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## Pre-project monitoring of the Qwuloolt restoration in the Snohomish River Estuary

Todd Zackey

*Tulalip Tribes, tzackey@tulaliptribes-nsn.gov*

Casimir Rice

*United States. National Oceanic and Atmospheric Administration*

Joshua Chamberlin

*Northwest Fisheries Science Center (U.S.)*

Jason E. Hall

*Northwest Fisheries Science Center (U.S.)*

Holly Zox

*One Horse Enterprises*

*See next page for additional authors*

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**Speaker**

Todd Zackey, Casimir Rice, Joshua Chamberlin, Jason E. Hall, Holly Zox, Jason Schilling, and Phil Roni

# Pre-project monitoring of the Qwuloolt restoration in the Snohomish River Estuary

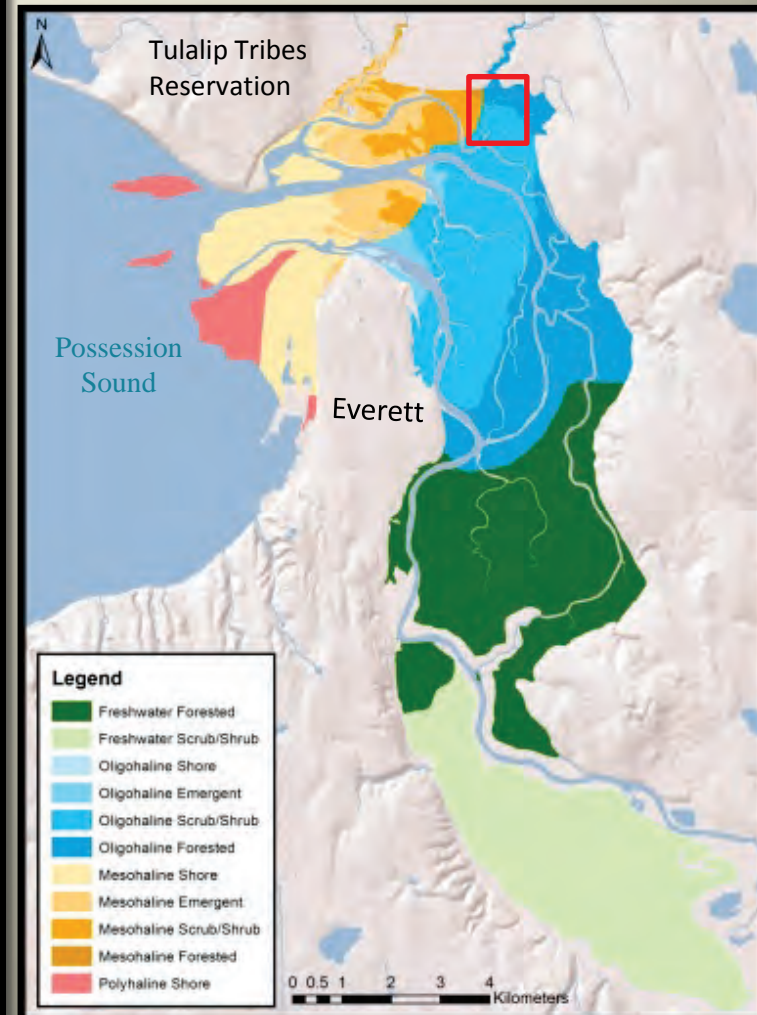


Todd Zackey<sup>1</sup>, Casey Rice<sup>2</sup>, Josh Chamberlin<sup>2</sup>, Jason Hall<sup>2</sup>, Jason Schilling<sup>1</sup>, Holly Zox<sup>3</sup>, Phil Roni<sup>1</sup>

<sup>1</sup>Tulalip Tribes ; <sup>2</sup>NOAA/NWFSC; <sup>3</sup> One Horse Enterprises

