



Fish Passage Improvements on Manning Creek as Part of the Kuhlmanapo Wetland Preserve Restoration Project

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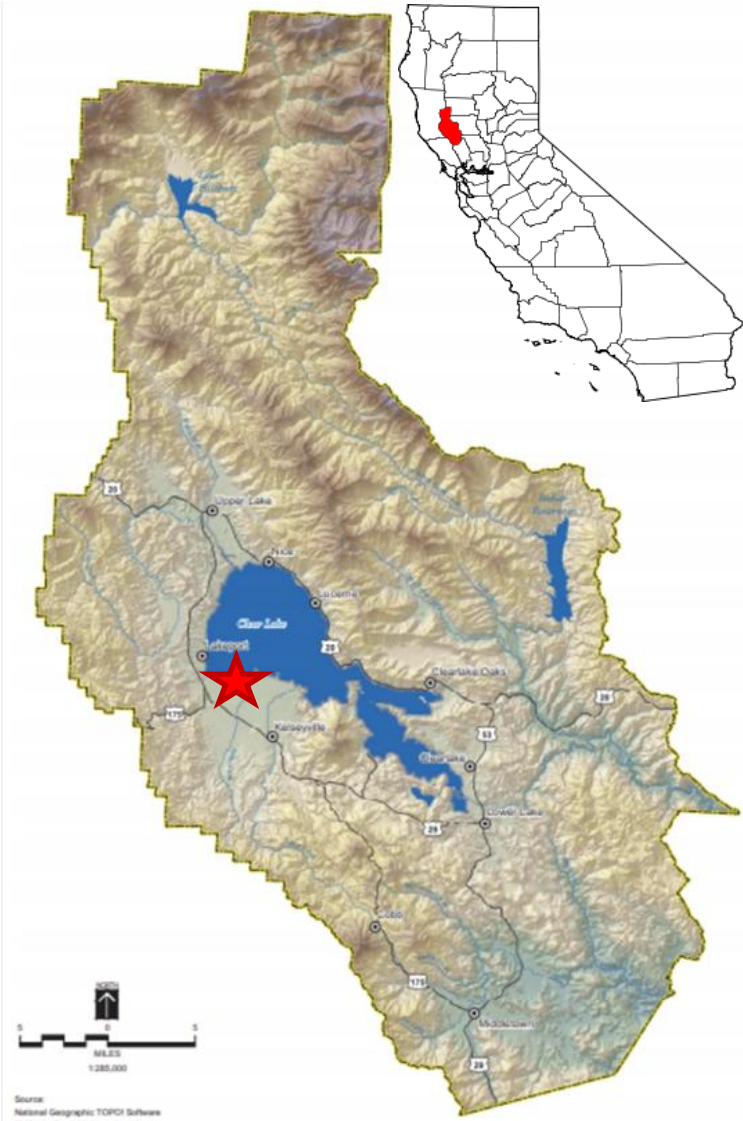




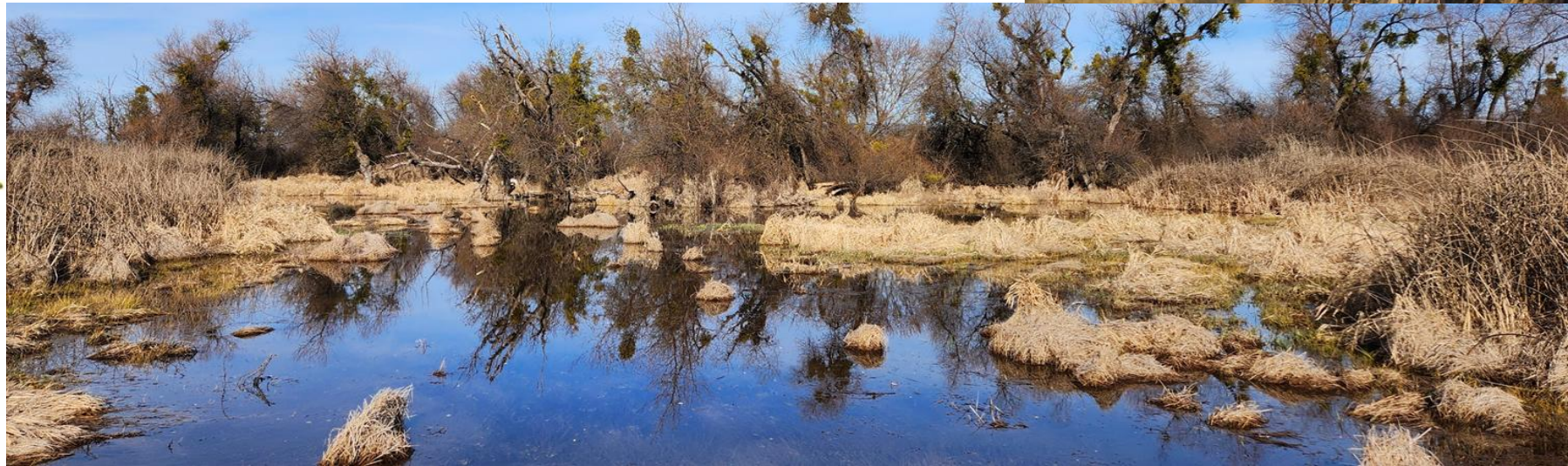
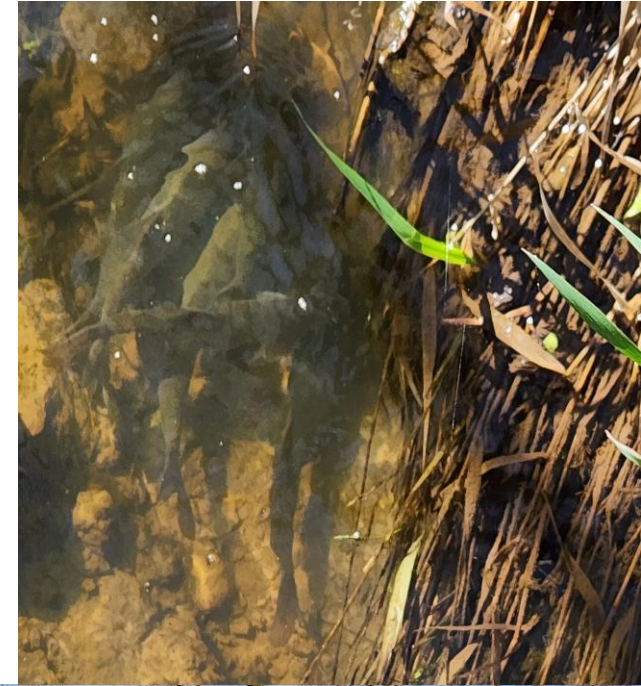
Lake County Land Trust Mission: to conserve and restore land and water resources of important environmental, scenic, cultural, and historic value on behalf of present and future generations.



