Using the EPA Core Element Framework to Guide the Prioritization of Headwater Wetland Restoration in Support of Climate Resiliency in Yurok Country

YUROK TRIBE WETLANDS PROGRAM

Matthew Hanington
Yurok Tribe Environmental Department
Water Program Manager

Thomas Starkey-Owens
Yurok Tribe Environmental Department
Environmental Specialist

Christine Cosby
Yurok Tribe Environmental Department
Program Coordinator

YUROK TRIBE

Stewardship and monitoring

- Federally recognized 1993
- Lower Klamath River including coastal regions
- Reservation boundary lower 44 miles

YUROK TRIBE

Stewardship and monitoring

- Federally recognized 1993
- Lower Klamath River including coastal regions
- Reservation boundary lower 44 miles

The Yurok Culture and Constitution Define its Approach to Restoration

"We also have practiced our stewardship of the land in the prairies and forests through ***controlled burns*** *that improve wildlife habitat and enhance the health and growth of the tan oak acorns, hazelnuts, pepperwood nuts, berries, grasses and bushes, all of which are used and provide materials for baskets, fabrics, and utensils."*

Excerpt from the preamble of the Yurok Constitution, 1993

Climate change in Yurok country

Impacts on aquatic resources (Cozetto et al. 2017)

Changing weather patterns:

- Increasing air temperatures
- Heavier storm events -> increase erosion and turbidity
- Decreasing snowpack
- Declining fog frequency

Dead fish began surfacing in Happy Camp, August 4, 2022.
Photo credit: Karuk Tribe

LATIMES.COM

McKinney fire landslide kills scores of fish in Klamath River

Flash flooding in a Northern California burn scar triggered a massive debris…

Klamath River Estuary, August 8, 2022

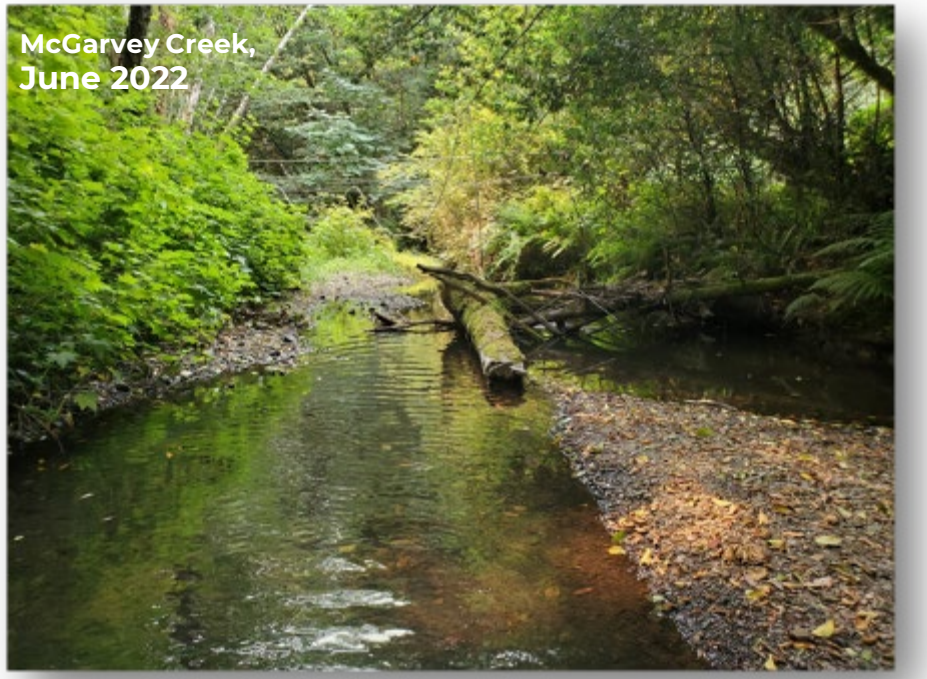
Photo credit: Barry McCovey, Yurok Fisheries Director

Climate change in Yurok country

Impacts on aquatic resources (Cozetto et al. 2017)

Changing weather patterns:
- Increasing air temperatures
- Heavier storm events -> increase erosion and turbidity
- Decreasing snowpack
- Declining fog frequency

Changing flow regimes:
- Extreme drought
- Reduced Spring and Summer baseflows
- Increasing intermittency of stream flows @ historically perennial sites



Climate change in Yurok country

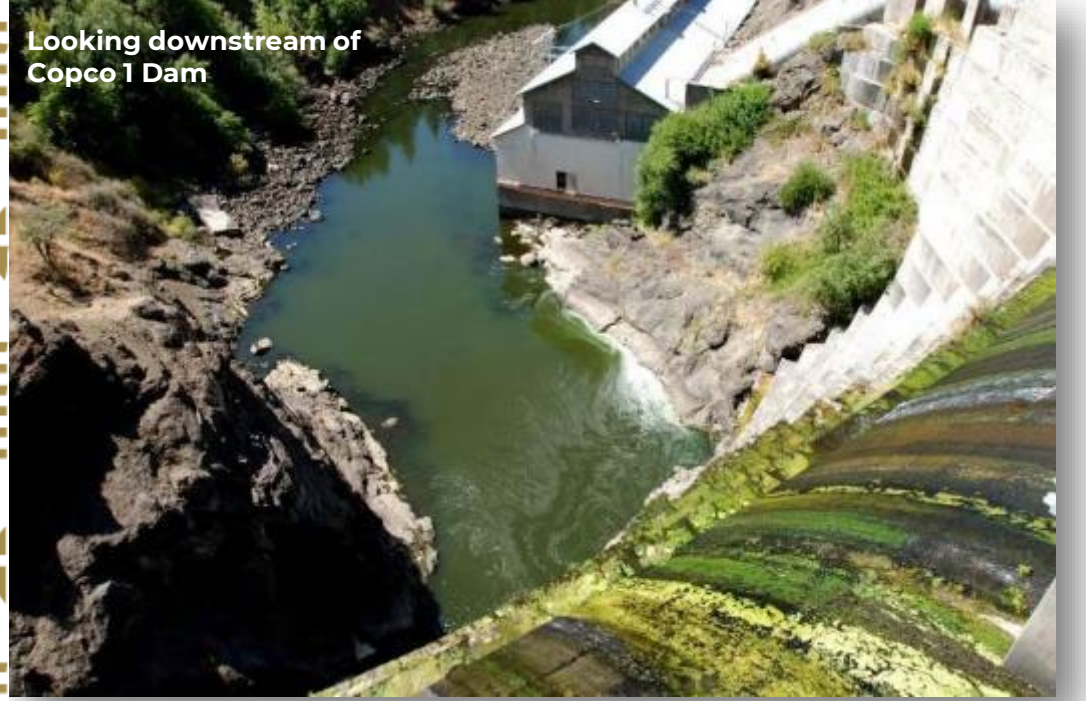
Impacts on aquatic resources (Cozetto et al. 2017)

Changing weather patterns:
- Increasing air temperatures
- Heavier storm events -> increase erosion and turbidity
- Decreasing snowpack
- Declining fog frequency

Changing flow regimes:
- Extreme drought
- Reduced Spring and Summer baseflows
- Increasing intermittency of stream flows @ historically perennial sites

Impacts on wetland ecosystems (NRC 2004; Powers et al. 2005)

BOR Klamath River Project completed 1918-1962:
- Disrupted natural flows and extensive loss of wetlands
- Conflict with Tribal Sovereignty and Wetlands Mitigation Rules
- Monocropping of Wetlands – Failure of "No Net Wetland Loss"



Looking downstream of Copco 1 Dam

Climate change in Yurok country

Impacts on aquatic resources (Cozetto et al. 2017)

Changing weather patterns:
- Increasing air temperatures
- Heavier storm events -> increase erosion and turbidity
- Decreasing snowpack
- Declining fog frequency

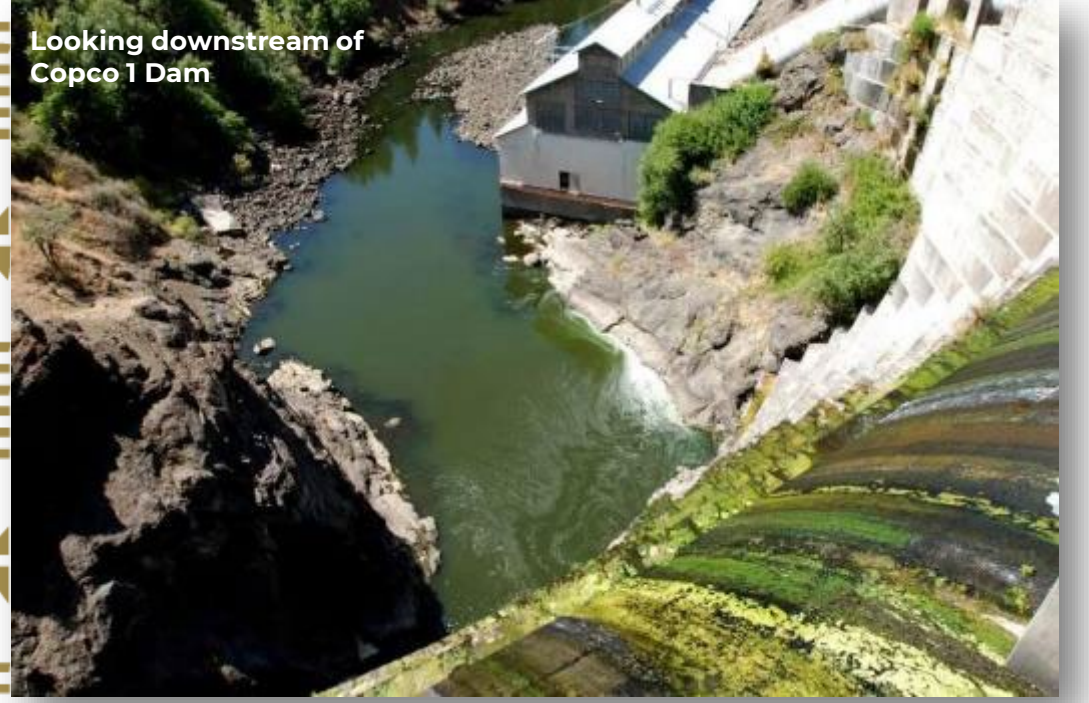
Changing flow regimes:
- Extreme drought
- Reduced Spring and Summer baseflows
- Increasing intermittency of stream flows @ historically perennial sites

Impacts on wetland ecosystems (NRC 2004; Powers et al. 2005)

BOR Klamath River Project completed 1918-1962:
- Disrupted natural flows and extensive loss of wetlands
- Conflict with Tribal Sovereignty and Wetlands Mitigation Rules
- Monocropping of Wetlands – Failure of "No Net Wetland Loss"

Extended periods of drought reduce surface water inundation of wetland complexes:

- Reduces viable amphibian habitat
- Reduces surface water and nutrient exchange with nearby streams
- Reduces drinking water resources for tribal community

