

# Central Valley Recovery Planning and Restoration

A Concurrent Session at the 35<sup>th</sup> Annual Salmonid Restoration Conference held in Davis, CA from March 29 – April 1, 2017.

# + Session Overview

- Session Coordinator:
  - Charlotte Ambrose, NOAA Fisheries

In the summer of 2014 a federal recovery plan was released for Central Valley salmon and steelhead that laid a framework to restore the region's historically abundant wild fish runs. This recovery plan complemented the California Department of Fish and Wildlife's Ecosystem Restoration Conservation strategy. Millions of wild salmon and steelhead once returned each year to spawn in the foothill and mountain streams surrounding California's Central Valley. Fed by rainfall, snowmelt, and coldwater springs, these streams fostered diverse and abundant Chinook salmon and steelhead runs. The mid-1800s ushered in sweeping changes to the landscape that led many species to the brink of extinction, including: Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and Central Valley steelhead. Gold mining, dam construction, water and hydropower development, and other land uses hindered fish populations from thriving in the Central Valley. By 1989, Sacramento River winter-run Chinook was listed under the Endangered Species Act as a threatened species, but was soon reclassified as endangered in 1994. Central Valley steelhead and spring-run Chinook followed suit in 1998 and 1999, respectively, becoming federally listed as threatened species.

Today, there is a path to recovery. A concerted effort among NOAA Fisheries, California Department of Fish and Wildlife, the U.S. Fish and Wildlife Service, additional agencies, and the public culminated in NOAA Fisheries' development and release of a federal plan to recover Central Valley's listed salmon and steelhead runs. The plan provides a road map to recover these species with the goal of removing them from the Endangered Species List. With science at its foundation, the plan identifies clear priorities to guide recovery efforts in the Sacramento-San Joaquin Delta and its watersheds. It also provides a framework for targeting conservation efforts and modifying on-the-ground actions based on new science and changing circumstances.

The Salmonid Restoration Federation Conference highlights key themes that are critical for the recovery of these Central Valley salmonids: reintroductions, hatchery reform, habitat and floodplain restoration, science and monitoring and others. This session will provide the background of the recovery plans and the context of how specific recovery actions are necessary in specific locations to shift Central Valley salmon and steelhead from extinction to recovery. Persons with an all-encompassing view of recovery for Central Valley salmonids with examples of how specific efforts advance those broader recovery goals are encouraged to submit abstracts.

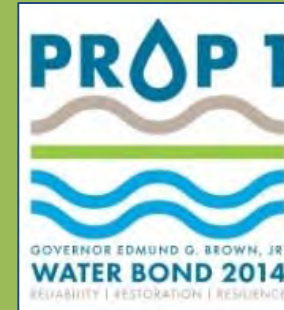
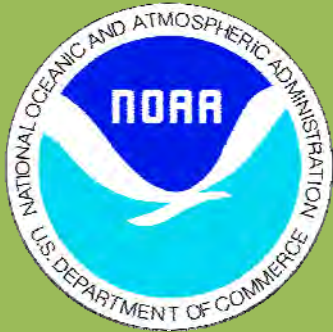
# + Presentations

## Part 2

*(Slide 4) Funding Opportunities for Fisheries and Watershed Restoration Projects*  
Matt Wells, California Department of Fish and Wildlife

*(Slide 40) Conservation Banking 101*  
Hal Holland and Greg DeYoung, Westervelt Ecological Services

*(Slide 64) Salmonid Conservation Banking: Two Central Valley Case Studies*  
Gregg Sutter and Mark Young, Westervelt Ecological Services



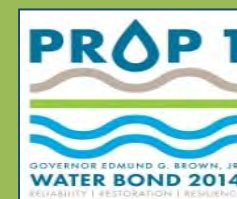
# Funding Opportunities for Fisheries and Watershed Restoration Projects

**Matt Wells**  
**Watershed Restoration Grants Branch**





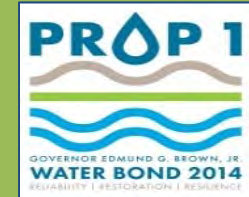
# Agenda



1. Overview – Successes & Challenges
2. Fisheries Restoration Grant Program
3. Proposition 1 Overview / Grant Programs
4. What Makes a Great Proposal?



# Overview

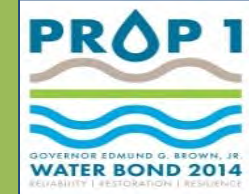


CDFW involved in fisheries projects

- Multiple Funding Streams
- Varying Priorities
- Many tied to salmonids / native fish
  - Fish Passage / Barrier Removal
  - Water Quality
  - Habitat Restoration
  - Scientific Studies



# Overview

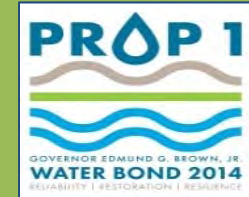


## Challenges

- Tight Timeframes
- Funding variability
- Changing Federal and State Policies
- Drought / Floods
- Growing Pains



# Key Distinctions



## FRGP

- Anadromous Salmonids
- Programmatic CEQA & Permitting
- Regionally Focused
- Federally Funded
- Variable Funding
- State / Federal Recovery Plans

## Prop 1

- Larger, more varied Projects
- Statewide
- All Native Fish
- State Bond Funds
- 10-Year Plan
- Federal Entities Not Eligible
- California Water Action Plan / Others





# FRGP- Overview



## Fisheries Restoration Grant Program (FRGP)

- Established in 1981
- Federally funded since 2000
- **Over 4,000 Projects Funded Since**
- 206 Active Projects
- Funds projects that improve, protect, restore or lead to the improvement, protection, or restoration of salmon and steelhead habitat.



# FRGP- Process



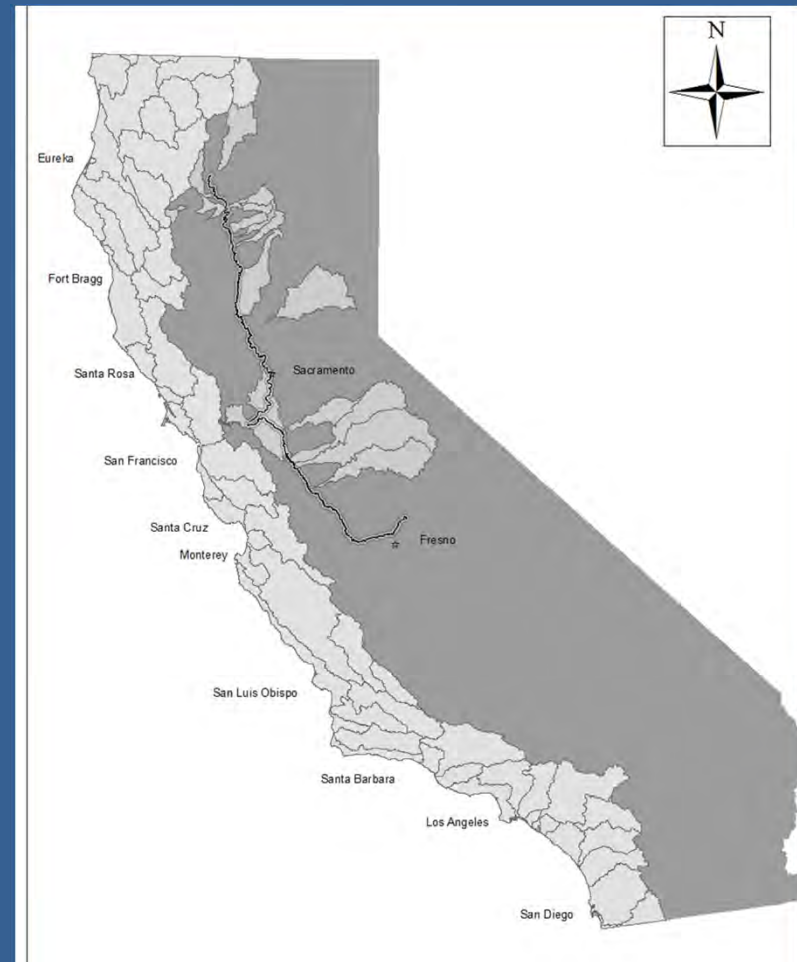
1. PSN
2. Proposal Administrative Review
3. Proposal Technical Review
4. Proposal Public Peer Review
5. CEQA
6. Director review/approval
7. Grant Packages



# FRGP - Regions



- Northern California  
*steelhead, coho salmon, and coastal Chinook salmon*
- Central California Coast (CCC)  
*coho salmon, steelhead, and coastal Chinook salmon*
- Southern California/South-Central  
*steelhead*
- Central Valley  
*Chinook salmon and steelhead*





## FRGP - Focus



### Fisheries Habitat Restoration includes:

- *FRGP*: Federal Pacific Coastal Salmon Recovery Fund (PCSRF) funds
- *Steelhead Report and Restoration Card (SHRRC)*: State report card sales
- *Forest Land Anadromous Restoration (FLAR)*: Timber industry regulation funds
- *Commercial Salmon Stamp (CSS)*: Revenue from State stamp sales



# FRGP – Recovery Plans



- *Steelhead Restoration and Management Plan for California (DFG 1996)*
- *Recovery Strategy for California Coho (DFG 2004)*
- *Southern California Steelhead Recovery Plan NOAA Final Version: January 2012*
- *South-Central California Steelhead Recovery Plan NOAA Final: December 2013*
- *Recovery Plan for Evolutionarily Significant Unit of Central California Coast Coho Salmon Final Plan September 2012 (CCC Plan)*
- *Recovery Plan for the Evolutionarily Significant Unit of Southern Oregon/Northern California Coast Coho Salmon Public Final: September 2014 (SONCC Plan)*



## Recovery Plans Cont.



- *Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-Run Chinook Salmon and Central Valley Spring-Run Chinook Salmon and the Distinct Population Segment of California Central Valley Steelhead* NOAA Final: July 2014
- *Coastal Multispecies Recovery Plan, North Central California Coast Recovery Domain: California Coastal Chinook Salmon, Northern California Steelhead, Central California Coast Steelhead* NOAA Public Draft: October 2015



# FRGP- Project Types



- Enforcement and Protection
- Fish Passage at Stream Crossings
- Instream Barrier Modification for Fish Passage
- Instream Habitat Restoration
- Riparian Restoration
- Instream Bank Stabilization
- Watershed Restoration (Upslope)
- Monitoring Status and Trends
- Monitoring Watershed Restoration
- Watershed and Regional Organization
- Project Design
- Public Involvement and Capacity Building (includes AmeriCorps projects)
- Watershed Evaluation, Assessment, and Planning
- Cooperative Rearing
- Fish Screening of Diversions
- Private Sector Technical Training and Education
- Water Conservation Measures
- Water Measuring Devices (Instream and Water Diversion)



# FRGP- FY 16-17



	#	Amount (millions)
Proposals received	117	\$36.9
Awarded projects	43	\$15.3*

\*PCSRF = ~\$13.3M  
FLAR = ~\$2M



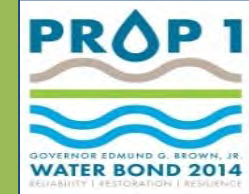


# FRGP- Timeline



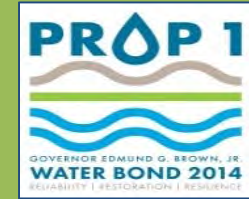
PSN Workshops	February
Application	Ongoing (May 4)
Evaluations/Reviews	Fall
CEQA Review	Winter
Director's Decision, Awards	Early 2018

# Proposition 1 - Overview

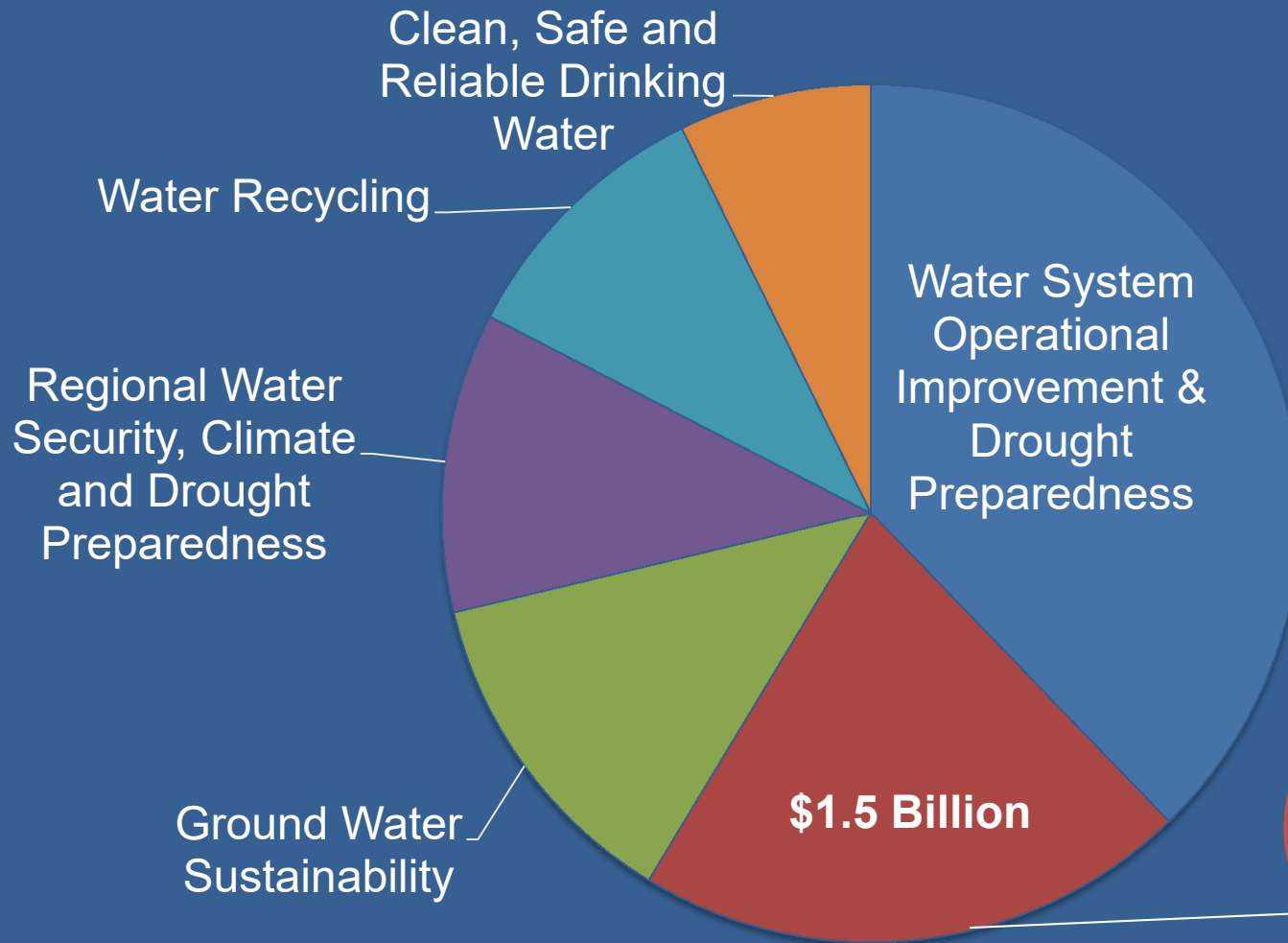


- The Water Quality, Supply, and Infrastructure Improvement Act of 2014 (Proposition 1)
- Funds implementation of CA Water Action Plan:
  1. More reliable water supplies
  2. Restoration of important species and habitat
  3. More resilient, sustainably managed water resources system

