

Hydrodynamics and Coastal Change along Pt. Whitehorn – Cherry Pt.

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Goals:

- 1. Quantify Sediment transport and Physical Processes (erosion, sedimentation)**
- 2. Assess Importance to Coastal Infrastructure and Ecosystems**
- 3. Predict Coastal Response to Sea-Level Rise and Climate Change**

Supports:

**WWU Thesis, Meghan Weaver
(Scott Linneman, Eric Grossman)**

**USGS Coastal Habitats in Puget
Sound Project (CHIPS)**

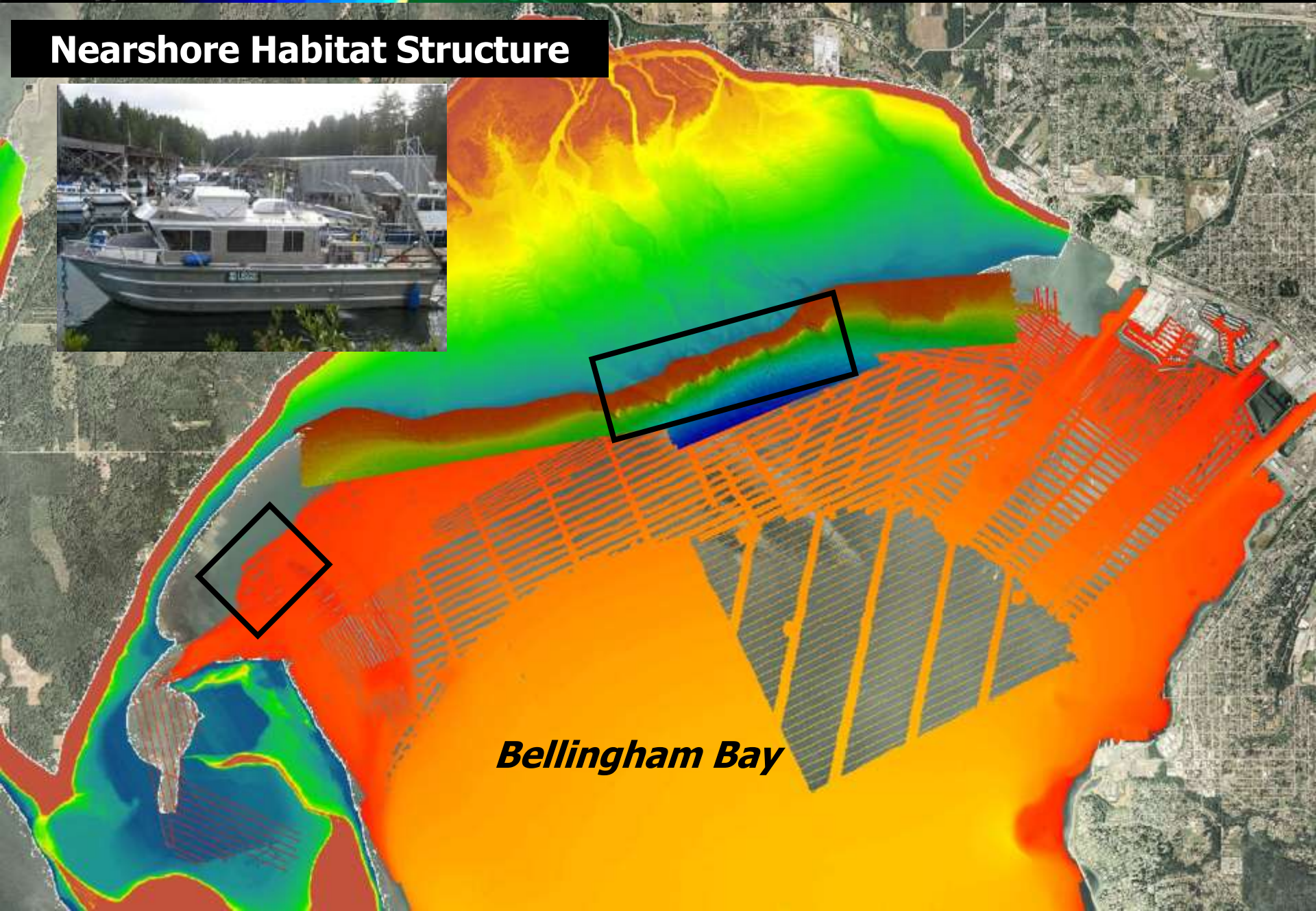
**WRIA1 Nearshore Habitat
Restoration Prioritization**

