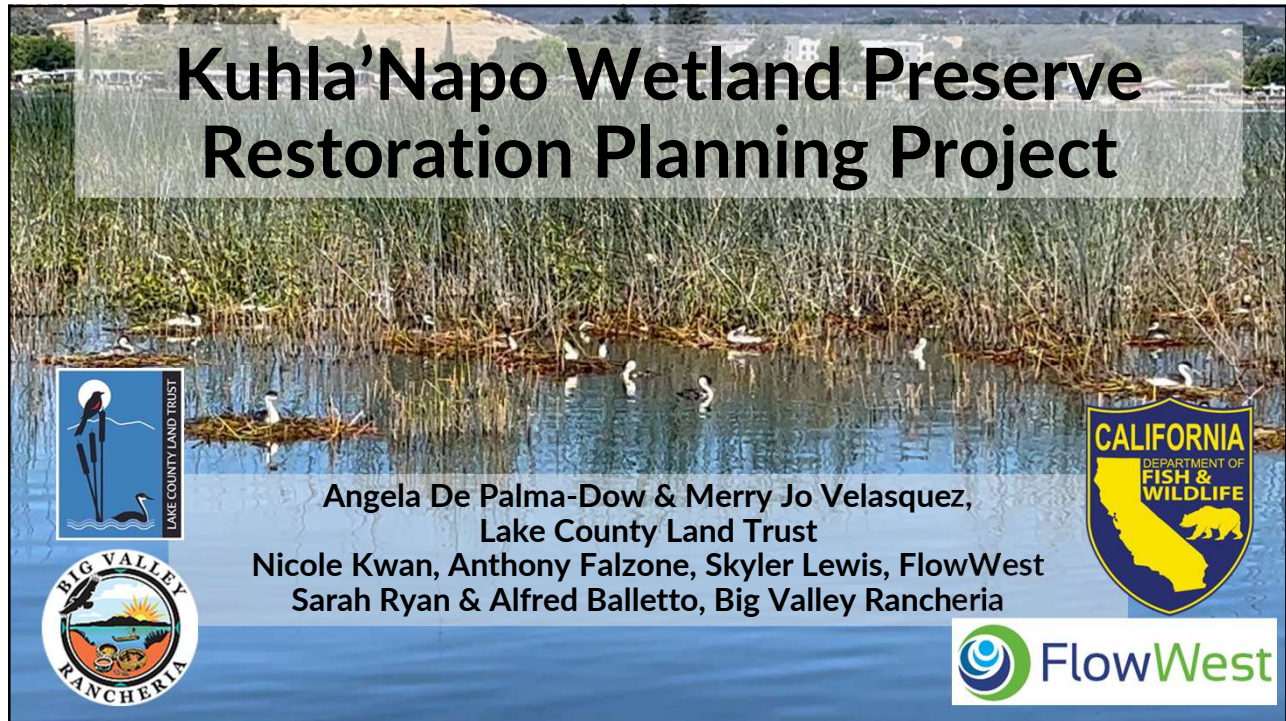




Kuhla'Napo Wetland Preserve Restoration Planning Project

Angela De Palma-Dow & Merry Jo Velasquez,
Lake County Land Trust

Nicole Kwan, Anthony Falzone, Skyler Lewis, FlowWest
Sarah Ryan & Alfred Balletto, Big Valley Rancheria






1




Lake County Land Trust Mission: to conserve and restore land and water resources of important environmental, scenic, cultural, and historic value on behalf of present and future generations.

2

Lakeport adjacent - diverse recreational opportunities



3

Important to Clear Lake and Lakeport

- Clear Lake has water quality Issues
 - Lost about 85% wetlands
 - 303d listed, TMDL sediment phosphorus
- Regional Importance
 - Fishing economy and ecology
 - Year-round drinking water to 66% county population - includes Lakeport
- This is a multi benefit project
 - Flood Protection
 - Hitch & fish habitat protection and creation
 - Nutrient Sediment reduction
 - Recreational & Education access