# Proposition 1 - Overview

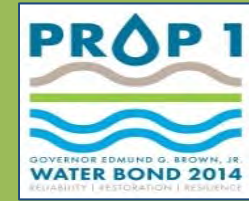


**Total Prop 1  
Funding \$7.1  
Billion**

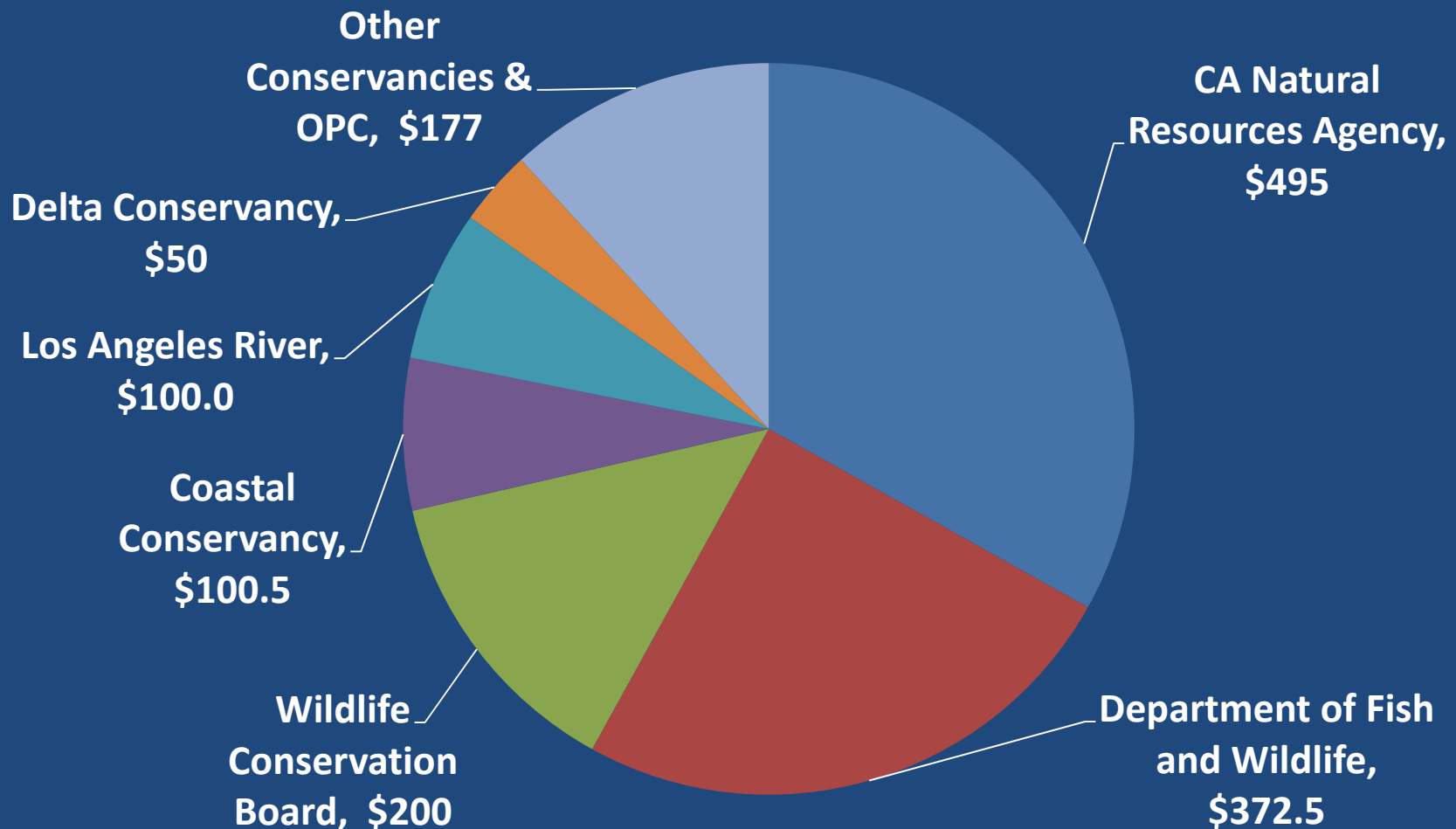


Ch. 6 - Protecting Rivers, Lakes, Streams, Coastal Waters & Watersheds

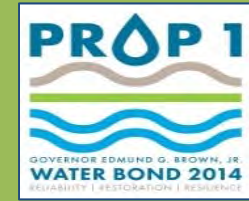
# Proposition 1 - Overview



## Chap. 6 – Protecting Rivers, Lakes, Streams, Coastal Waters & Watersheds



# Proposition 1 - Overview



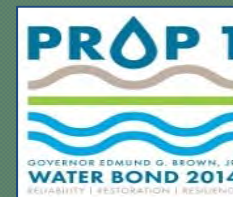
## Competitive, Open & Transparent Process

All grants awarded through competitive process.

Agencies develop project solicitation & evaluation guidelines.

Prioritization criteria identified in the bond.

# Proposition 1 - Overview



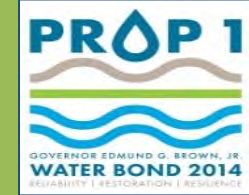
## Eligible Projects

- Purposes of Chapter 6 of Proposition 1
- Project Selection Criteria
- Promote and Implement State Plans and Policies
- Eligible Grantee
- Eligible for bond funding





# CDFW Proposition 1 Restoration Grant Programs



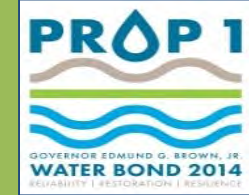
Funding distributed over 10 grant round years (2015-2025):

1. Watershed Restoration Grant Program – CWC §79737 – Watershed protection and restoration outside of Sacramento - San Joaquin Delta - **\$285 M**
2. Delta Water Quality and Ecosystem Restoration Grant Program – CWC §79738 – Sacramento-San Joaquin Delta specific project funding - **\$87.5 M**





# CDFW Proposition 1 Restoration Grant Programs

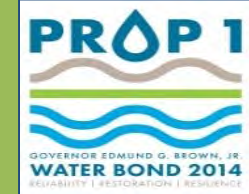


- Two grant rounds completed (2015 & 2016)
  - 310 proposals received requesting \$373 M
  - Awarded 71 projects for \$80 M
  - 2017 Solicitation anticipated for May 2017 release
  - Proposals due June 2017
  - Approximately \$24 M available for statewide projects
  - Approximately \$7 M available for Delta projects





# CDFW Proposition 1 Restoration Grant Programs

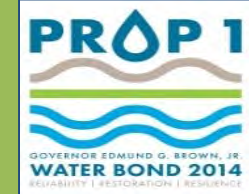


## Draft Statewide Priorities FY 2017-18:

- Protect and Restore Mountain Meadow Ecosystems
- Manage Headwaters for Multiple Benefits
- Protect and Restore Anadromous Fish Habitat
- Protect and Restore Coastal Wetland Ecosystems
- Protect and Restore Cross-border Urban Creeks and Watersheds



# CDFW Proposition 1 Restoration Grant Programs

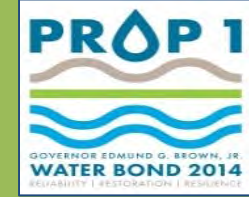


## Draft Delta Priorities FY 2017-18:

- Contribute to the Improvement of Water Quality
- Protect, Restore, and Enhance Aquatic, Terrestrial, and Transitional Habitats in the Delta
- Scientific Studies to Support Implementation of the Delta Science Plan



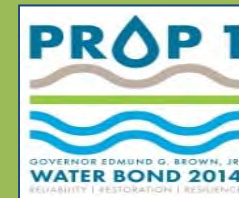
# Proposition 1 Project Categories



- **Planning**
  - Support necessary activities that lead to future on-the-ground implementation projects, including environmental review, design, and project development.
- **Implementation**
  - Construction of restoration and enhancement projects and new or enhanced facilities. Some late phase permitting and design allowed.
- **Acquisition**
  - Purchases of land and interests in land or water.
- **Scientific Studies (Delta Only)**
  - Projects to assess the condition of natural resources, inform policy and management decisions, or assess the effectiveness of grant projects and programs under the Delta Water Quality and Ecosystem Restoration Program.



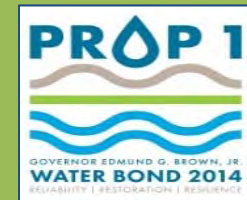
# Proposal Requirements



- California Conservation Corps Consultation
  - Must consult prior to submitting proposal
- Environmental Compliance and Permitting
  - Applicant is responsible for obtaining all permits
- Project Monitoring and Reporting
  - Plan required for Implementation and Acquisition Projects.
- Land Tenure/Site Control
  - On the ground projects should be improved or restored for 25 years



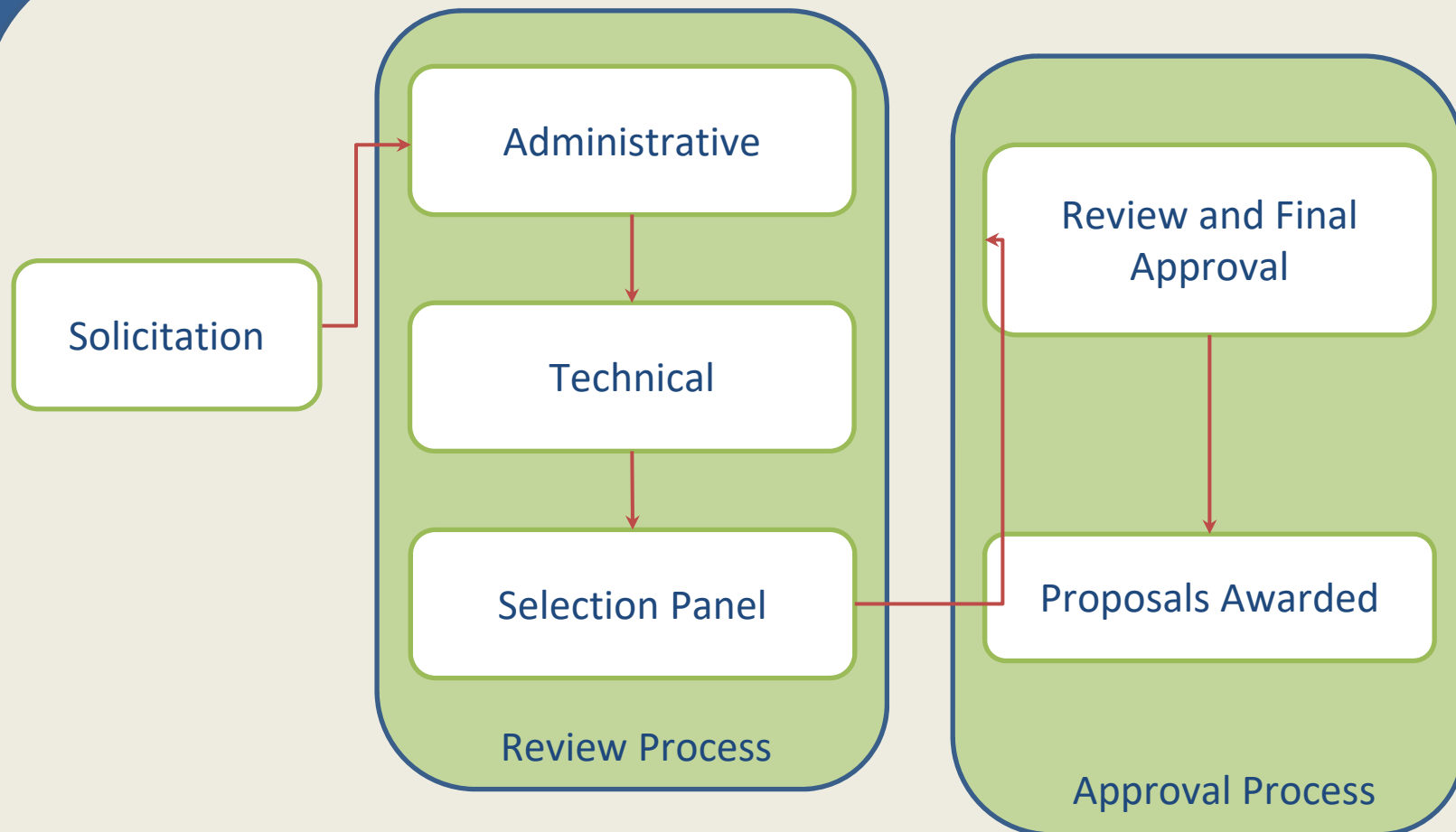
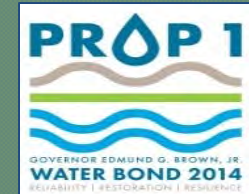
# Submission Process



- Online Submission
  - Online proposal application submittal.
- Application
  - All fields of the proposal application form must be completed.
- Application Workshop
  - Online system training, guidance for complete applications.

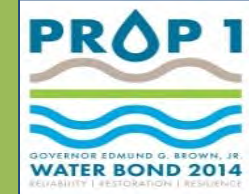


# Solicitation and Award Process





## Proposition 1 Funded Projects



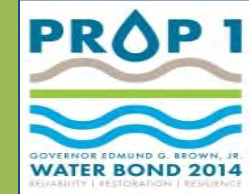
### Salmon Projects Funded Through Prop 1:

- 18 Salmon Projects funded in 2015 (6 in Delta; 12 Statewide) - \$23,465,643
- 30 Salmon Projects funded in 2016 (3 in Delta, 27 Statewide) – \$29,684,547



CDFW

## Proposition 1 Funded Projects



### Habitat Restoration, Conservation, and Enhancement

#### Tuolumne River Bobcat Flat Salmonid Habitat Restoration

- **Purpose:** Off-channel habitat for fry and juvenile salmonids
- **Type:** Implementation
- **CDFW:** \$453,618
- **Cost Share:** \$175,000
- **Grantee:** Tuolumne River Conservancy

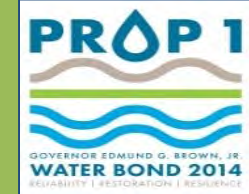






CDFW

## Proposition 1 Funded Projects



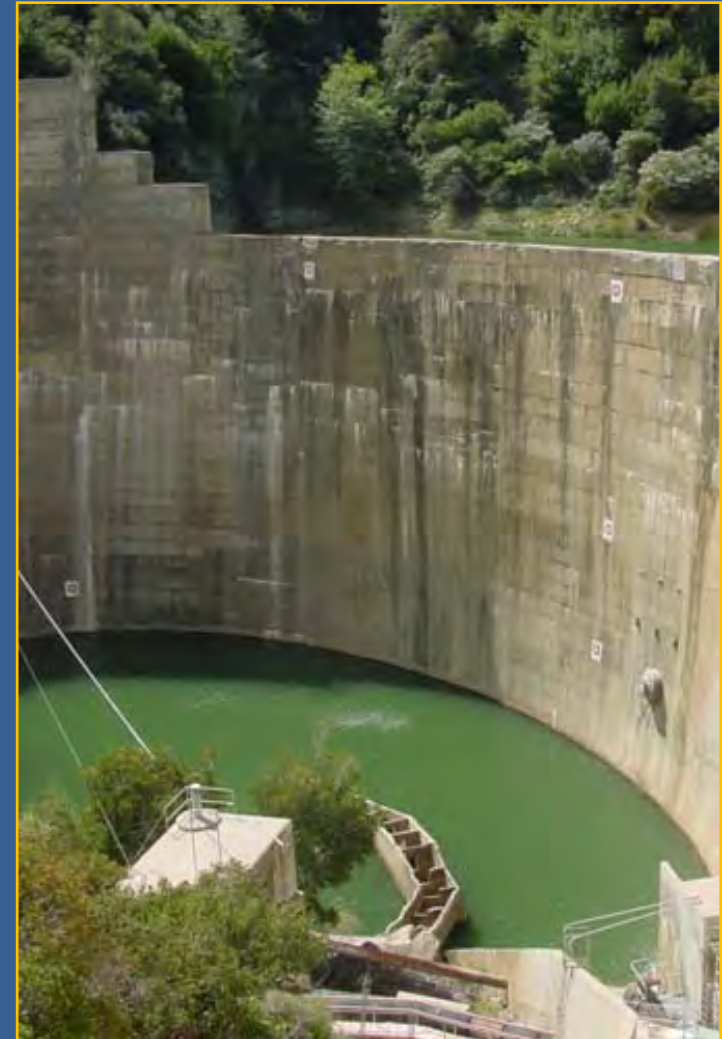
### Manage Headwaters Anadromous Salmonid Habitat Coastal Wetlands