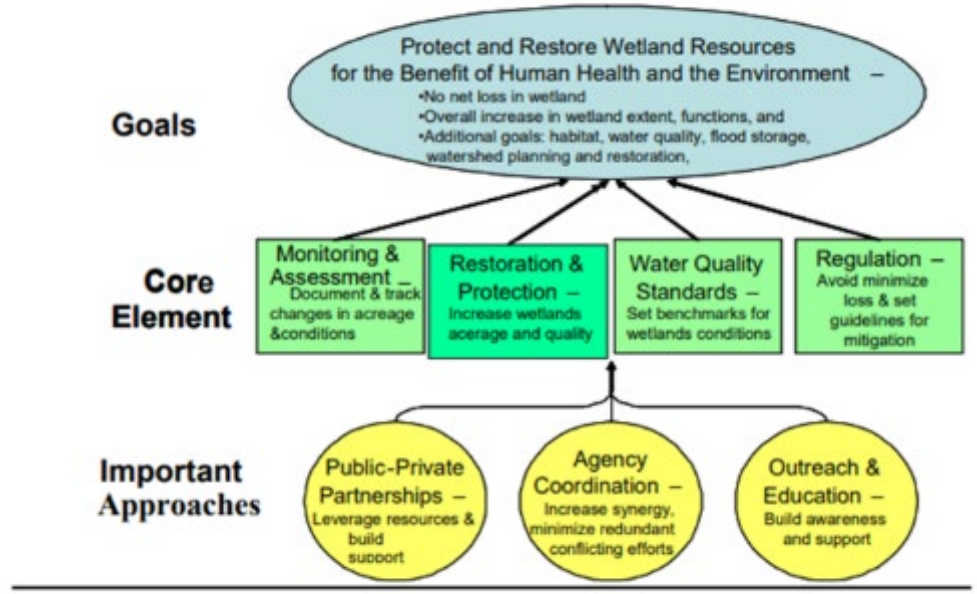

Looking downstream of Copco 1 Dam


Youngs Lake Wetland, Fall 2022

EPA Core Element Framework

Wetlands Program Planning

- ☑ Monitoring and Assessment
- ☑ Regulatory activities including 401 certification
- ☑ Voluntary Restoration and Protection
- ☑ Water Quality Standards for wetlands



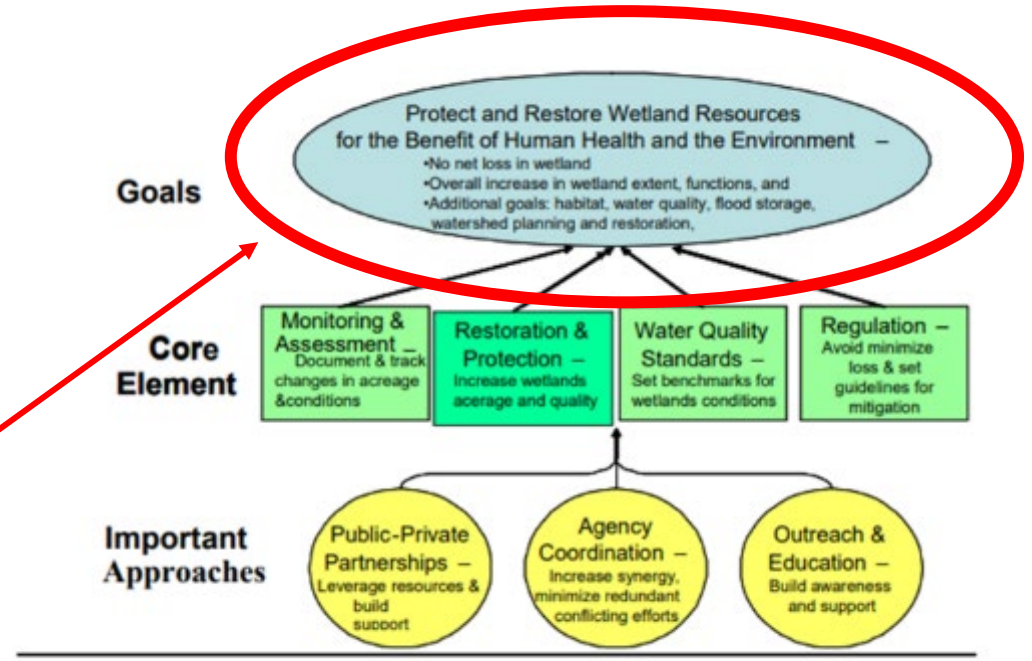
EPA Core Element Framework

Wetlands Program Planning

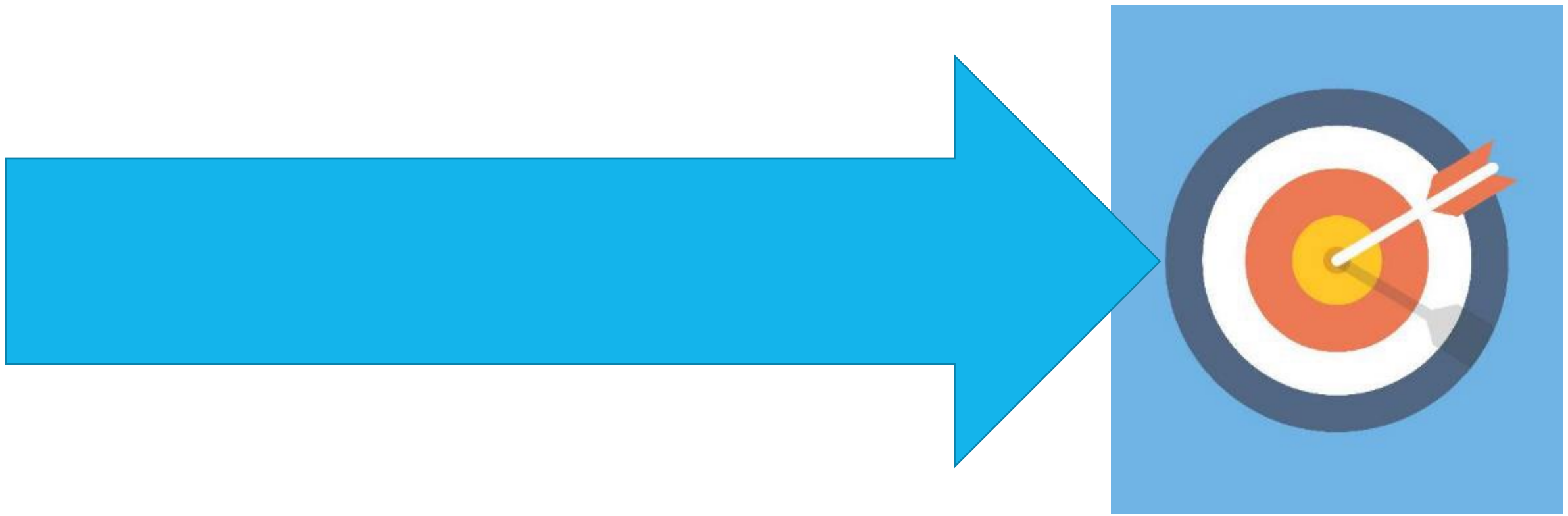
- ☑ Monitoring and Assessment
- ☑ Regulatory activities including 401 certification
- ☑ Voluntary Restoration and Protection
- ☑ Water Quality Standards for wetlands

Communication, Communication, Communication

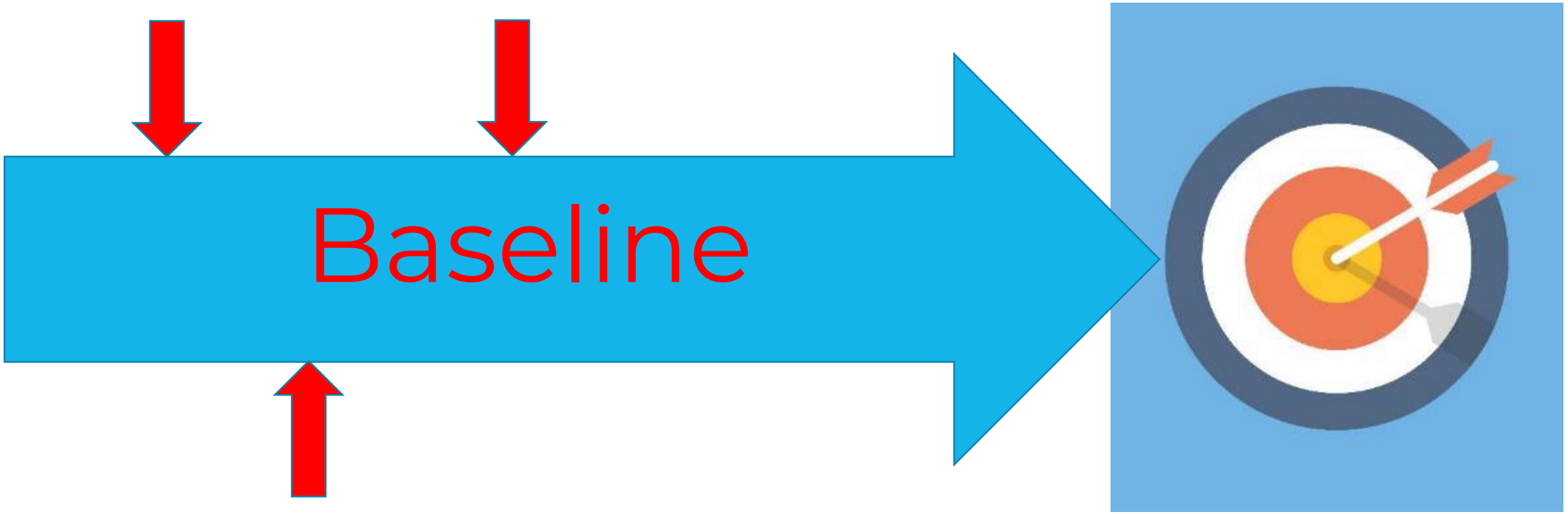
What is the potential?
Brainstorm Session – Followed by Organization



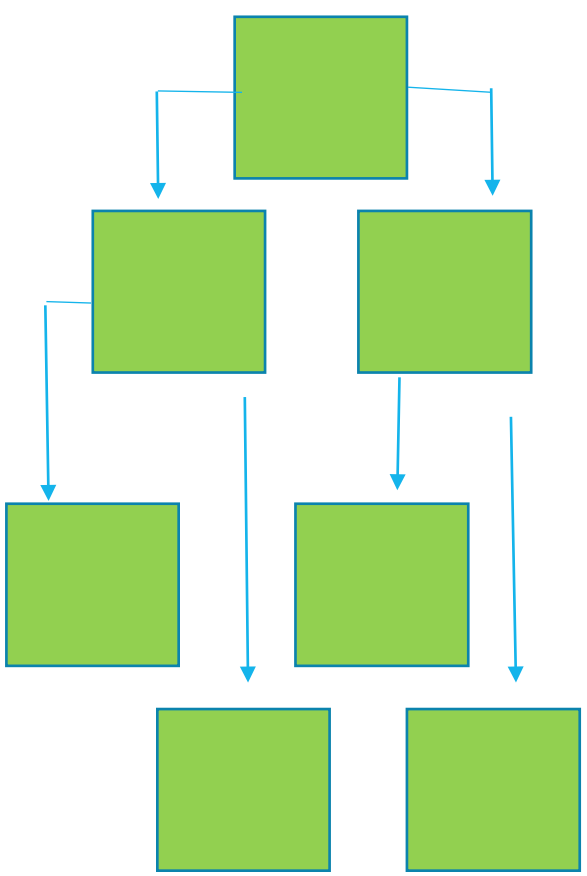
Where are we?

