May 2nd, 8:30 AM - 10:00 AM

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

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Speaker
Todd Zackey, Casimir Rice, Joshua Chamberlin, Jason Hall, Holly Zox, Jason Schilling, and Phil Roni
Pre-project monitoring of the Qwuloolt restoration in the Snohomish River Estuary

Todd Zackey¹, Casey Rice², Josh Chamberlin², Jason Hall², Jason Schilling¹, Holly Zox³, Phil Roni¹

¹Tulalip Tribes; ²NOAA/NWFSC; ³ One Horse Enterprises
Qwuloolt Estuary Restoration Project
Restore 350 acres Breach Scheduled for late Summer 2015
5 factors and ultimate response

<table>
<thead>
<tr>
<th>Factors</th>
<th>Biological responses</th>
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</thead>
<tbody>
<tr>
<td><strong>Landforms</strong> (elevation, channel morph,</td>
<td><strong>Community</strong> (veg, invert, fish,</td>
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<tr>
<td>sediment dynamics)</td>
<td>bird, mammal assemblage composition)</td>
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<tr>
<td><strong>Hydrology</strong> (tidal regime, temperature,</td>
<td><strong>Populations</strong> (salmonid abundance,</td>
</tr>
<tr>
<td>salinity)</td>
<td>growth, life history diversity)</td>
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<td><strong>Energy &amp; nutrients</strong> (organic matter,</td>
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<tr>
<td>nutrients)</td>
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<td><strong>Chemistry</strong> (contaminants)</td>
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<tr>
<td><strong>Biological interactions</strong> (competition,</td>
<td></td>
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<tr>
<td>predation, disease)</td>
<td></td>
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</tbody>
</table>
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

Site
- Ebey Island
- Forested Wetland
- Marysville Mitigation
- Quil Ceda
- Qwuloolt
- Smith Island

2D Stress: 0.16
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

Neuston Plankton Tow Samples
- 4 installed
- 16 planned

DNA Isotopes Otoliths

Surface Elevation Table

- 4 installed
- 16 planned
Data Gaps

Watershed Response
Allen & Jones Creeks

Beaver alterations to
Qwuloolt site Pre & Post Breach?

Groundwater Levels
and Salinity
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
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Washington Department of Ecology

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Estuary and Salmon Restoration Program
EPA National Estuaries Program
Questions?