# Qwuloolt Estuary Restoration Project

## Restore 350 acres Breach Scheduled for late Summer 2015



# 5 factors and ultimate response

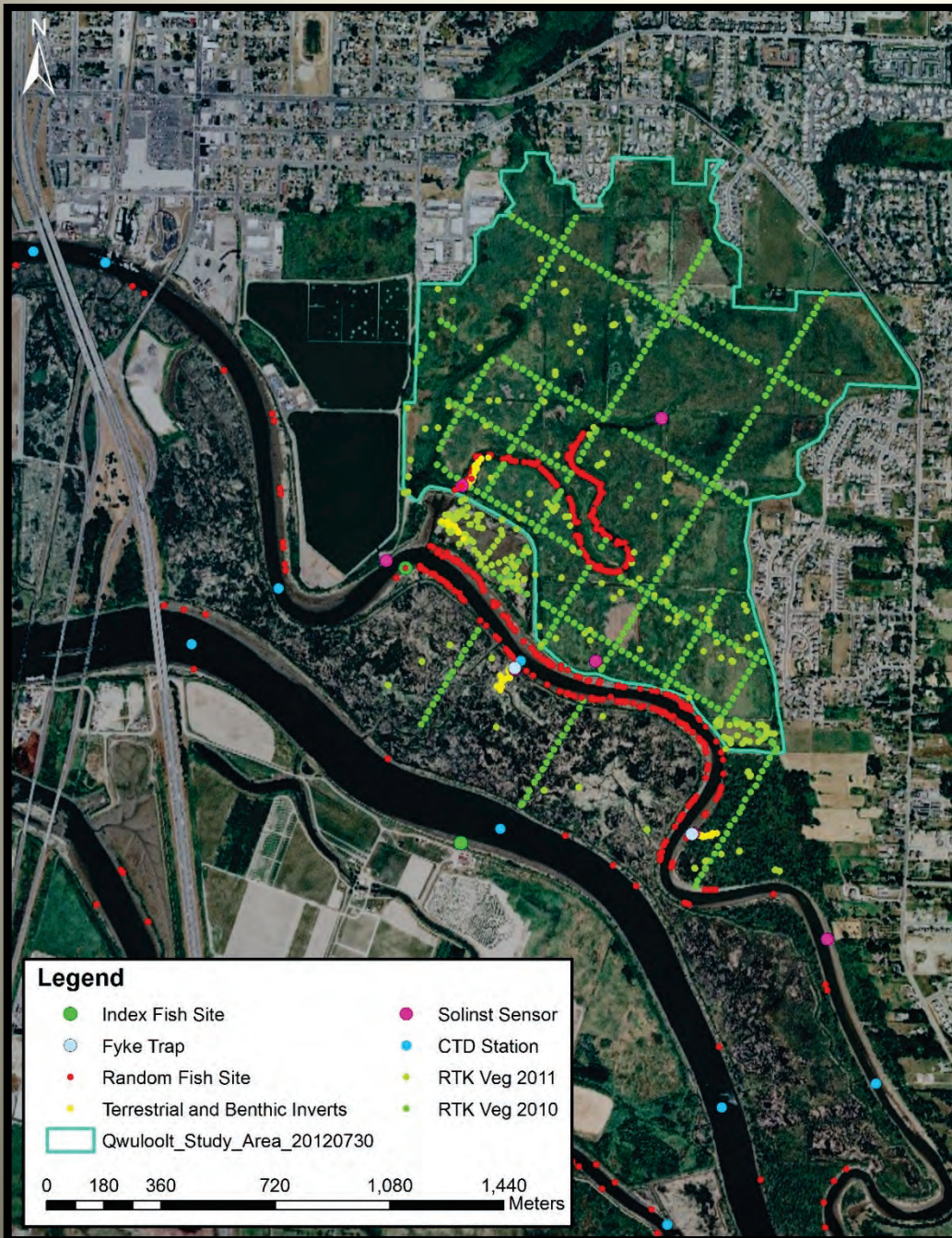
<b>Factors</b>
<b>Landforms</b> (elevation, channel morph, sediment dynamics)
<b>Hydrology</b> (tidal regime, temperature, salinity)
<b>Energy &amp; nutrients</b> (organic matter, nutrients)
<b>Chemistry</b> (contaminants)
<b>Biological interactions</b> (competition, predation, disease)



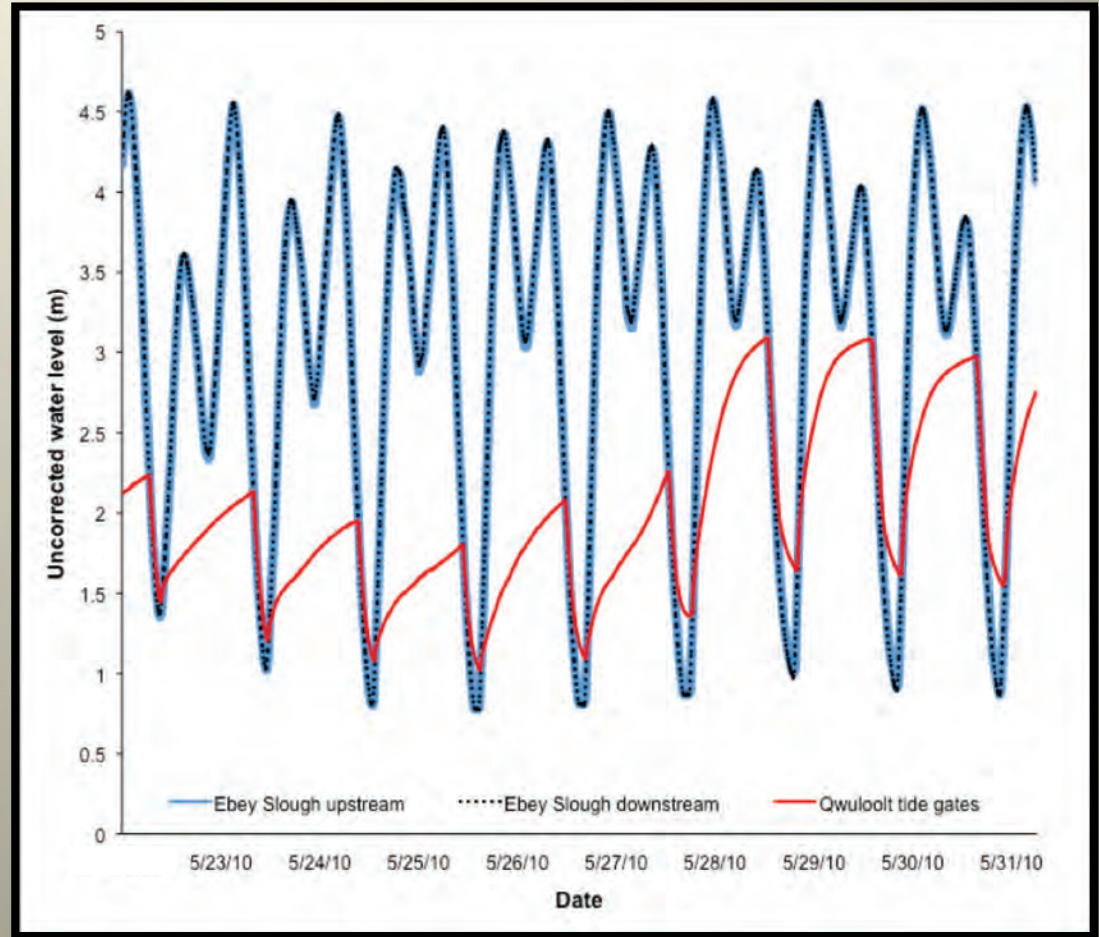
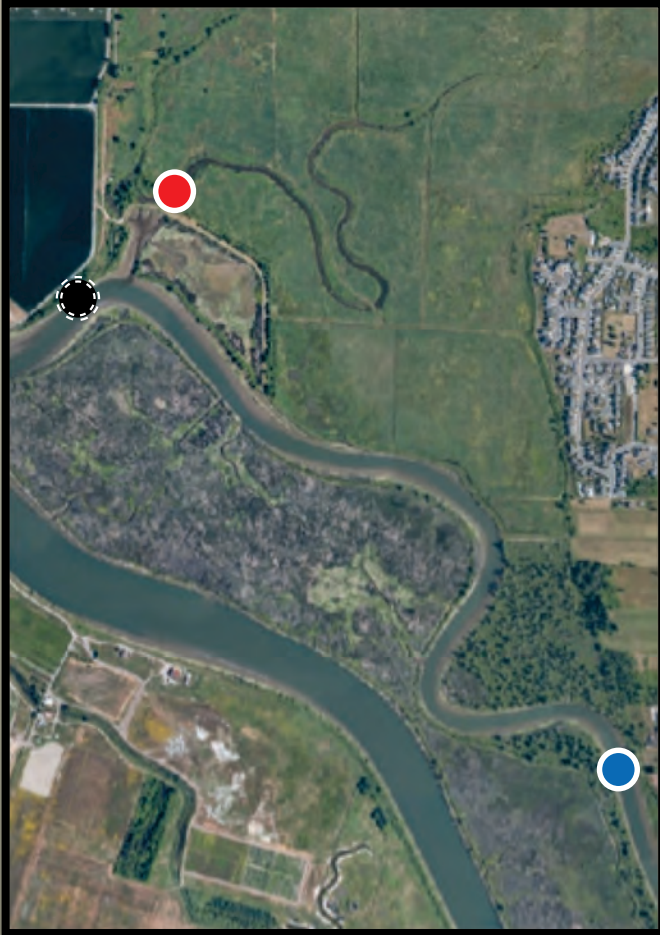
<b>Biological responses</b>
<b>Community</b> (veg, invert, fish, bird, mammal assemblage composition)
<b>Populations</b> (salmonid abundance, growth, life history diversity)