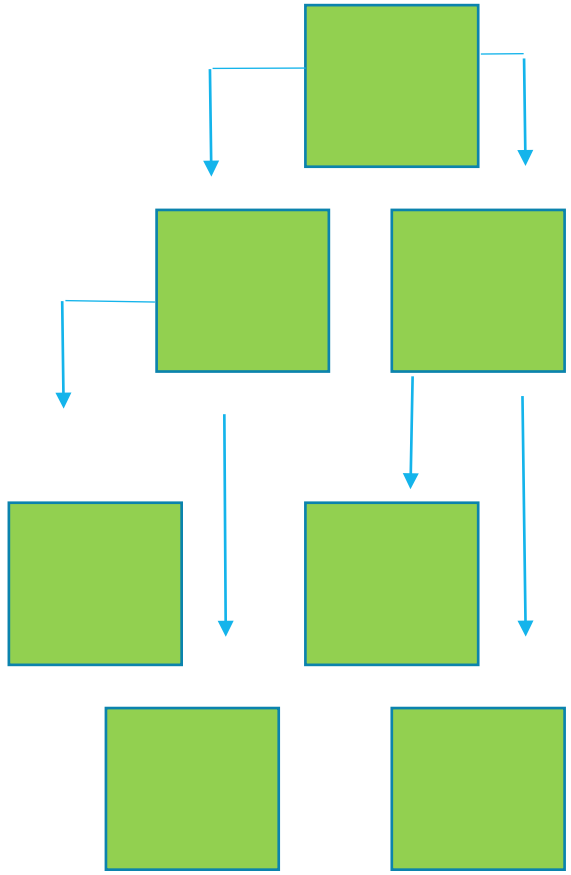


Where are we?



What is the best path?



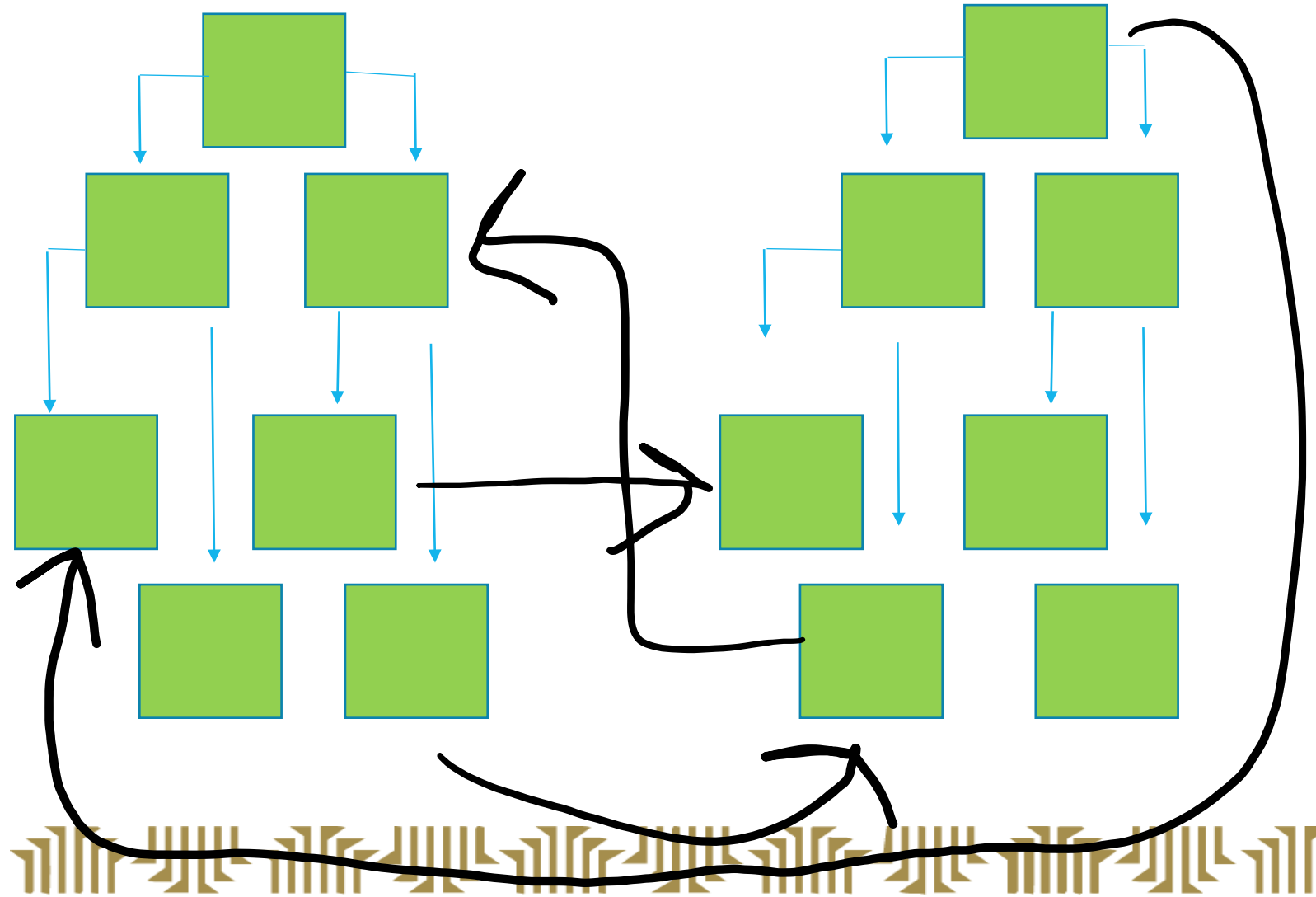


YUROK TRIBE
Environmental Department

Yurok Tribe Environmental Plan 2022

Prepared By:
Yurok Tribe Environmental Department
15900 Hwy 101N
Klamath, CA 95548
(707)482-1822
https://www.yuroktribe.org/environmental-program
Kems - Yurok Tribe Data Exchange Portal

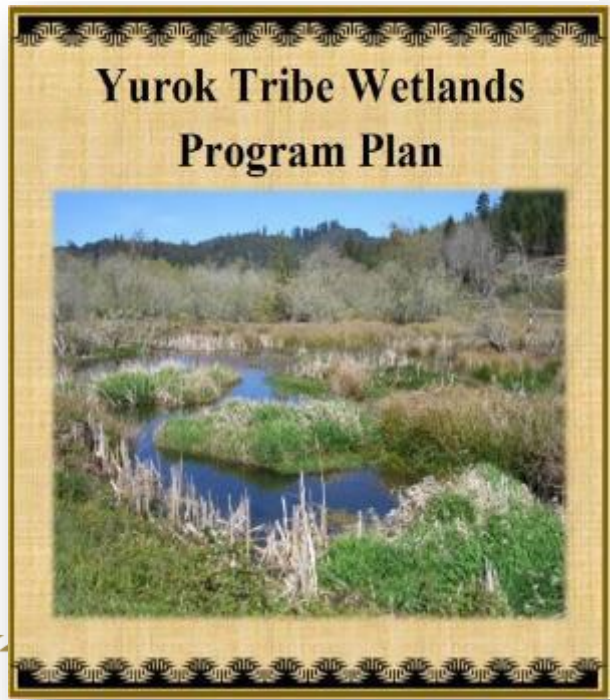
There is not one way forward



YUROK TRIBE
Environmental Department

Yurok Tribe
Environmental Plan
2022

Prepared By:
Yurok Tribe Environmental Department
15900 Hwy 101N
Klamath, CA 95548
(707)482-1822
https://www.yuroktribe.org/environmental-program
Kom - Yurok Tribe Data Exchange Portal



Using environmental DNA (eDNA) to monitor stream health

Partnership and contract with the Goldberg Lab at Washington State University

- WSU sampling protocols (Goldberg & Strickler 2017)

Using environmental DNA (eDNA) to monitor stream health

Partnership and contract with the Goldberg Lab at Washington State University

- WSU sampling protocols (Goldberg & Strickler 2017)

Questions asked:

- What are baseline occupancy and detection probabilities at selected study streams?
- What's the relationship between water quantity and species presence?
- Will sensitive species persistence drop due to drought and extended drought?
- What factors limit the presence and persistence of sensitive species through time?

Using environmental DNA (eDNA) to monitor stream health

Partnership and contract with the Goldberg Lab at Washington State University

- WSU sampling protocols (Goldberg & Strickler 2017)

Questions asked:

- What are baseline occupancy and detection probabilities at selected study streams?
- What's the relationship between water quantity and species presence?
- Will sensitive species persistence drop due to drought and extended drought?
- What factors limit the presence and persistence of sensitive species through time?

Which of the study streams are more resilient to extreme drought?

Using environmental DNA (eDNA) to monitor stream health

Field Methods:

Onset HOBO water level probes in headwater wetland ponds

- Water level (ft)
- Water temperature (c)

HOBO probe placement in headwater wetland ponds

Measuring reference water level

Using environmental DNA (eDNA) to monitor stream health

Field Methods:

Onset HOBO water level probes in headwater wetland ponds

- Water level (ft)
- Water temperature (c)

Stream Duration Assessment method (SDAM)

- Beta testing for EPA's Wester Mountain Region

Sampling in-stream

Stonefly larvae

Using environmental DNA (eDNA) to monitor stream health

Field Methods:

Onset HOBO water level probes in headwater wetland ponds

- Water level (ft)
- Water temperature (c)

Stream Duration Assessment method (SDAM)

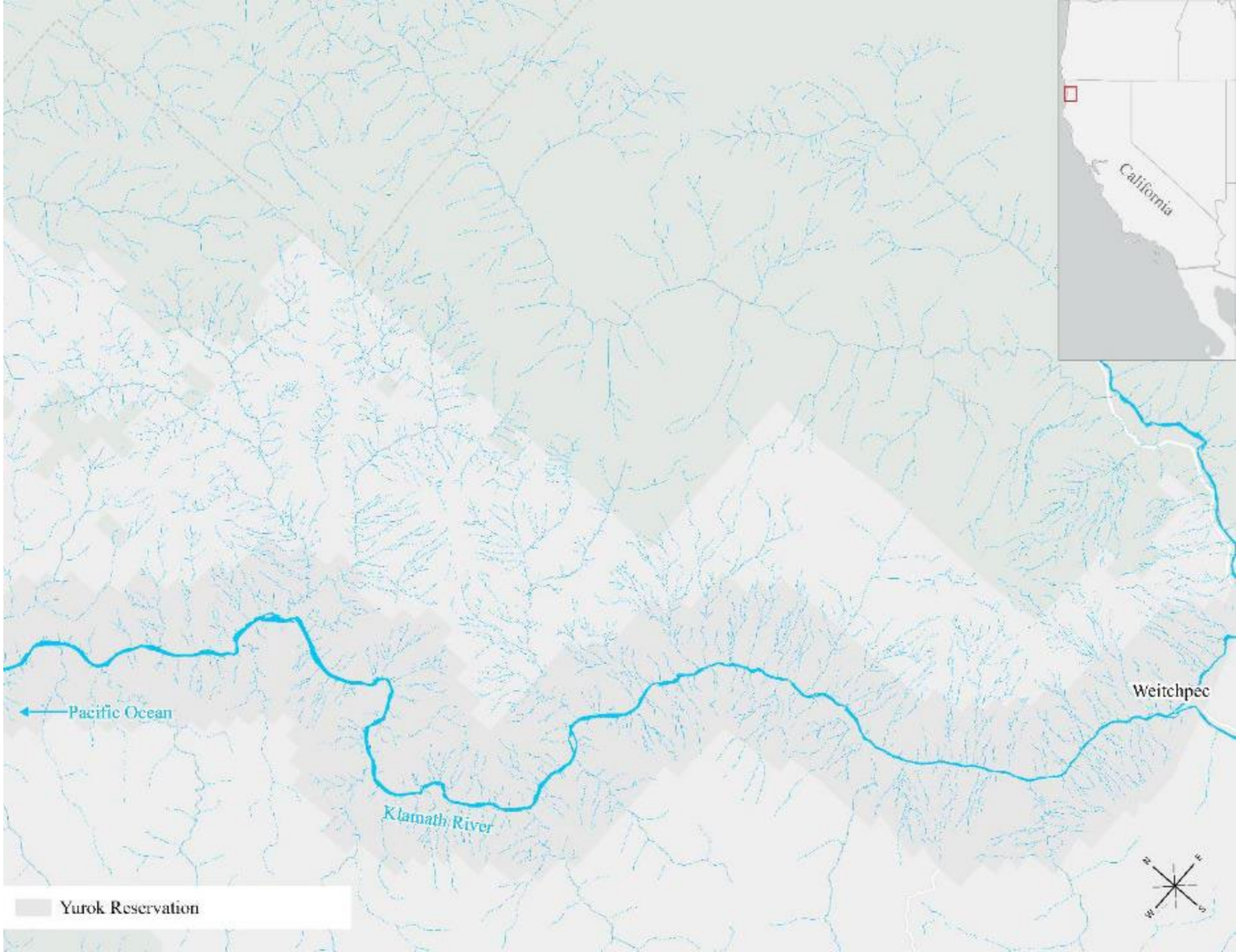
- Beta testing for EPA's Wester Mountain Region

eDNA sampling four target amphibian species:

- Coastal Giant Salamanders
- Pacific Tailed Frogs
- Foothill Yellow-legged frogs
- Southern Torrent Salamanders

Yurok eDNA Monitoring: Findings

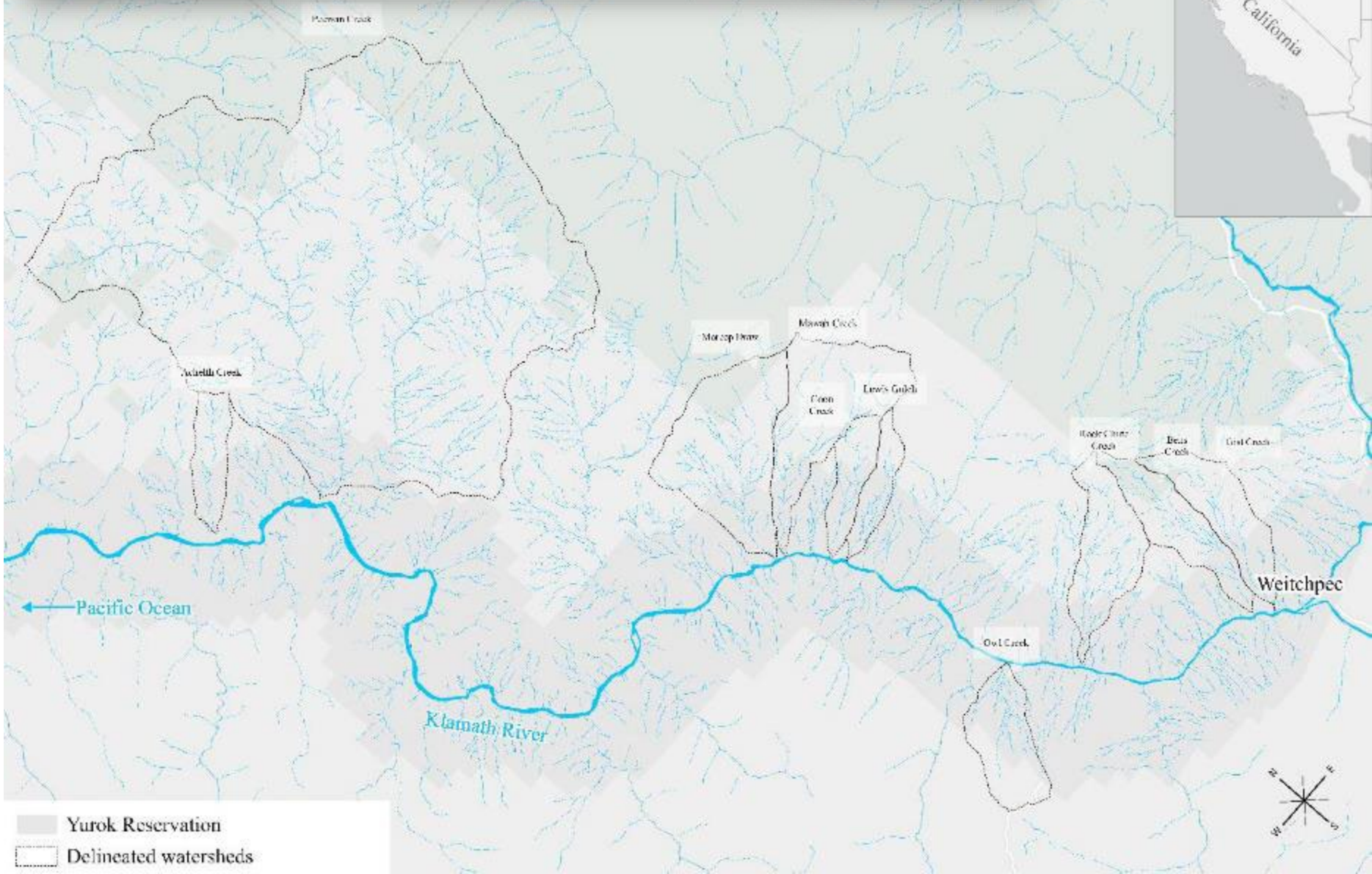
Analysis:



Yurok eDNA Monitoring: Findings

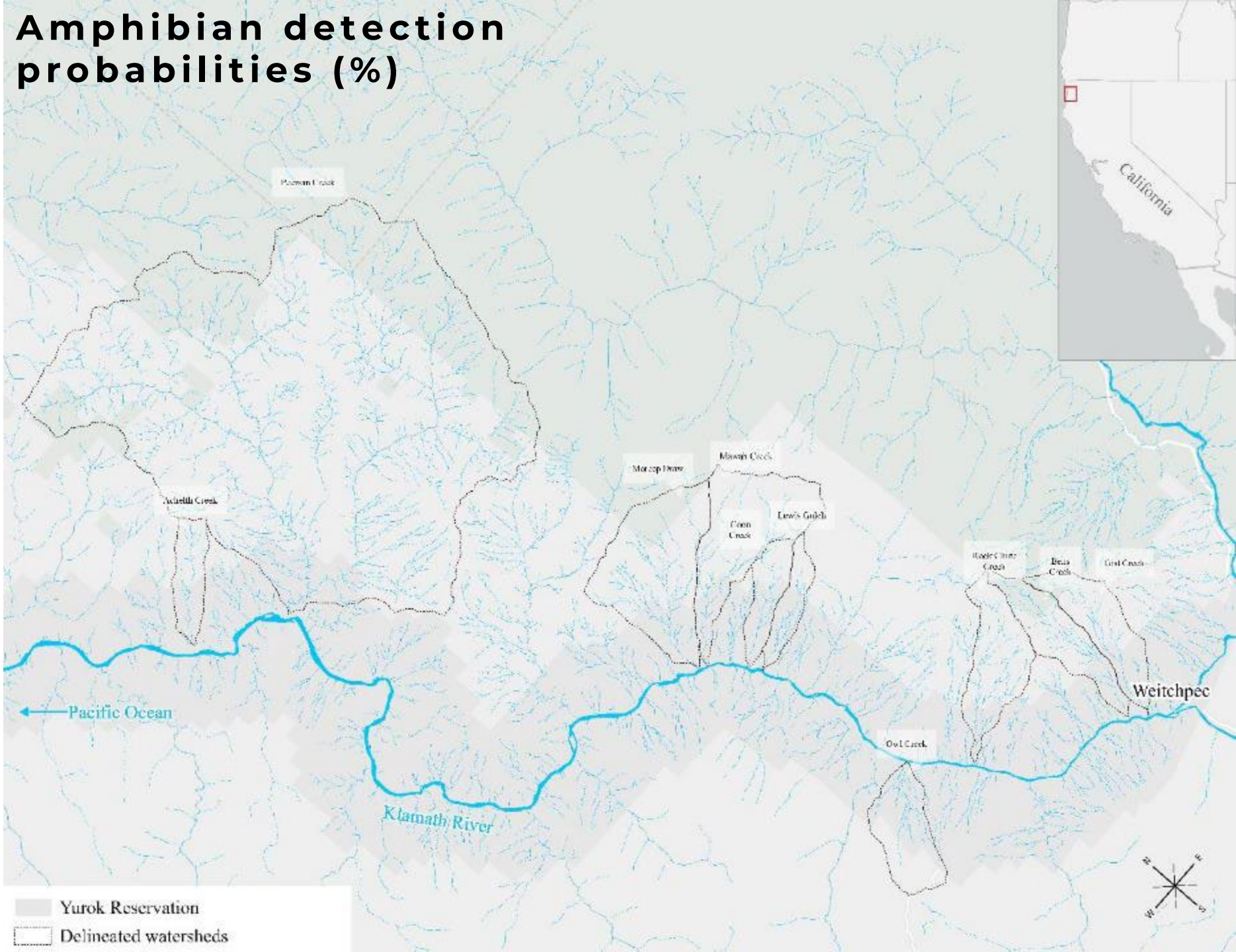
Analysis:

- Determined detection probabilities across all sampling locations



Yurok eDNA Monitoring: Findings

Amphibian detection probabilities (%)



Yurok eDNA Monitoring: Findings

Amphibian detection probabilities (%)

100%
100%
100%
100%
89%
44%
89%
67%
100%
100%
Pacific Ocean
Klamath River
Weitchpec
Yurok Reservation
Delineated watersheds

Yurok eDNA Monitoring: Findings

Amphibian detection probabilities (%)

Yurok eDNA Monitoring: Findings

Amphibian detection probabilities (%)

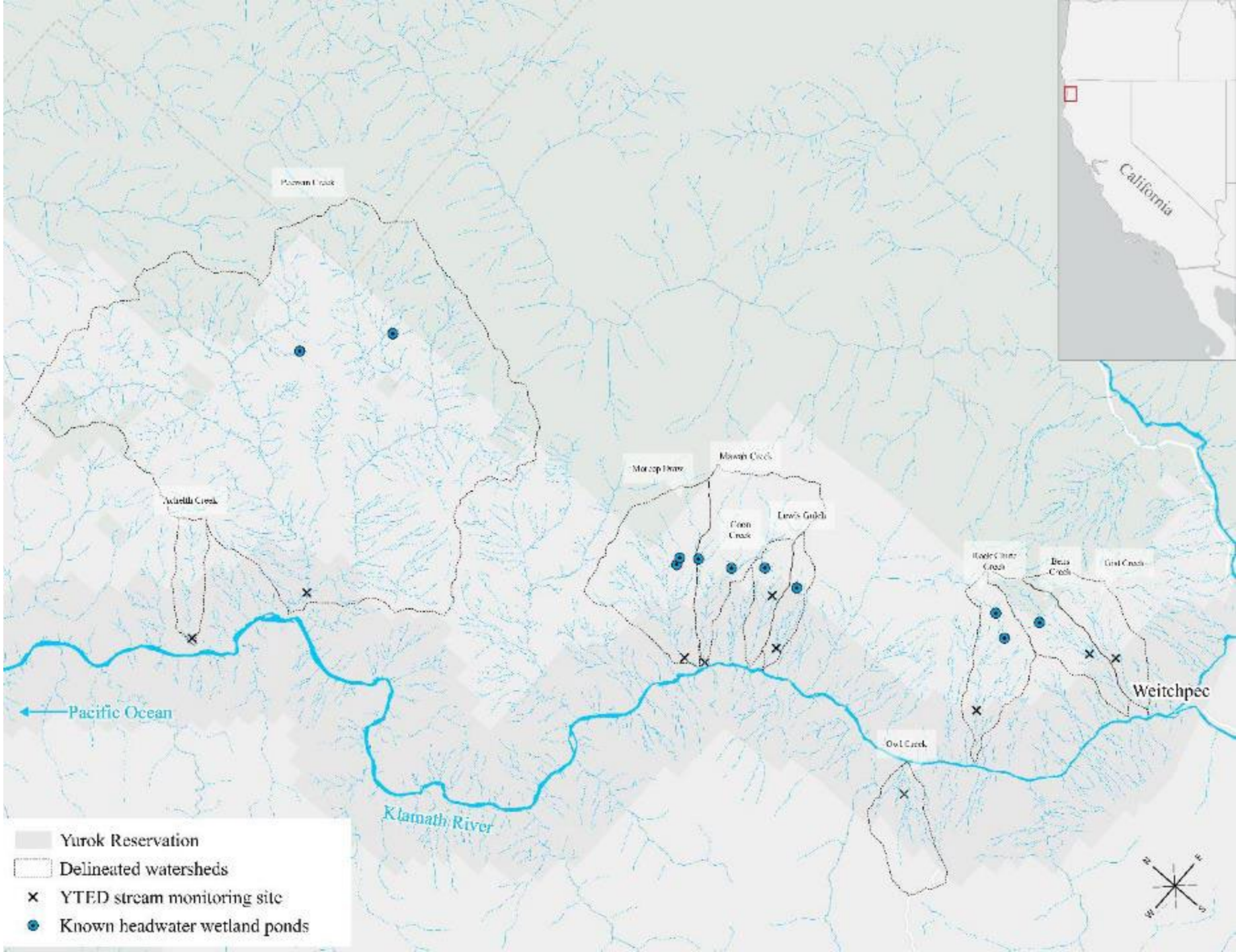
Yurok eDNA Monitoring: Findings

Amphibian detection probabilities (%)