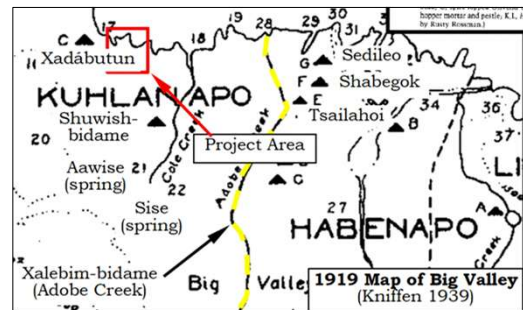
4

Important Indigenous Cultural Site

Kuhla'Napó = Water Lily People

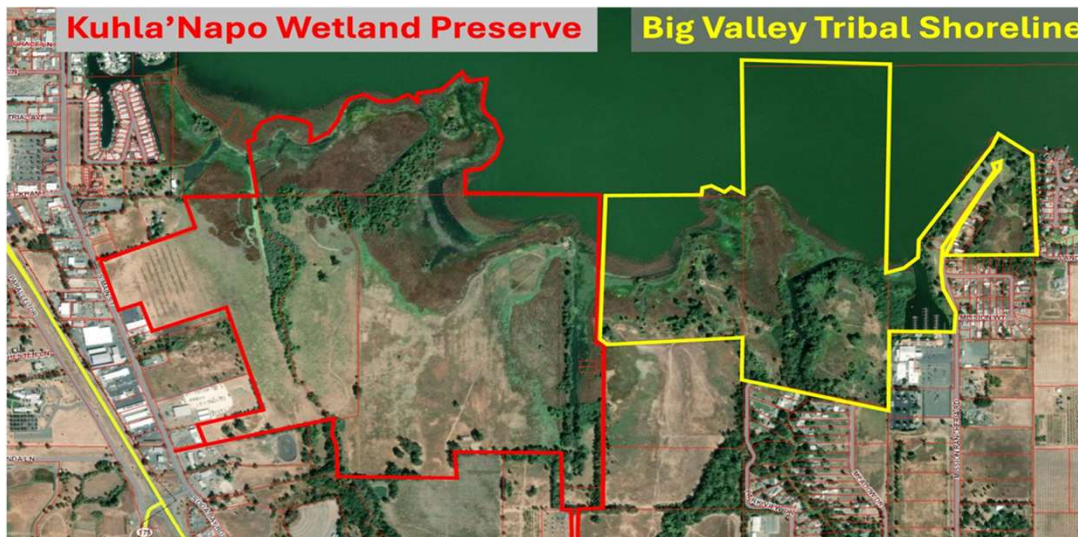
Current Site of Big Valley Band of Pomo Indians

- MOU with Big Valley for Access and Planning
- Co-Management / Stewardship Plan drafted
- Using this as model for future tribal relationships
- Full partners / decision makers
 - Access & Gathering
 - Design decisions
 - Site Security
 - Uses
 - Grant Planning



5

Today: Planning Project 292-acre Kuhla'Napó Preserve in Big Valley Wetland Complex on Manning Creek



6

Manning Creek Delta 1942

- Manning Creek flows through east branch riparian corridor
- Connects to lake at Manning Creek Delta tule wetland complex



7

Manning Creek Delta 1952

- Poof! Manning Creek east branch riparian corridor is gone
- Flow redirected through west branch agricultural canal
- Straightened, hardened, hydromodified



8

Manning Creek Delta 2022

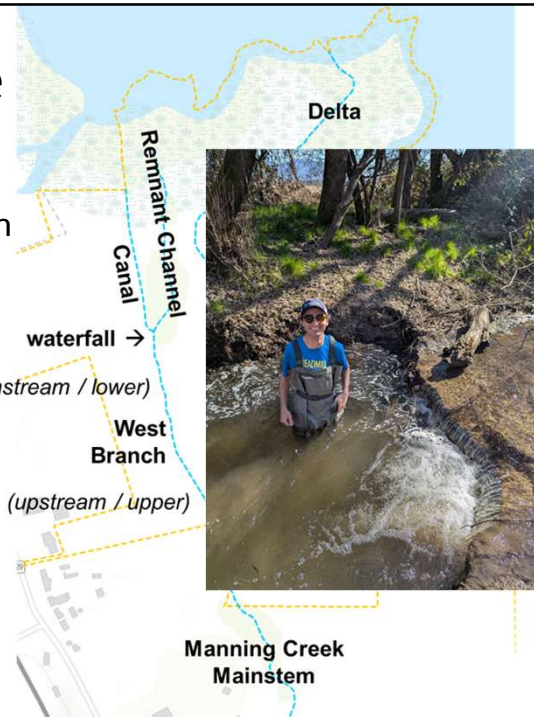
- Steep head cut is hitch passage barrier
- East branch now flows as a secondary channel
- Tule wetlands disconnected from the rest of the floodplain by levees