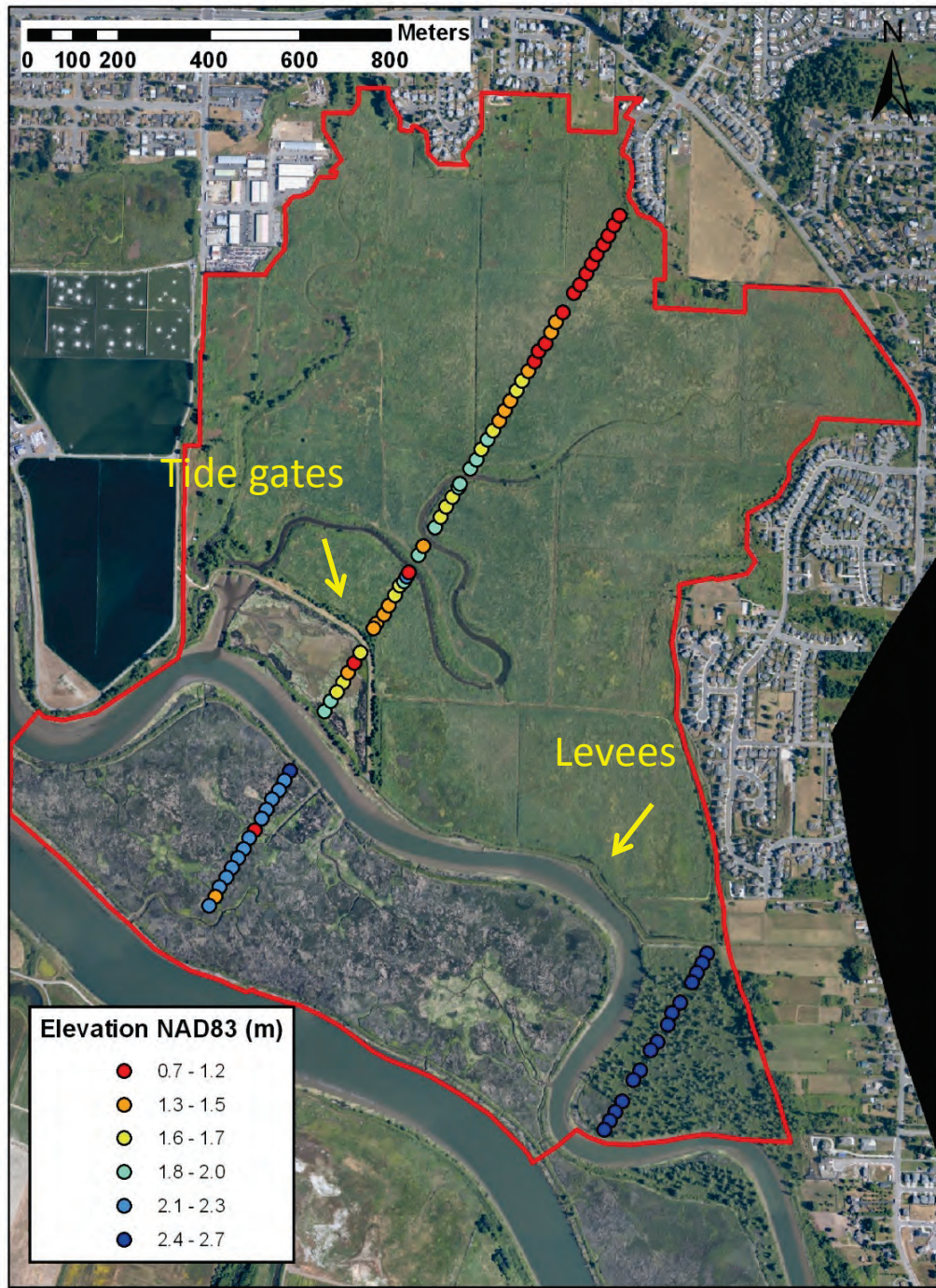
# Sampling to date

2009-present  
year round fish (5+ yrs)  
elevation  
hydrology  
Chemistry  
  
vegetation  
invertebrates  
birds  
mammals  
FISH!