Yurok eDNA Monitoring: Findings

Analysis:

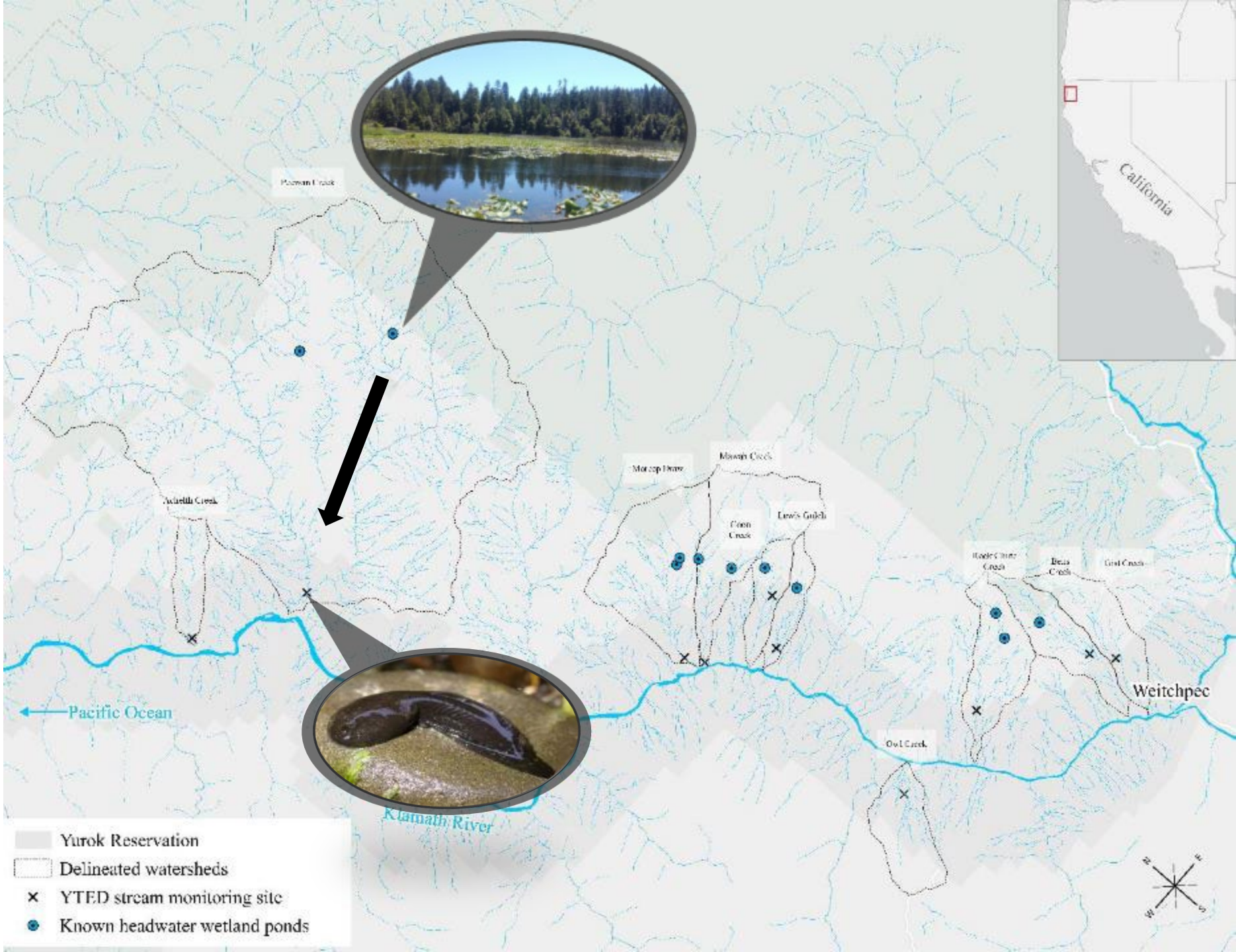
- Amphibian detection response to surface water availability



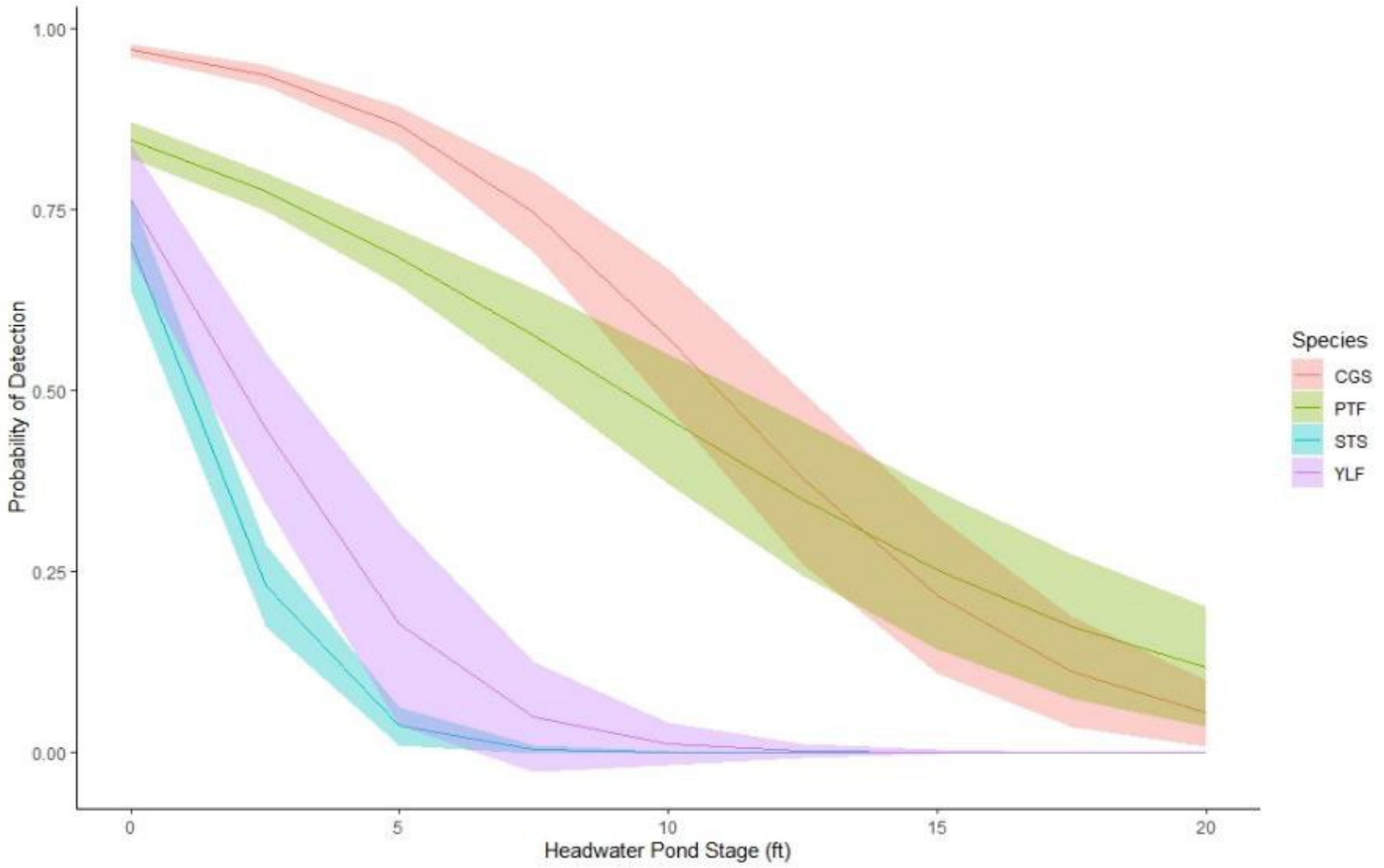
Yurok eDNA Monitoring: Findings

Analysis:

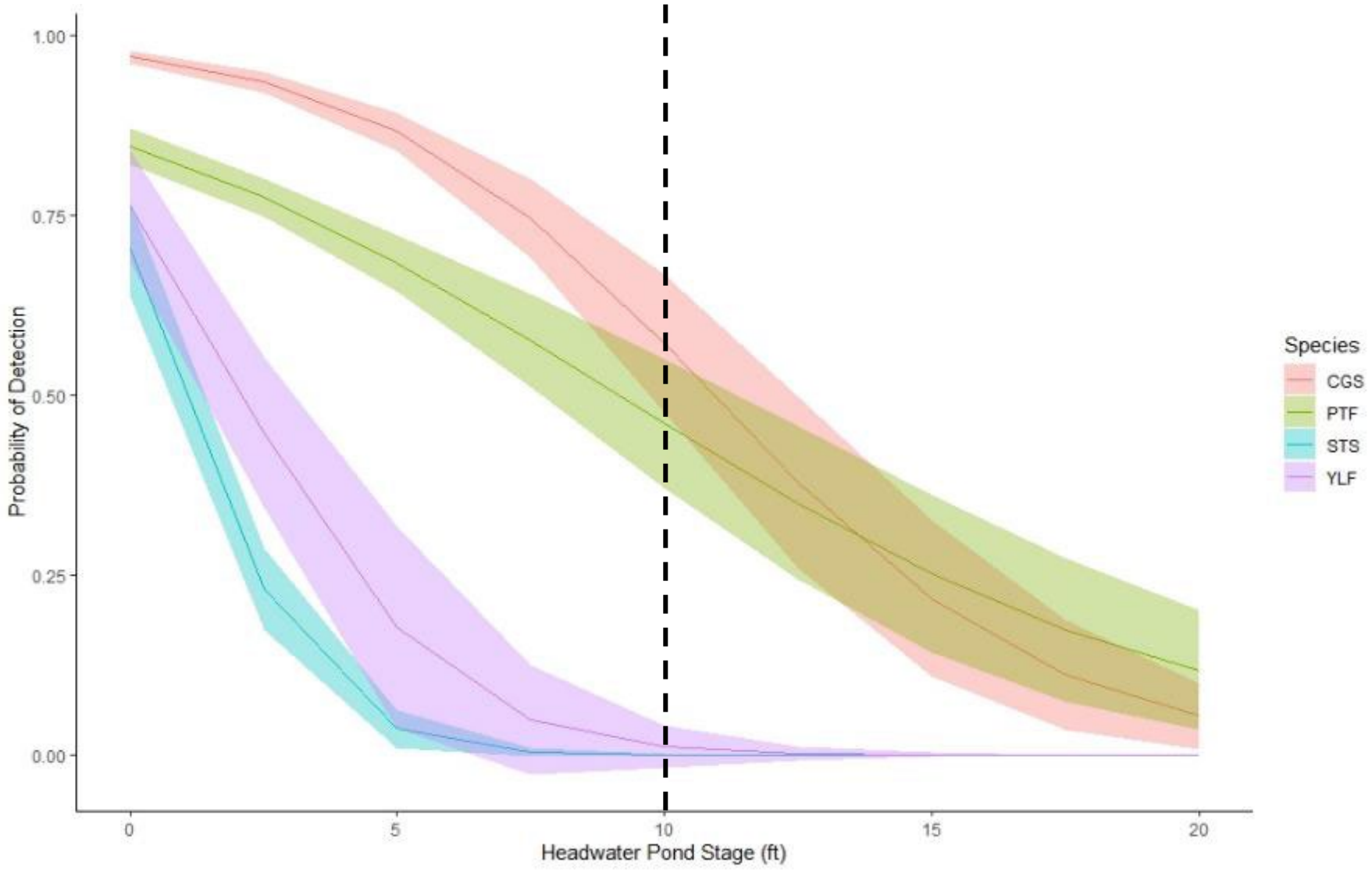
- Amphibian detection response to surface water availability



