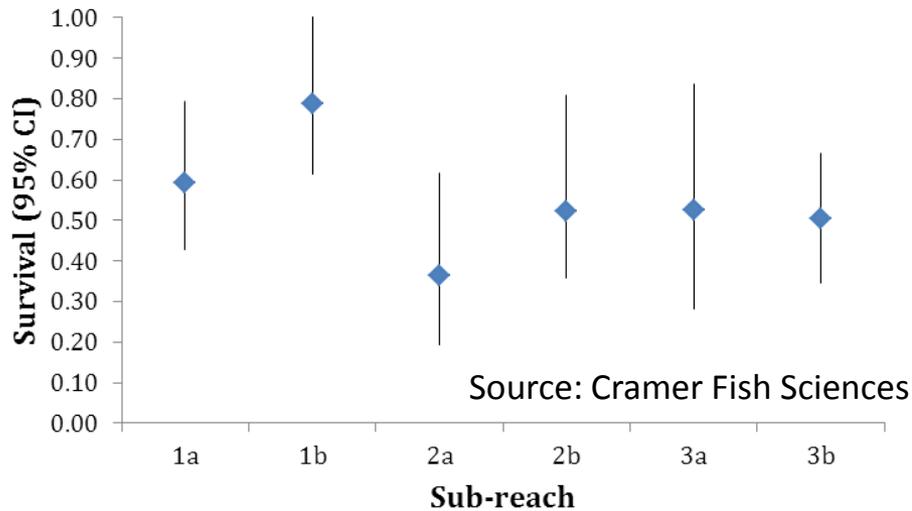




# Stanislaus River Adaptive Management



Post project assessment and Radio-tagged Chinook salmon



Photos: Cramer Fish Sciences

- Overall survival (for fish outmigrating through entire study area):
  - $S_0 = 0.07$  (SE = 0.03; lower 95% CI = 0.03, upper 95% CI = 0.13)





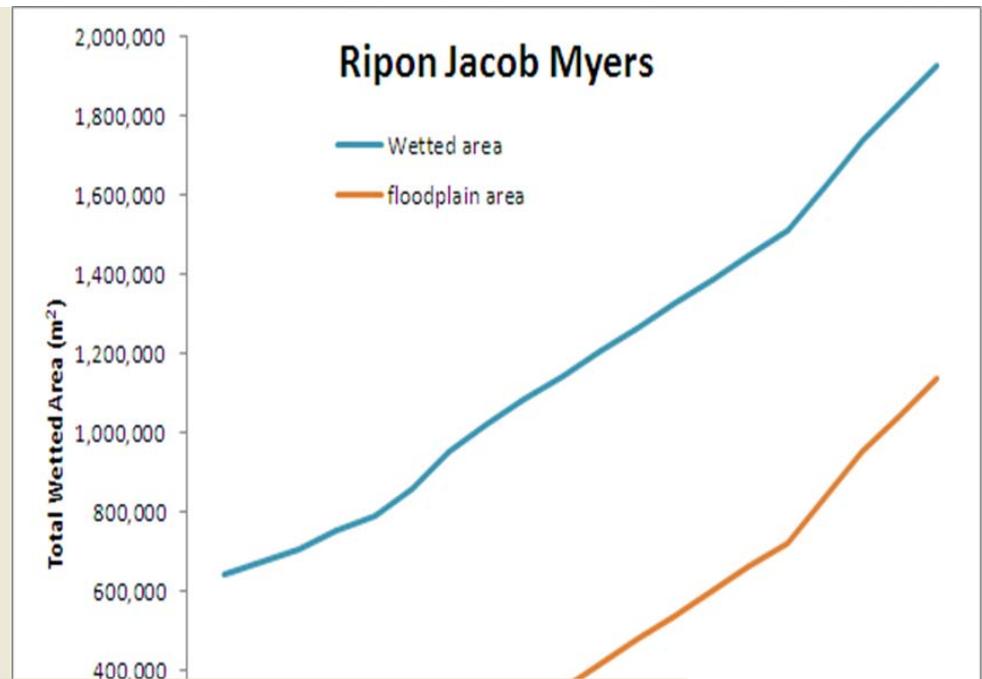
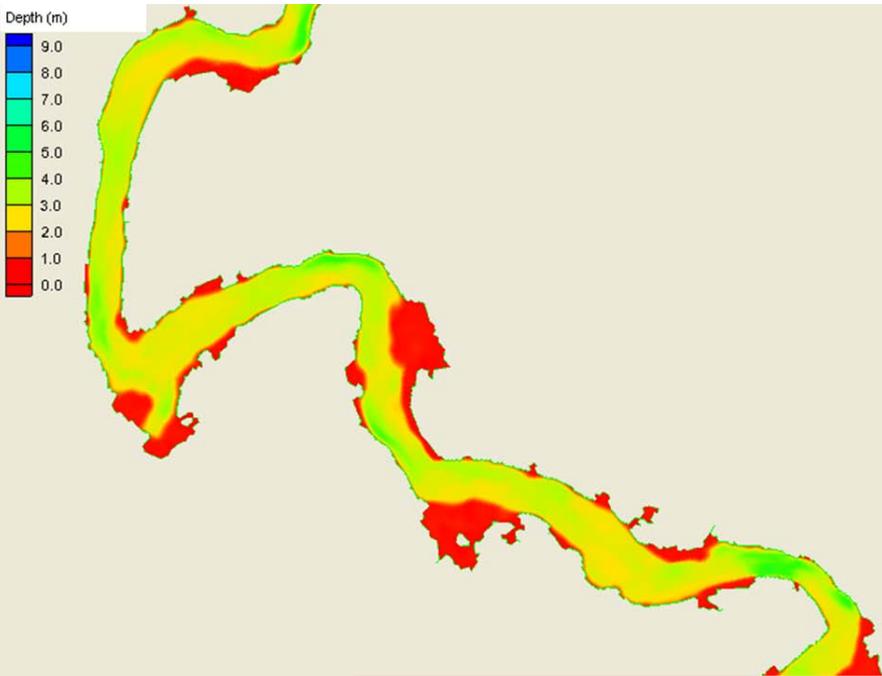
# Stanislaus River Adaptive Management



## Floodplain Restoration

- Inundated Floodplain at 1500 cfs in the Stanislaus (red)
- Identify floodplain restoration areas

Source: USFWS, unpublished data



4000 5000



# Questions?



Photo: EBMUD