# Hydrology





# Hydrological Disconnection & subsidence

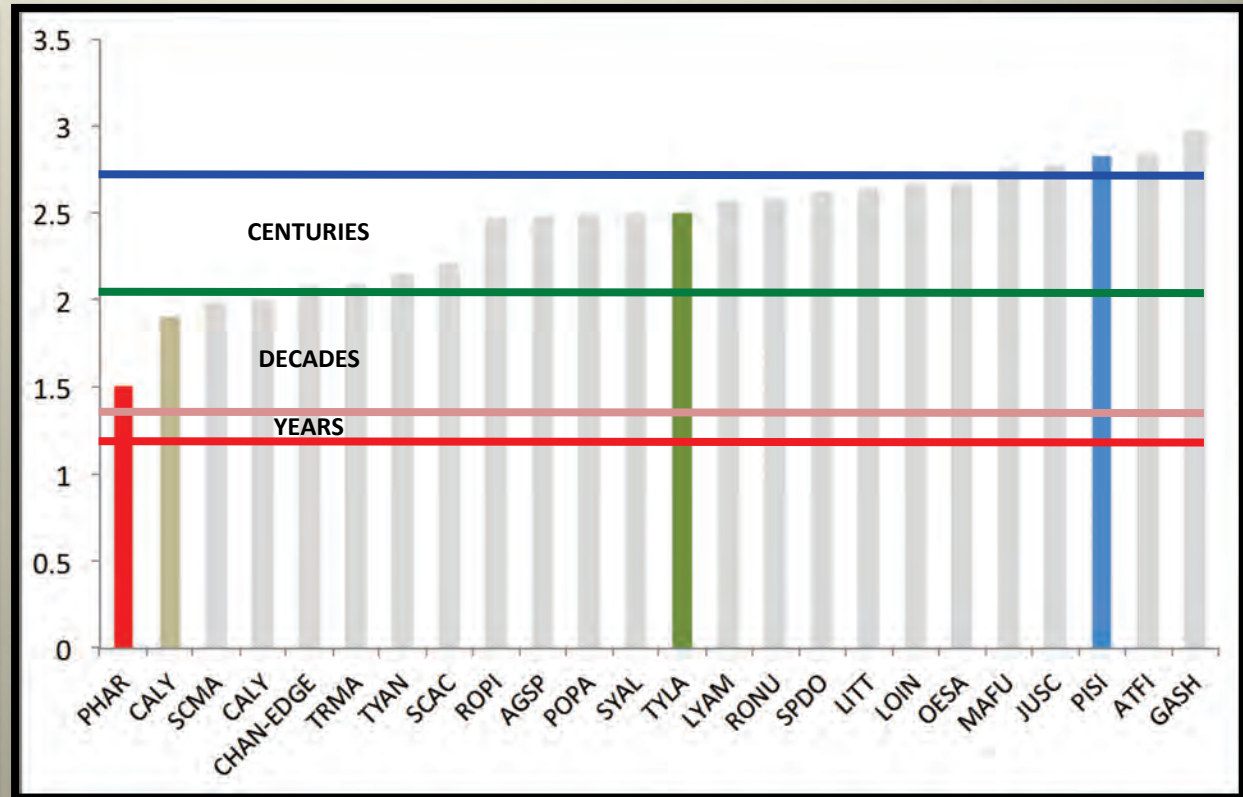
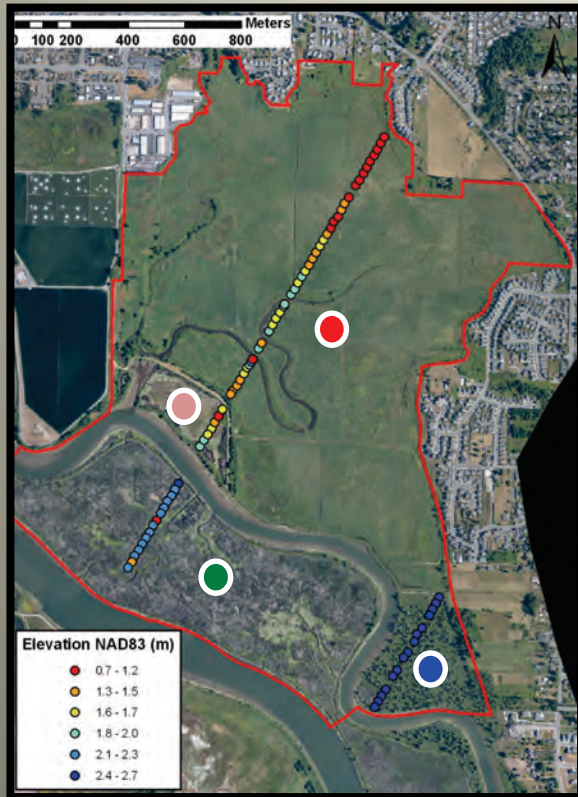
Qwuloolt verses  
Heron Point...