Matilija Dam Removal Planning Project

**Purpose:** Steelhead spawning habitat (30 miles)

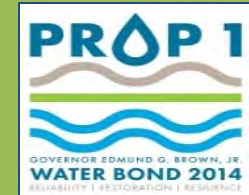
**Type:** Planning

- **CDFW:** \$3,300,504
- **Cost Share:** \$118,286
- **Grantee:** County of Ventura





# Timeline



**Draft Solicitation**

**March 2017**

**Final Solicitation Release**

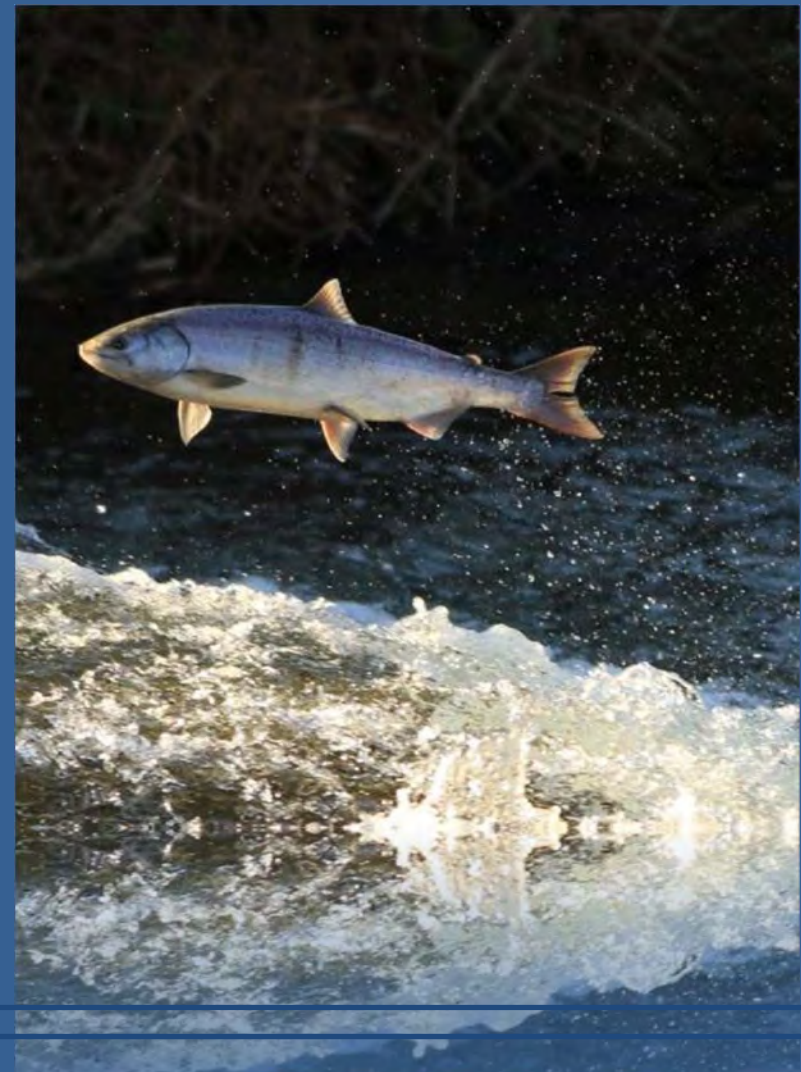
**May 2017**

**Proposals Due**

**June 2017**

**Awards Announced**

**November 2017**



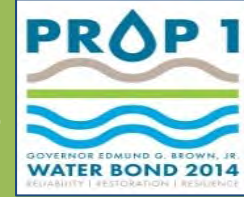


# What Makes a Great Proposal?





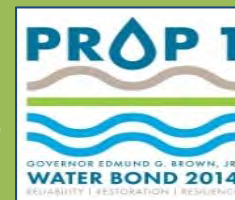
# Writing Complete Proposals



1. Is this the right grant program?
2. Is this the right time?
3. Know your audience...don't assume.
4. Repeat yourself.
5. Connect the Dots.
6. Do the math.
7. Details, Details, Details.
8. Ask Questions.
9. Debrief.



# Writing Complete Proposals



- **Read Solicitation and instructions carefully**
- **Solicitation is new and different from last year**
- **Clearly address the criteria outlined in the solicitation**
- **Make a clear tie between your project and the Solicitation Priorities**



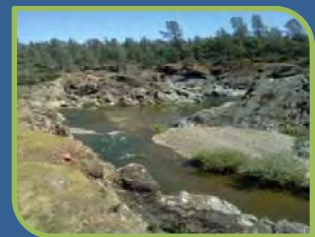
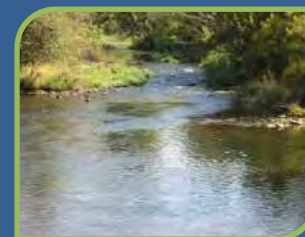
# Questions / Comments

Matt Wells

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[Matt.Wells@wildlife.ca.gov](mailto:Matt.Wells@wildlife.ca.gov)

[WatershedGrants@wildlife.ca.gov](mailto:WatershedGrants@wildlife.ca.gov)





# Conservation Banking 101

## Advancing Compensation for Impacts to Species

Presented by  
Greg DeYoung and Hal Holland  
Westervelt Ecological Services



## Session Goals

- To define Conservation Banking and explore its origins
- To provide an update on policy development
- To describe how it works
- To provide a foundation for the next session by Greg Sutter on case studies





# Conservation Banking Questions

1. What is Conservation Banking?
2. Compensatory mitigation
  - What is it?
  - How has it worked?
  - How can we make it work better?
3. What sets conservation banking apart from other salmonid recovery efforts?
4. What does successful conservation banking look like?

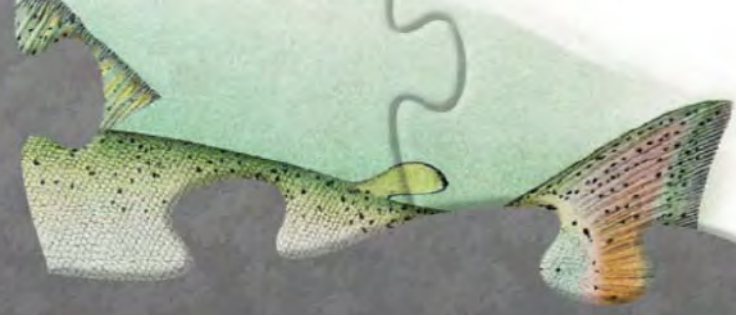


# Recovery

**Grant Funded Projects**



**Licensing Requirements**



**Judicial Extractions**

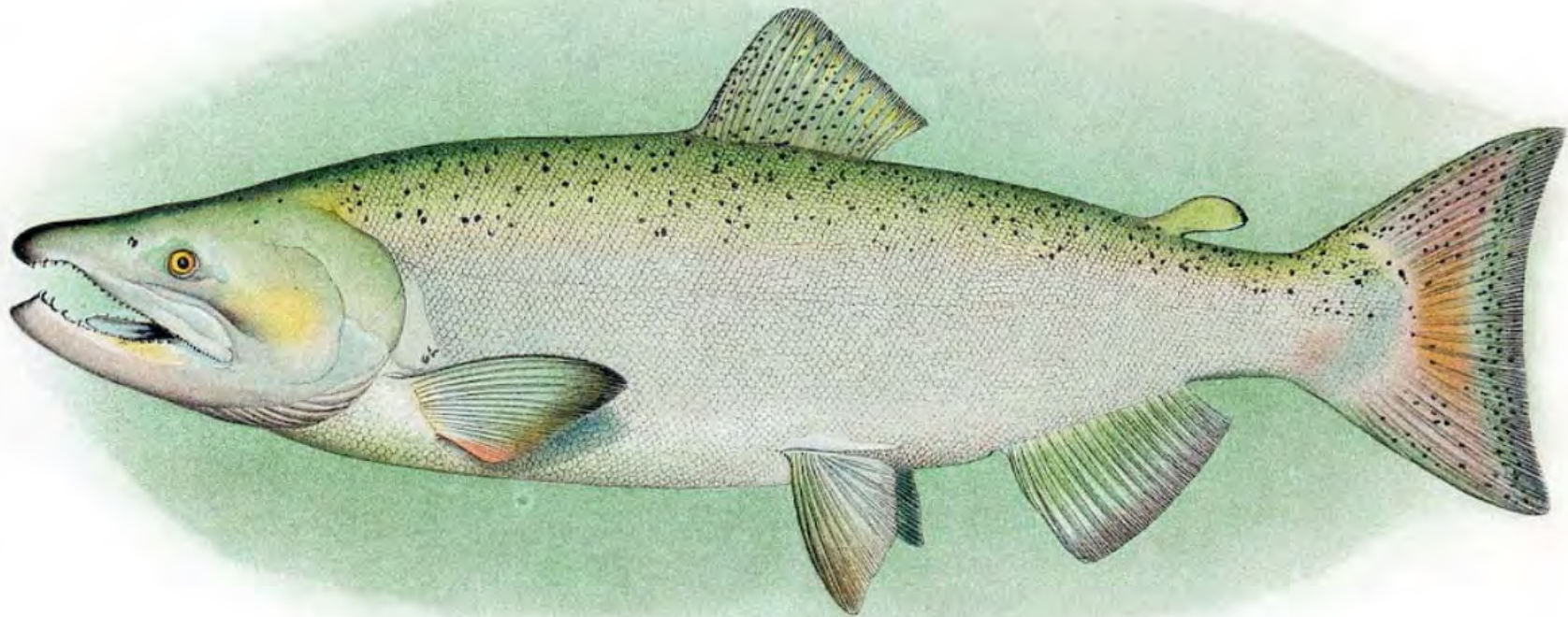


**Compensatory Mitigation**





# Comprehensive Recovery Strategy







## Question:What is Conservation Banking?

A form of compensatory mitigation for species



## Question: What is Compensatory Mitigation?

Clean Water Act Definition:

- Avoidance
- Minimization
- **Compensation: the focus of this presentation**

# Why Mitigation?



River & Harbors Acts



Fish & Wildlife Coord. Act



Clean Water Act



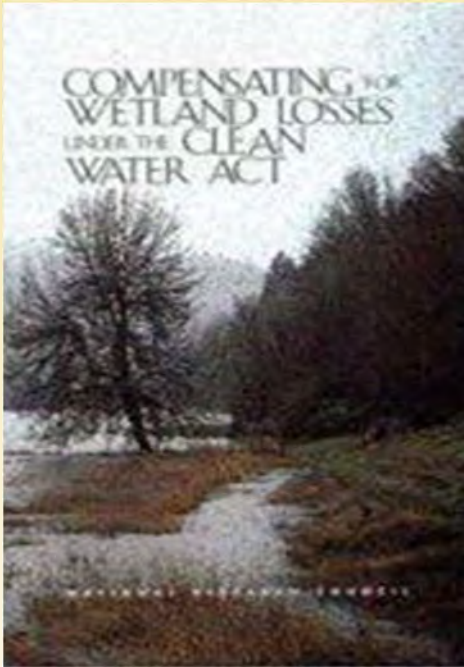
Endangered Species Act

1800's

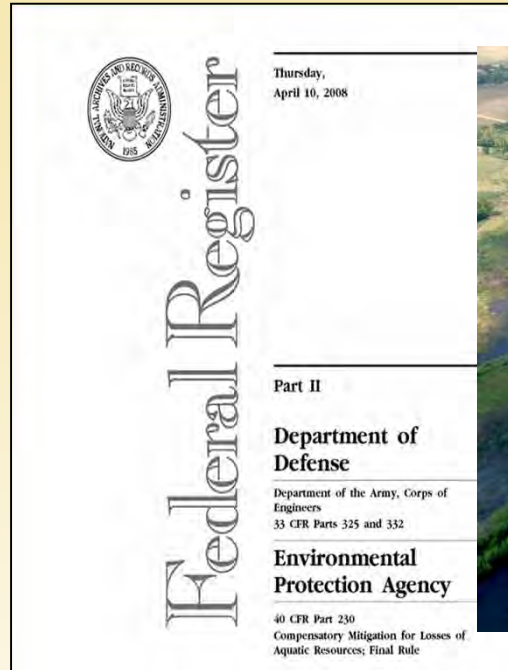
1930's

1970's

# How Should we Mitigate?



**National Academy of Sciences Evaluation**



**Mitigation Rule**



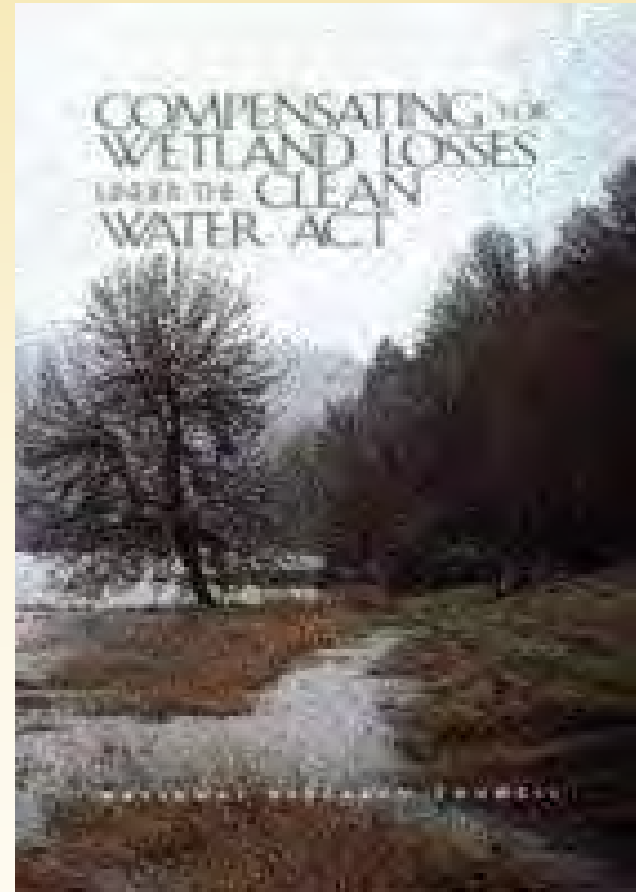




# The National Research Council

## “Compensating for Wetland Losses under the Clean Water Act”

*“The committee concludes that the wetland remnants of the development process **may not** constitute the best configuration of wetland type for a watershed.”*



# Cumulative Effects

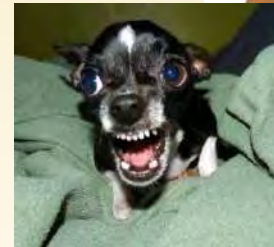
Mitigation fragments on development sites don't address habitat fragmentation

*"Cumulative impacts are like being mauled by a pack of Chihuahuas."*

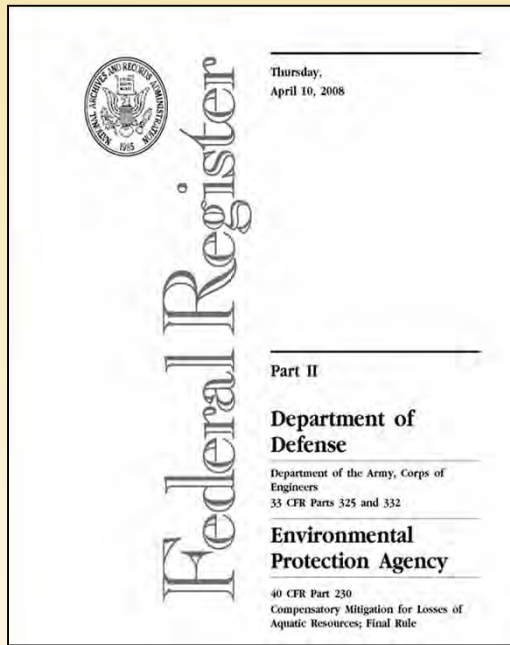
*Thomas Leroy, Pacific Watershed Associates, SRC, March 29, 2017*

