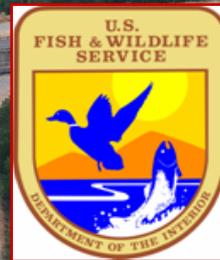


Riparian Sanctuary: Utilizing Multiple Science Disciplines to Design Grass Roots Solution for Agricultural and Environmental Interests

Helen Swagerty, Tom Griggs, Michael Rogner
River Partners



Multi-objective Projects

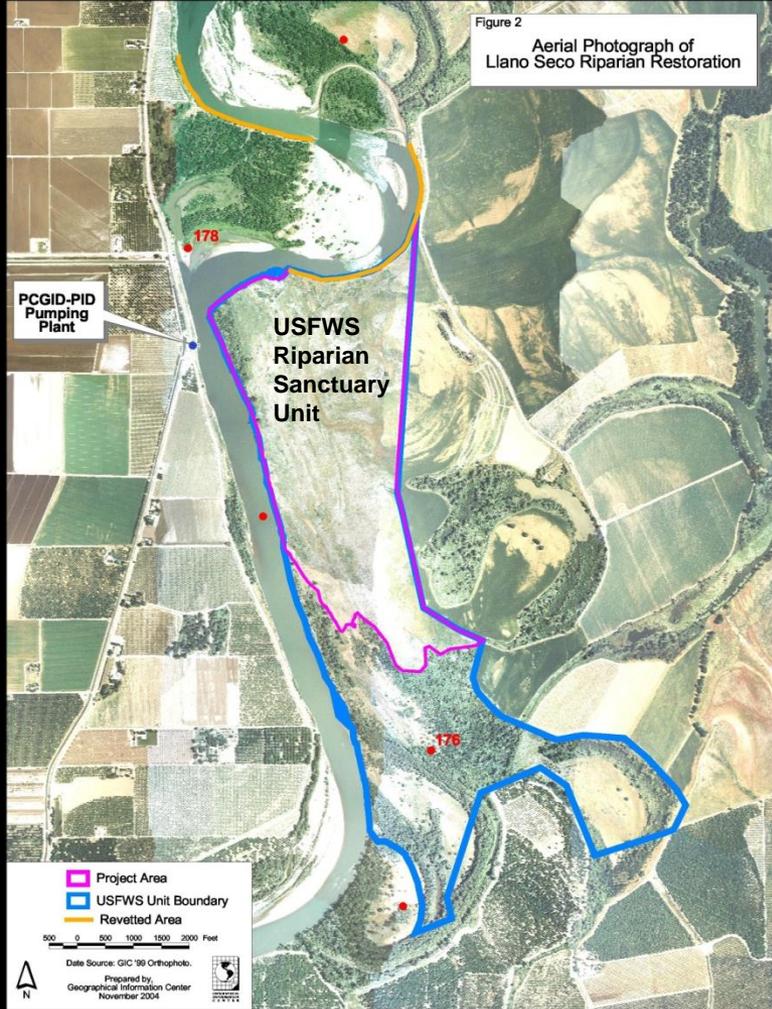
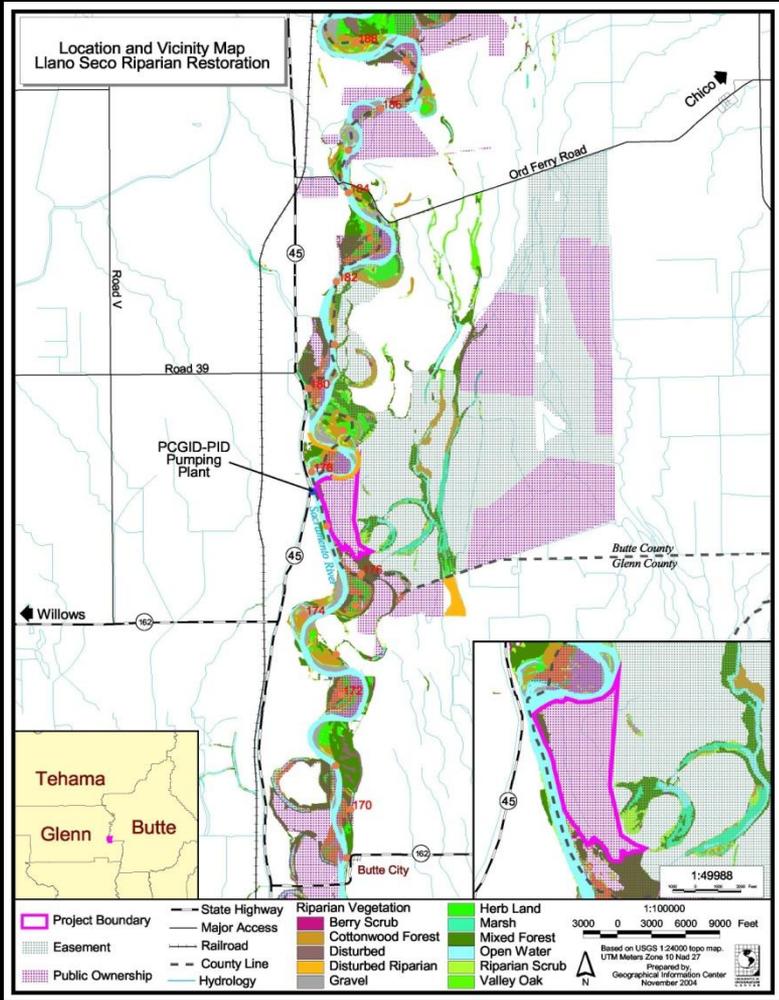
- Flood attenuation
- Transitory storage
- Protection of infrastructure
- Enhancement of wildlife habitat
- Support ecosystem services and natural river processes