**EPA Region 10 Scientific
Investigation of Vulnerability
of Coastal Infrastructure,
Ecosystems and Communities**

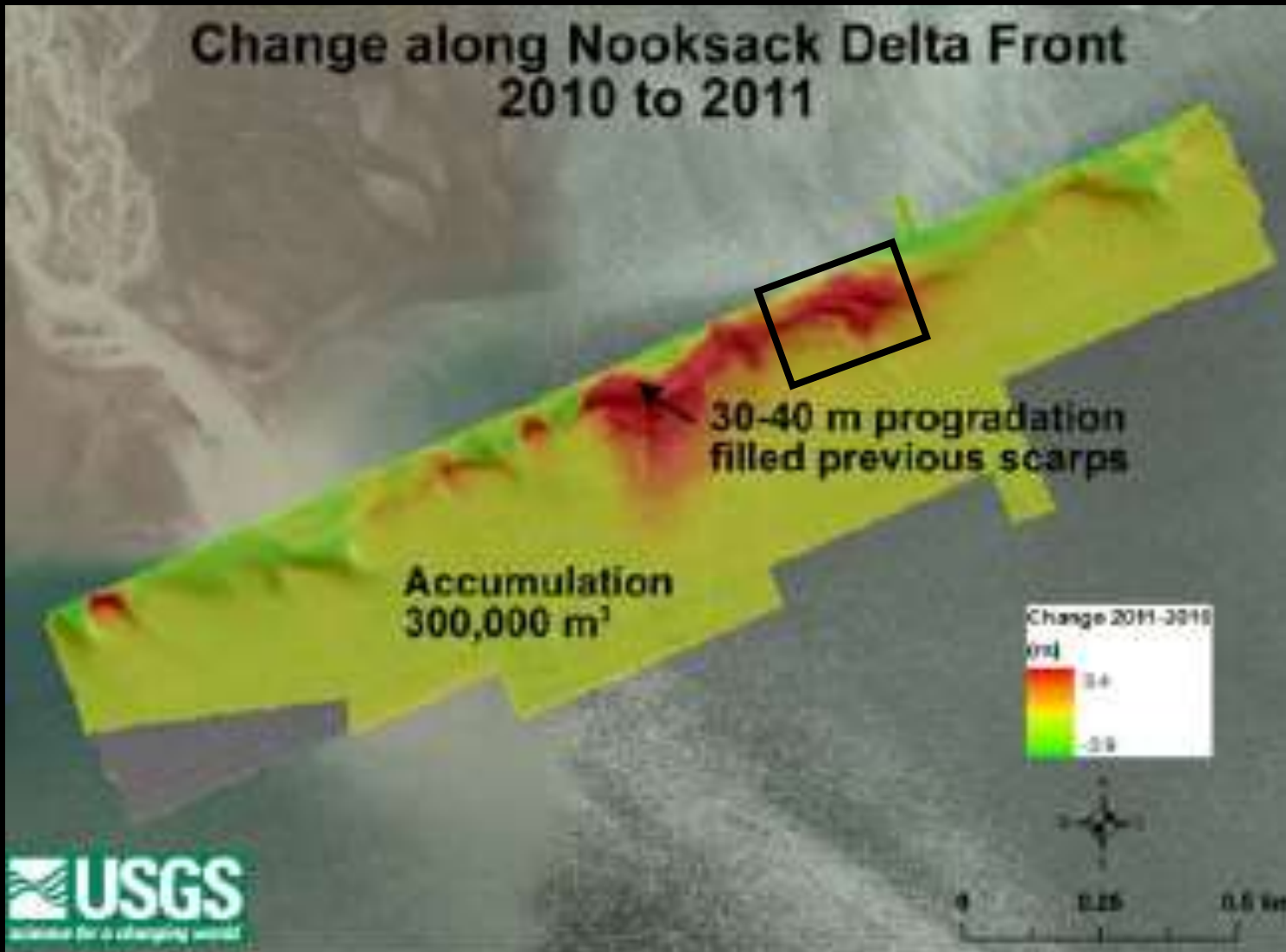
State Aquatic Reserve Program

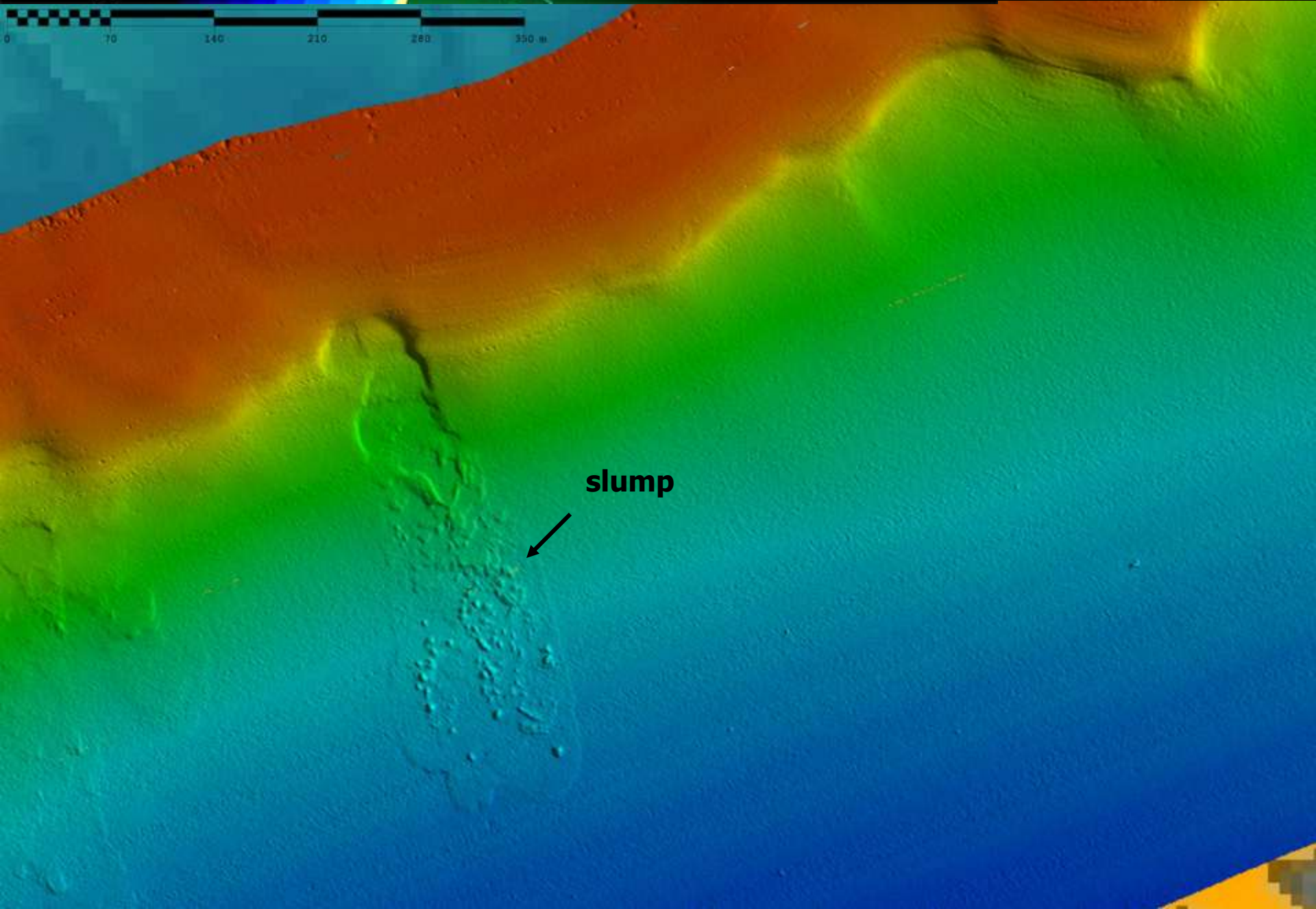


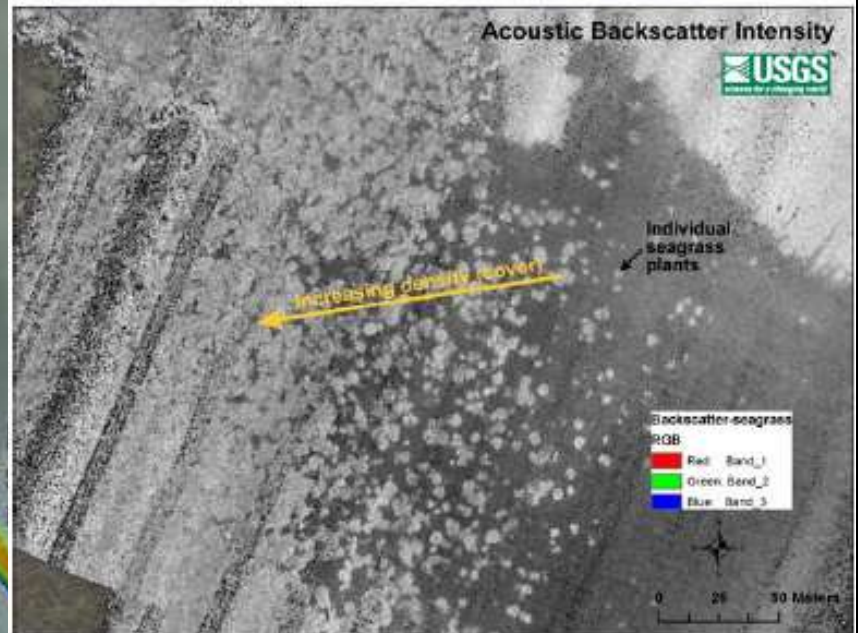