Added Restoration to Our Vision - *Focus on Clear Lake Hitch*



- **Priority natural shorelines, wetlands, tributaries**
- Hitch spring stream spawning
- Use wetlands and shorelines when streams are dry
- Juveniles spawn & grow in shoreline / littoral zones





Today: Planning Project 283-acre Kuhlano Preserve in Big Valley Wetland Complex on Manning Creek

Kuhlano Wetland Preserve

Big Valley Tribal Lands



**CDFW \$1.2 M
restoration
planning grant**

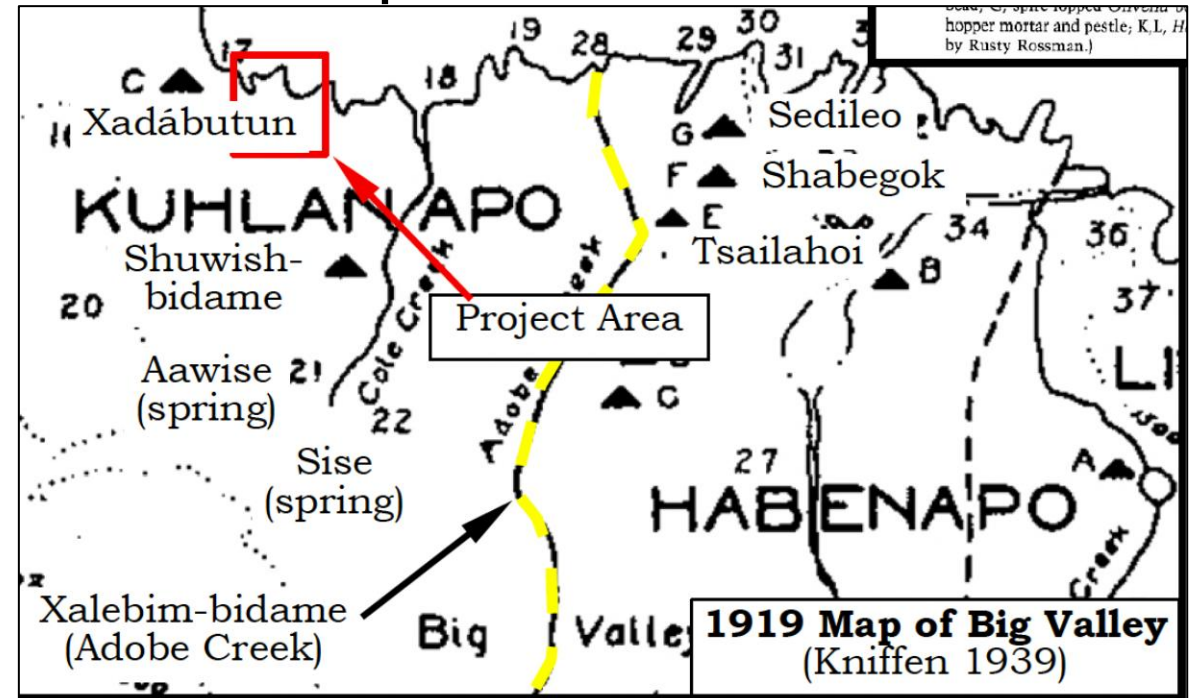


Important cultural site

Kuhlanapo = Water Lily People

Current Site of Big Valley Band of Pomo Indians

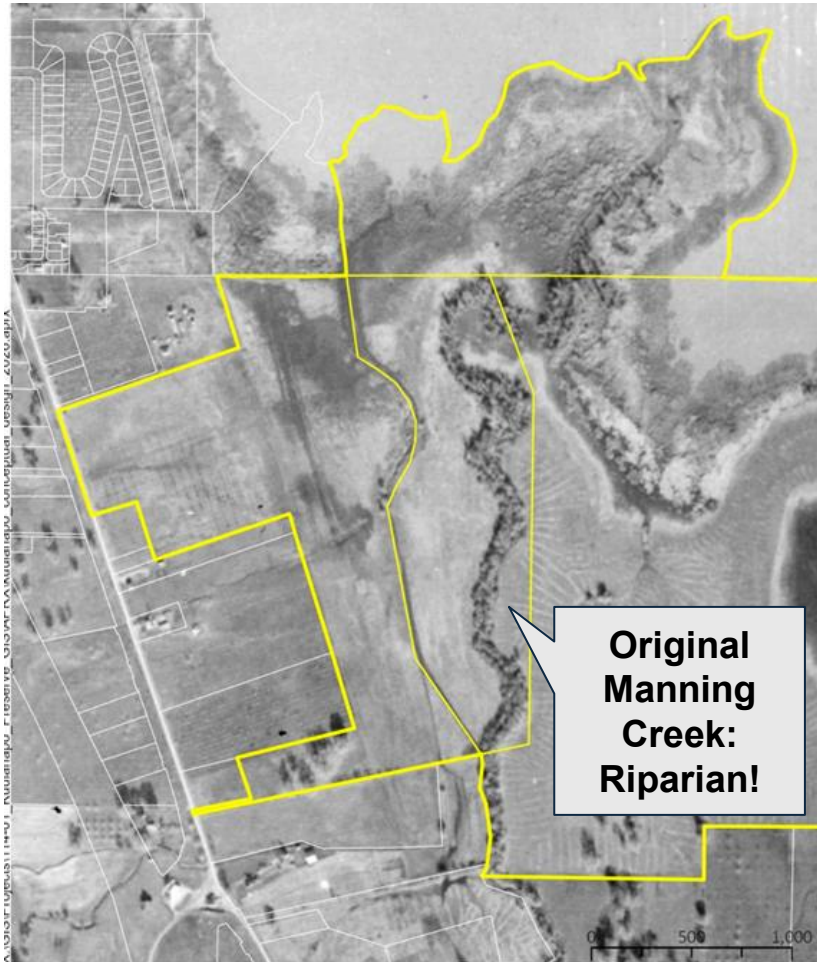
- Current MOU with Big Valley for Access and Planning
- Co-Management / Stewardship Plan in draft form
- Using this as model for future tribal relationships
- Full partners / decision makers
 - Access & Gathering
 - Design decisions
 - Site Security
 - Uses
 - Grant Planning