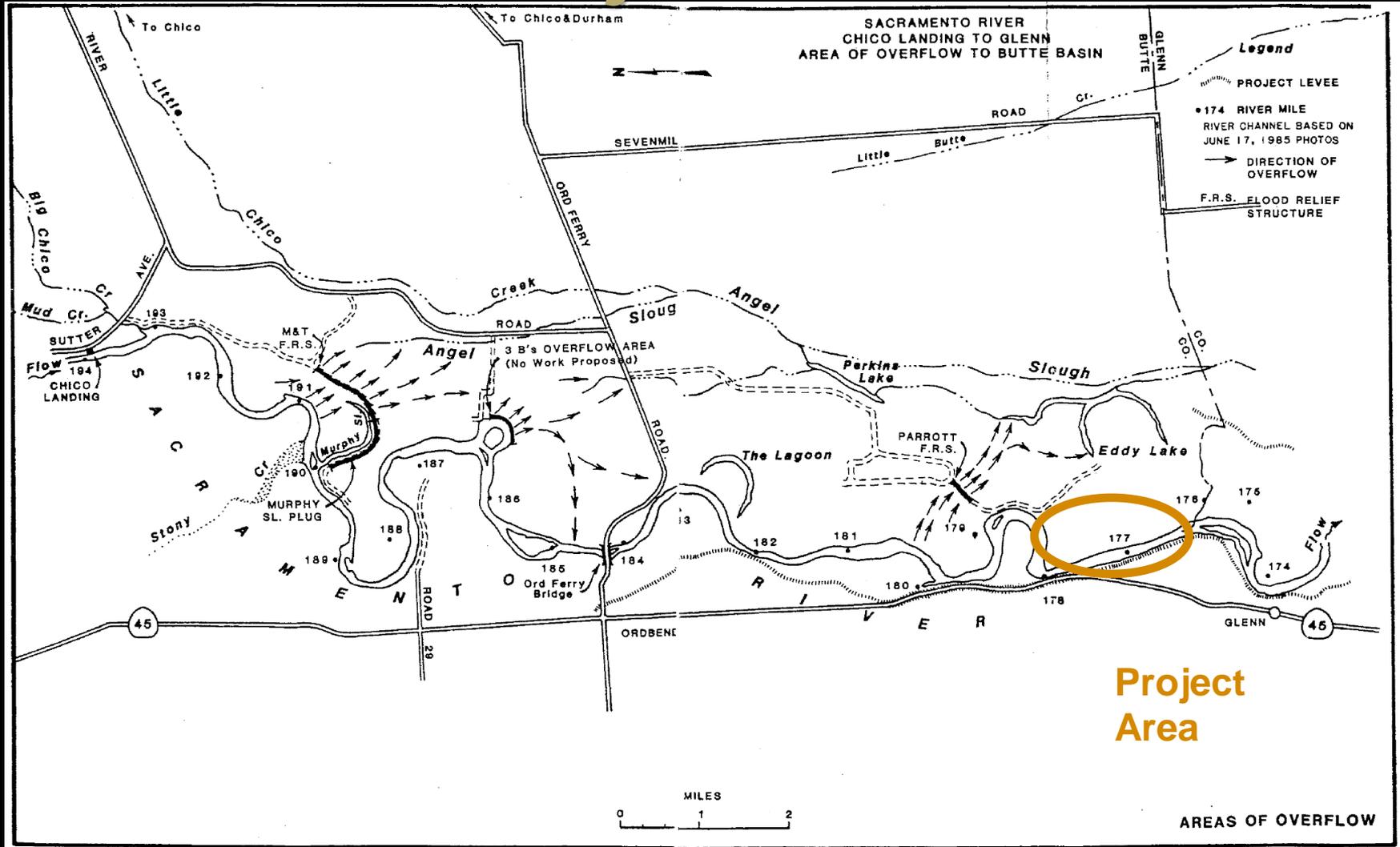
Integration Strategy



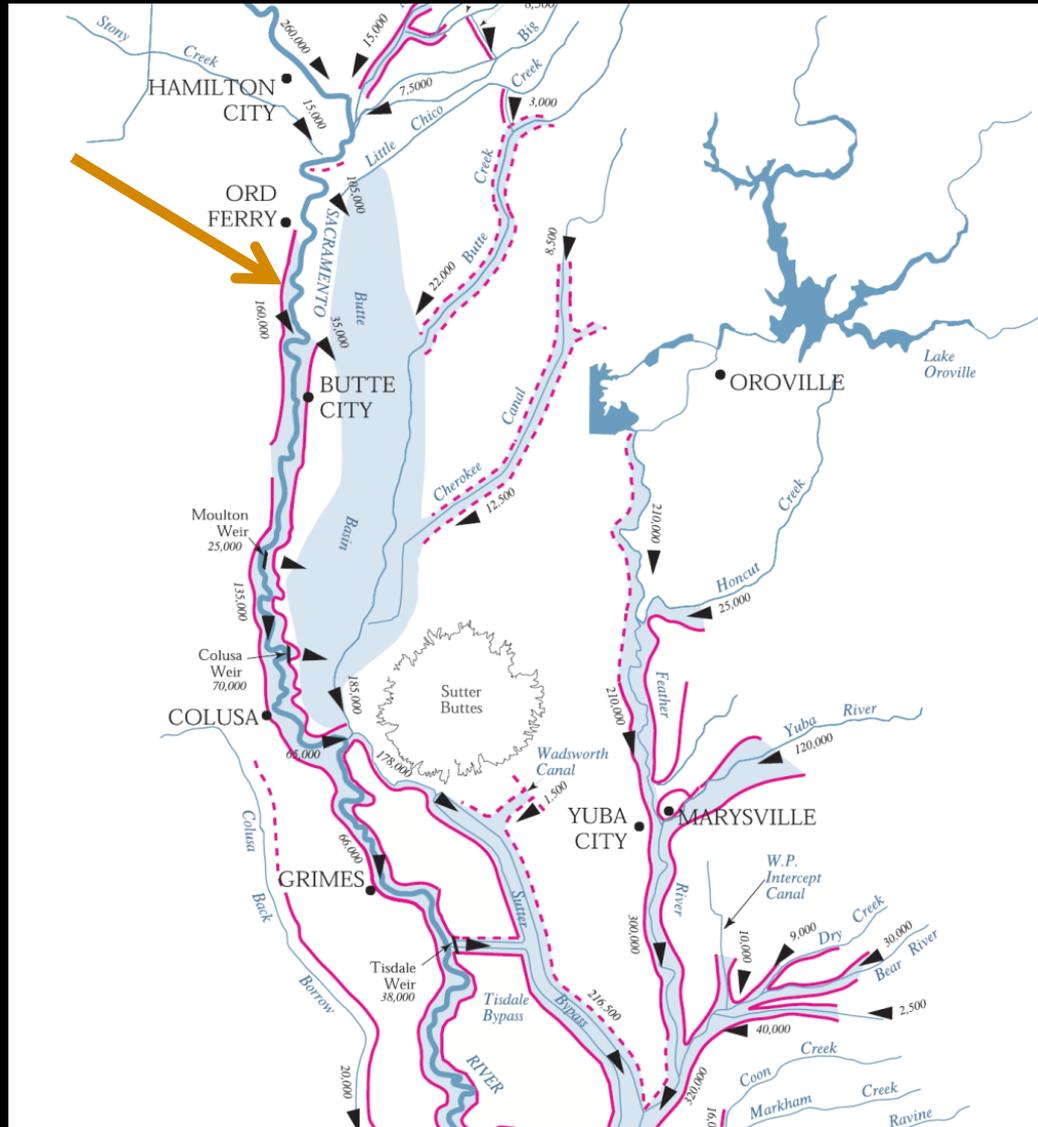
Location



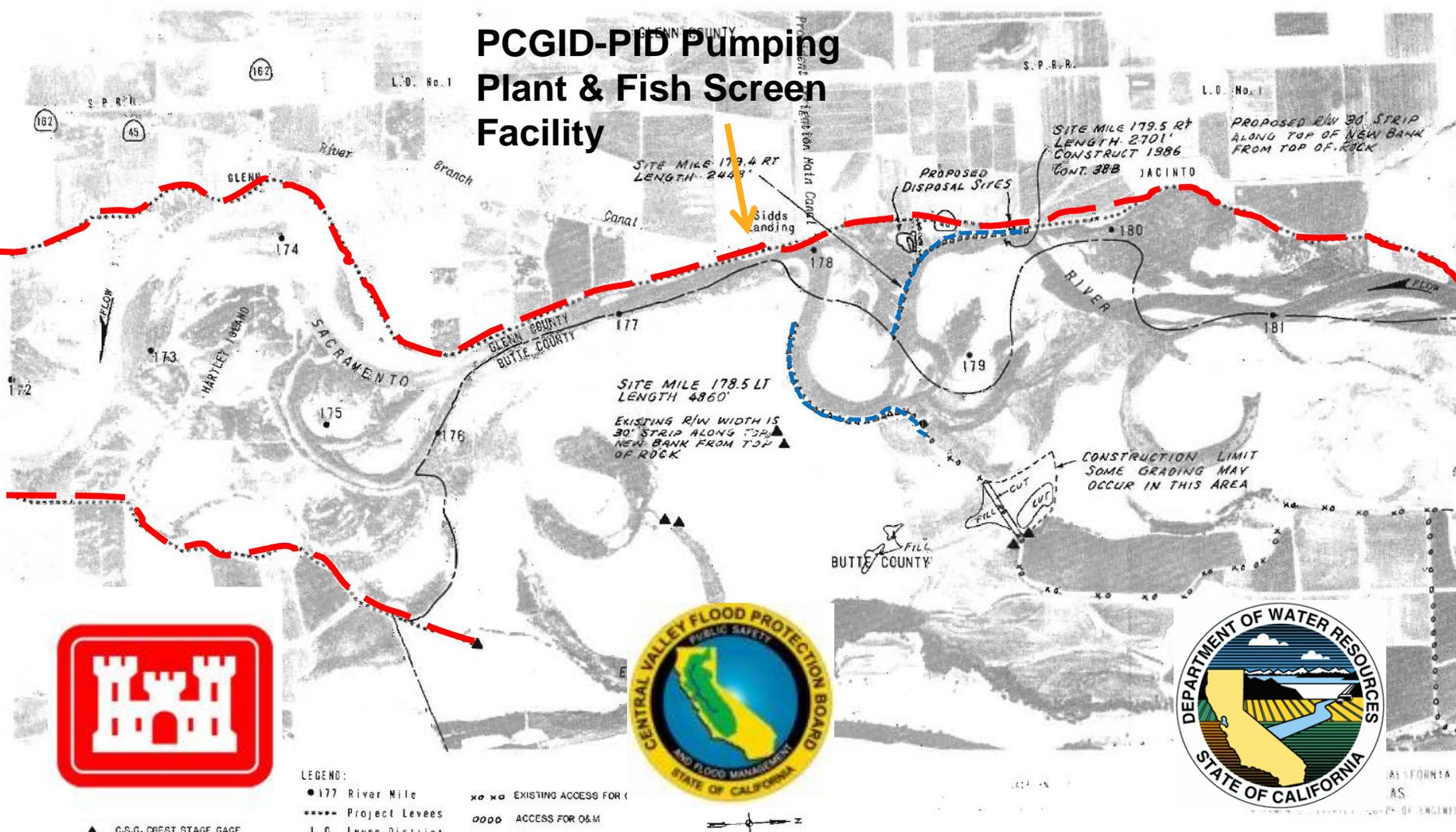
Sacramento River Flood Control System



Butte Basin Overflow Area



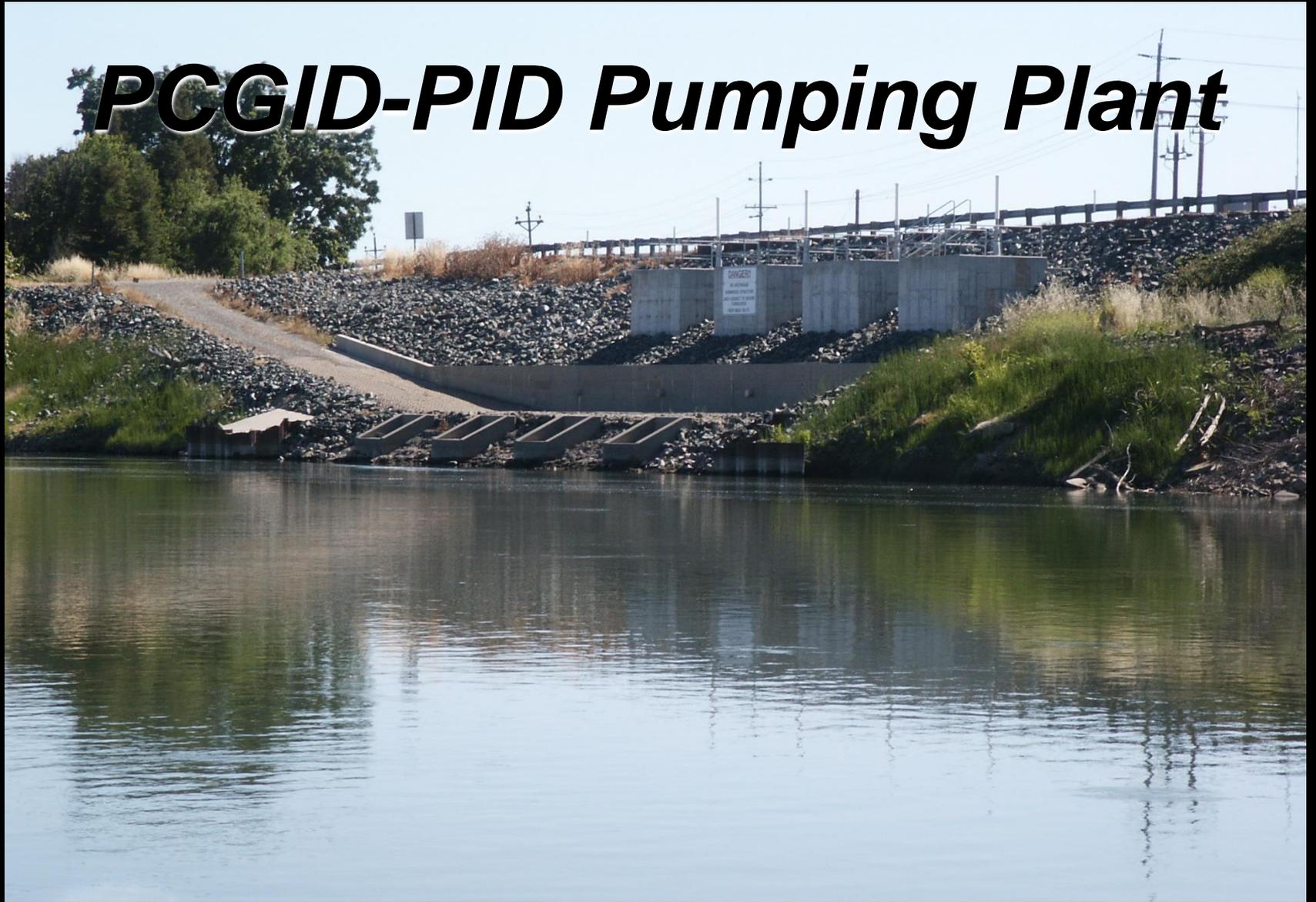
PCGID-PID Pumping Plant & Fish Screen Facility



- LEGEND:
- 177 River Mile
 - ***** Project Levees
 - L.D. Levee District
 - ▲ C.S.G. CREST STAGE GAGE
 - xo xo EXISTING ACCESS FOR (