*"We need a holistic approach recognizing effects beyond single projects."*

*Barry Wilson, CE Analytics. SRC, March 29, 2017*

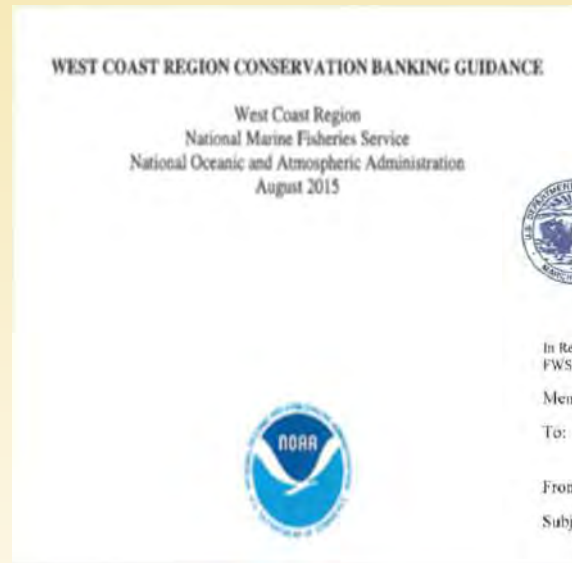


# Further Developments



Mitigation Rule

2008



NMFS Conservation Banking Guidance

2015



FWS Mitigation Policy & ESA Compensatory Mitigation Guidance

2016/2017

HR 60, EO & SO 3349

# Site Specific Banking Benefits

- *Large, restored and/or enhanced wetland and/or species habitat formally approved by regulatory agencies to provide compensatory mitigation to third parties*

## Benefits:

- Large Scale
- Upfront planning & site selection
- Implementation prior to project impacts
- Financial assurances
- Performance standards
- Long-term stewardship
- Perpetual site conservation



# Strategic Advanced Planning

## Central Valley Chinook Salmon & Steelhead Recovery Plan

### Strategy for recovery

The recovery strategy focuses on protecting existing populations while reintroducing populations into their historical habitats. We prioritized fish populations and actions so that resources are strategically invested. This strategy, coupled with actions that address threats, will contribute to restored salmon and steelhead runs. Here's what the plan envisions for recovery:

#### Spring-run Chinook salmon

- One viable population in the Northwestern California Region
- Two viable populations in Basalt & Porous Lava Region
- Four viable populations in Northern Sierra Region
- Two viable populations in the Southern Sierra Region

#### Winter-run Chinook salmon

- Three viable populations in the Basalt & Porous Lava Region

#### Steelhead

- One viable population in the Northwestern CA Region
- Two viable populations in Basalt & Porous Lava Region
- Four viable populations in Northern Sierra Region
- Two viable populations in the Southern Sierra Region

Over time, salmon and steelhead evolved to their unique geographic surroundings. Whether it be low elevation rivers fed by rainfall or high elevation streams sustained by snow-melt, the populations adapted genetically to the flow, water temperature, and habitat conditions of particular regions. Diversity groups represent the varied landscapes and subsequent genetic identity of the salmon and steelhead populations. Recovering the species requires the protection and restoration of populations in each of the diversity groups shown on this map.

A more detailed map of Central Valley Salmon and Steelhead Diversity Groups is on the final page.

### LEARN MORE...

To learn more about recovery efforts in California's Central Valley please visit:  
[On the web: westcoast.fisheries.noaa.gov/protected\\_species/salmon\\_steelhead/recovery\\_planning\\_and\\_implementation/california\\_central\\_valley/california\\_central\\_valley\\_salmon\\_recovery\\_division.html](http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/california_central_valley/california_central_valley_salmon_recovery_division.html)

Central Valley Technical Recovery Team:  
[On the web: sfwsc.noaa.gov/wordpress.aspx?DYid=FEED&ParentNodeID=64&id=2260](http://www.sfwsc.noaa.gov/wordpress.aspx?DYid=FEED&ParentNodeID=64&id=2260)

## The Sacramento River Basin

### A Roadmap to Watershed Management

#### EXECUTIVE SUMMARY

OCTOBER 2010



# Banks – Multi-benefit

Steelhead Salmon

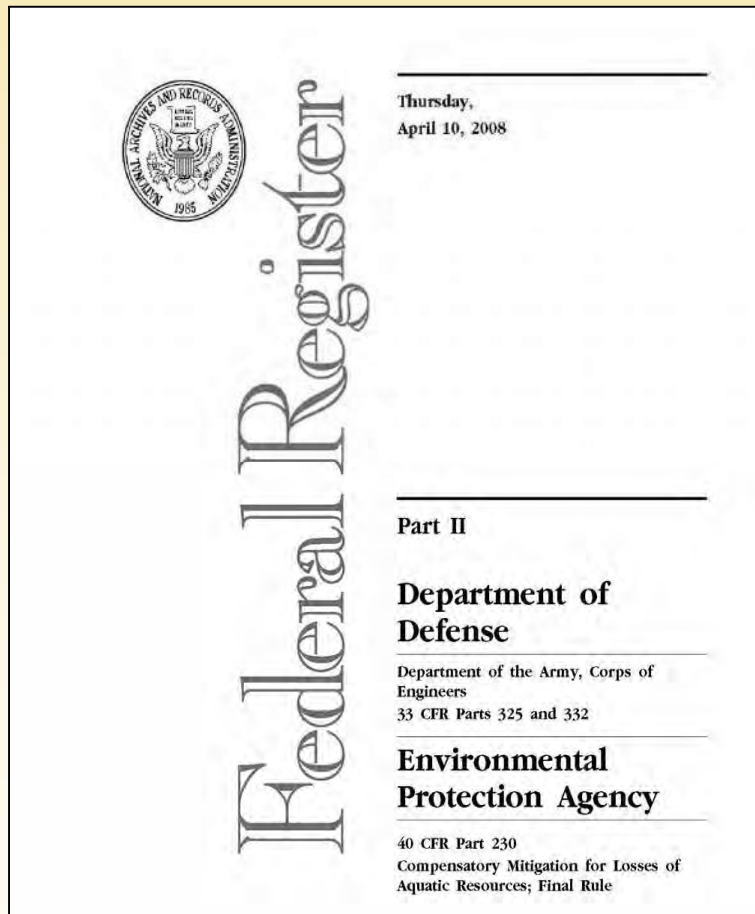


Sandhill Cranes



# Mitigation Banks Requirements

(a.k.a. Mitigation's 12-Step Program)



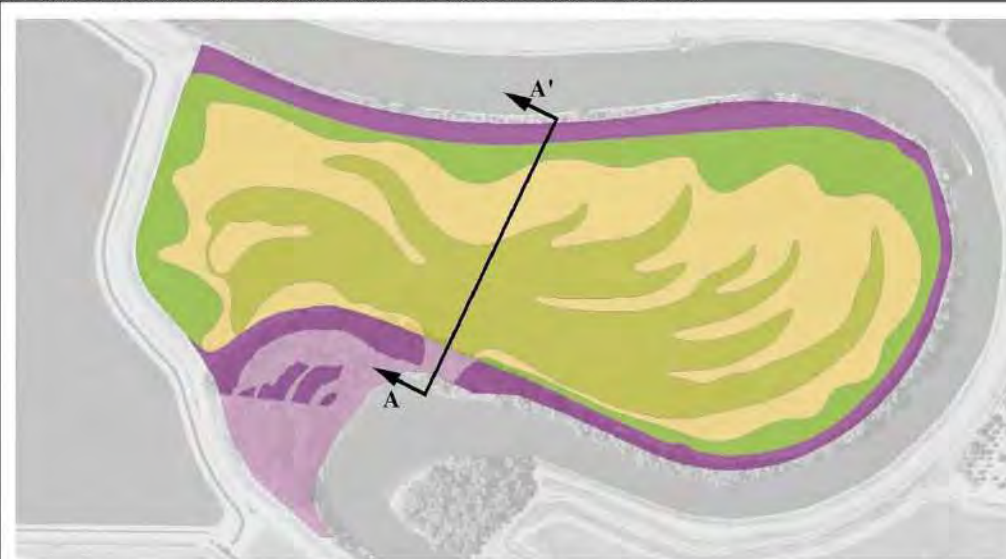
1. Objectives.
2. Site Selection.
3. **Site protection instrument.**
4. Baseline information.
5. **Determination of credits.**
6. Mitigation work plan.
7. Maintenance plan.
8. **Performance standards.**
9. Monitoring requirements.
10. **Long-term management plan.**
11. Adaptive management plan.
12. **Financial assurances.**

## **Sec. 230.94 (c)**

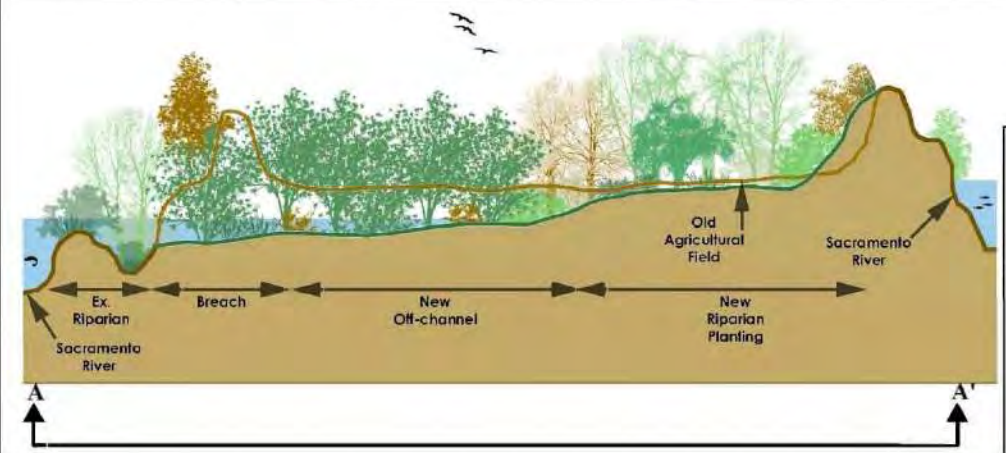


# Determination of Credits

GISProject09\Bullock\_Bend\MXD\1509\BE\ Sept 2015\Bullock Bend Habitat types and Credits XSection 150902 v1.mxd



- Habitat Types
- Species Proximity/Utilization
- Species Benefit
- Functional Assessment



**Bullock Bend  
Mitigation Bank  
Credit Evaluation and  
Credit Table**

June 2016

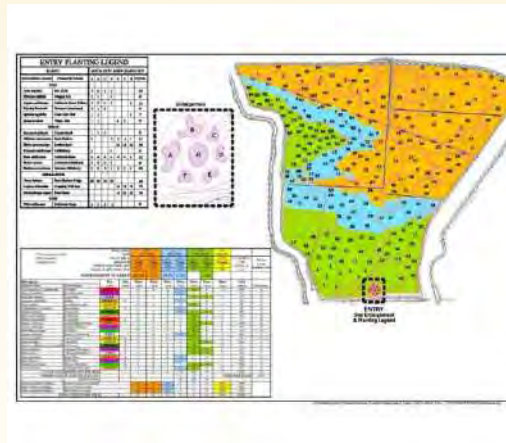
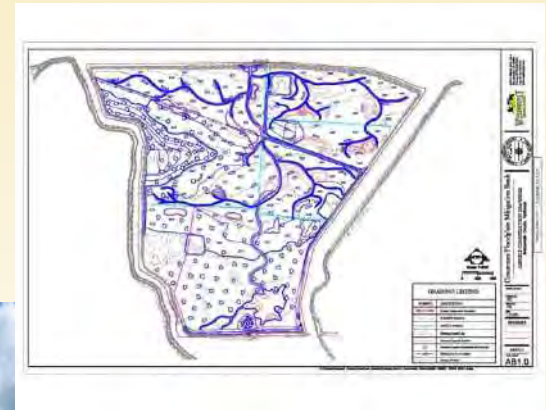
**Figure 2**

**Habitat Types  
Cross-Section**

Not To Scale

# Performance Standards

- Built as Designed (As-built drawings)
- Natural processes (self sustaining)
- Development of hydrology & vegetation
- Species Utilization





# Financial Assurances

- Upon Approval
- Maintained through the life of the project
- Short-to-medium term
  - Construction security
  - Performance security
  - Interim management security
- Long-term
  - Stewardship endowment
  - Conservation Easement monitoring

# Long-Term Management Plan

- **“Long-Term Management Plan”**: A description of how the site will be managed after performance standards are met, including long-term financing and responsible parties.

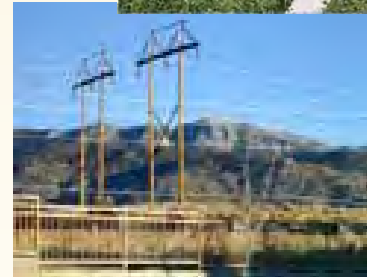


- Maintenance
- Management
- Monitoring



# Site Protection Instrument

- **“Site Protection Instrument”**: Legal agreements ensuring long-term protection of the site.
- How Implemented at the Cosumnes Floodplain Mitigation Bank:
  - **Conservation Easement** conforming to the interagency document
  - **No other superior interests** in property
  - **Purchase of surface entry rights** to mineral resources
  - **Abandonment of utility easements**



*“Let the future say of our generation that we sent forth mighty currents of hope and that we worked together to heal the world.”*

Jeffrey Sachs, The Earth Institute, Columbia University





# Salmonid Conservation Banking; Two Central Valley Case Studies

Greg Sutter, President

Mark Young, Design Manager

Westervelt Ecological Services  
March 31, 2017



# The Westervelt Company

- Established in 1884
- Started with paper production - Herbert Westervelt patented the paper bag
- 133 years in land stewardship
- Ownership of over 500,000+ acres (stewardship of an additional 400,000 acres)