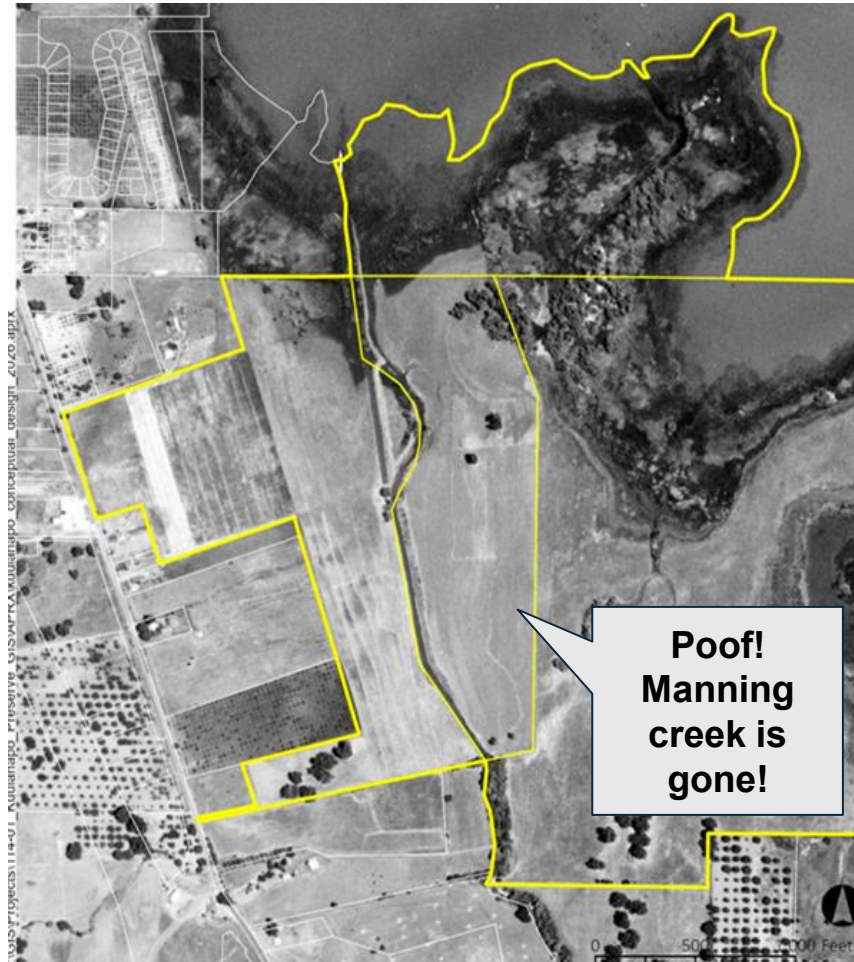
Manning Creek Site History

A picture is worth 1,000 words.....or a \$1.2 Million planning grant

1942



1952

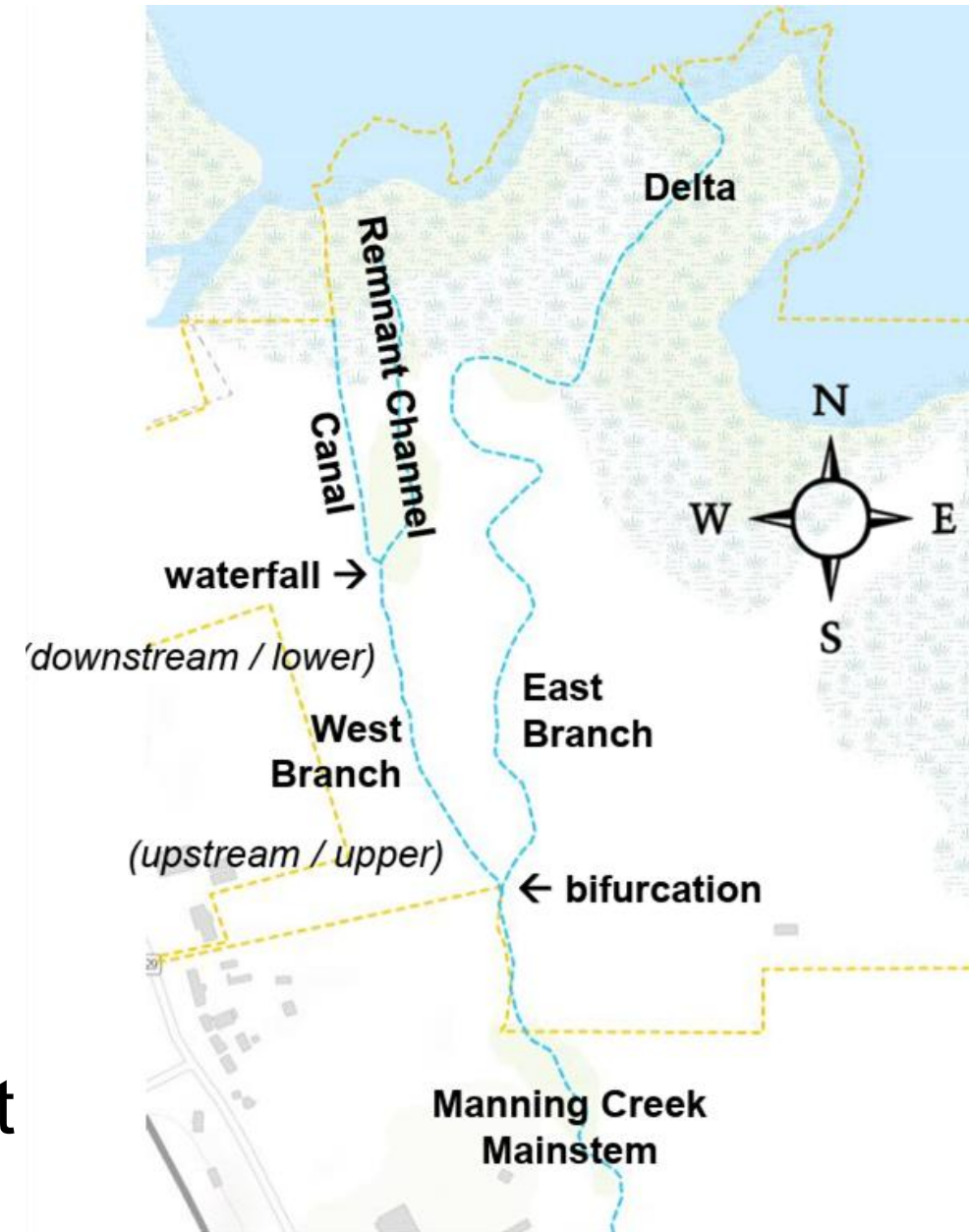


2022



Current Day Issues on Site

- Head cuts (waterfalls)
 - Passage barriers for Hitch
 - Bed and bank erosion
- Reduced channel conveyance
 - Flooding where Hitch get stranded
 - Contribute nutrients
- Sediment deposition and LWD jams
 - Clogged stream channels
- Loss of native, culturally important plant species



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The east and west Manning Creek today is not preferred hitch habitat

West Channel (dredged & straightened, primary channel by 1952)



Wet - East (original site) channel



Dry - East (original site) channel



Flooding at site

Contribute to fish strandings, sediment and nutrient leaching



Head cuts and remnant channel barrier

Enlargement of 1952 aerial image.