9

Current Day Issues on Site

- **Creek modification**
 - Increased Bank Erosion & Sedimentation
 - Flooding into nearby ag areas
 - Fish passage barriers
- **Wetland Removal**
 - Less space to absorb and hold nutrients
 - Reduced natural shoreline
 - Reduced native vegetation
 - Area and diversity



10

Fish barriers and Flooding at site

Contribute to fish strandings, sediment and nutrient leaching



11

West Channel Manning Creek straightened, deepened, native vegetation removed and previous wetland drained



Remnant secondary Manning Creek Channel, blocked, debris accumulation, contributes to erosion and blow outs



12

Fish Passage Barrier Removed in 2025



parcel acquired in 2020

Current Fish Passage Barrier (image taken 10/12/2026)



parcel acquired in 2026

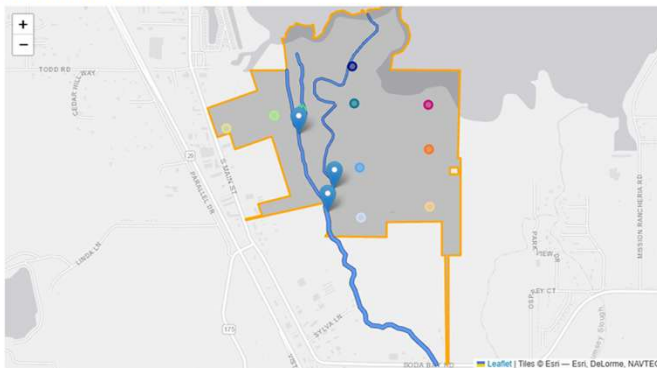
13

Data for Design

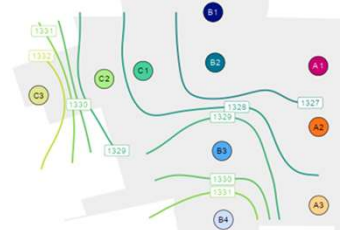
Monitoring Equipment

- Shallow Groundwater Elevation
- Creek Stage and Temperature
- Real Time Data on our Restoration Website

MONITORING LOCATIONS



Piezometer Key Map Showing Example Contours for 1 Jan 2026



Installation with BVBPI Tribal monitor present

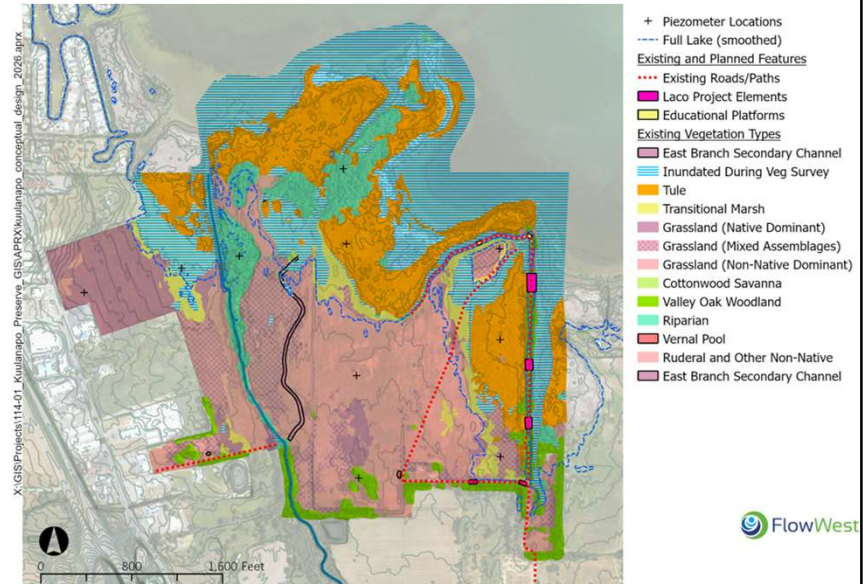


14

Data for Design

Vegetation Mapping

- Current vegetation conditions:
 - established tule beds
 - non-native invasives
 - oak woodlands