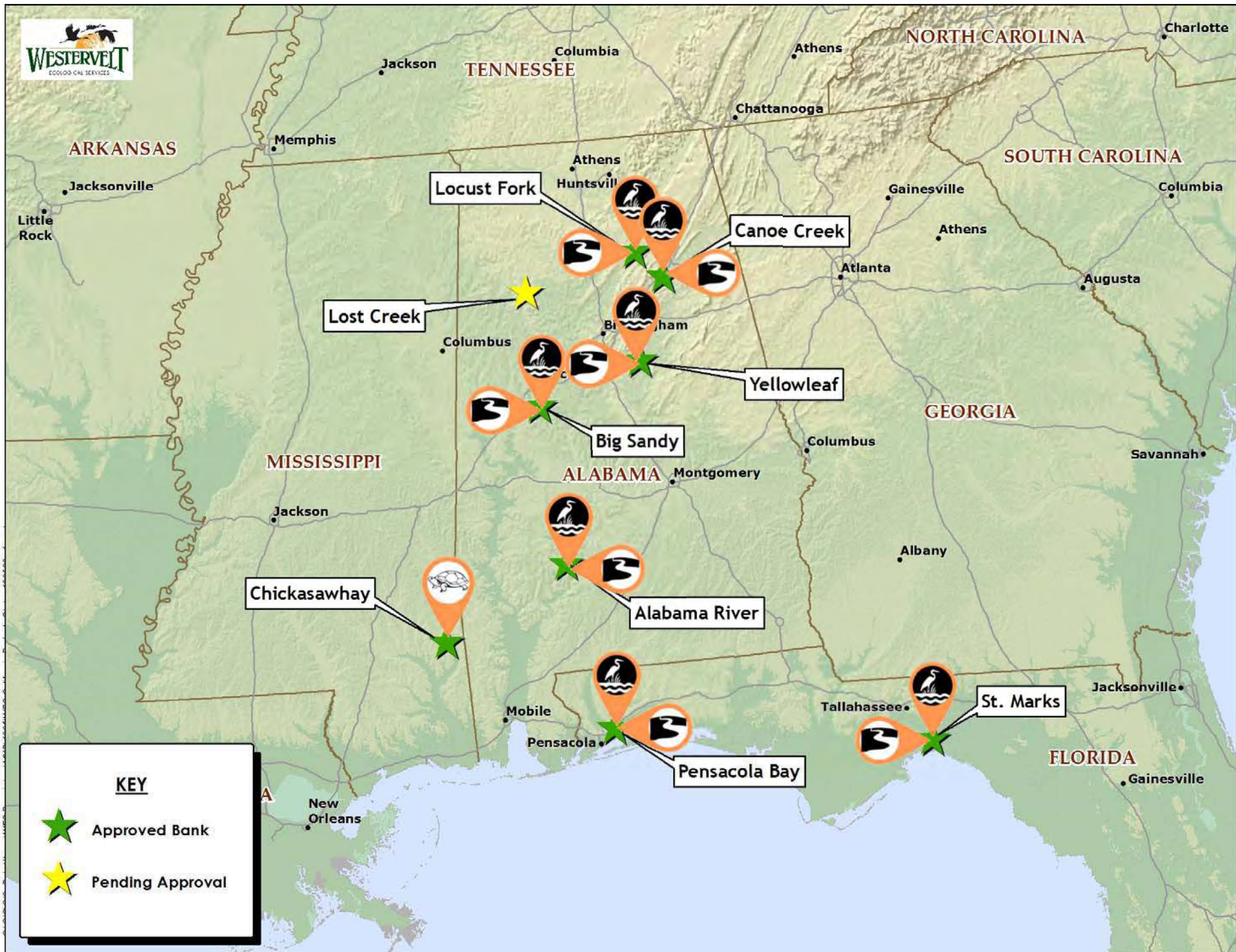
# Westervelt Ecological Services

- Established in 2006
- Offices in Alabama, California and Colorado
- Privately Owned and Funded Mitigation Banking Company with over 16,000 acres in Conservation
- Our products and services include:
  - Mitigation and Conservation Bank Establishment
  - Turnkey Mitigation Projects
  - Mitigation Consulting Services
- Leaders in the field of wetland and species mitigation
  - Extensive experience in entitling and managing over 6 conservation and 15 mitigation banks
  - Mitigation instructors at national conferences for the federal agencies
- A division of The Westervelt Company



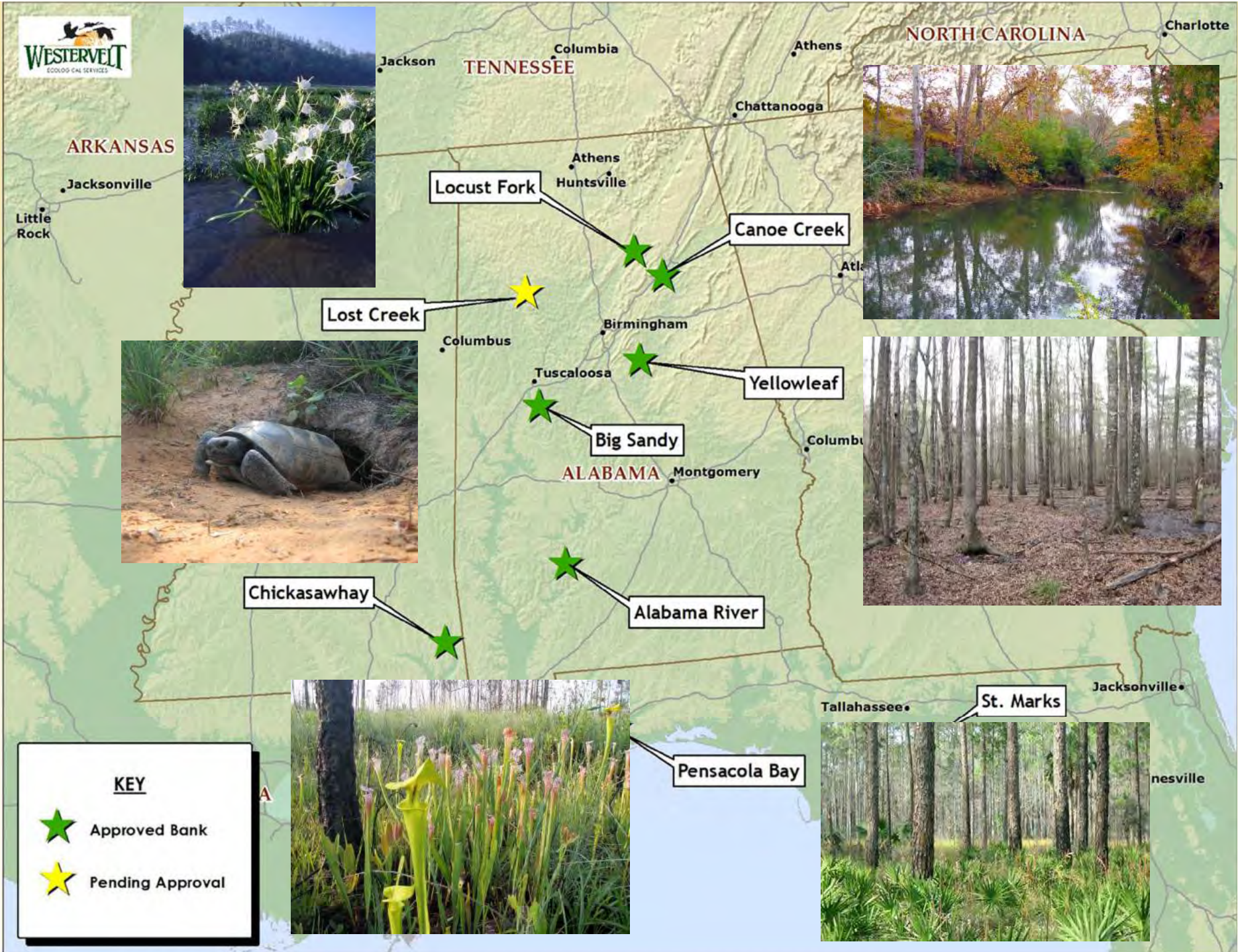
# Our Model for Restoration

- Landscape-Scale Restoration
- Multi-Benefit Projects
- Species Recovery
- A Private Sector Contribution to a Public Conservation Need