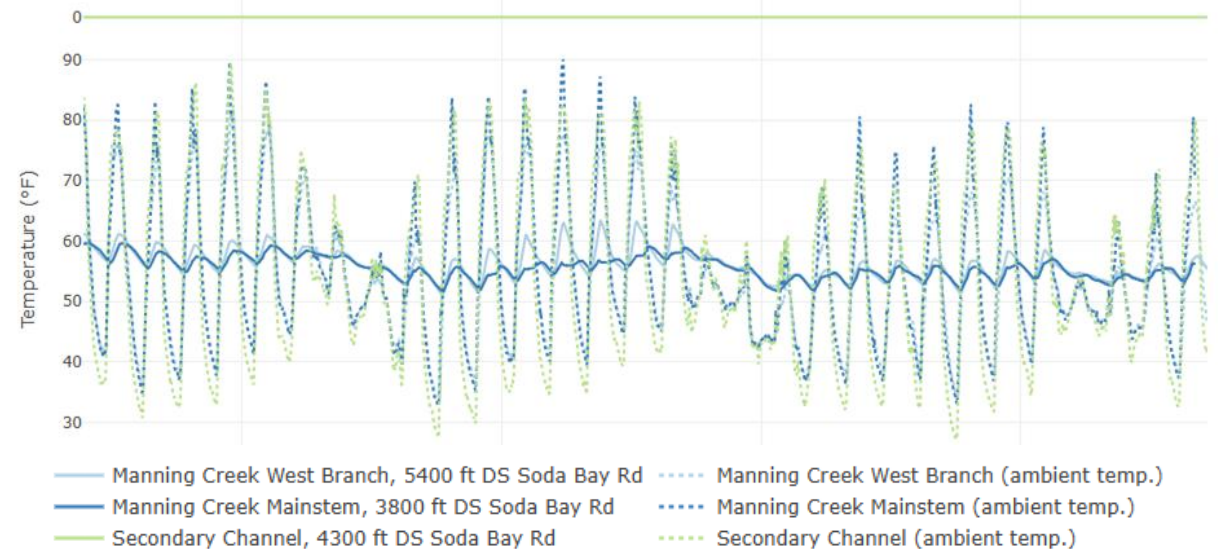
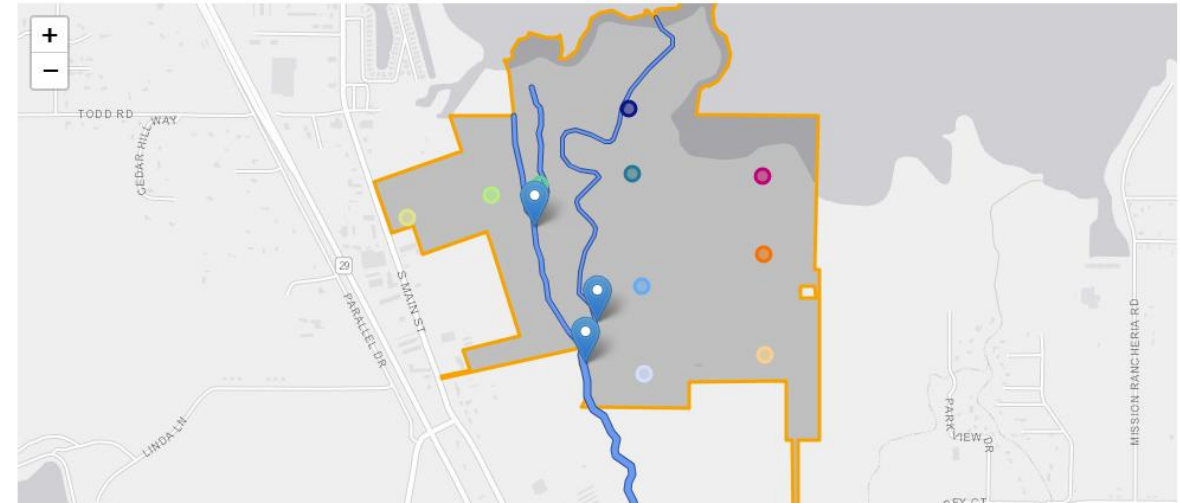


Data for Design

- Stage, Temperature
- Shallow Groundwater Elevation
- Real Time Data On our Restoration Website



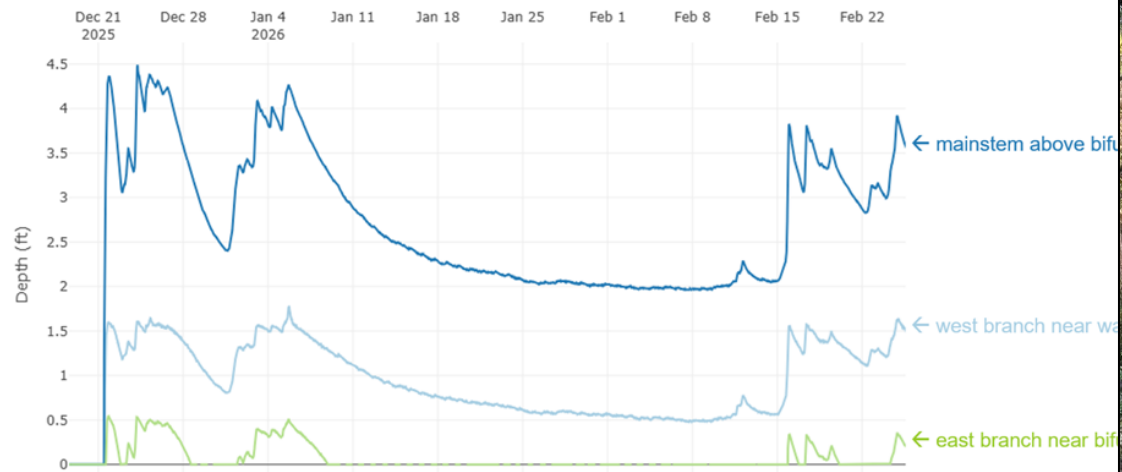
MONITORING LOCATIONS



<https://www.lakecountylandtrust.org/lands/kuhlanapo-wetland-restoration>

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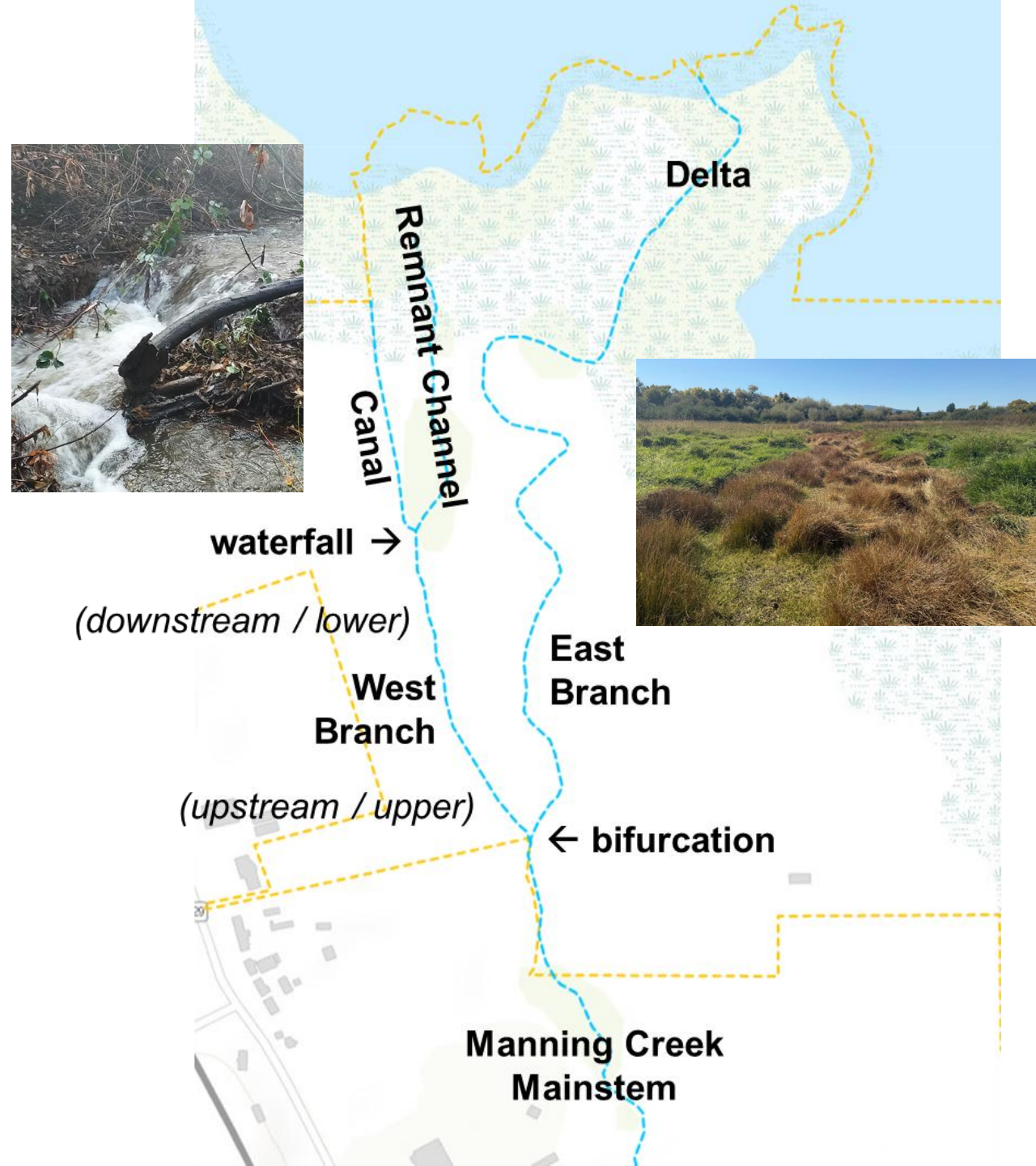