Consequences  
of land use



# Subsidence effects-vegetation

vertical distribution of wetland plants in study area

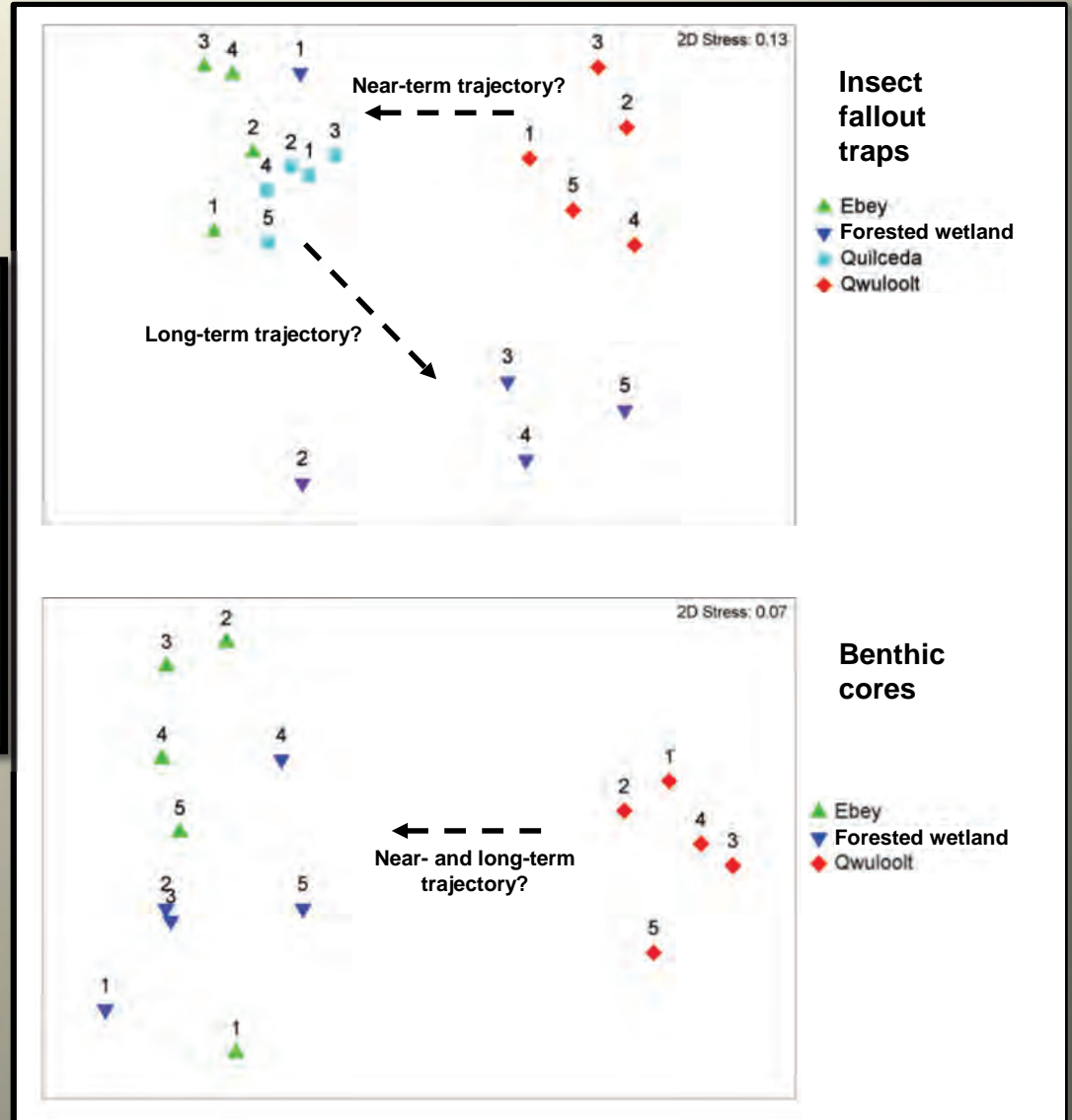


Curveballs: freshwater, beaver, SLR, etc...

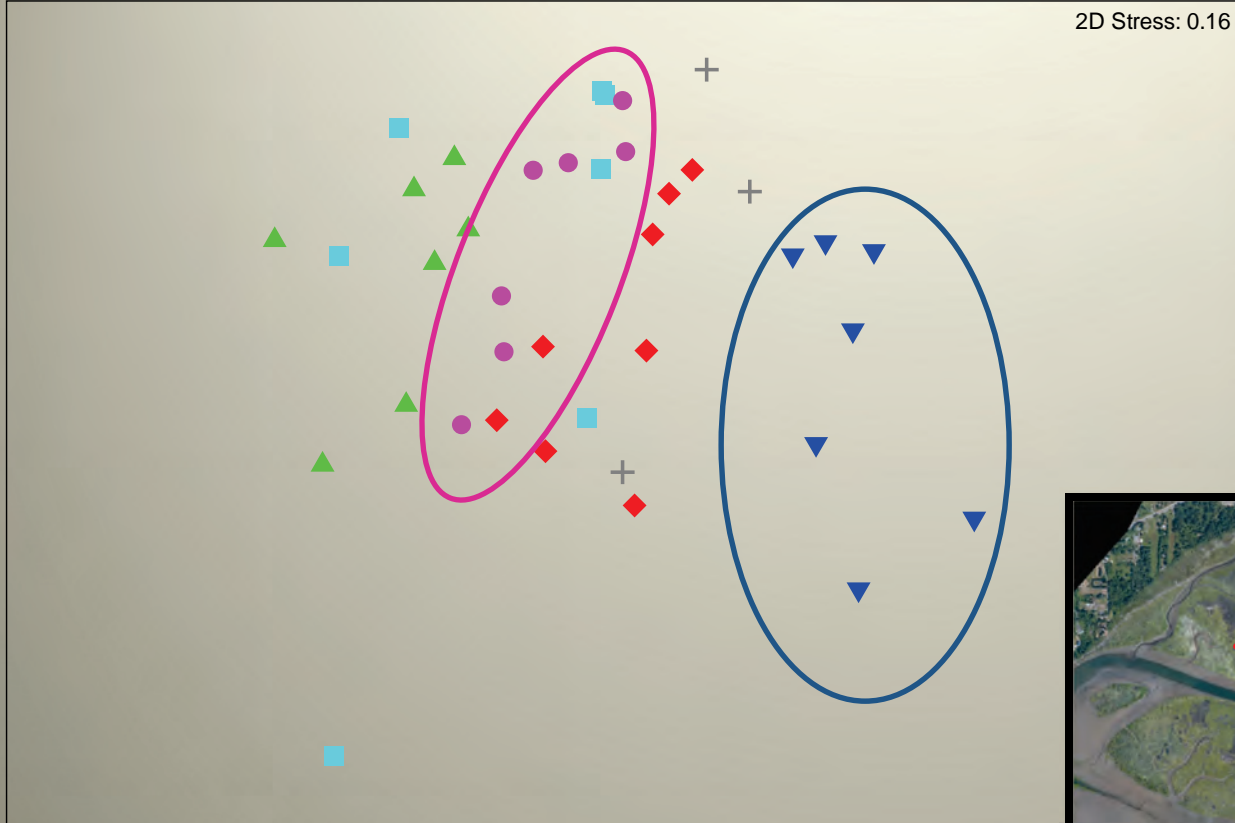
# Invertebrate Assemblages: Fallout Traps & Benthic Cores