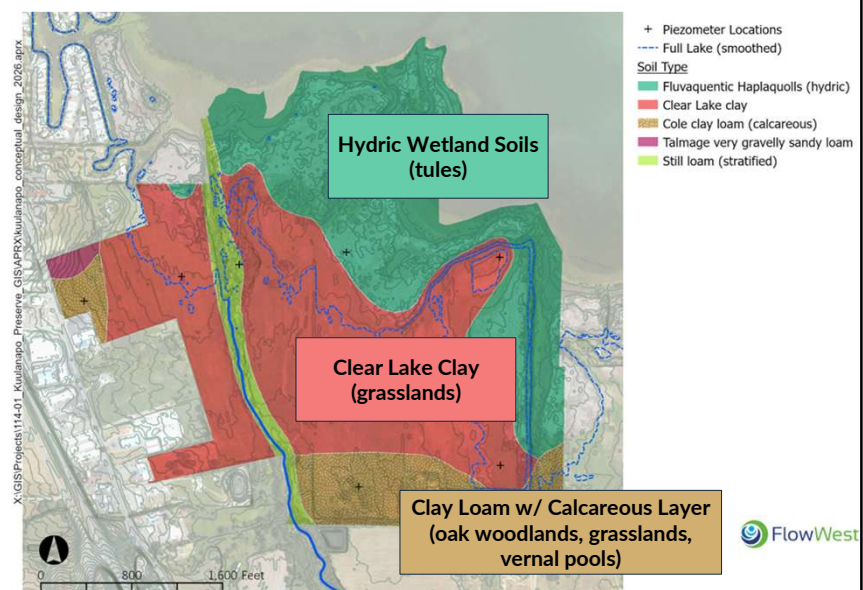


15

Data for Design

Soils Mapping

- Current soils conditions:
 - hydric wetland soils
 - clear lake clay
 - clay loam

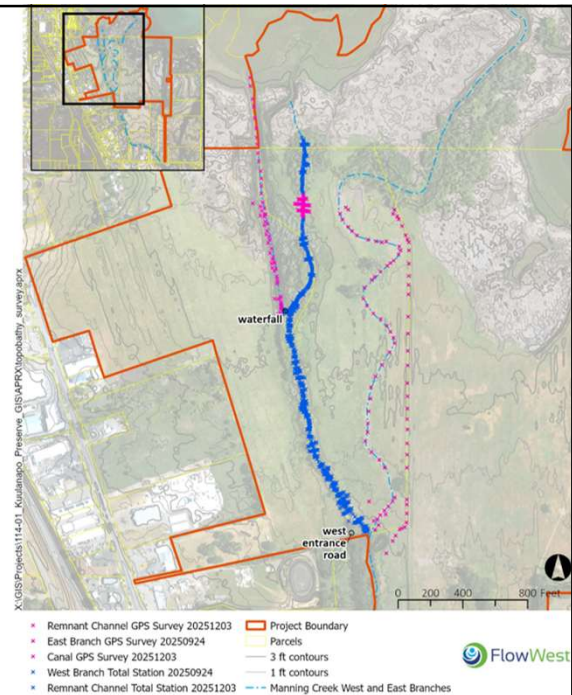
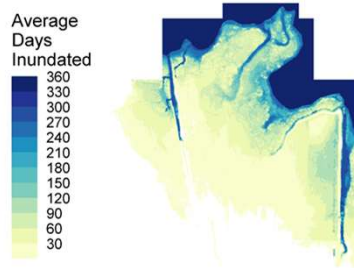