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Manning Creek Restoration

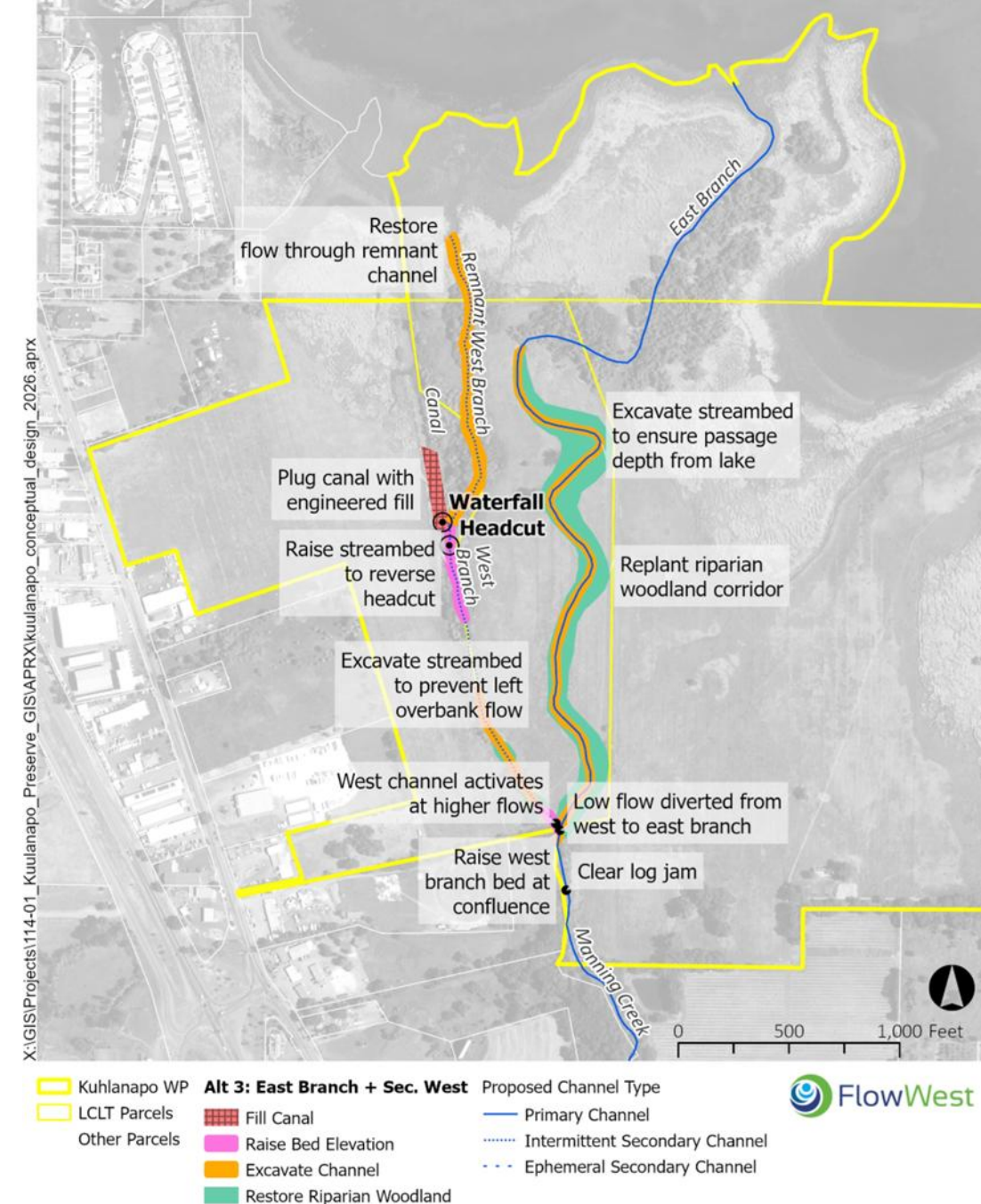
Design goals:

- Keep more flow in the channel to reduce stranding and maintain passage
- Eliminate headcut barrier that is present when lake levels are low
- Restore historic channel alignments