 - oooo ACCESS FOR O&M
 - CONSTRUCTION ACCESS

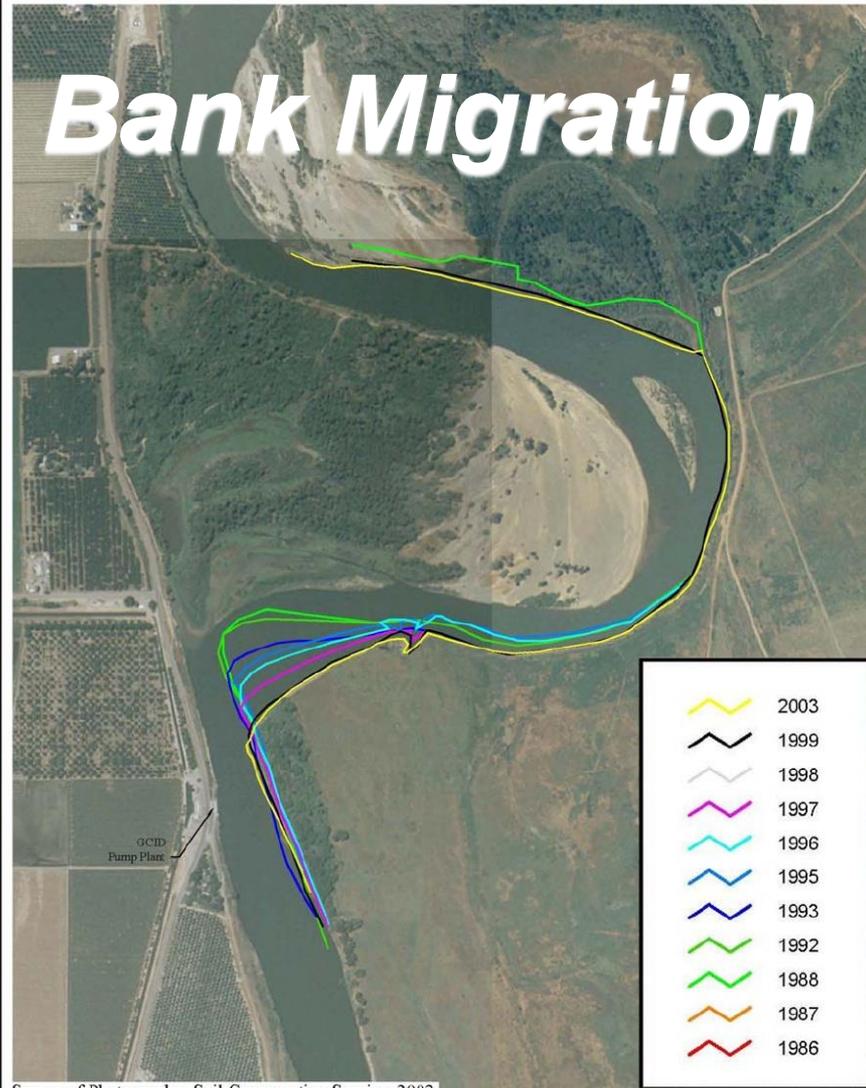


PCGID-PID Pumping Plant



Creating Wildlife Habitat for the Benefit of People and the Environment

Bank Migration

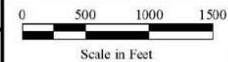


Source of Photography: Soil Conservation Service, 2003

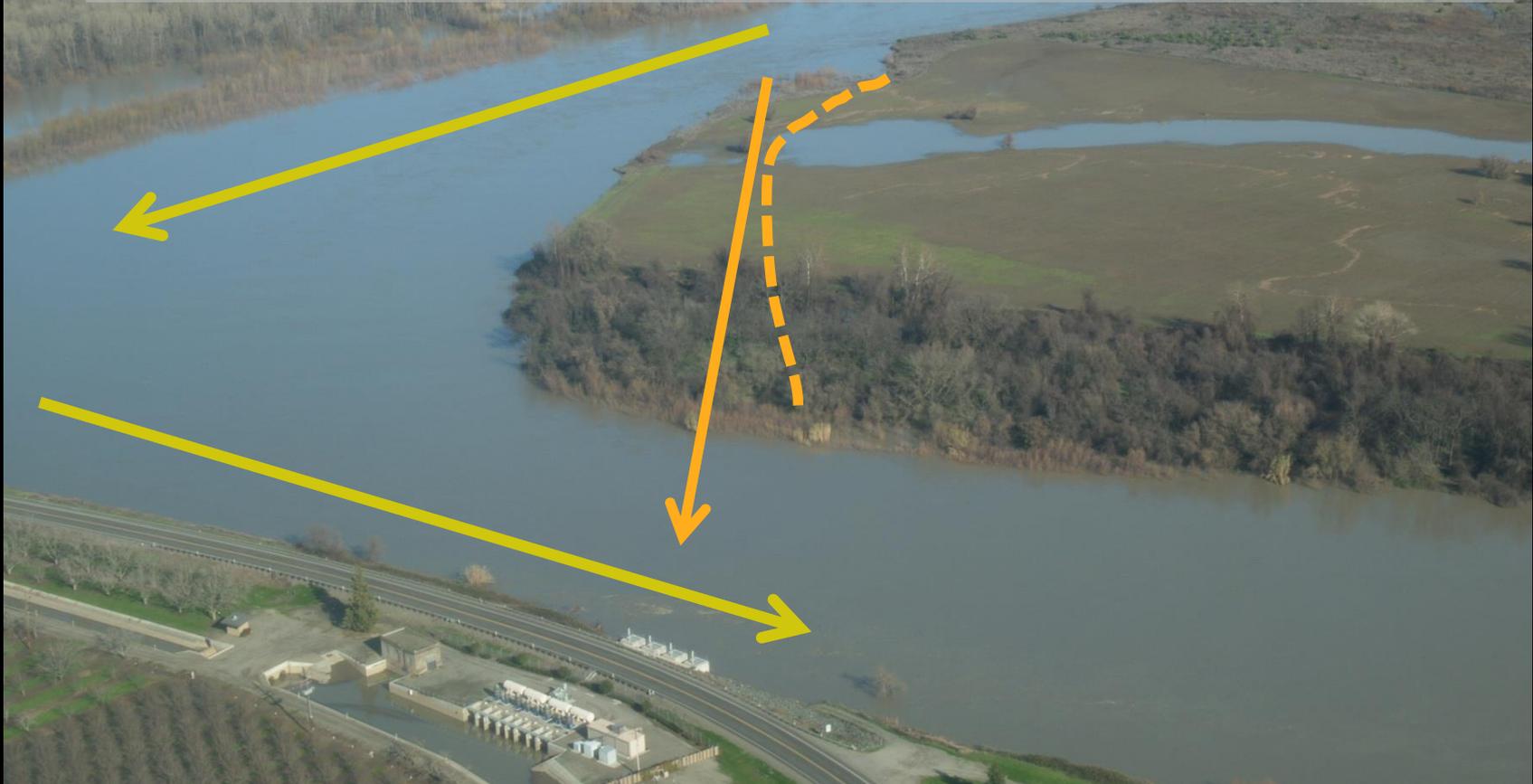
MBK
ENGINEERS
2150 Alhambra Boulevard, 2nd Floor
Sacramento, California 95817
Phone: (916) 456-4100 • Fax: (916) 456-0253