**KEY**

-  Approved Bank
-  Pending Approval



**KEY**

-  Approved Bank
-  Pending Approval



**KEY**

- Approved Bank
- Pending Approval



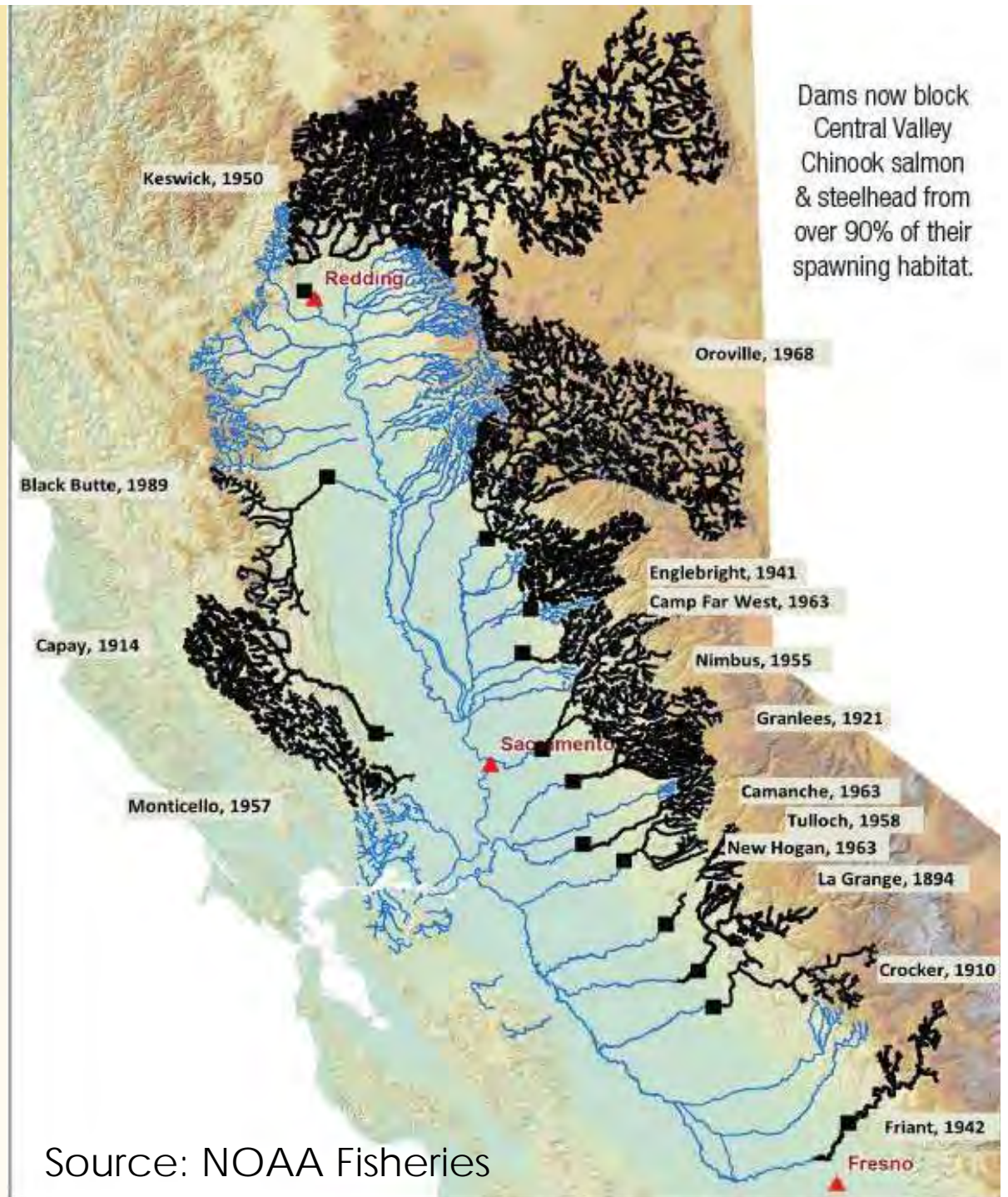
HUMBOLDT



**KEY**

- ★ Approved Bank
- ★ Pending Approval

# Salmonid Habitat Has Been Severely Truncated



# Integration into Broader Recovery Effort



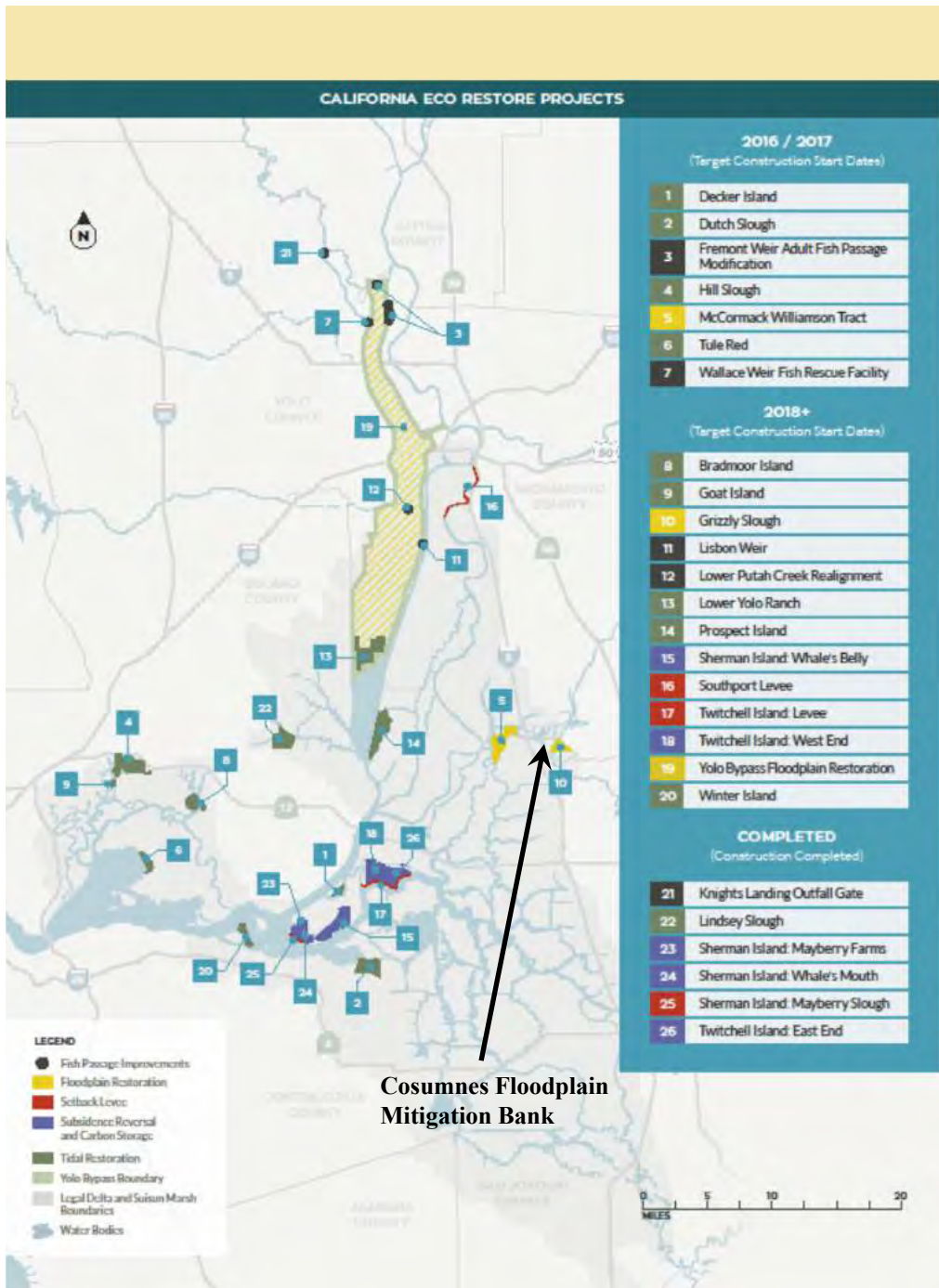




# Cosumnes Floodplain Mitigation Bank

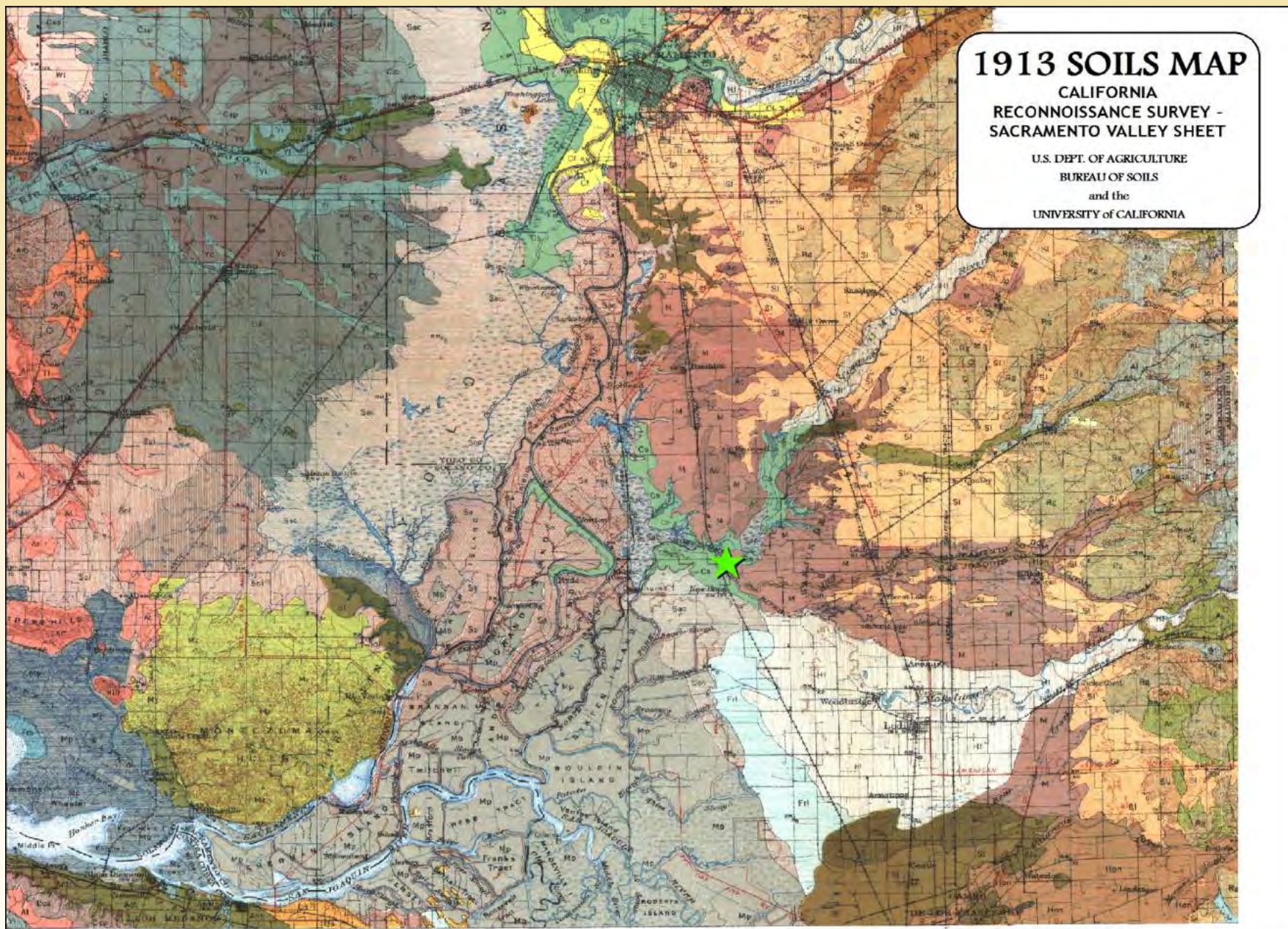
- Roughly 500 Acre Property
- Abuts Cosumnes & Mokelumne Rivers
- Adjacent to Cosumnes Preserve & DWR Lands
- Restored in 2010-2011





# Delta Restoration Priority Areas

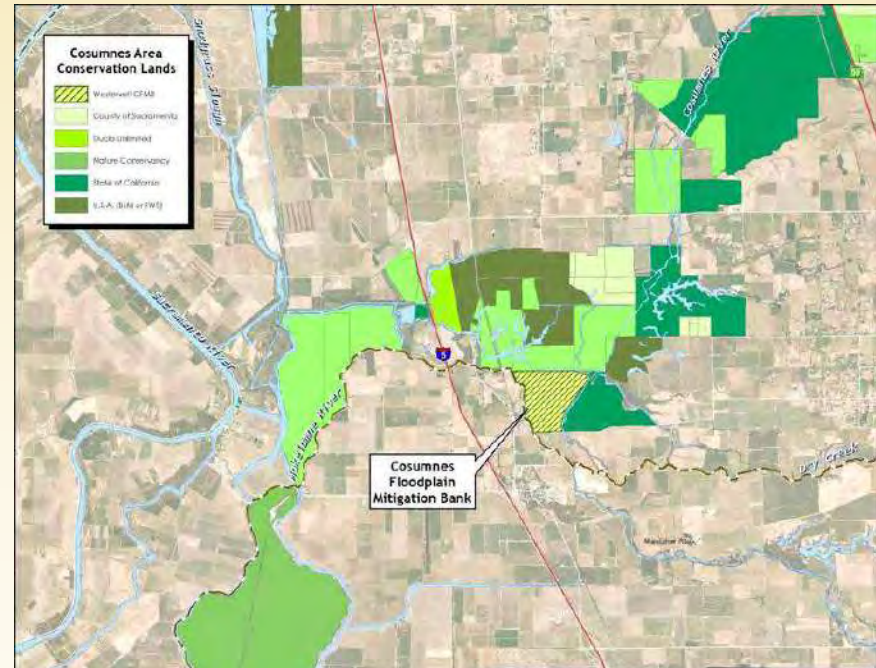
- Target Areas
  - Intertidal
  - Sea-Level Rise
  - Floodplain
  - Transition
  - Upland





# Conservation Perspective

- Regional Landscape
  - Planned Preserves
- Integrated Habitats
  - Intertidal to Uplands
- Species Utilization
  - Salmonids and Other Native Fish
  - Riparian Species

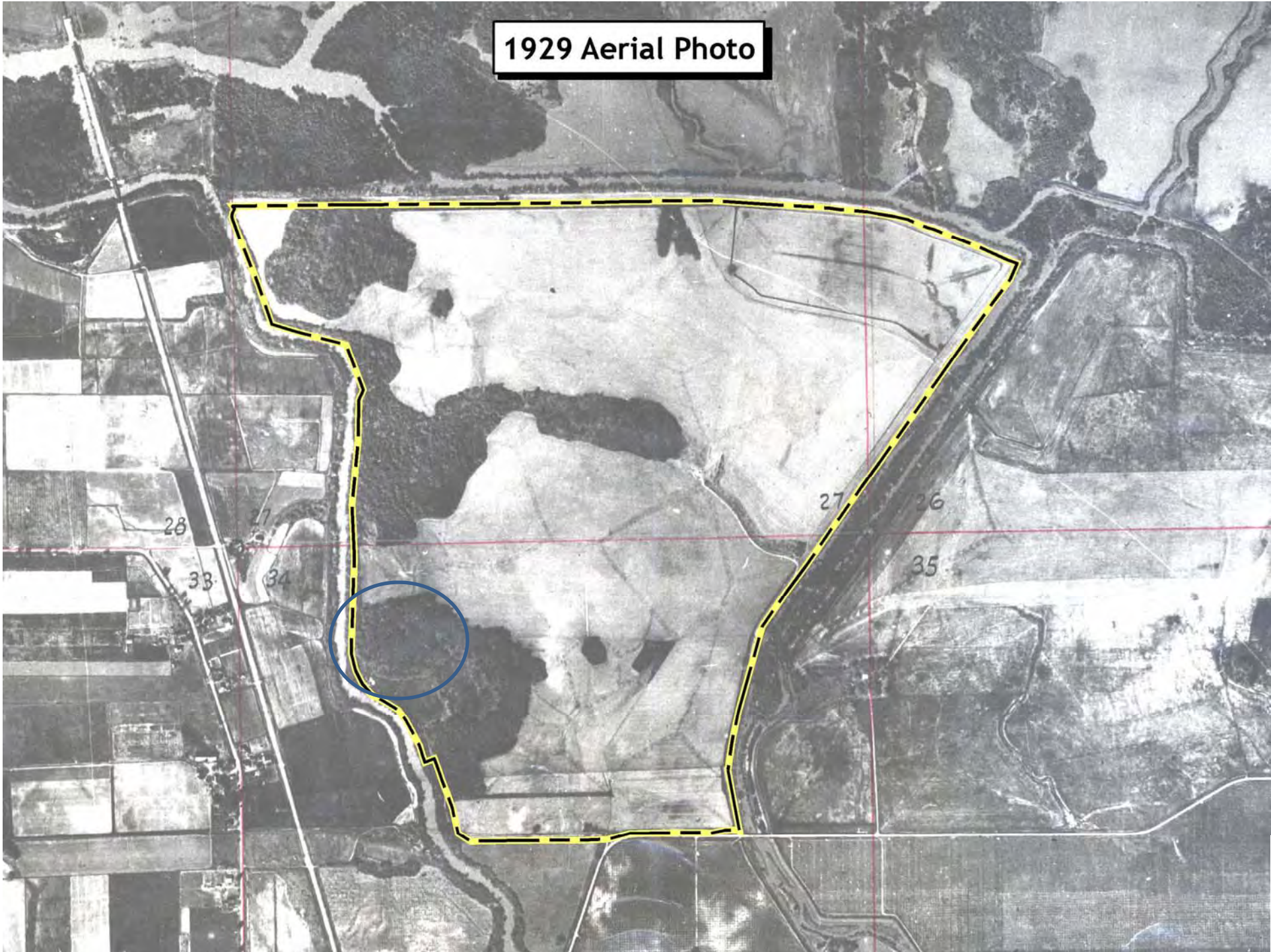




- 1870's Mapped as Swamp & Overflow Lands
- 1894 - 1910 Farm Berms / Levees Constructed in Area



1929 Aerial Photo





# Project Goals & Objectives

- Re-Established Natural Spring Flooding & Tidal Flows
- Essential Fish Habitat (EFH)
- Created Mitigation Credits
  - Floodplain Mosaic Wetland (CWA 404)
  - Floodplain Riparian Habitat (Waters of the US)
  - Shaded Riverine Aquatic (Waters of the US)



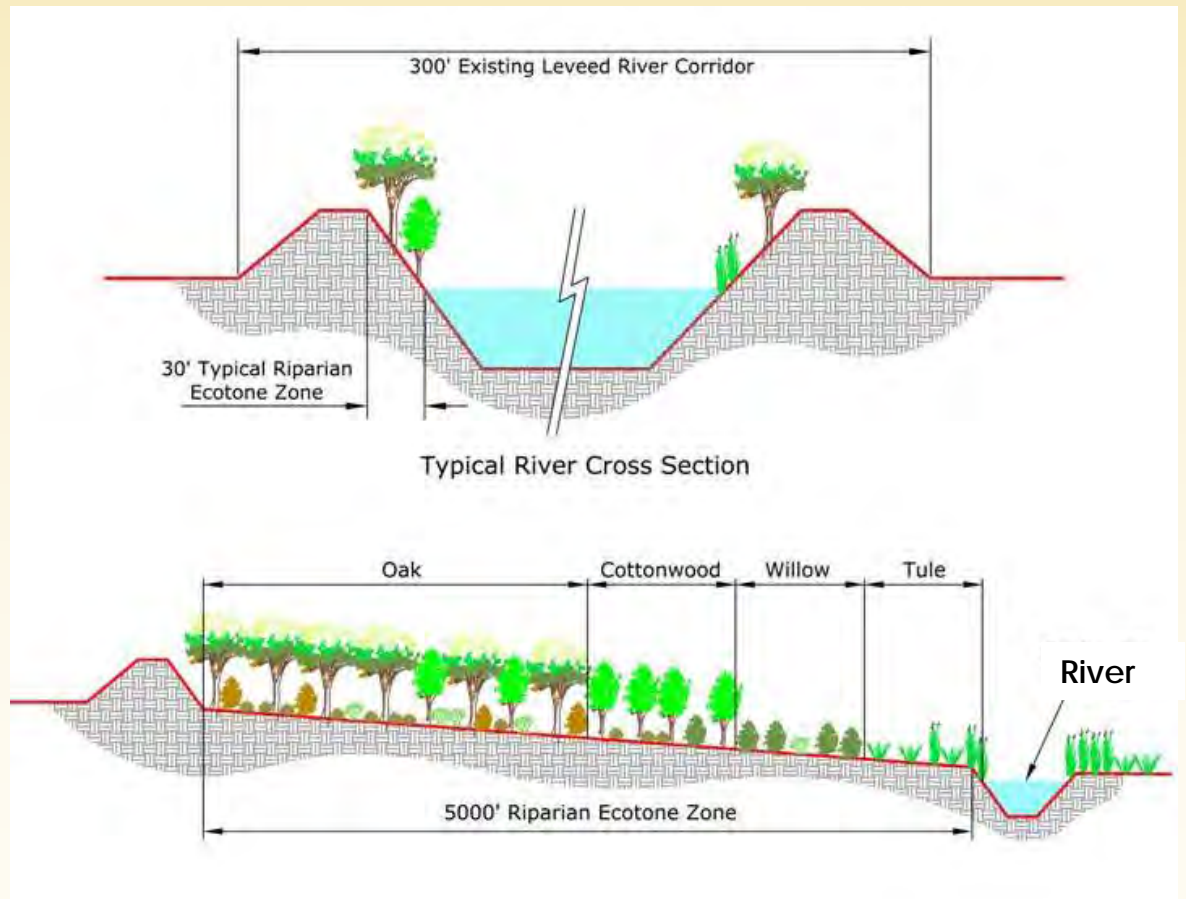


# Riparian Zone

- Typical Section

Verses

- New Bank



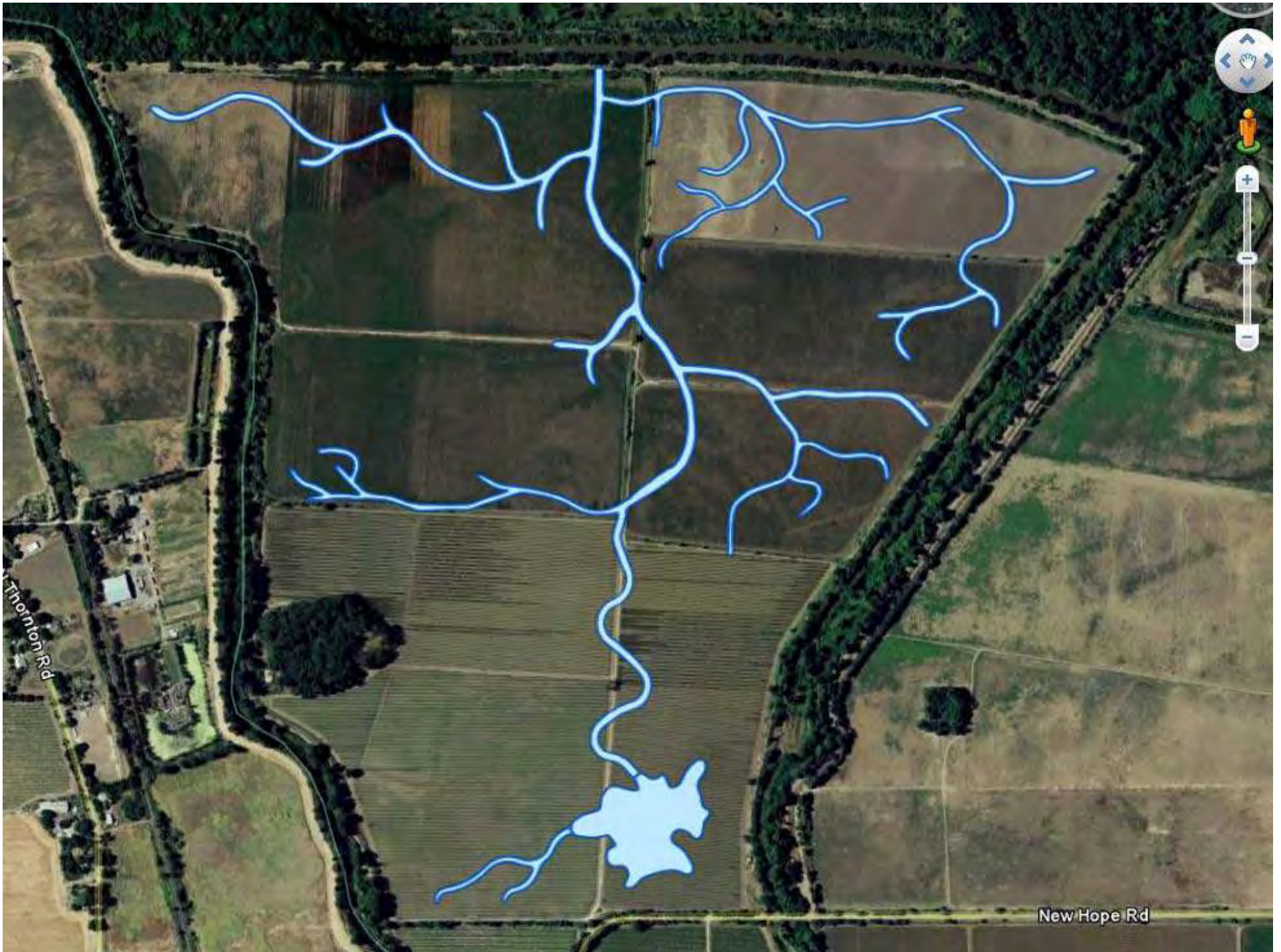




# Design Considerations

- Essential Fish Habitat (EFH)
  - Chinook Salmon
  - Steelhead
- Endangered Species Act
  - NOAA Fisheries
  - CA Dept of Fish & Wildlife