16

Data for Design

Bathymetry & Hydrology

- Collected new bathymetric data via field survey
- Analyzed:
 - Lake elevation statistics
 - Inundation frequency
 - Elevation ranges of existing vegetation

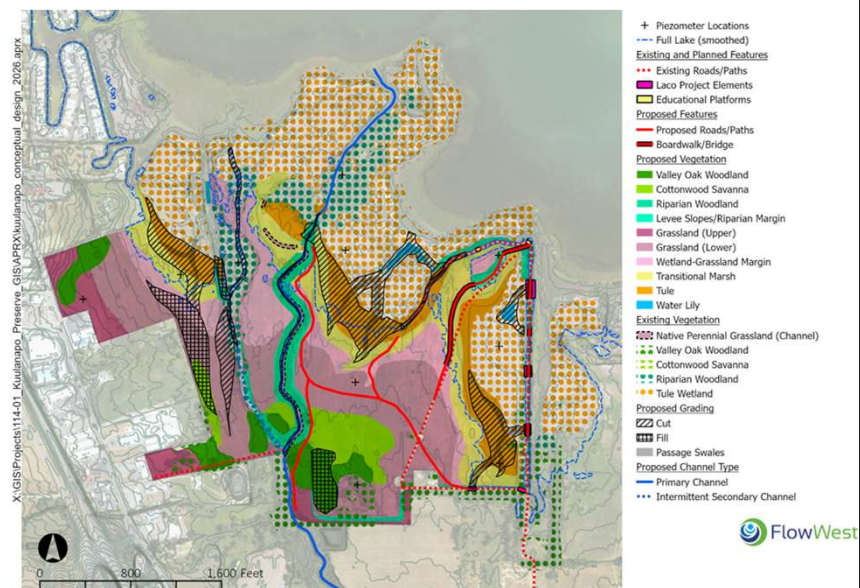


17

Restoration Plan

Overview

- Main areas of focus:
 - Manning Creek
 - Planting and Wetlands
- Started with a conceptual design and advanced to 30%
 - Project will take this to 100% design with submitted permit applications

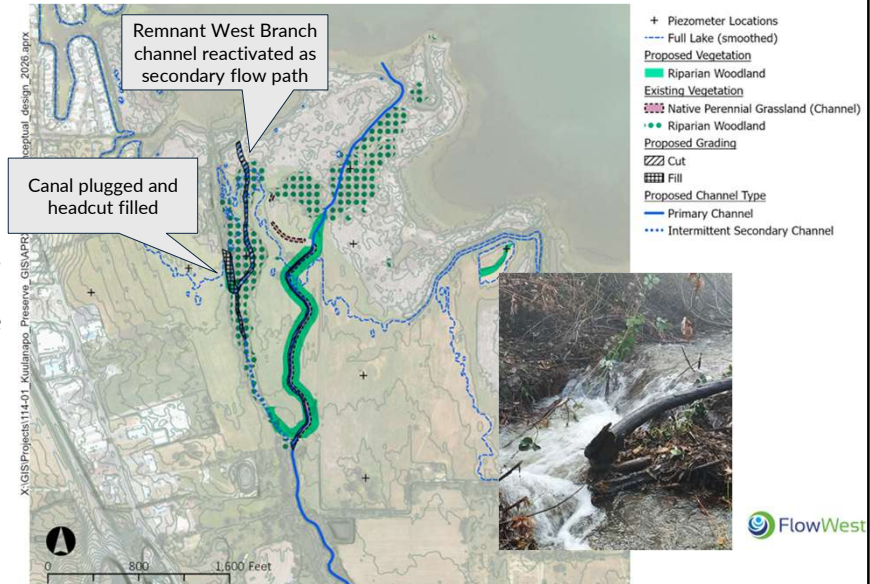


18

Restoration Plan

Manning Creek

- Considered 5 different alternatives to improve hitch passage and prevent stranding
 - Preferred alternative restores the creek to its historical alignment through the tules of the Manning Creek delta