Sacramento River Partners, Llano Seco

Historic Erosion, Sacramento River Mile 178



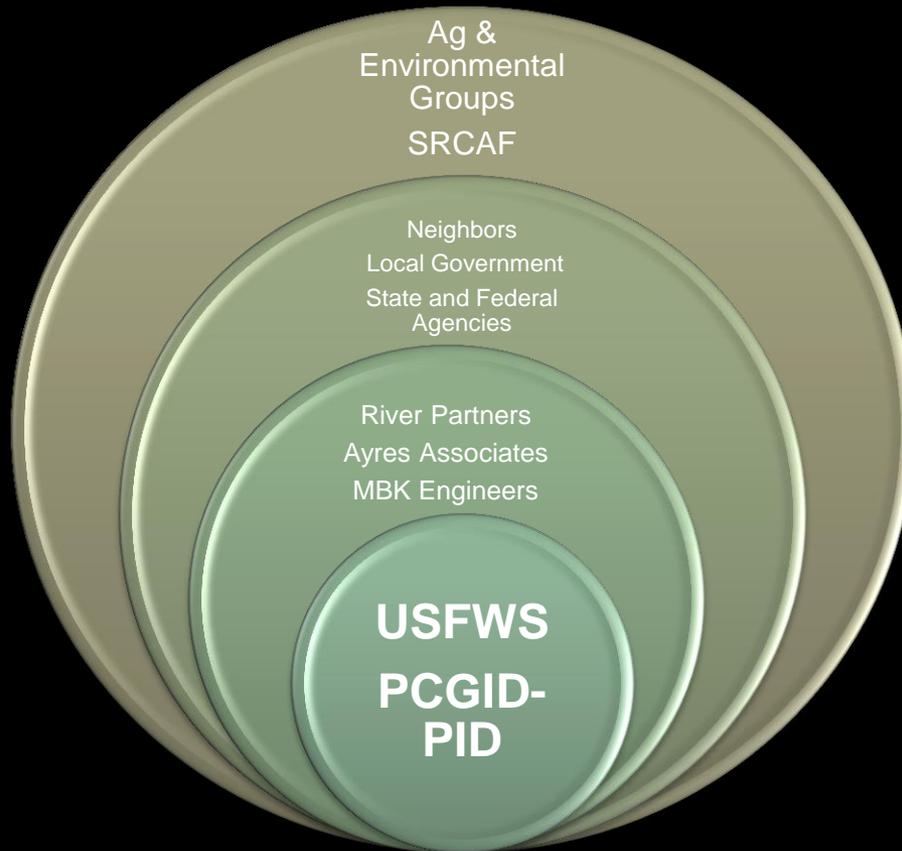
- **Problem:** As the bank erodes, the angle of flow and velocity of the water passing the pumping plant fish screen will change. Rather than flowing across the screens, the river will begin to flow toward the screen, trapping fish against screens.





Riparian Sanctuary

Partnerships





Engaging the Local Community



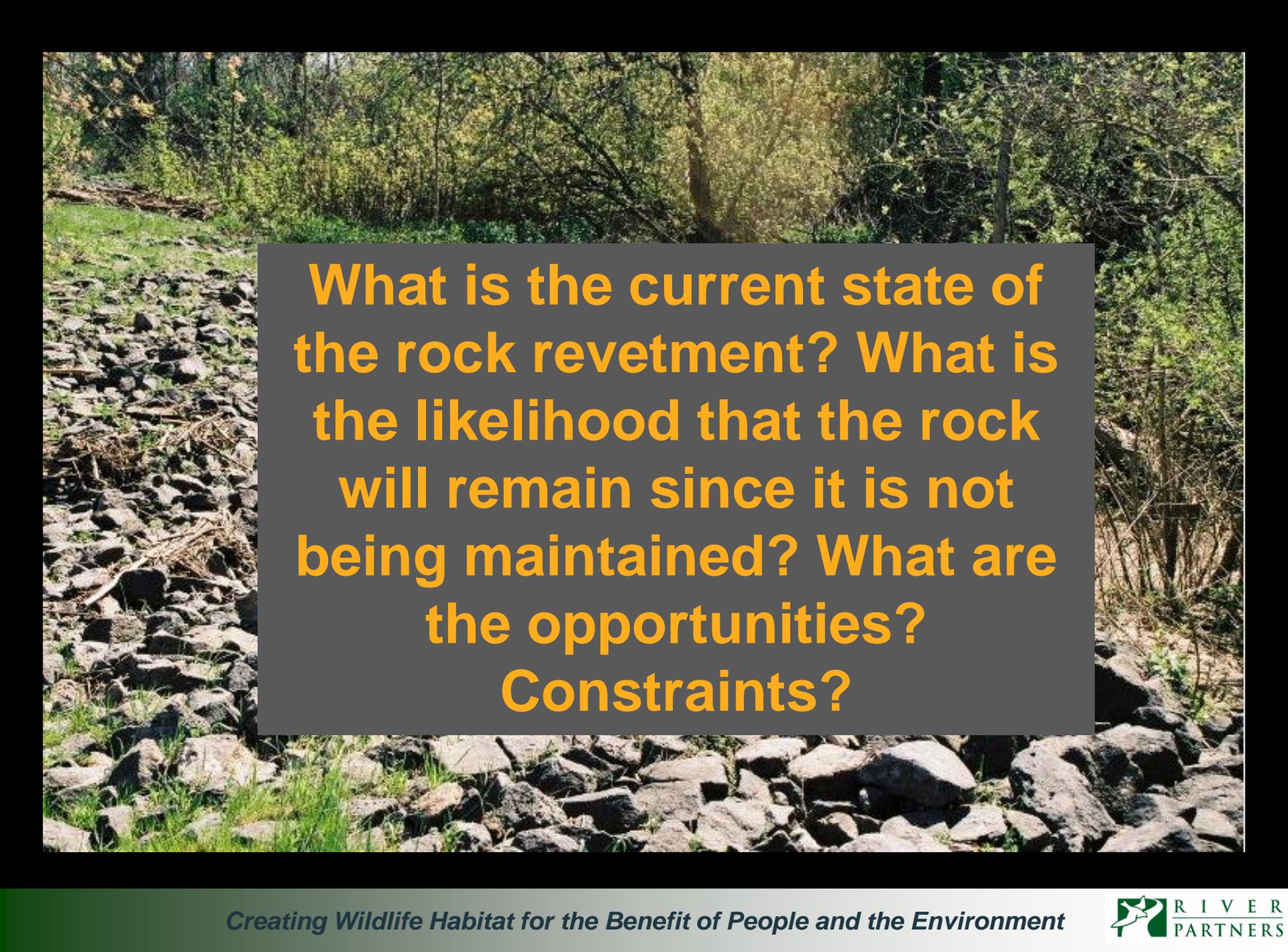
Creating Wildlife Habitat for the Benefit of People and the Environment

Technical Advisory Committee and Consulting Team



Educating State and Federal Agencies





What is the current state of the rock revetment? What is the likelihood that the rock will remain since it is not being maintained? What are the opportunities? Constraints?



A map showing a river meander with various colored overlays in shades of green, blue, purple, and brown, likely representing different land use or habitat types. The river is shown in a central, winding path.