# Predicted Inundation Footprint (2-Yr Event)





# Bullock Bend Mitigation Bank

**Location:** Northeast corner of Yolo County on the Sacramento River (River Mile 106).

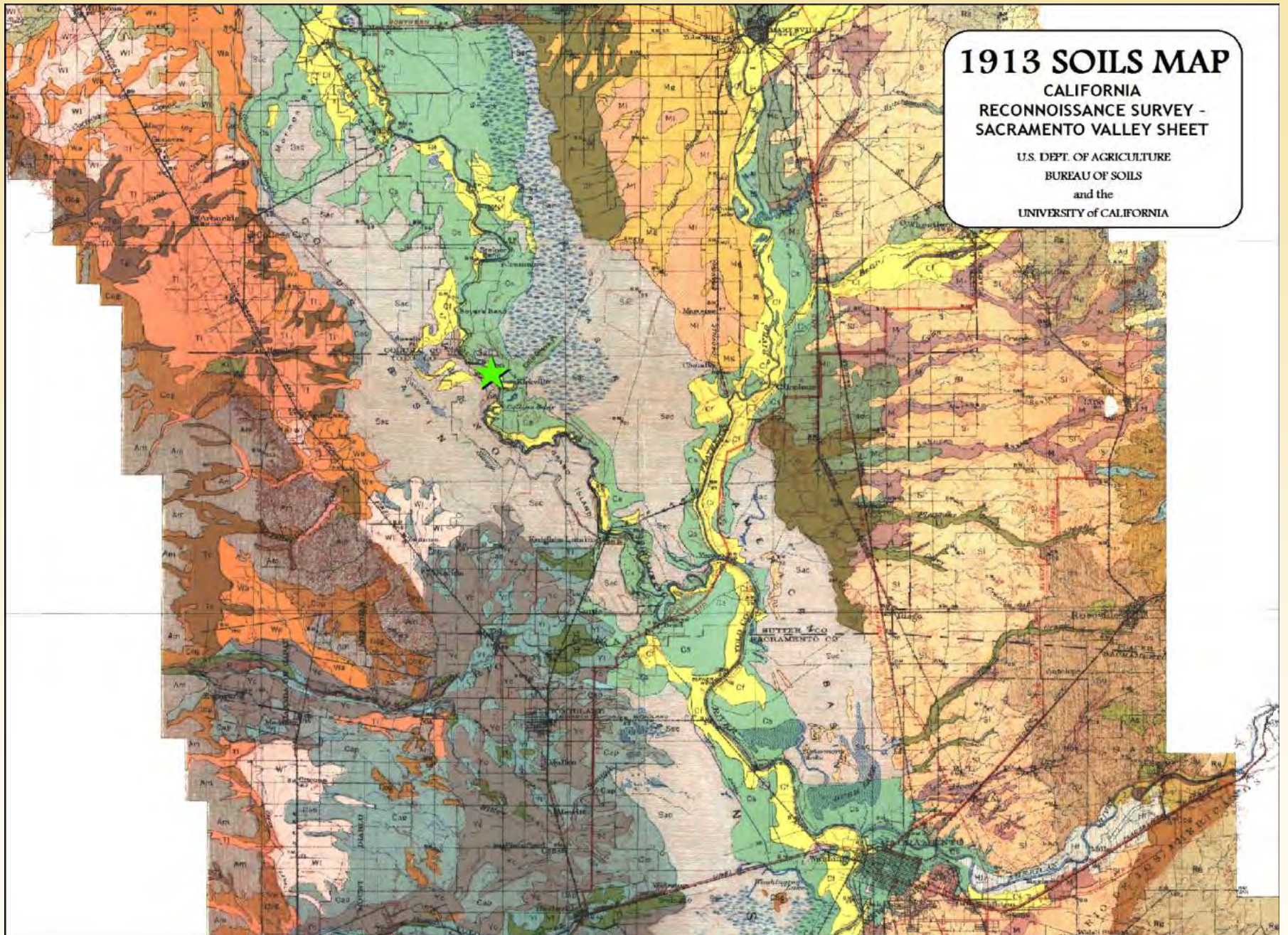
**Property Size :** 119.65 acres

**Bank Size:** 116.15 acres

**Project Goal:** Mitigation Credits for Public Infrastructure Impacts to Salmon and Riparian Habitat.

**Objective:** Re-establish an active floodplain and riparian habitat by excavating backwater channels and breaching the farm berm.





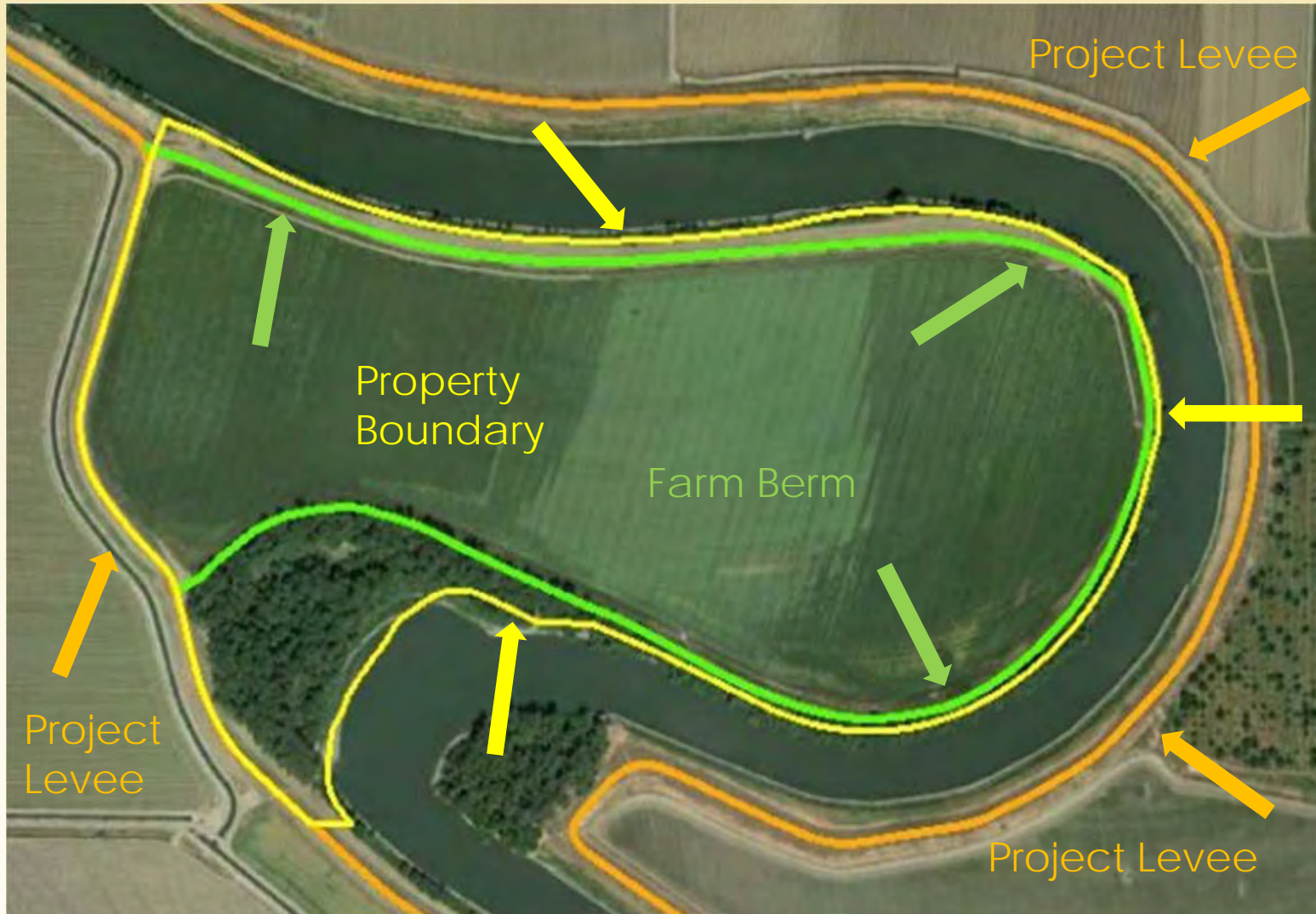


# Historic Context and Setting

*Along the Sacramento River, the riparian corridor was estimated to range in width from 1 to 10 miles, with an average width of 3 miles (Thompson 1961).*



# Bullock Bend Property







# Existing Riparian Forest

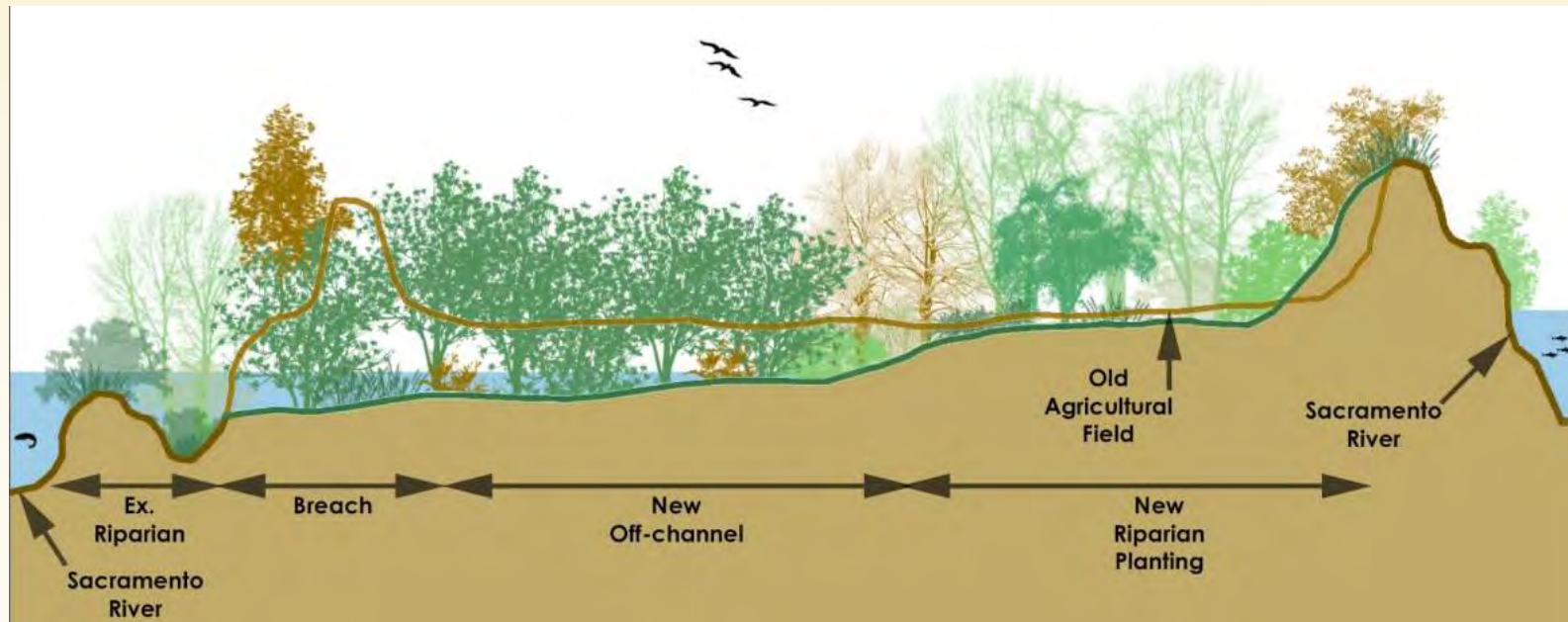


Aerial Source: Google Earth



# Project Objectives

- Approx. 116-Acre Bank Area
  - Excavate Backwater Channels
  - Breach Farm Berm
  - Create Neutral Flood Impacts
  - Restore Riparian Vegetation
  - Promote Active Flooding
  - Focus on Salmonids & Other Riparian Species





# Regional Planning Consistency

- CV Flood Protection Plan
- Recovery Plan (for Central Valley salmonids)
- Sacramento River Conservation Area Handbook
- CA Essential Habitat Connectivity Project

**CENTRAL VALLEY FLOOD PROTECTION PLAN**

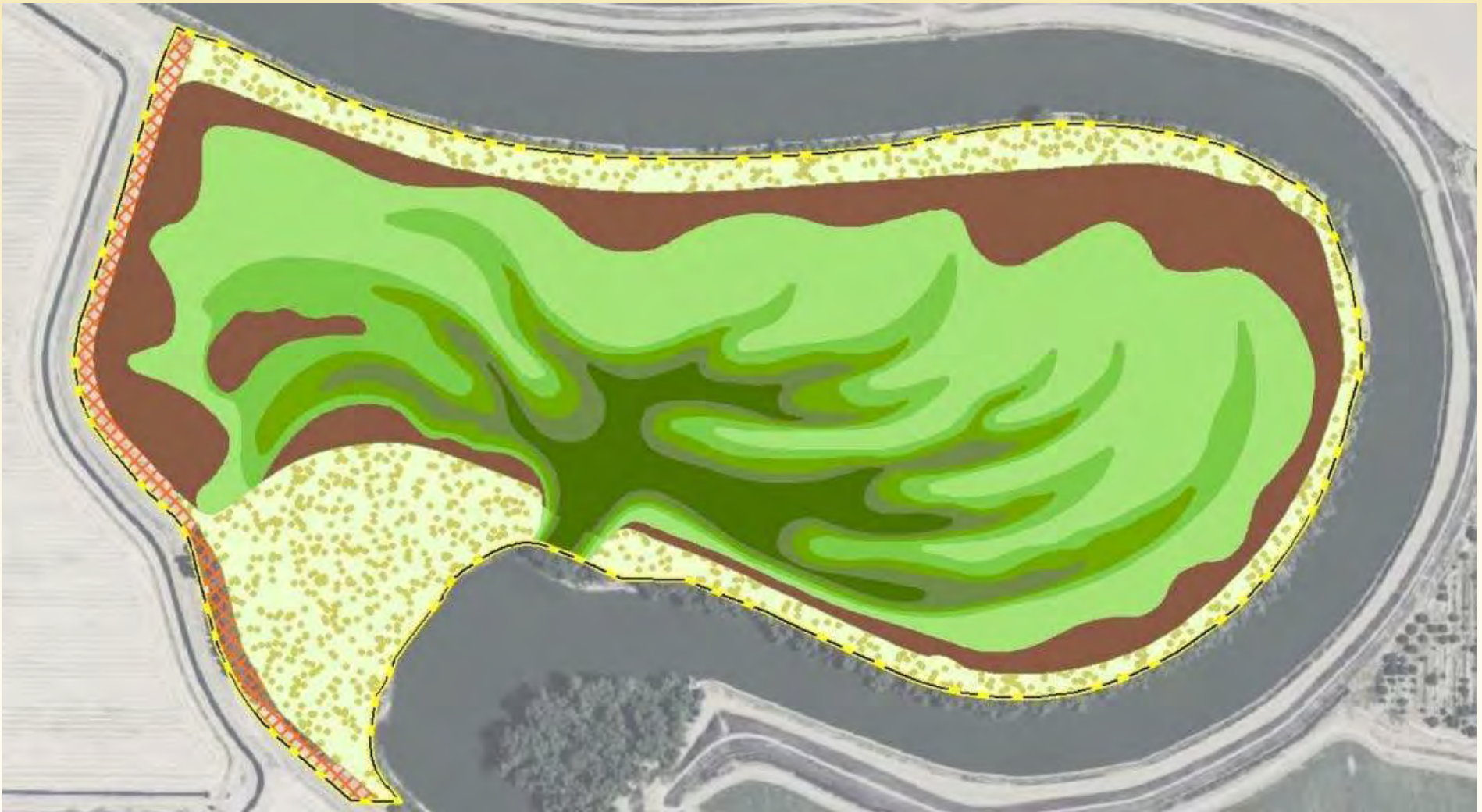
**CALIFORNIA ESSENTIAL HABITAT CONNECTIVITY PROJECT:**  
 A STRATEGY FOR CONSERVING A CONNECTED CALIFORNIA  
 FEBRUARY 2010  
 PREPARED FOR:  
 CALIFORNIA DEPARTMENT OF TRANSPORTATION  
 CALIFORNIA DEPARTMENT OF FISH AND GAME  
 WITH FUNDING FROM:  
 FEDERAL HIGHWAYS ADMINISTRATION