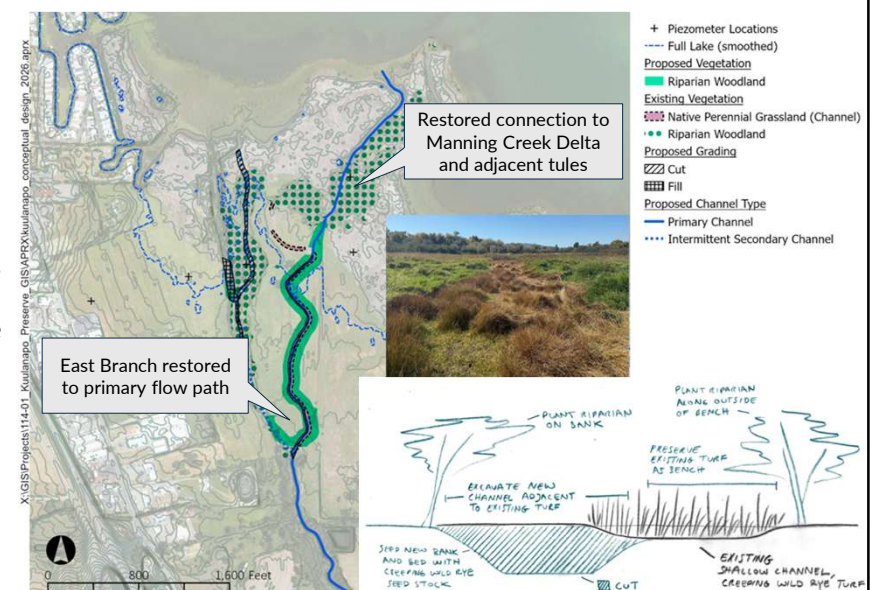


19

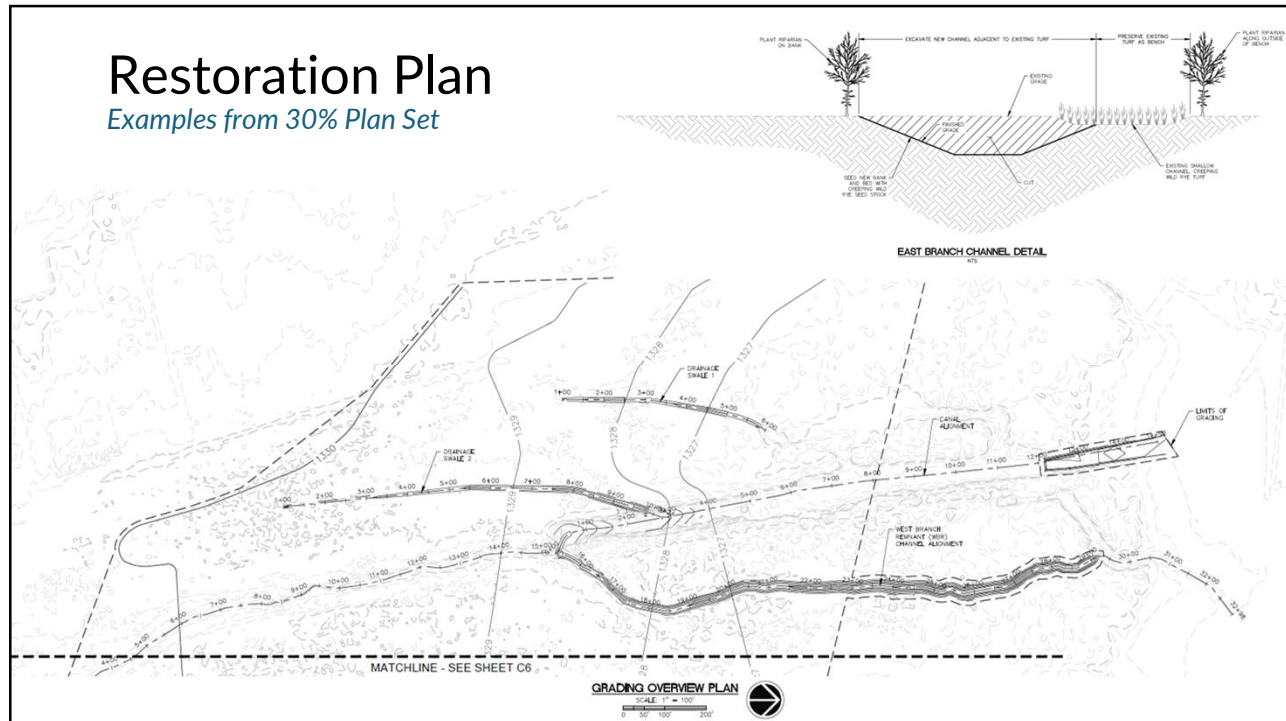
Restoration Plan

Manning Creek

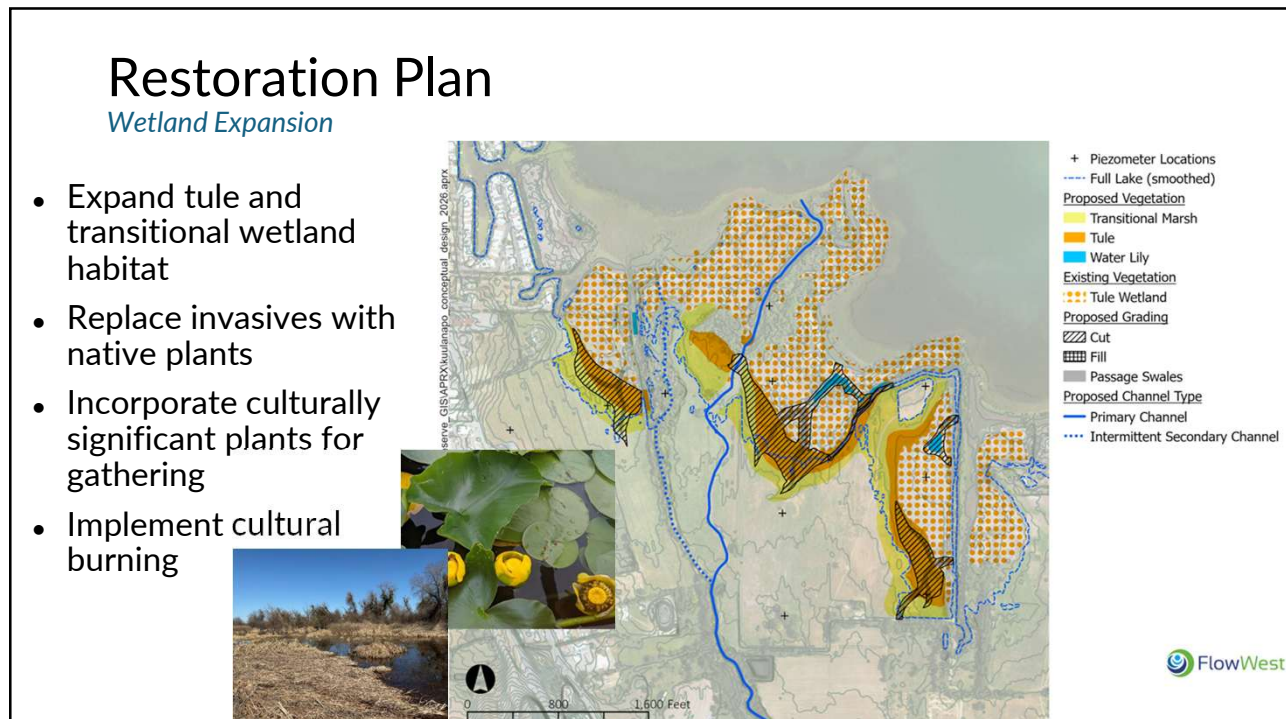
- Considered 5 different alternatives to improve hitch passage and prevent stranding
 - Preferred alternative restores the creek to its historical alignment through the tules of the Manning Creek delta



20



21



22



23

Conclusion

- Research is essential!
 - Historical information maximizes restoration potential - maps & aerial imagery
 - Integrate site data: groundwater monitoring, vegetation mapping, and elevation analysis
- Wetland / floodplain recreation and reconnection will improve Clear Lake
 - Reduce nutrient input into lake and sources
 - Increase shoreline habitat
 - Improve nearby ecology – Lakeport!
- Collaboration with Tribal partners
 - Historical ecology and land use
 - Stewardship, design, and use planning

24