River Meander Analysis

Eric Larsen, UC Davis

**How will river meander
impact pumping plant
operations? Will it impact
landowners upstream and
downstream?**

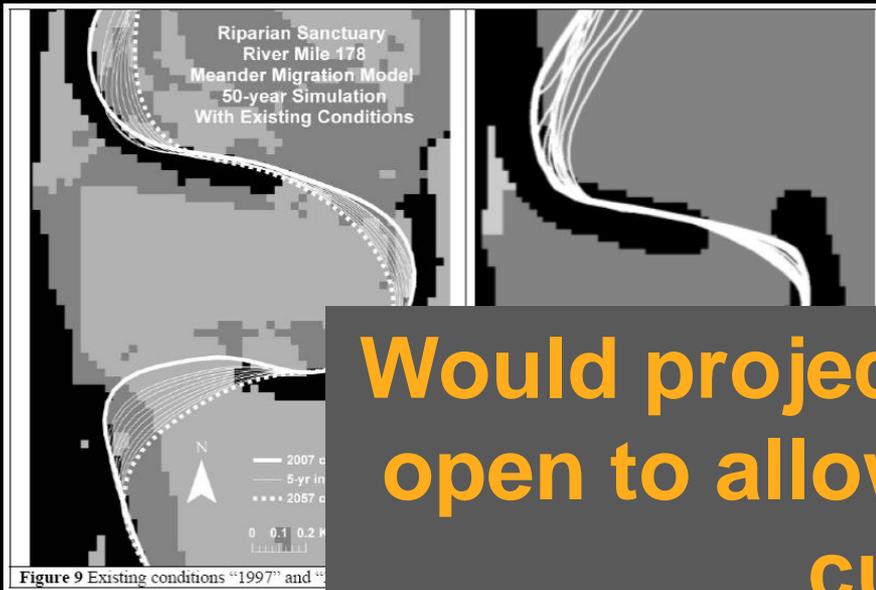


Figure 9 Existing conditions “1997” and “

Would project proponents be open to allowing the river to cutoff?

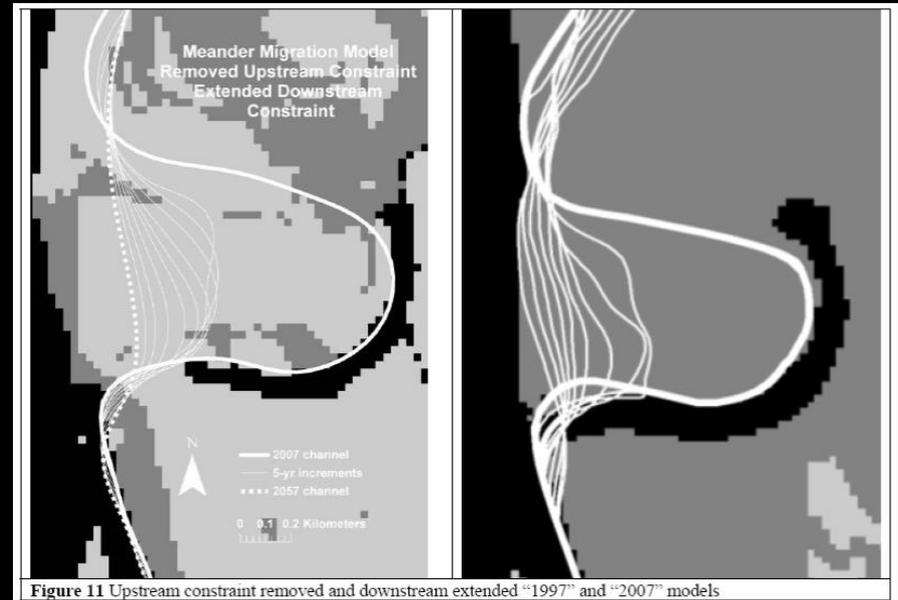


Figure 11 Upstream constraint removed and downstream extended “1997” and “2007” models

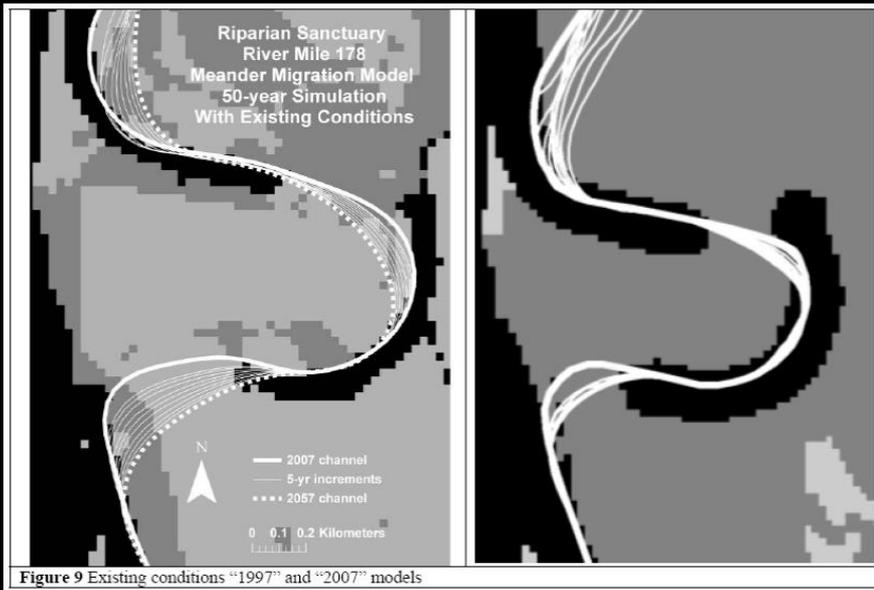


Figure 9 Existing conditions “1997” and “2007” models

Under current conditions, what is the likely migration scenario near the pumping plant and fish screen facility?

If the bank is stabilized and rock is removed upstream, how will the river behave under this scenario?

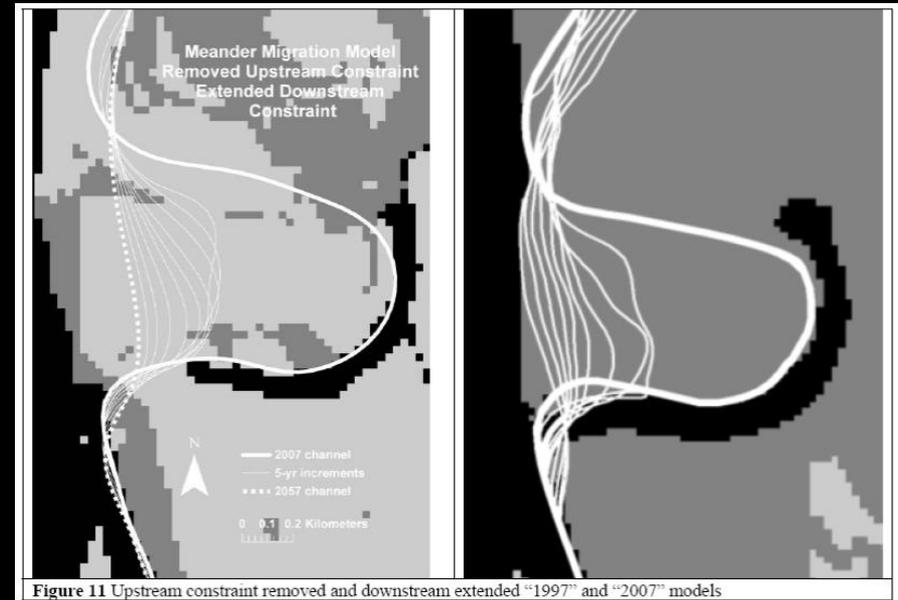


Figure 11 Upstream constraint removed and downstream extended “1997” and “2007” models

Pumping Plant Feasibility Study- MBK Engineers

What are the best alternatives for protection based on effectiveness, hydraulic considerations, ecological advantages or disadvantages, and estimated costs ?