Neuston Tow samples  
have not been analyzed



# Bird Assemblages



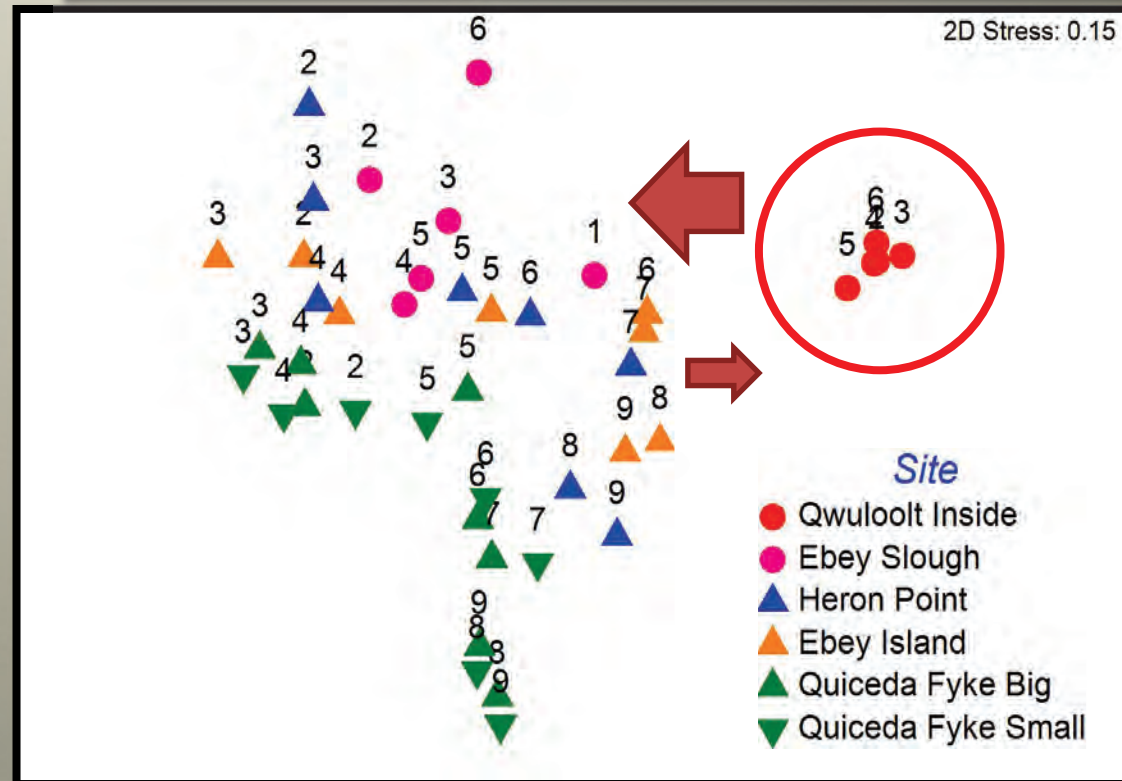
# Qwuloolt Fish/ Amphibian Assemblage

214 samples  
each dot = 1 site/month  
combination

Disconnected habitat =  
different fish assemblages

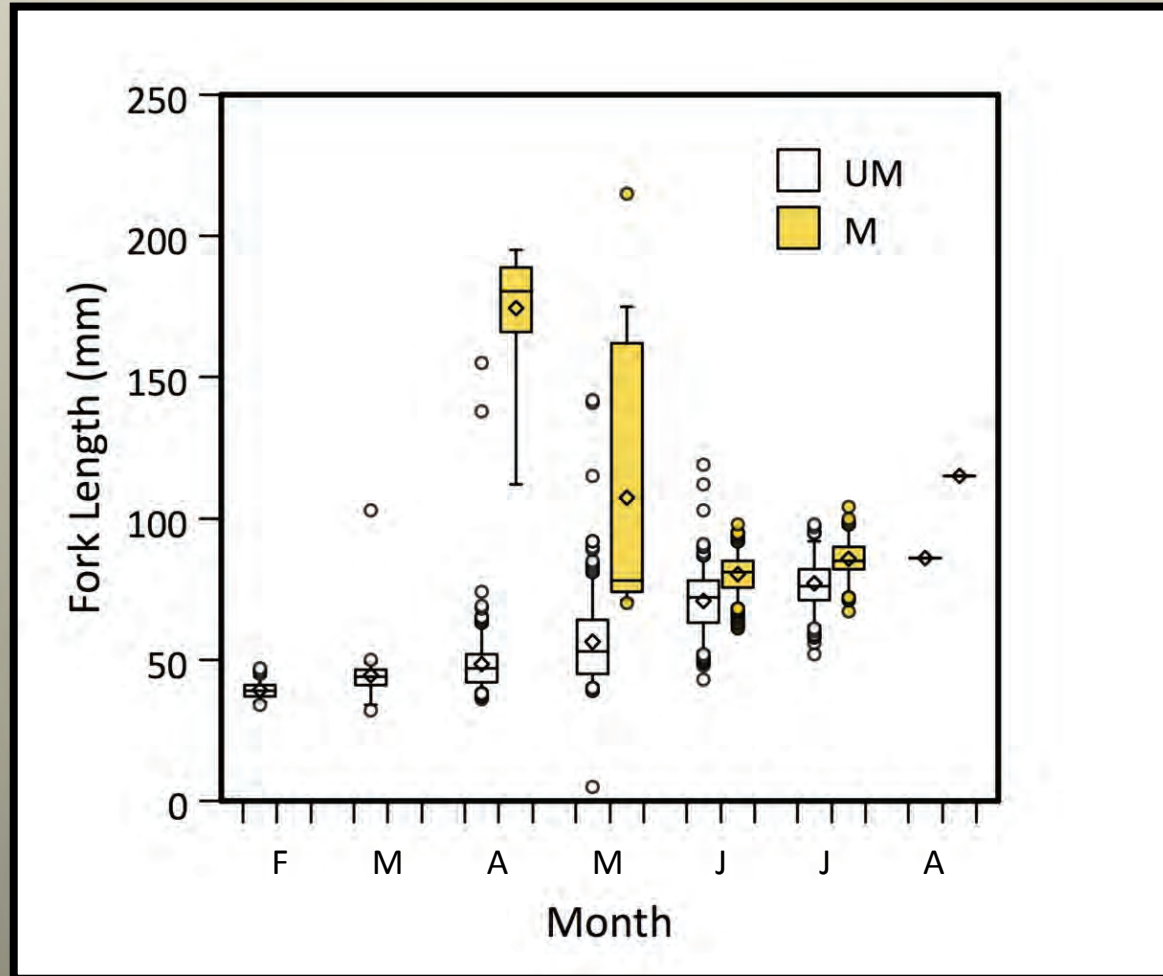
Less native (warm water  
invasives)