**LEGEND**

- river main channel
- surface water
- water infrastructure
- water infrastructure
- primary highway
- county boundaries
- State River Zone C
- Sacramento River Conservation Area

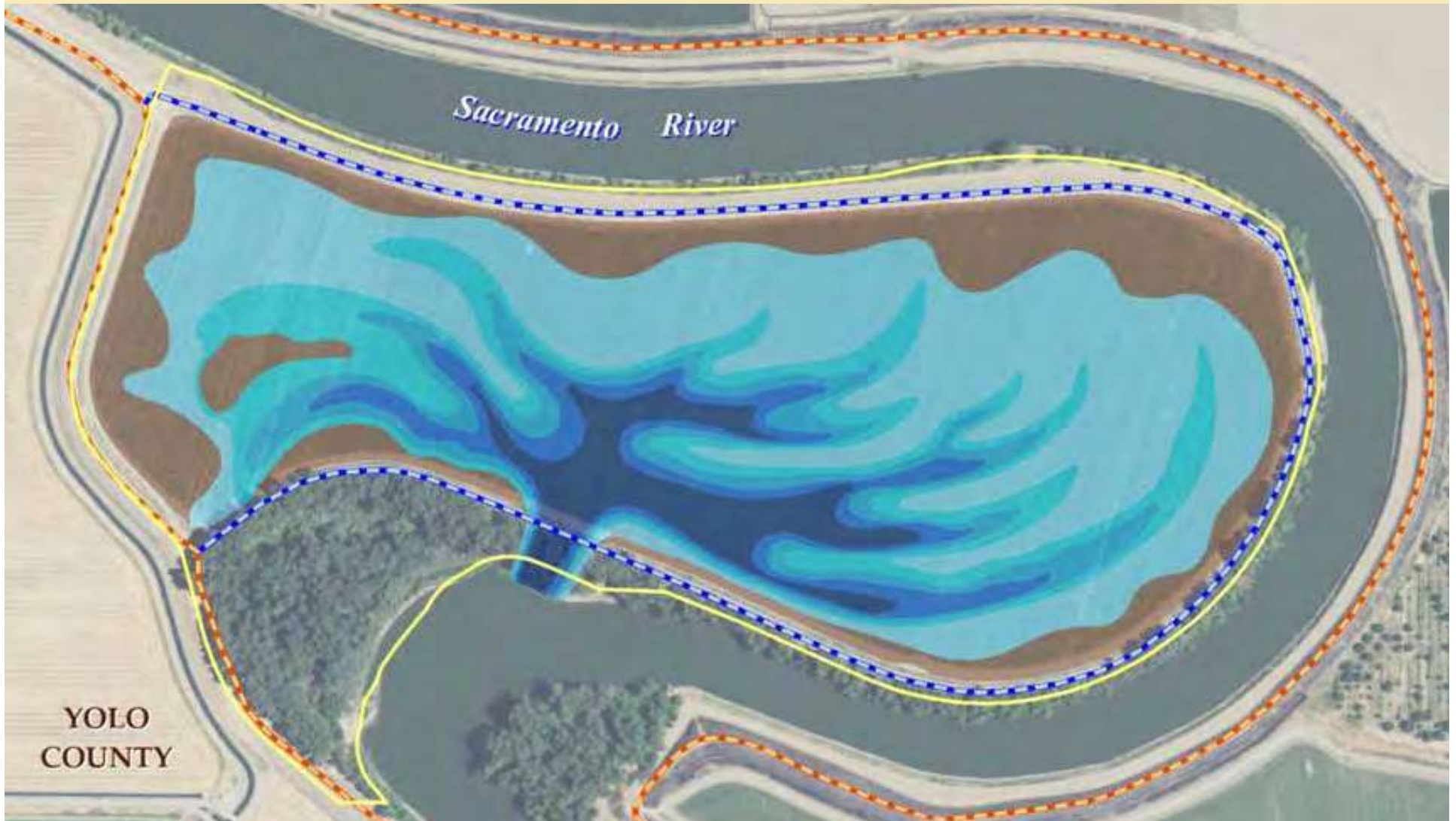
# Project Design

## Dry Season Conditions (Summer-Fall)

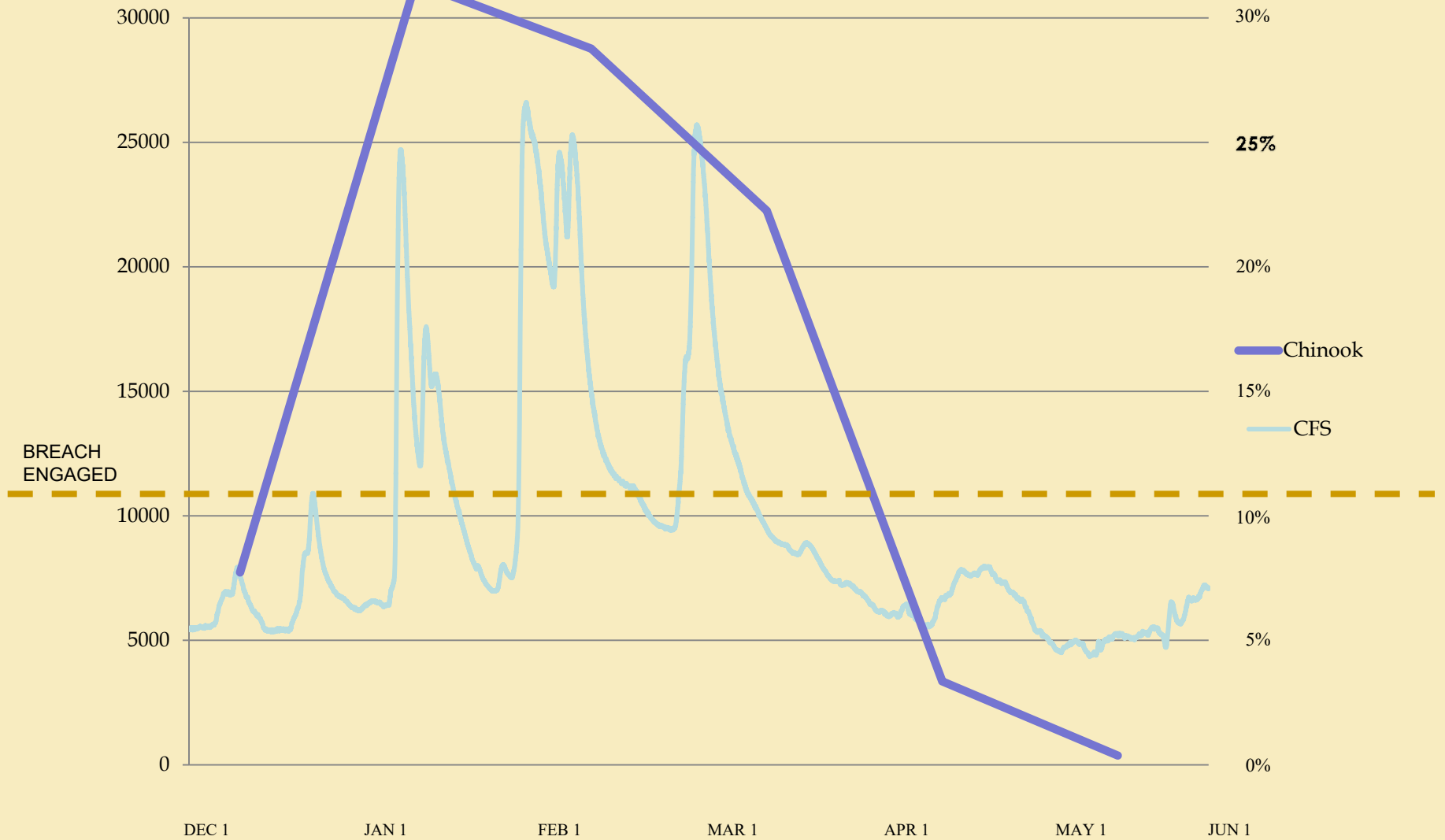


# Project Design

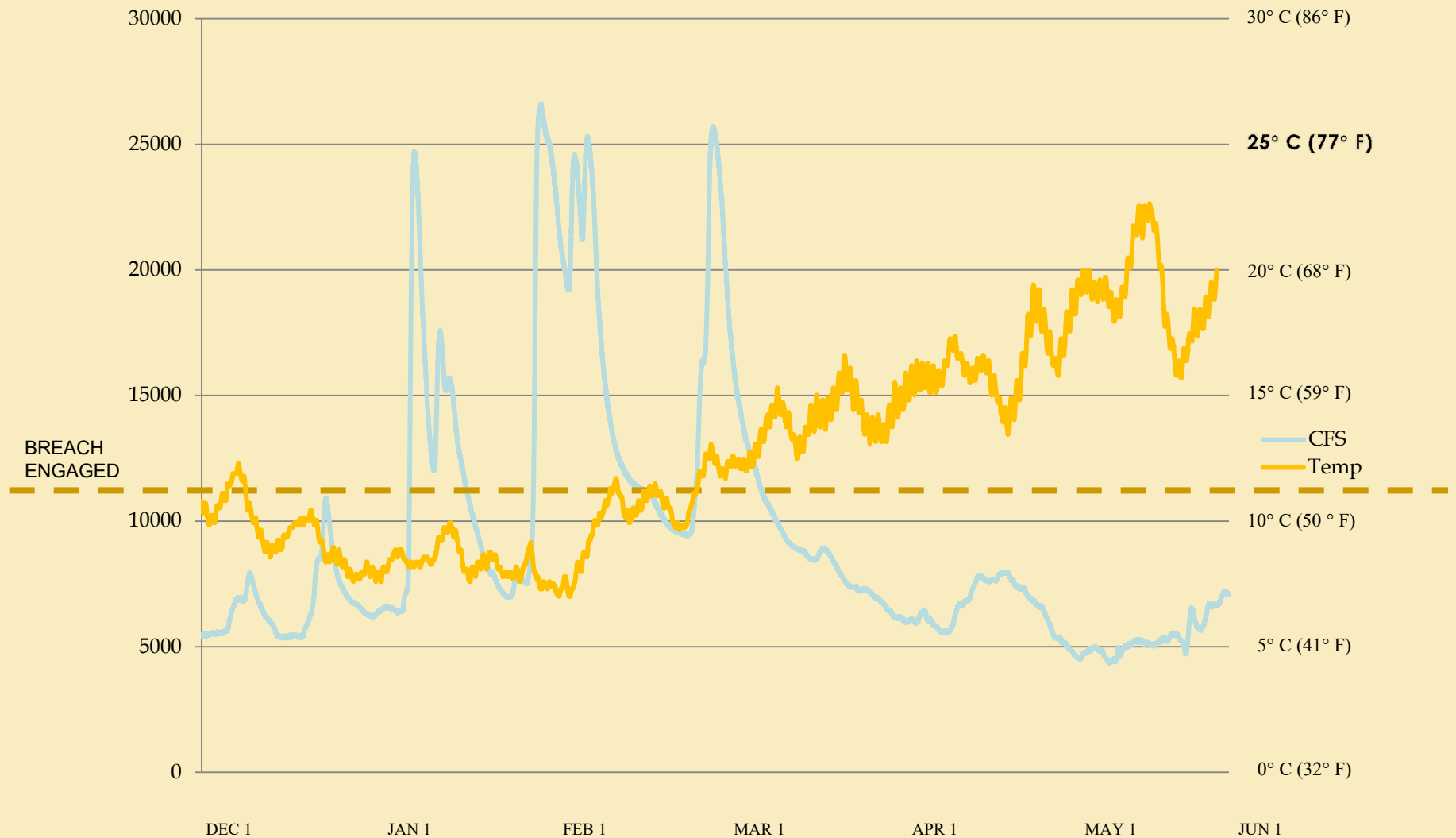
## Wet Season Conditions (Winter-Spring)



# Monthly Revenue Derived by end-graph in 2020 on the Foughting (US\$ (with 1976-2016))



# Sacramento River Hydrograph(12-01-07 through 05-31-08 (Wilkins Slough))



# Multi Benefit

## Benefits to Farmers-What is good for fish is good for farms

- More reliable water delivery for farms
- Donation of soil to RD 108 for levee toe road and irrigation delivery canal improvements.
- Contributions to food protection
- Permanent protection of 88 acres of “Prime” farmland





# Multi Benefit

Mitigation solution for levee and flood infrastructure projects



# Mitigation Crediting



Credit Type <sup>1, 2, 3, 4, 5, 6, 7</sup>		Approving Agency		
		USACE	NMFS	CDFW
<i>I. FLOODPLAIN RESTORATION (REESTABLISHMENT)</i>				
1	Salmonid/Riverine Riparian	X	X	X
2	Salmonid/Riverine Riparian/Swainson's Hawk Nesting Buffer	X	X	X
3	Salmonid/Floodplain Riparian/Swainson's Hawk Nesting Buffer		X	X
<i>II. FLOODPLAIN ENHANCEMENT</i>				
4	Salmonid/Riverine Riparian		X	X <sup>7</sup>
5	Salmonid/Floodplain Riparian/Swainson's Hawk Nesting Buffer		X	X





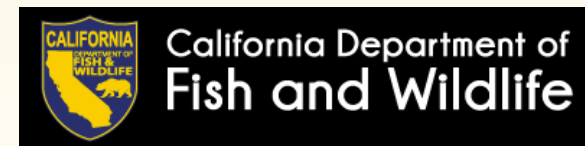
# In Conclusion

- Proximity of Floodplain Restoration
- Multi-Benefits beyond Salmonids
- Integration into Regional Conservation Planning Needs



# Project Supporters

- Dept. of Water Resources
- Reclamation District 108
- Local Farmers
- Yolo County Farm Bureau
- UC Davis Professors & Researchers
- Professional Fisheries Experts
- Sacramento River Forum
- NOAA Fisheries
- CA Dept. of Fish & Wildlife
- US Army Corps of Engineers
- US Environmental Protection Agency



# Important Design Criterion

- Maximize residence time by having limited connections to the river channel (i.e., no cross flow)
- Longer residence time equals higher water temperatures (relative to the river) which equals greater production of important prey items for juvenile salmonids.



# Important Design Criterion

Maximize areas of velocity and turbidity refugia by limiting the number and size of the connections to the river channel

- Refugia from high flows and turbidity are important factors in why juvenile salmonids seek out and utilize floodplains and off channel habitats.
  - Use less energy in low velocity areas
  - Higher fitness (gills clear of sediment)