No Action

Monitor
Bank
Retreat

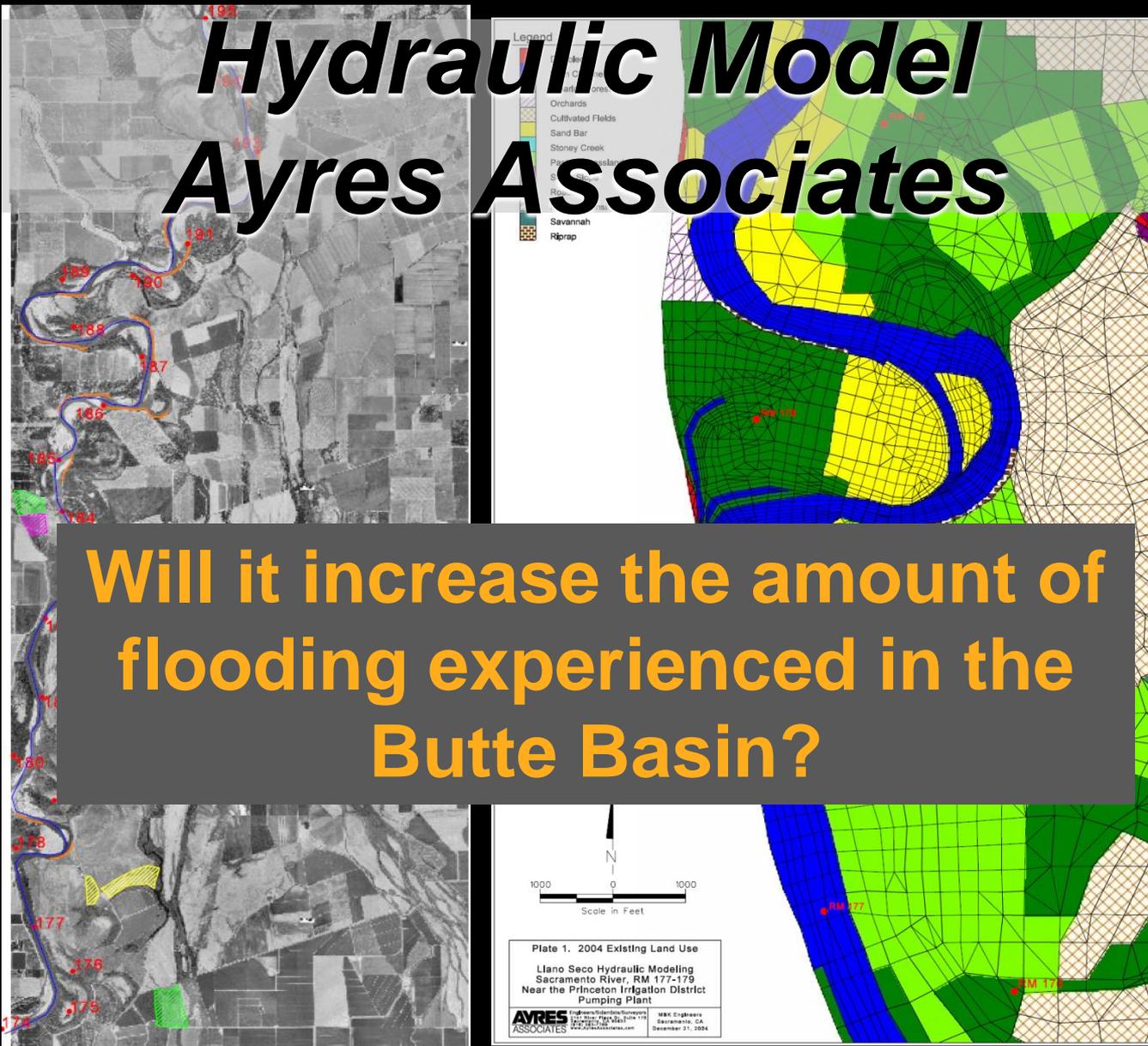


Riprap

Restoration Feasibility Study River Partners

**Will habitat restoration
impact flow conveyance?**

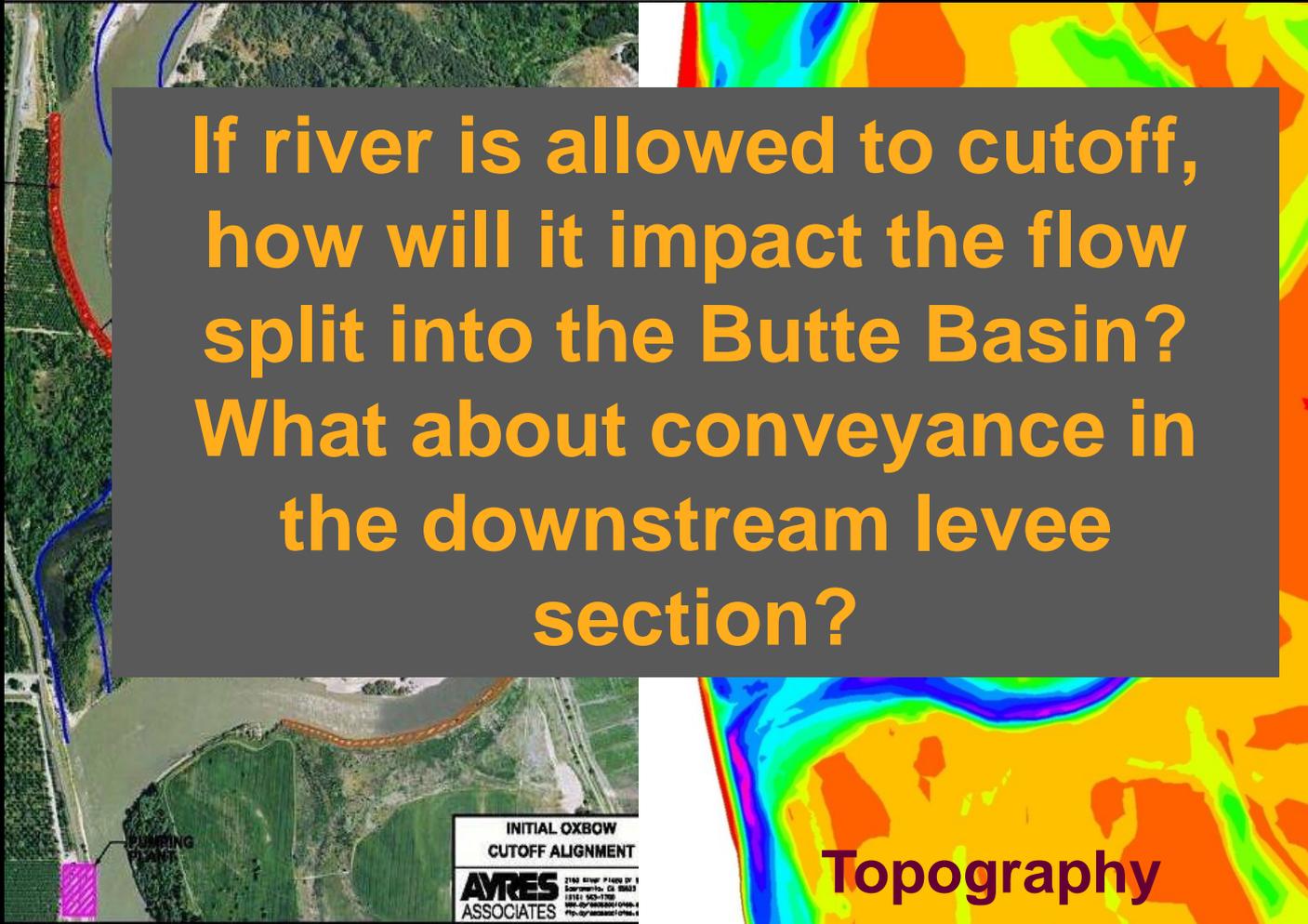
Hydraulic Model Ayres Associates

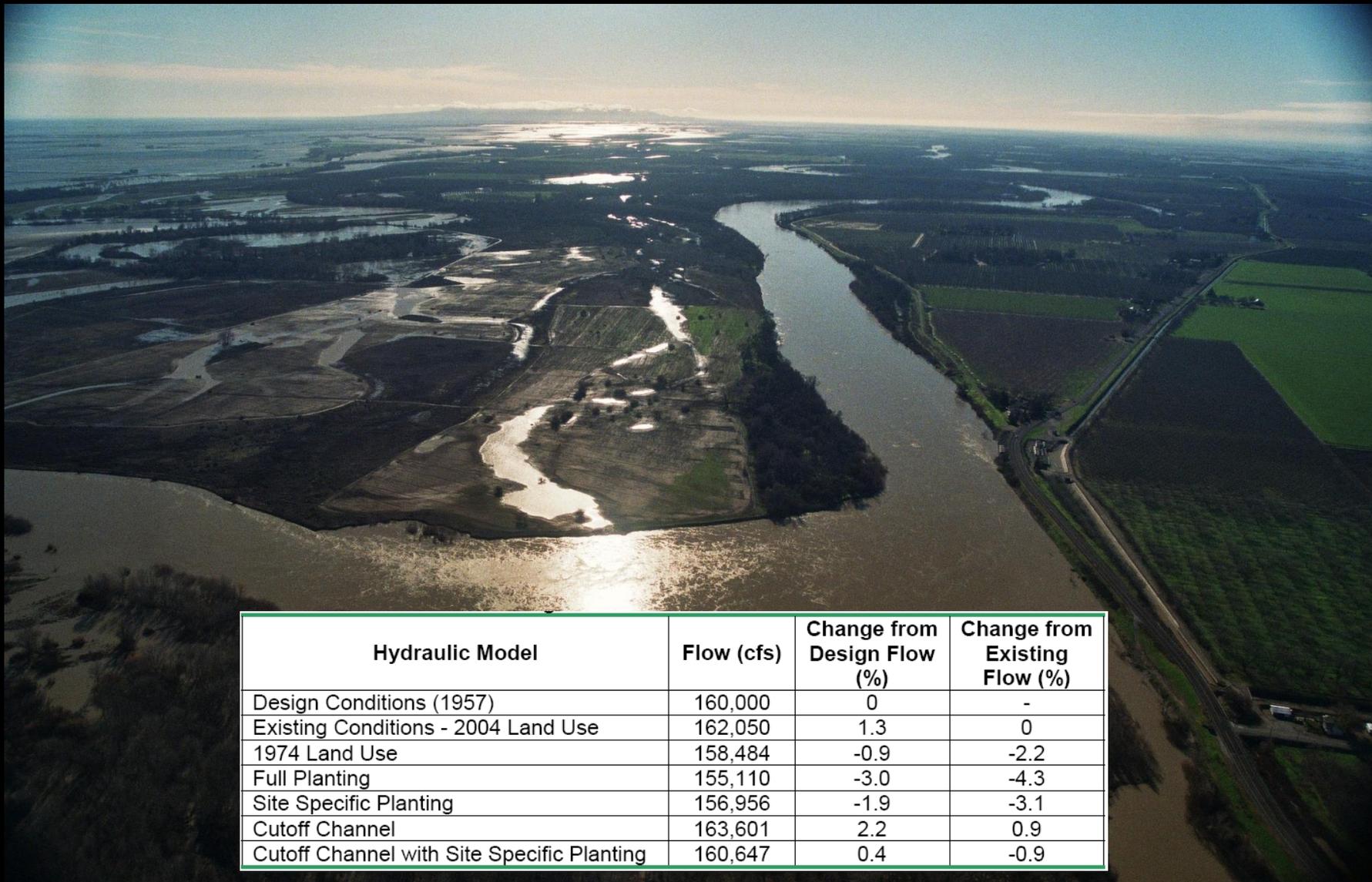


Will it increase the amount of flooding experienced in the Butte Basin?

Potential Alignment of Oxbow Cutoff

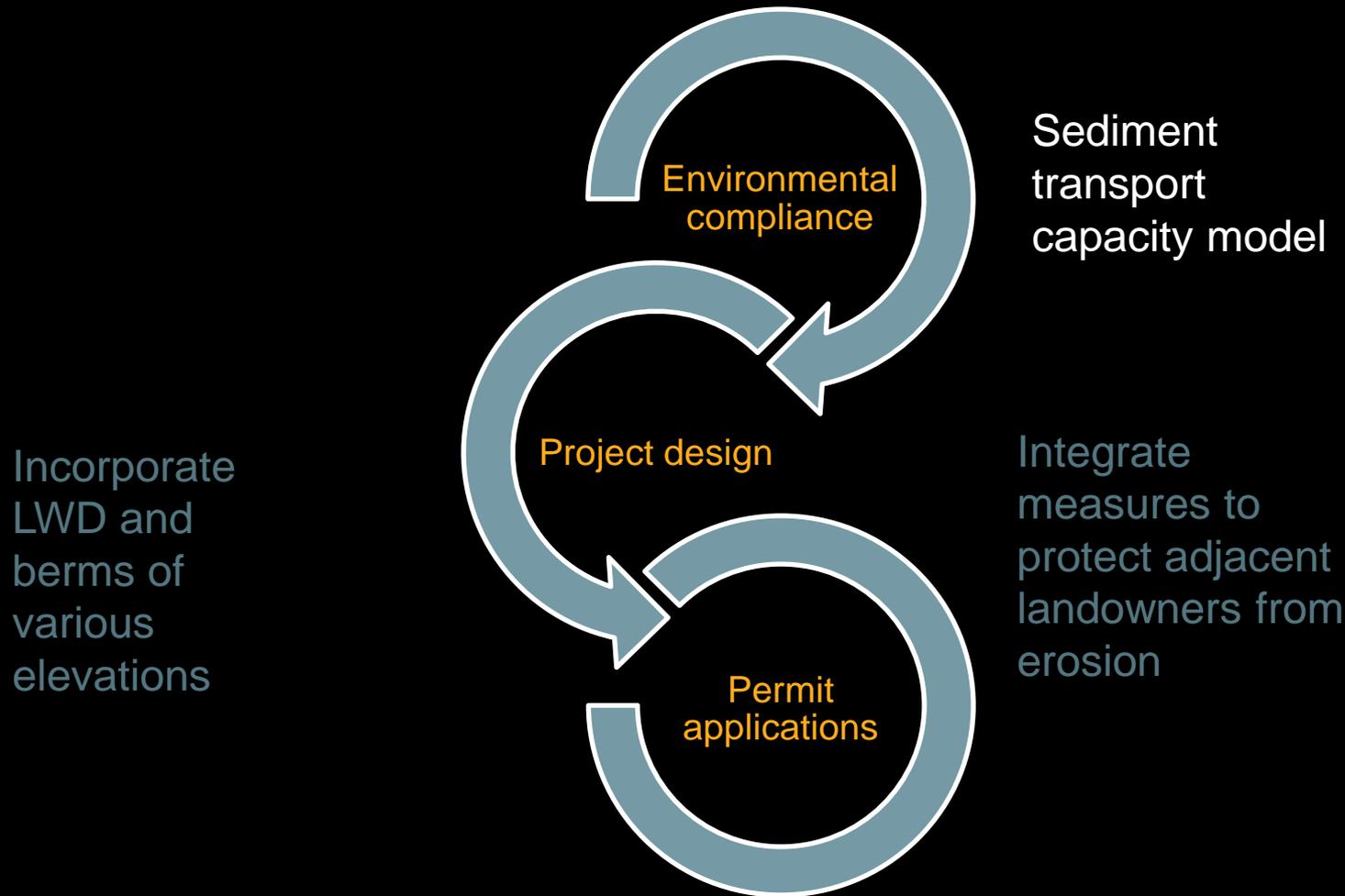