Native salmonids present



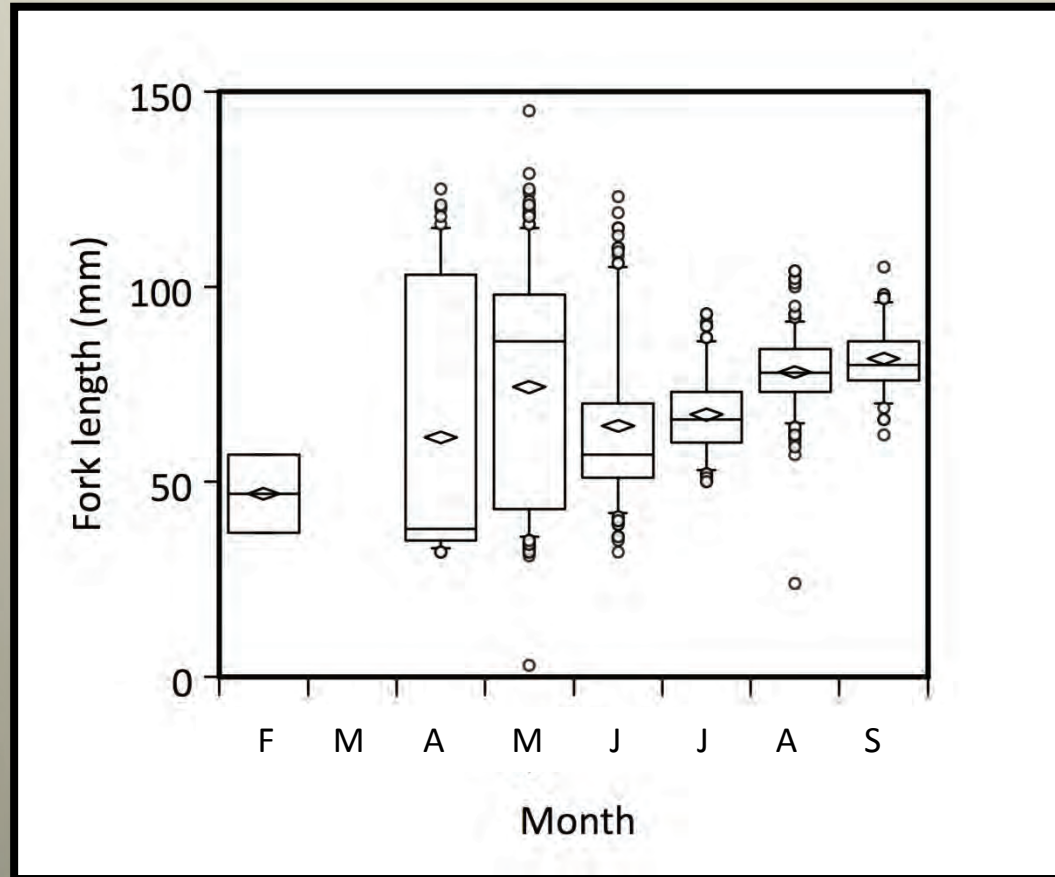
# Pre-breach seasonal Chinook salmon size 2012