Yurok eDNA Monitoring: Findings

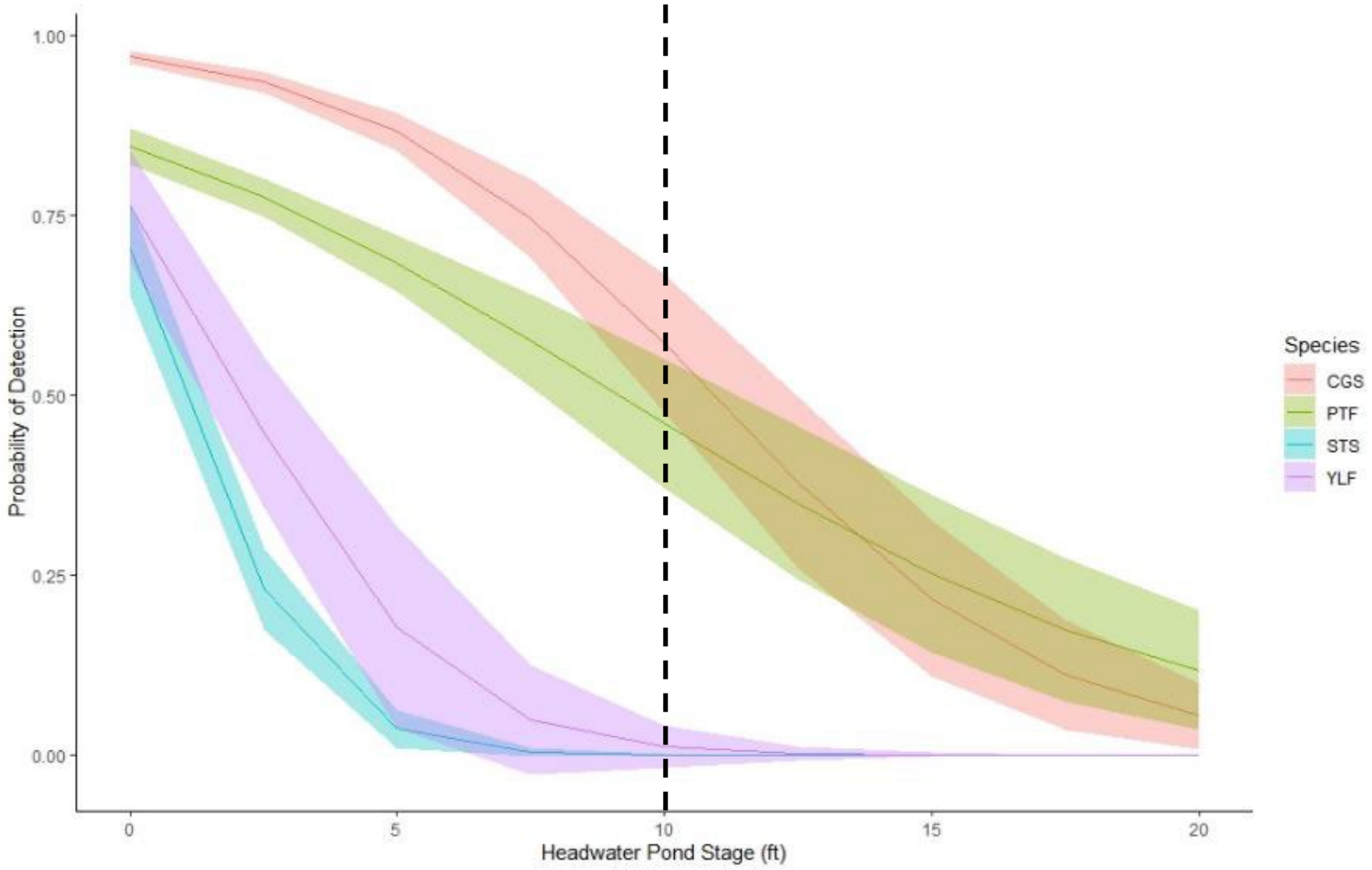


Yurok eDNA Monitoring: Findings

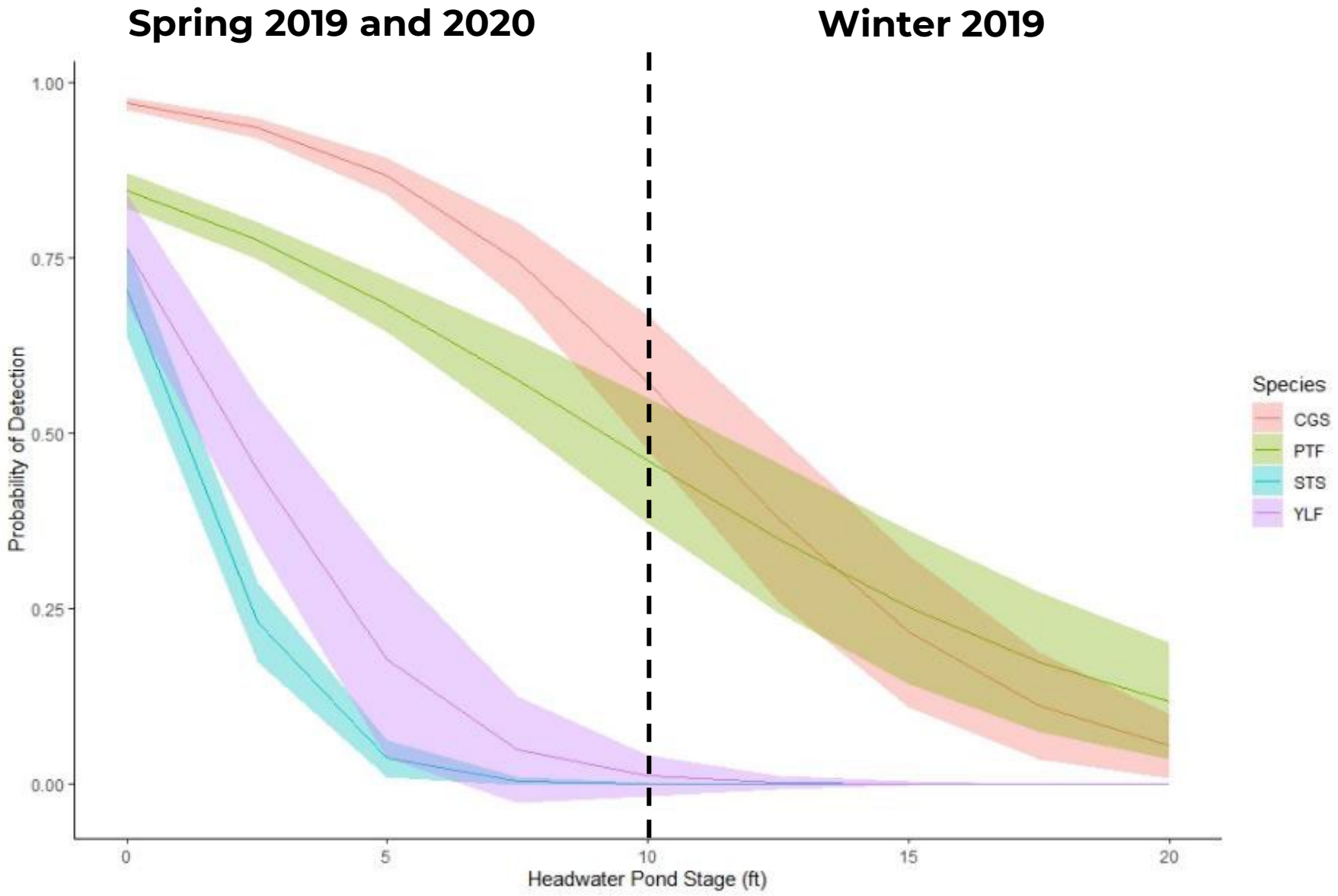


Yurok eDNA Monitoring: Findings

Spring 2019 and 2020



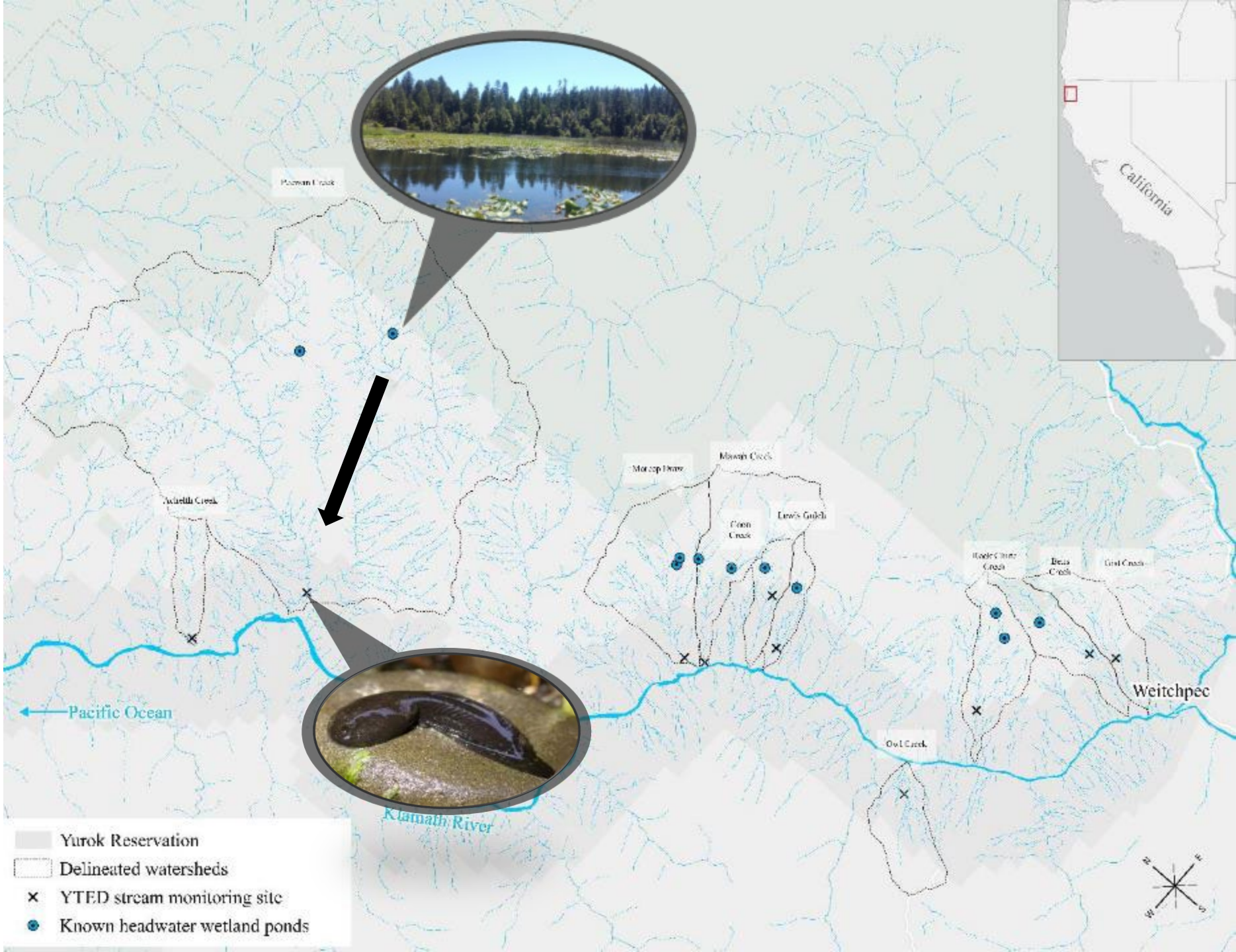
Yurok eDNA Monitoring: Findings



Yurok eDNA Monitoring: Findings

Analysis:

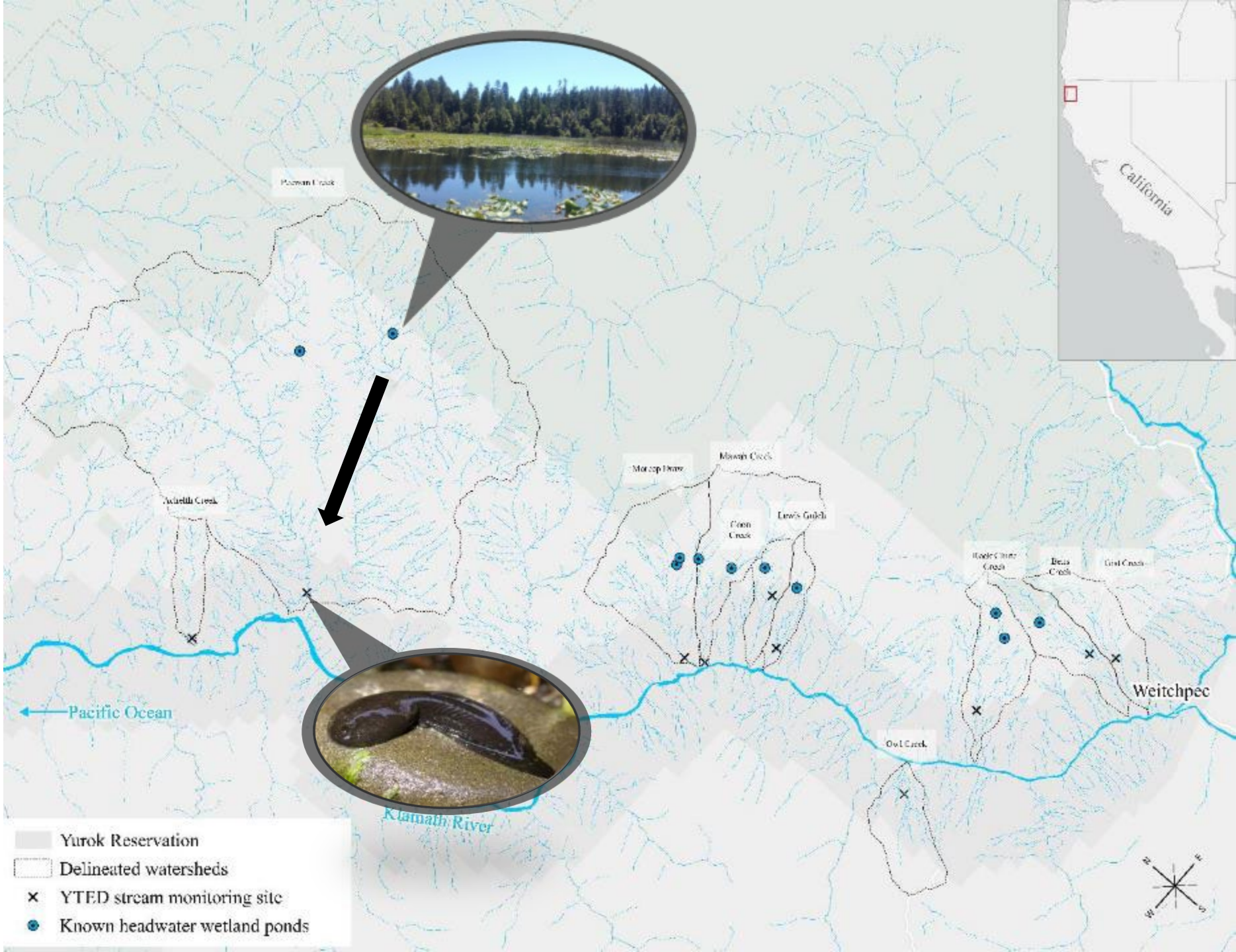
- Amphibian detection response to surface water availability



Yurok eDNA Monitoring: Findings

Analysis:

- ~~Amphibian detection response to surface water availability~~



Yurok eDNA Monitoring: Findings

Analysis:

- ~~Amphibian detection response to surface water availability~~

2022-2023 methods:

- Continued monitoring of headwater wetland ponds
- In-stream HOBO probes

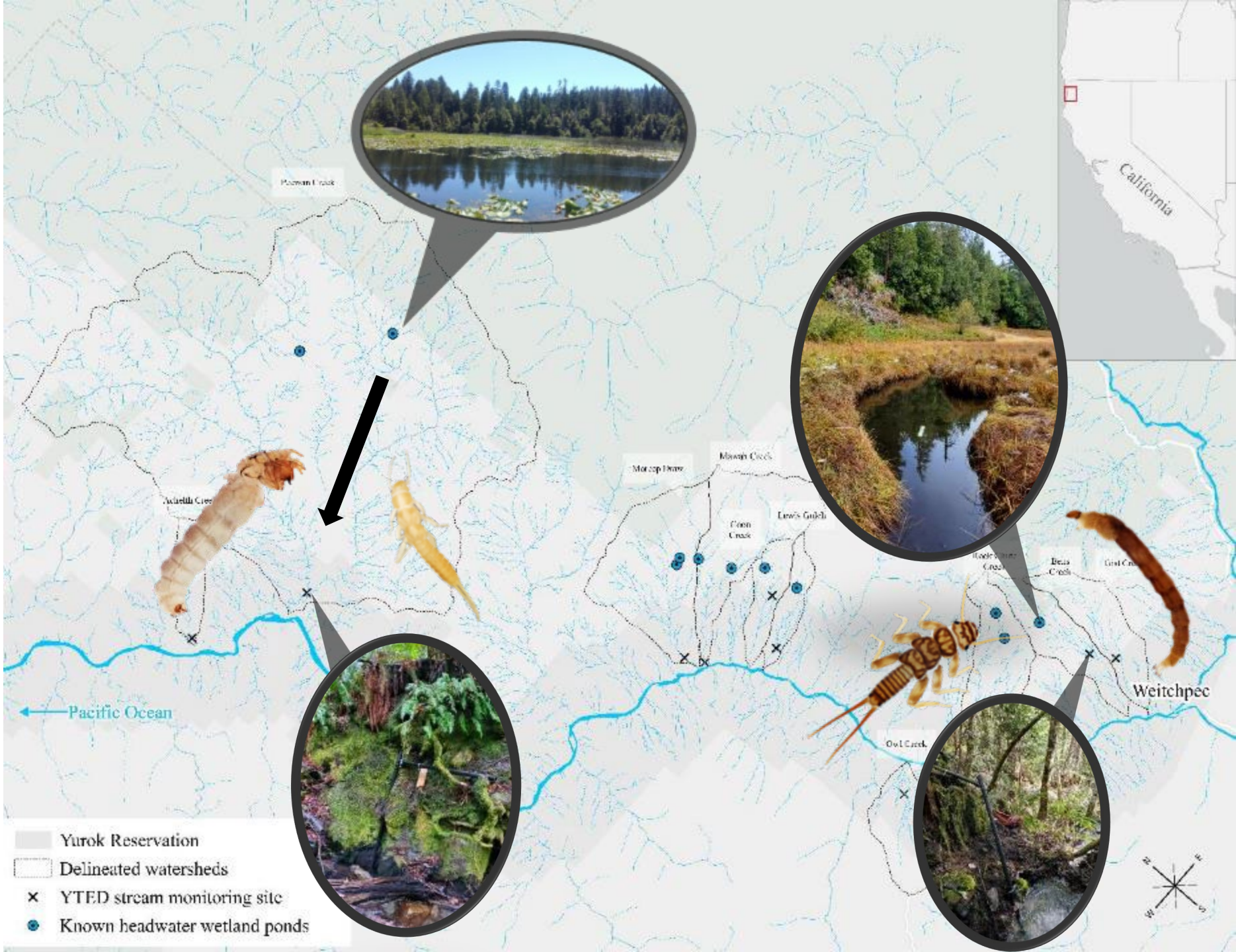
Yurok eDNA Monitoring: Findings

Analysis:

- ~~Amphibian detection response to surface water availability~~

2022-2023 methods:

- Continued monitoring of headwater wetland ponds
- In-stream HOBO probes
- Increased SDAM sampling



Yurok eDNA Monitoring: Findings

Analysis:

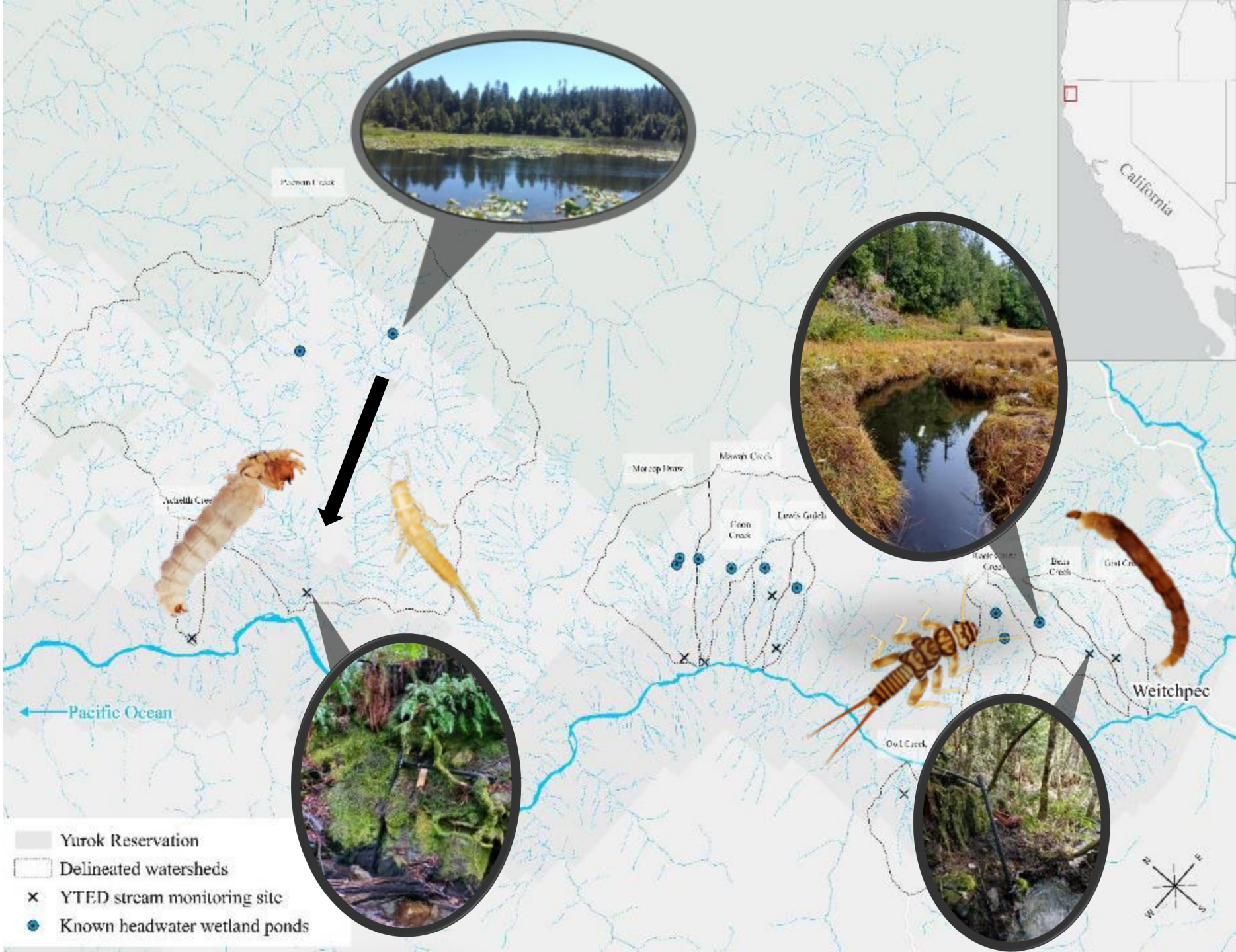
- ~~Amphibian detection response to surface water availability~~

2022-2023 methods:

- Continued monitoring of headwater wetland ponds
- In-stream HOBO probes
- Increased SDAM sampling

Restoration:

- Additional monitoring at restoration sites



Monitoring in support of long-term stewardship

McGarvey Creek BDA

McGarvey Creek groundwater palisade

Influence on traditional stewardship practices and restoration on surface water

Monitoring in support of long-term stewardship

McGarvey Creek BDA

McGarvey Creek groundwater palisade

Influence on traditional stewardship practices and restoration on surface water

In-stream Restoration:

- Restoration effectiveness monitoring
- Monitoring stage:
  - upstream of restoration
  - engineered alcove and groundwater palisade
  - mainstem gage station downstream of restoration

Photo Credit: Louisa McCovey, Yurok Environmental Department Director

Monitoring in support of long-term stewardship

Influence on traditional stewardship practices and restoration on surface water

In-stream Restoration:

- Restoration effectiveness monitoring
- Monitoring stage:
  - upstream of restoration
  - engineered alcove and groundwater palisade
  - mainstem gage station downstream of restoration

Restorative Fire:

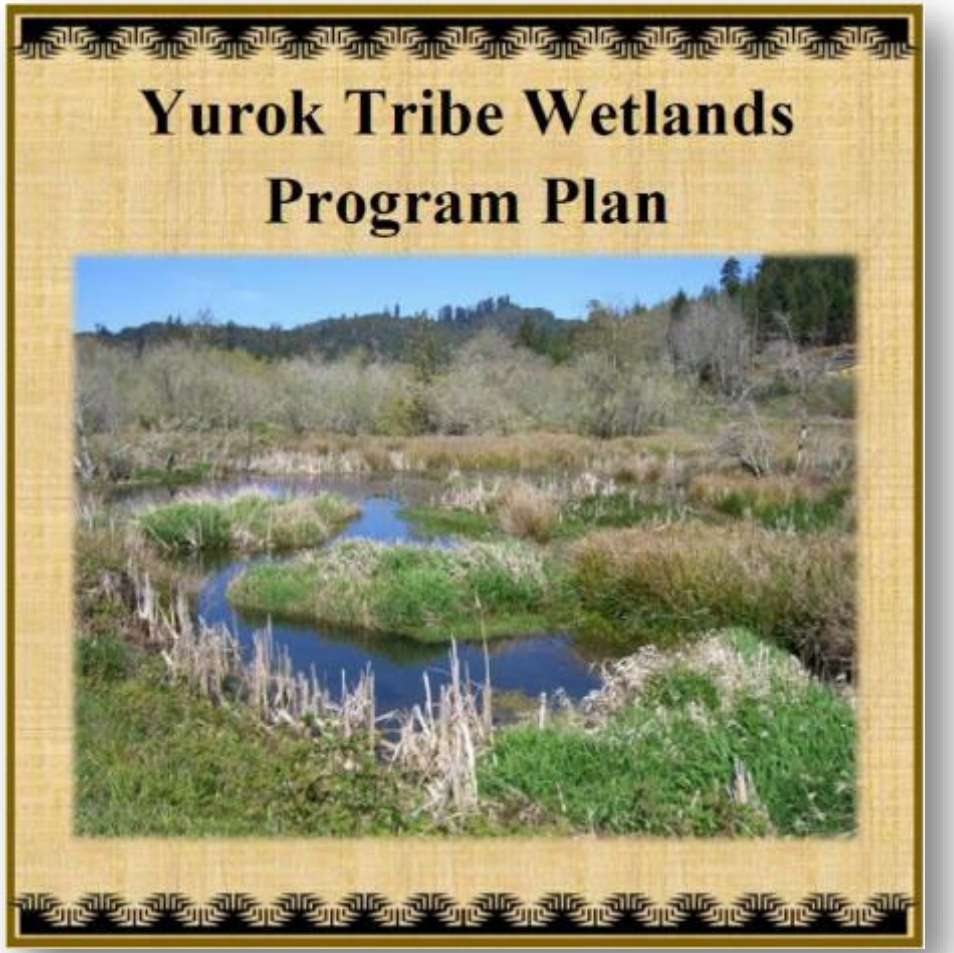
- Good fire increases the health and availability of cultural resources and traditional food sources like acorns, berries, mushrooms, deer, elk, basketry and medicine plants.

- Less straws= more surface water?

Monitoring in support of long-term stewardship

Yurok Tribe Environmental Program (YTEP)

Yurok Tribal Wetland Program Development 2022:
Refining the Yurok Tribe Wetland Program Plan to determine preservation and restoration of headwater wetlands in response to climate change



Next Steps

Inter-tribal collaboration:

- Yurok Fire
- Watershed Restoration
- Fisheries
- Forestry
- Planning
- Public Water Systems

Wetlands Program Plan:

- Update plan to reflect progress, results, lessons learned, and recommendations to move forward in wetlands program.

Headwaters Wetland Preservation and Restoration Plan:

- Using data and TEK
- Matrix and Rank tributaries
- Make restoration and stewardship recommendations

Acknowledgements

Thanks to the amazing Yurok Tribe staff for help in the field and constant inspiration!

Past and present Yurok Tribe staff: Louisa McCovey, Richard Myers, Joshua Cahill, Kaitlyn Woolling, Ana Rubio, Jennifer Brown, and Sarah Beesley.

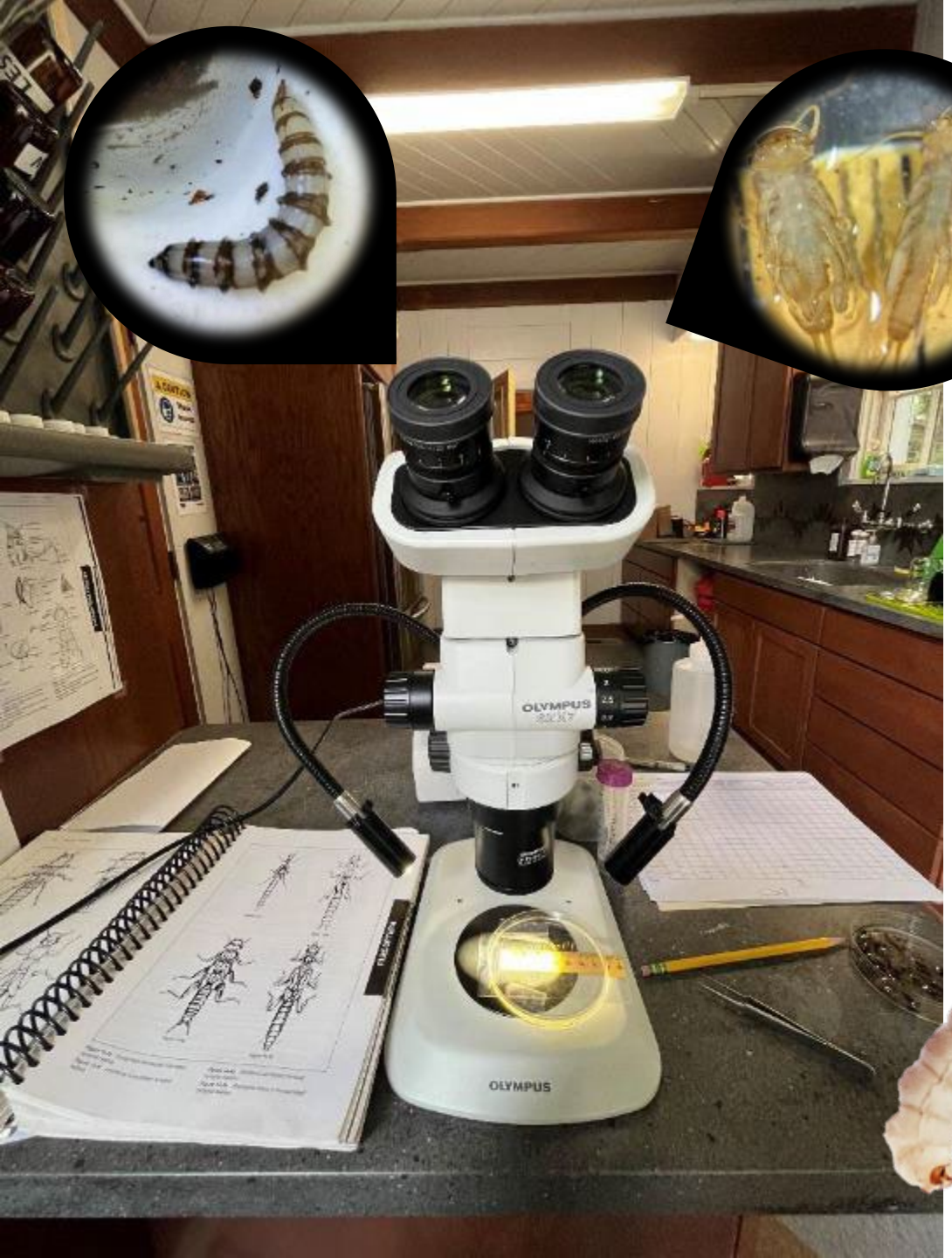
Volunteers: Kira Burnett (Watershed Stewards Program) and Morgan Turner.

Yurok Fire and Cultural Fire Management Council

EPA Tribal Wetlands Development Grant, Region 9 EPA

National Association of Wetland Managers


Questions?



Streamflow Duration Assessment Method (SDAM)

text

Rapid, field-based methods to classify streamflow duration as perennial, intermittent, or ephemeral at the reach scale using hydrological, geomorphological, and/or biological indicators

Beta Western Mountains Region released March 2021

https://www.epa.gov/streamflow-duration-assessment

Capacity building – microscope…

SDAM Success- Achelth example documenting transitions from perennial to intermittent and highlighting areas with management implications