If river is allowed to cutoff, how will it impact the flow split into the Butte Basin? What about conveyance in the downstream levee section?



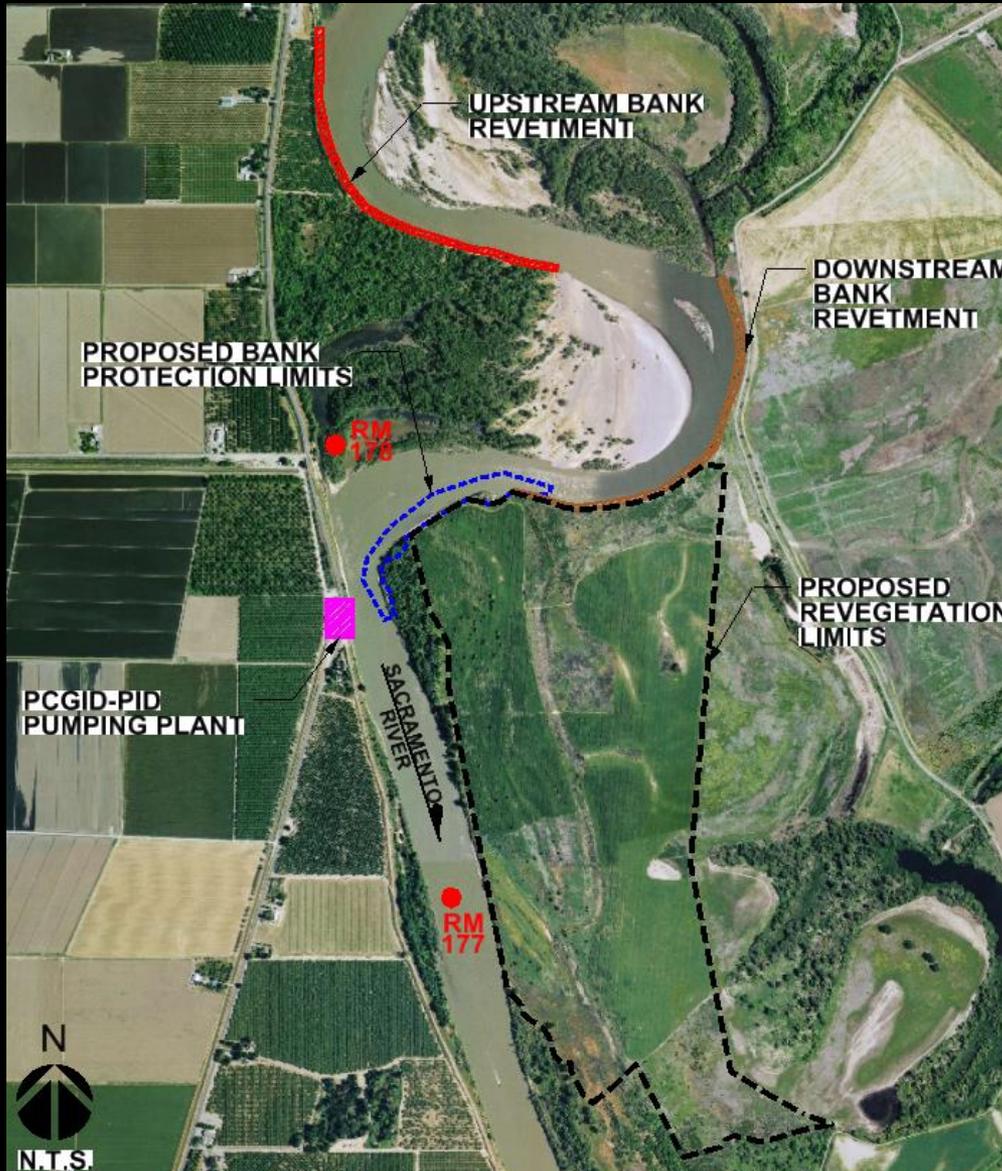


Hydraulic Model	Flow (cfs)	Change from Design Flow (%)	Change from Existing Flow (%)
Design Conditions (1957)	160,000	0	-
Existing Conditions - 2004 Land Use	162,050	1.3	0
1974 Land Use	158,484	-0.9	-2.2
Full Planting	155,110	-3.0	-4.3
Site Specific Planting	156,956	-1.9	-3.1
Cutoff Channel	163,601	2.2	0.9
Cutoff Channel with Site Specific Planting	160,647	0.4	-0.9