Beach seines and fyke traps combined



# Pre-breach seasonal coho salmon size 2012

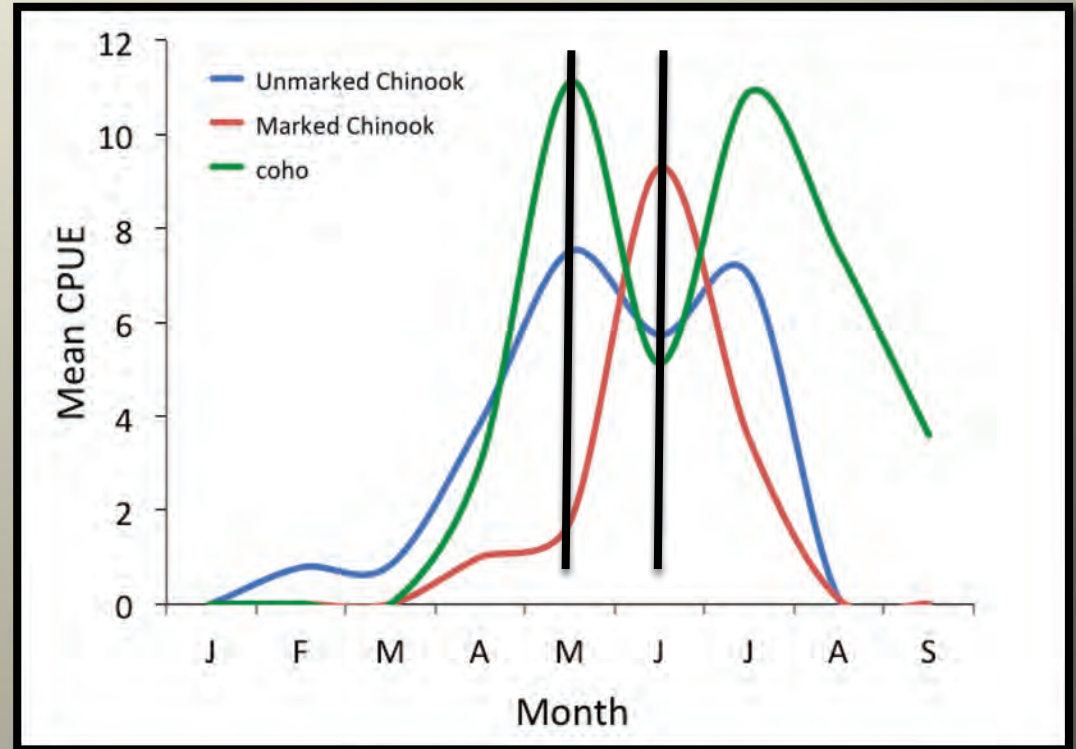
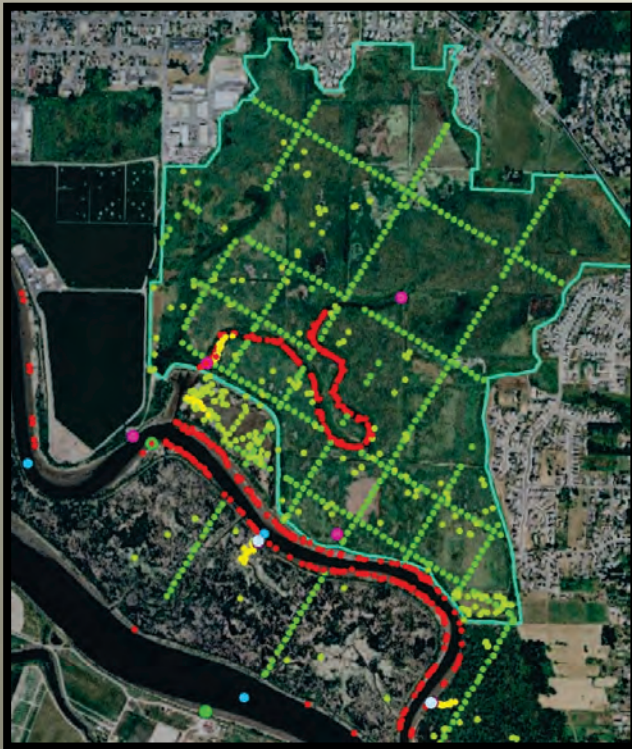
Beach seines and fyke traps combined



# Qwuloolt and salmon

Pre-breach fish abundance—Ebey Slough 2012

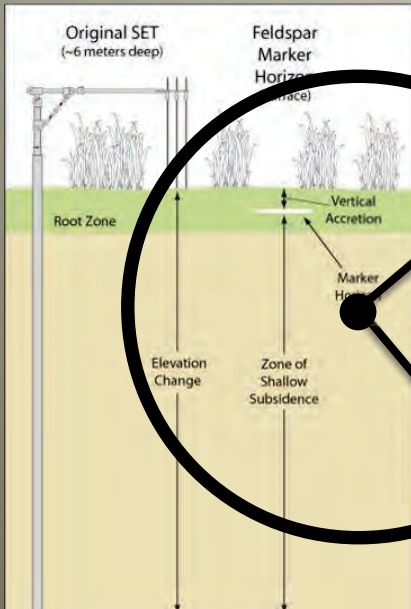
101 beach seine sets



# Future Data



## Surface Elevation Table



- 4 installed
- 16 planned



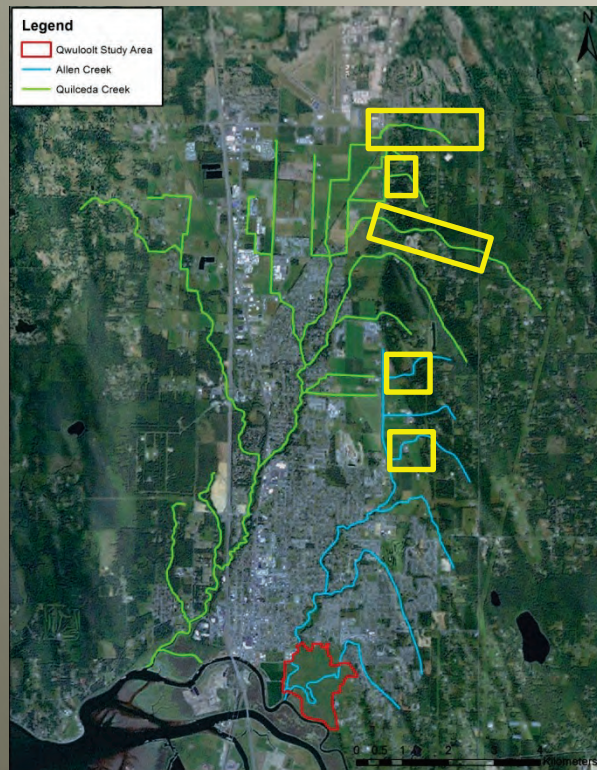
Stomach  
Content





# Data Gaps

## Watershed Response Allen & Jones Creeks



## Groundwater Levels and Salinity

## Beaver alterations to Qwulooit site Pre & Post Breach?



# Conclusions

Qwuloolt is

- subsided and disconnected
- degraded
  - Less diverse
  - Less indigenous
  - Less salty
- Monitoring is doing a good job of documenting pre-breach conditions and setting up meaningful short and long-term evaluations at project and system level

# Acknowledgements

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Nick Weatherly  
Michael Abrahamse  
Craig Wollum  
Tim Beechie



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Sound Salmon Solutions  
Washington Department of Fish & Wildlife  
Washington Department of Ecology



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EPA National Estuaries Program

# Questions?



Qwaloalt Restoration  
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