9th National Summit on Coastal and Estuarine Restoration and Management
Restoring Tidal Regimes and Flows – Paper 355
Wednesday, December 12, 1:30 pm – 3:00 pm PT in Room 103B
Long Beach Convention Center, California USA

Qwuloolt Wetland Restoration

Bob Battalio, PE – Engineer-in-charge: Environmental Science Associates (ESA)
Kurt Nelson, Project Manager: Env. Division Manager, Tulalip Tribes Natural Resources Dept.
Ryan Bartelheimer, PE -Natural Resources Engineer at Snohomish Conservation District (formerly ESA)
Pre-project 2005

350 acres former estuarine marsh
Diked, drained for agriculture and subsided
Two creeks modified
Tide Gates at historical mouth
Encroachment by development
QWULOOLT WETLAND RESTORATION

Restoration Elements

GOAL: Restore historic tidal circulation and other natural processes and functions

- Tidally-influenced creeks (Allen and Jones)
- Tidal mouth at Ebey Slough, Snohomish River
- Levee removal
- Tidal channels
- Wetland and forest berms
- Storm water detention and treatment basin
- Levee
Post-construction digital recording fly-through
Breach Day August 28 2015
Breach evolution

2015

2017
Post-construction monitoring, USGS

Over 10 feet of scour!
Qwulooit Interior Avian Assemblages

Avian Foraging Method
- Carnivore
- Frugivore
- Granivore
- Herbivore
- Insectivore
- Omnivore
- Piscivore
- Vertebrate

Average Birds Per Visit

Restoration Stage (Pre, Post) by Year

Tidal Inundation Restored

Pre 2012
Pre 2013
Pre 2014
Pre 2015
Post 2015
Post 2016
Fish Assemblage Pre and Post Breach

Qwuloolt - Jones Creek

Post Breach Fish Species
37 Beach Seines
n= 271:
Ebey Slough – Snohomish River Estuary Flooding

Combined coastal and river flood recurrence along Ebey Slough

- River governs – mostly
- Coastal contributes
- Wind waves affect site
vegetated berms

Pre-breach construction

Feb 13 2016
Industrial Park Flood Management

- Parking, El. 6+
- Flood Storage, El. 4
- max wse, El. 5
- WQ Stor, El. 3
- Allen Creek, El varies tidally El. 2.5-4.5
- D/S Chan El. -0.7

Map details:
- Levee Centerline
- Watershed Boundary, Typ.
- Wo Treatment Area = 4.0 AC
- El. 3.0
- Stormwater Detention Total Area = 6.5 AC
- 25-Year Flood Storage Shelf Area = 2.5 AC
- El. 4.0
- Outlet Pipes

Scale (feet):
- 0, 150, 300, 600
100 yr w and w/out exist. culvert

Allen Creek Flood Hydraulics

Example food hydrographs

10 yr coastal and annual creek flow

Downstream boundary
Ebey Slough
Monitoring Components

**Fish**
- Counts
- Assemblage Composition
- Size

**Vegetation**
- Plot
- Transects

**Invertebrates**
- Fallout
- Benthic Coring
- Plankton

**Birds**
- Assemblages

**Mammals**
- Rodents
- Beaver

**Elevation**
- LiDAR
- RTK (survey grade) GPS
- SET (Surface Elevation Tables)
- Bathymetry

**Hydrology**
- Vertical Profiling
- Continuous data loggers (Temp, Salinity, & Depth)
- Point Measurements
acknowledgements

Qwuloolt Trusties
US Army Corps of Engineers
City of Marysville
Adolfson (now part of ESA)
Philip Williams & Associates – PWA (now part of ESA)
Steve Winter, formerly Adolfson and ESA, now Natural Systems Design
Questions?

Photos by Loren Mooney