Collaborative and Iterative Process



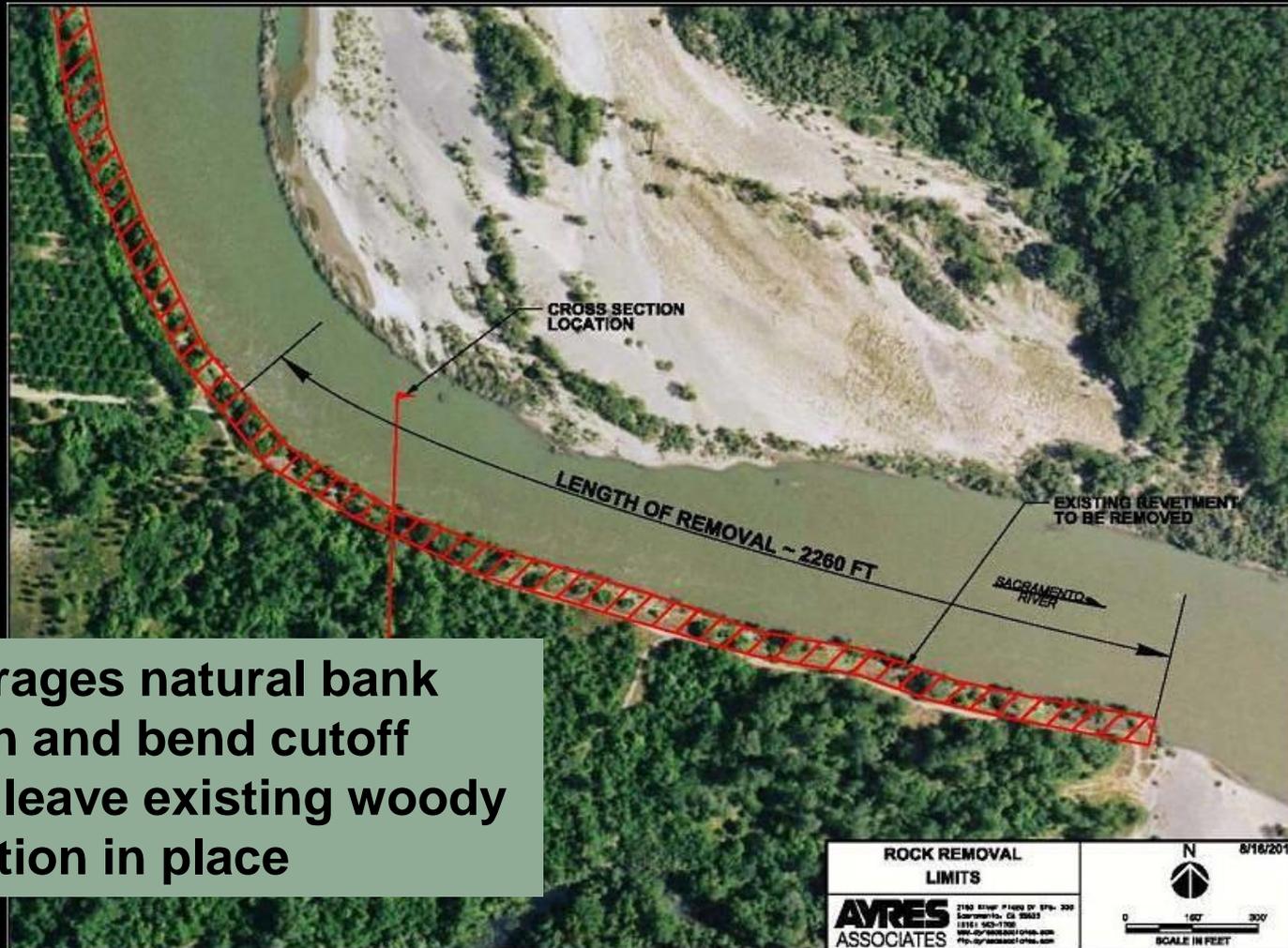




Solution

- Remove 2,200 feet of rock upstream
- Extend revetment 1,900 feet along downstream bend
- Restore 400 acres of riparian habitat
- Allow river to cutoff

Riprap and Upstream Rock Removal



- Encourages natural bank erosion and bend cutoff
- Would leave existing woody vegetation in place

Remove and Reuse Rock and Keep Existing Vegetation



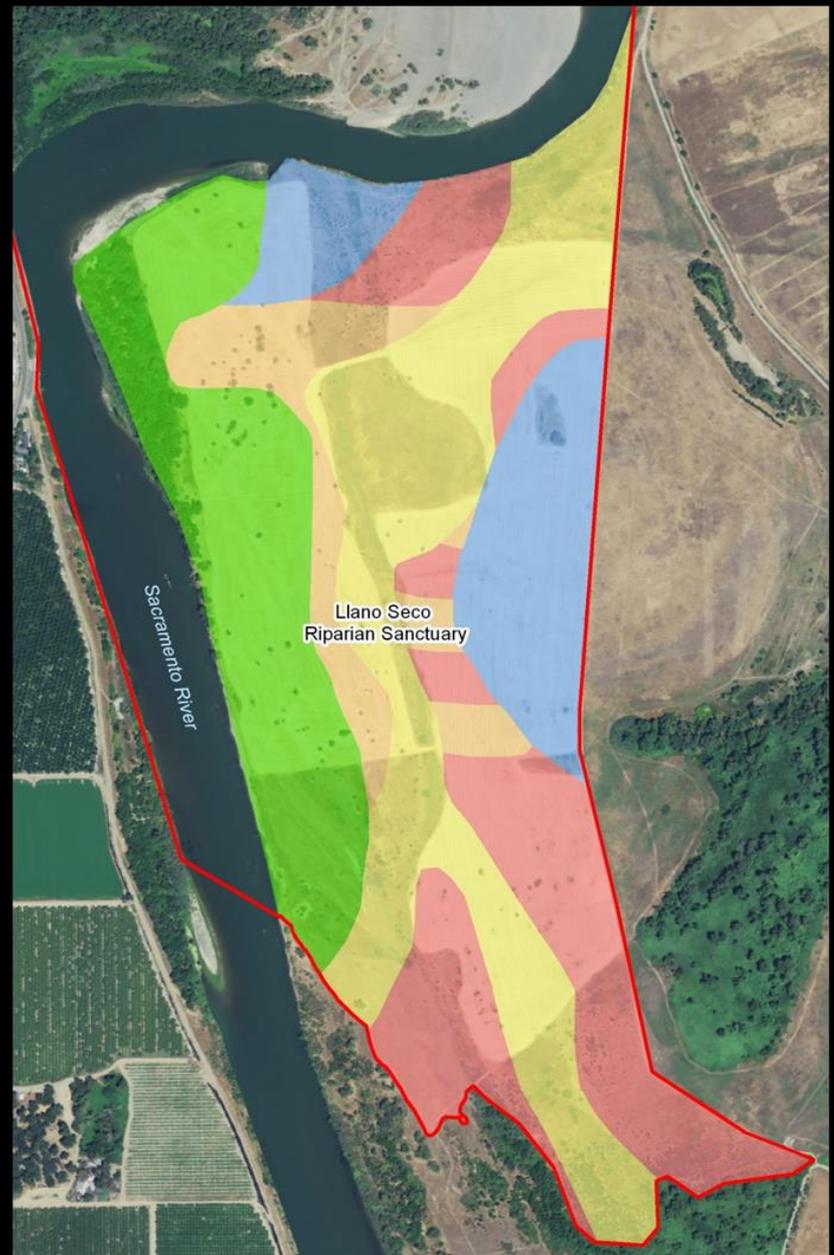
Vegetated Bank with LWD



Site Specific Habitat Restoration

Restoration Design

	Great Valley Grassland
	Elderberry Savanna
	Valley Oak Savanna
	Mixed Riparian Forest
	Valley Oak Woodland



Questions?

<http://www.riverpartners.org/where-we-work/sanctuary/>

River Partners
Contact: Helen Swagerty
(530) 894-5401 ext. 227