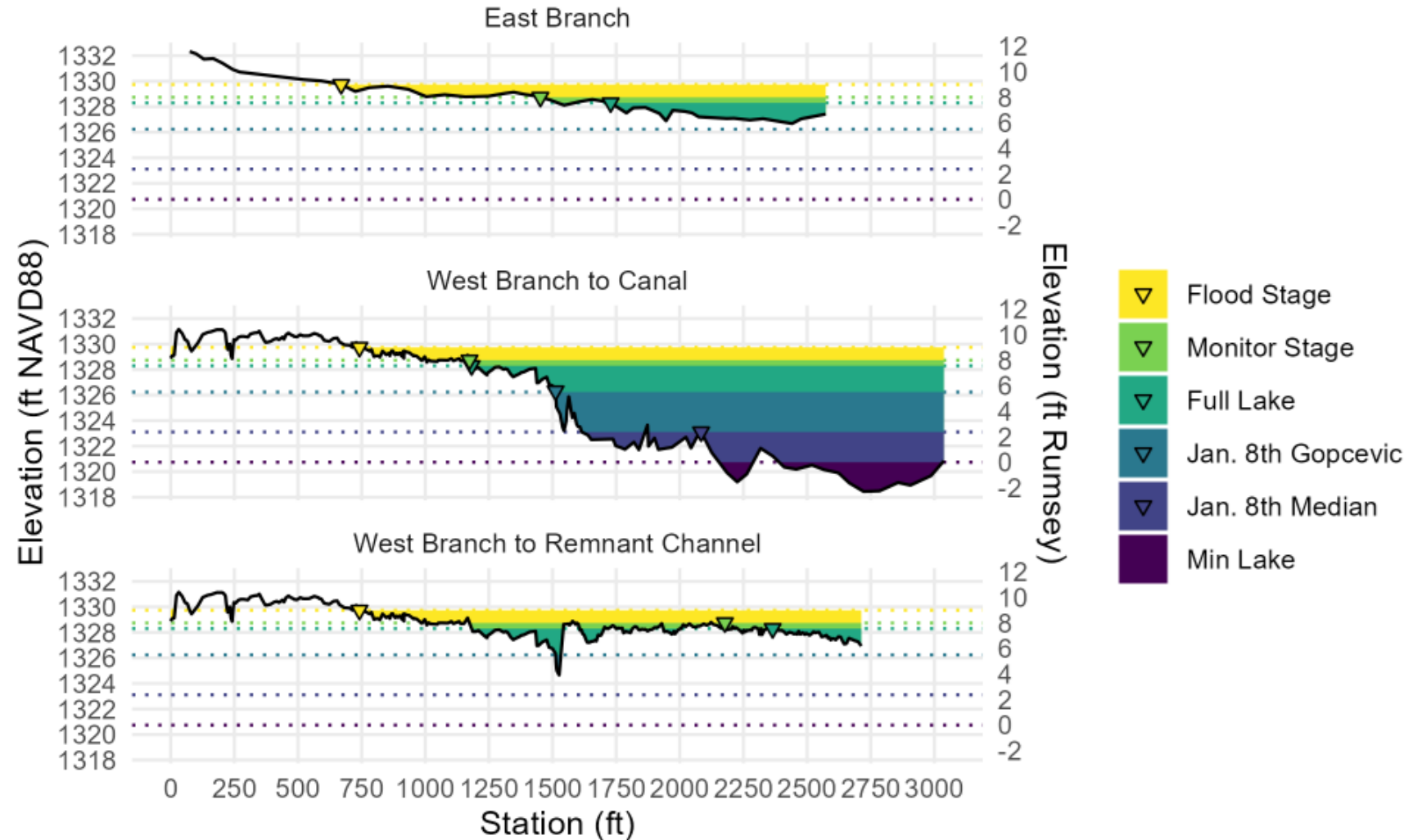
Design Alternatives

- Considered 5 different design alternatives
 - Minimum included fixing the headcut with step/vane features
- Preferred alternative bypasses the headcut by restoring a remanent channel & the main flow path through the historic meandering east branch



Channel Profiles

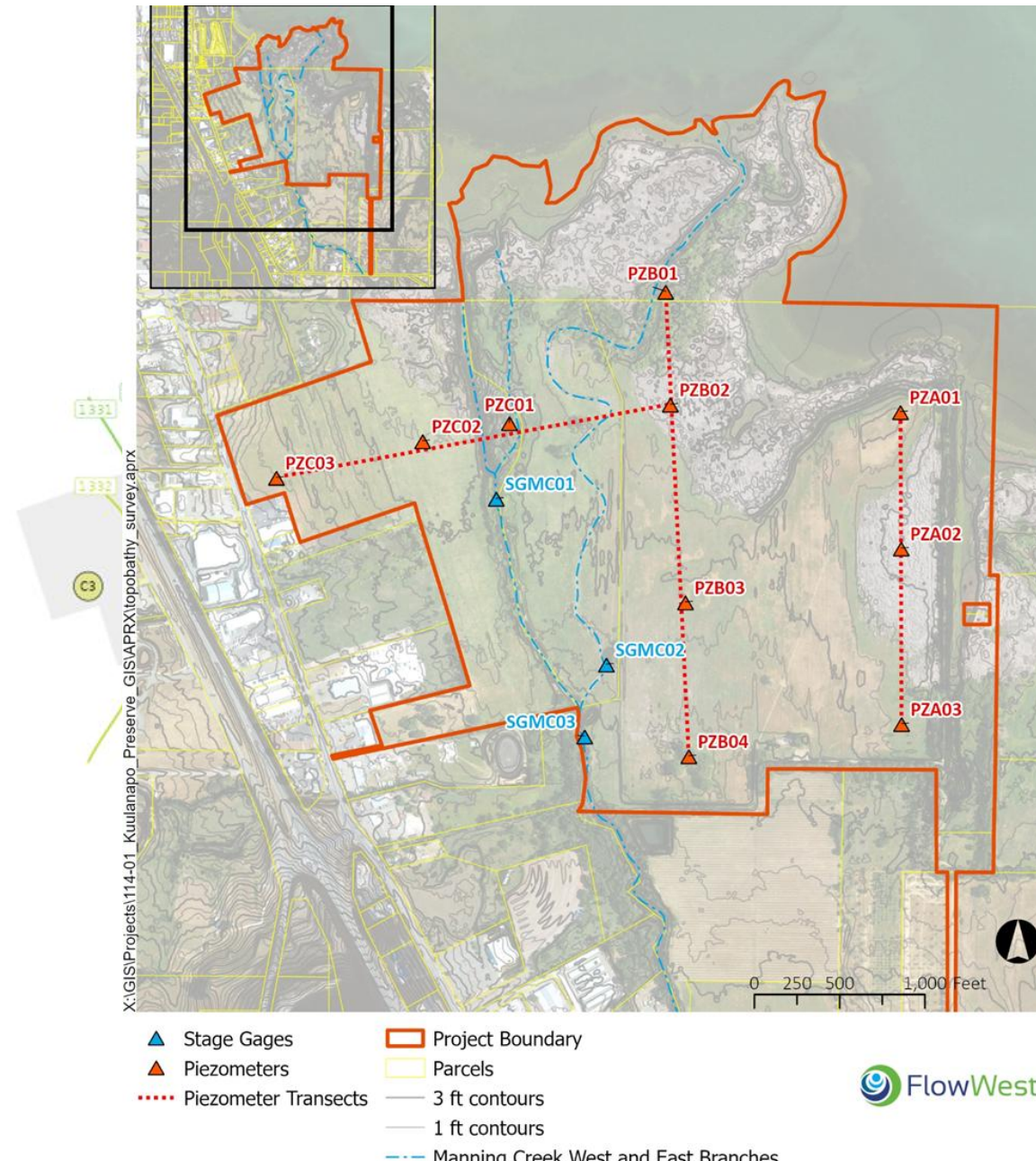
- Will require excavation to restore the East Branch
- Material can be used on site to plug the West Branch and create upland surfaces



Shallow groundwater Monitoring

Piezometers:

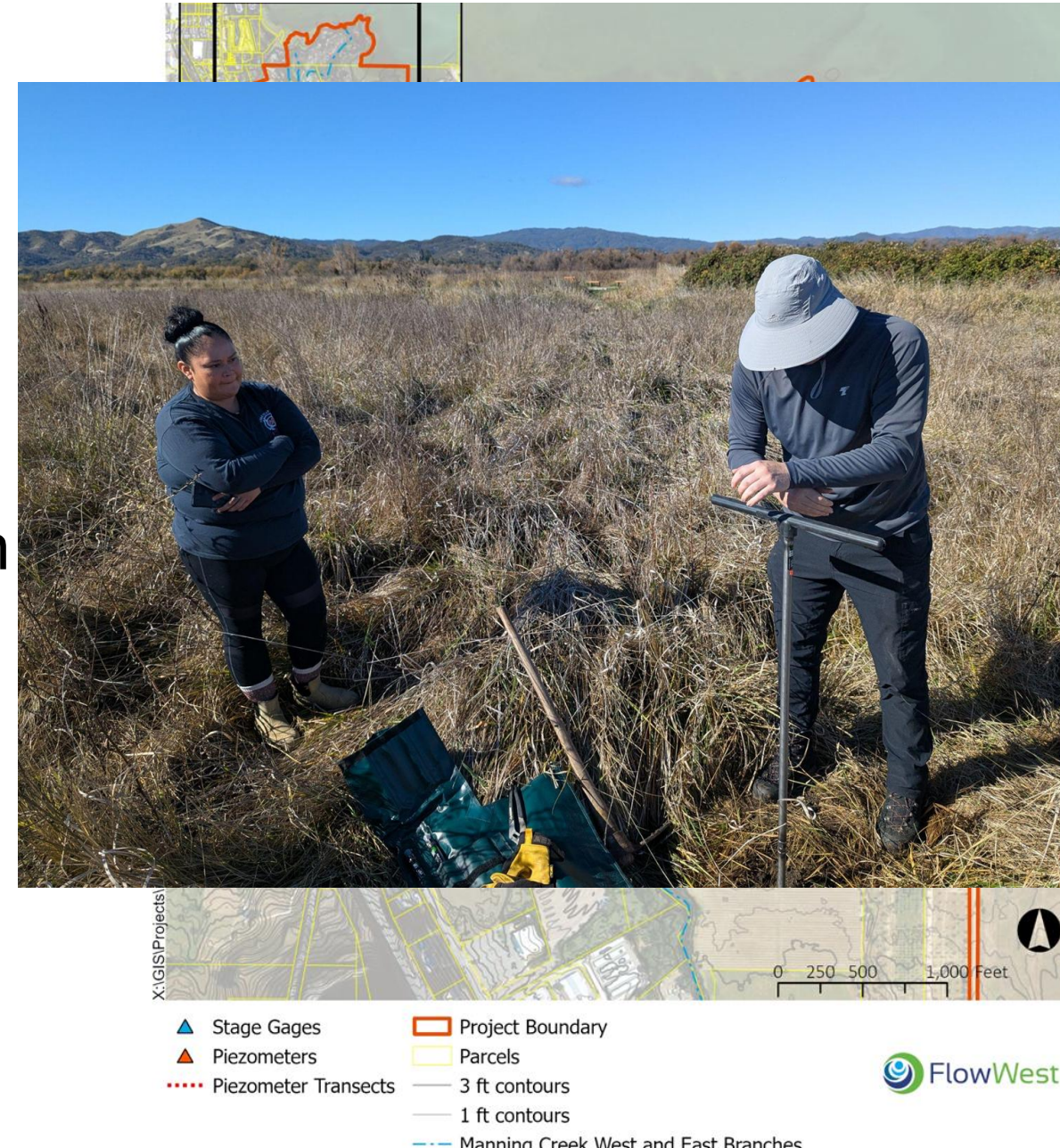
- Hand augered 10 shallow groundwater monitoring wells
- Tribal monitor on site
- Pressure transducers record depth and temperature
- Installed in transects to capture different
 - soil types
 - vegetation communities
 - distance from the lake



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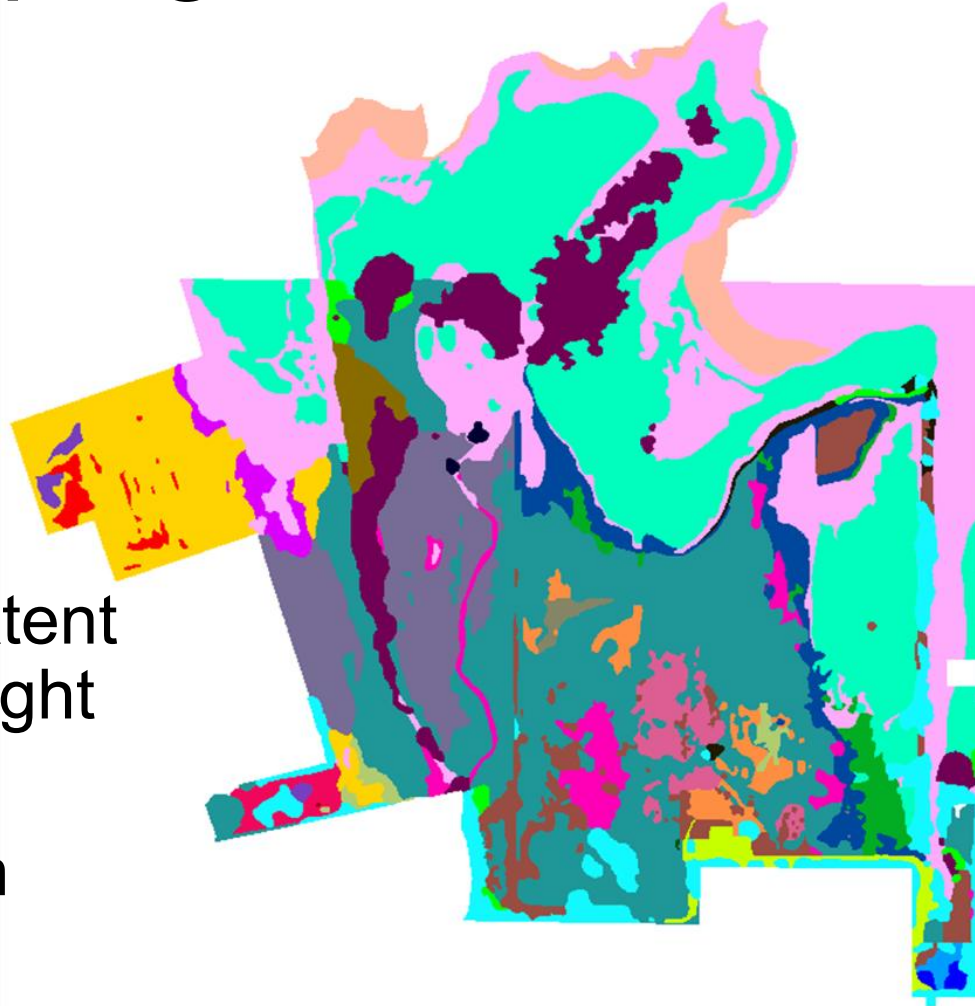
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Vegetation Mapping

Current conditions:

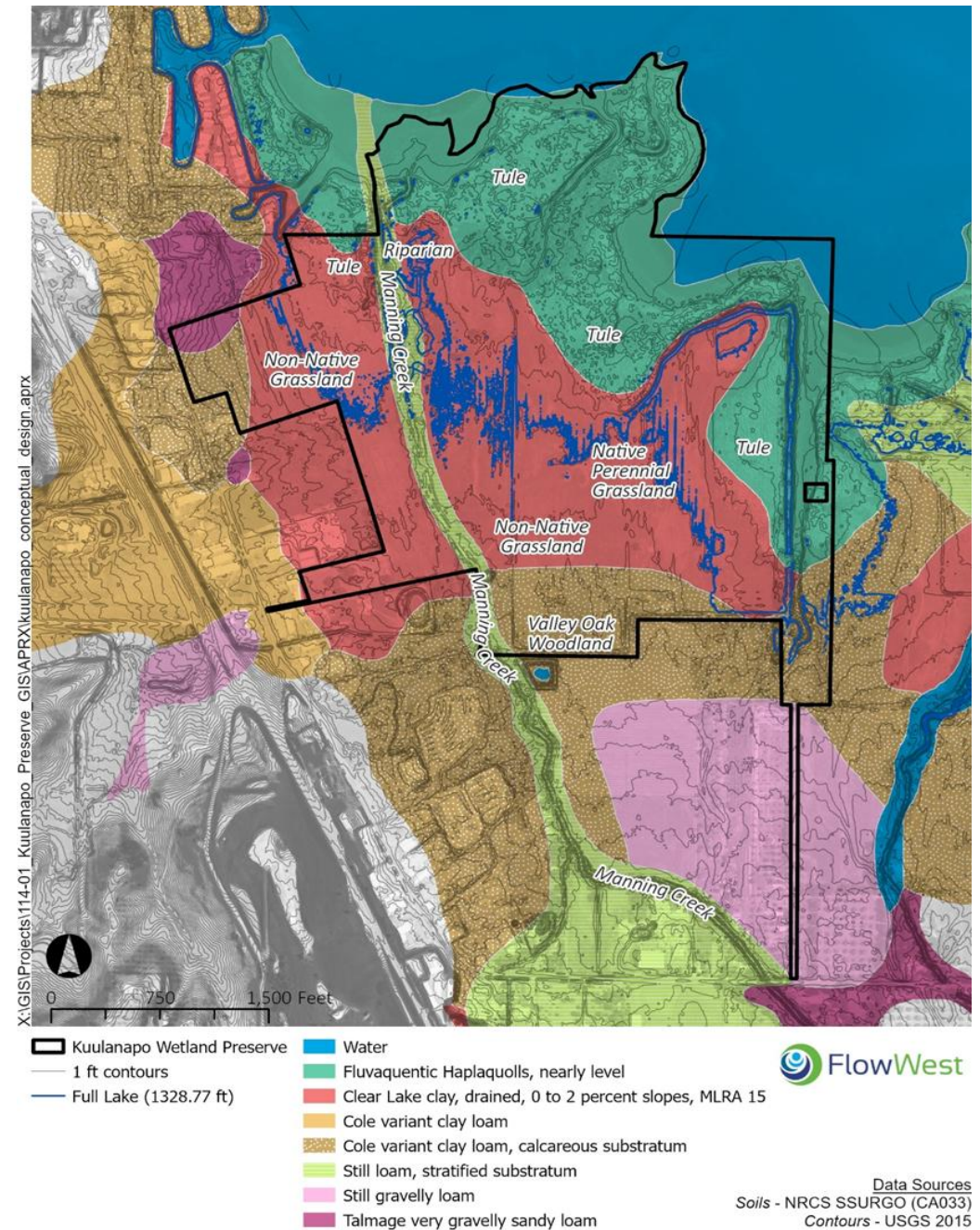
- established tule beds
- non-native invasives
- Oak woodlands
- Change in wetland extent between the last drought and now
- Vernal pool protection



Soils

Current conditions:

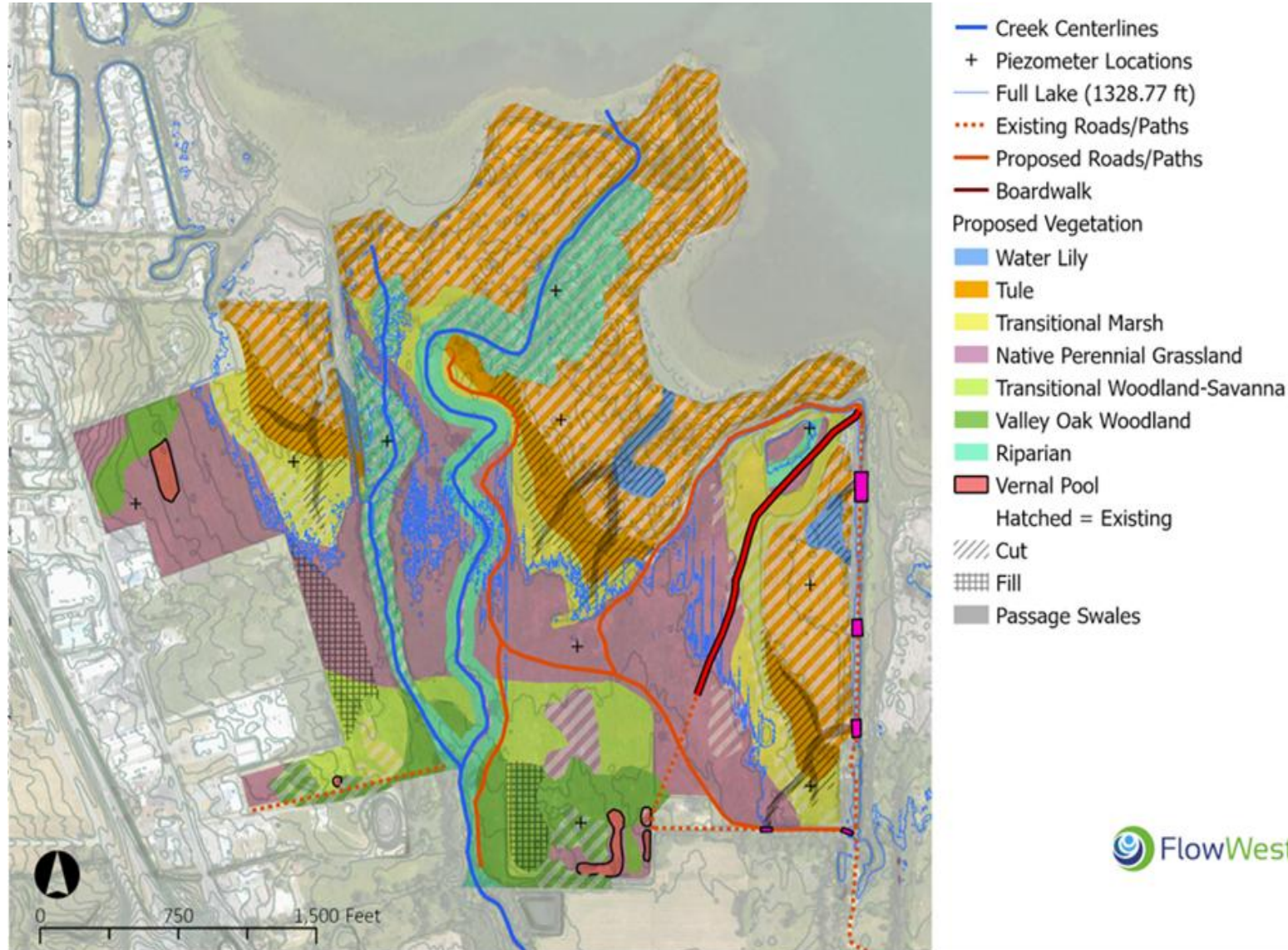
- Match proposed vegetation with appropriate soils
- Understand shallow groundwater and overland flow dynamics for different soil types



Revegetation

Design goals:

- Expand tule wetland habitat
- Replace invasive species with native plants
- Incorporate culturally significant plants for gathering
- Implement cultural burning



Conclusion

- Research is essential!
 - Collect historical information to maximize restoration potential
 - maps
 - aerial imagery
 - Historical analysis of land use
 - interview previous and adjacent landowners
- Collaboration with Tribal partners
 - historical ecology and land use
 - Identify culturally significant species
 - sustenance
 - baskets
 - Gathering, cooking, storing food
 - ceremonial
 - transportation (tule boats)
 - Implementation (planting, fire, & thinning)



Thank you for caring about the Clear Lake Hitch!



Questions?

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