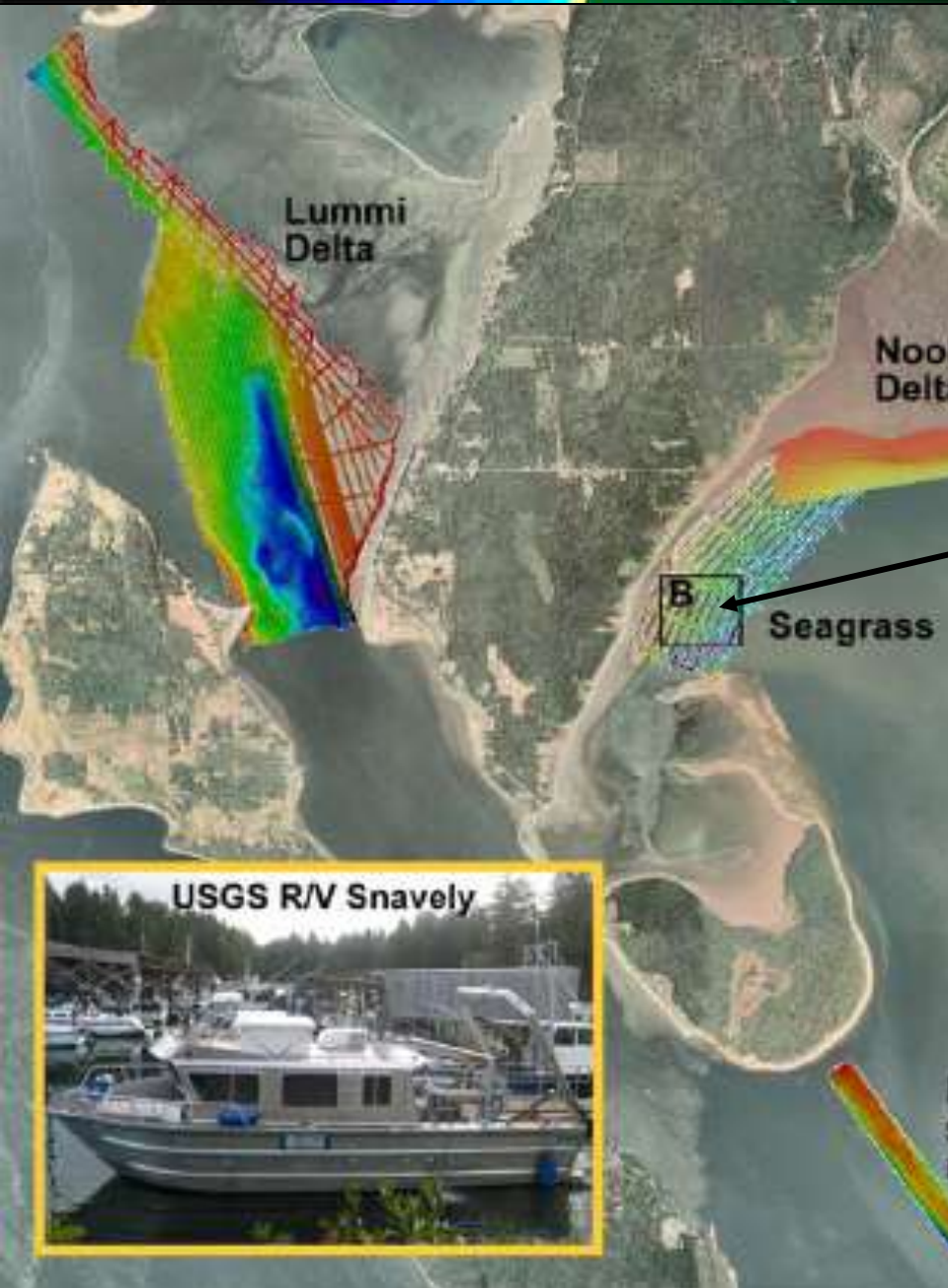
Nearshore Habitat Structure



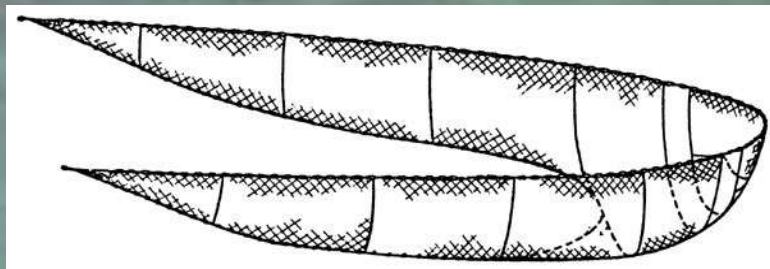
Bellingham Bay



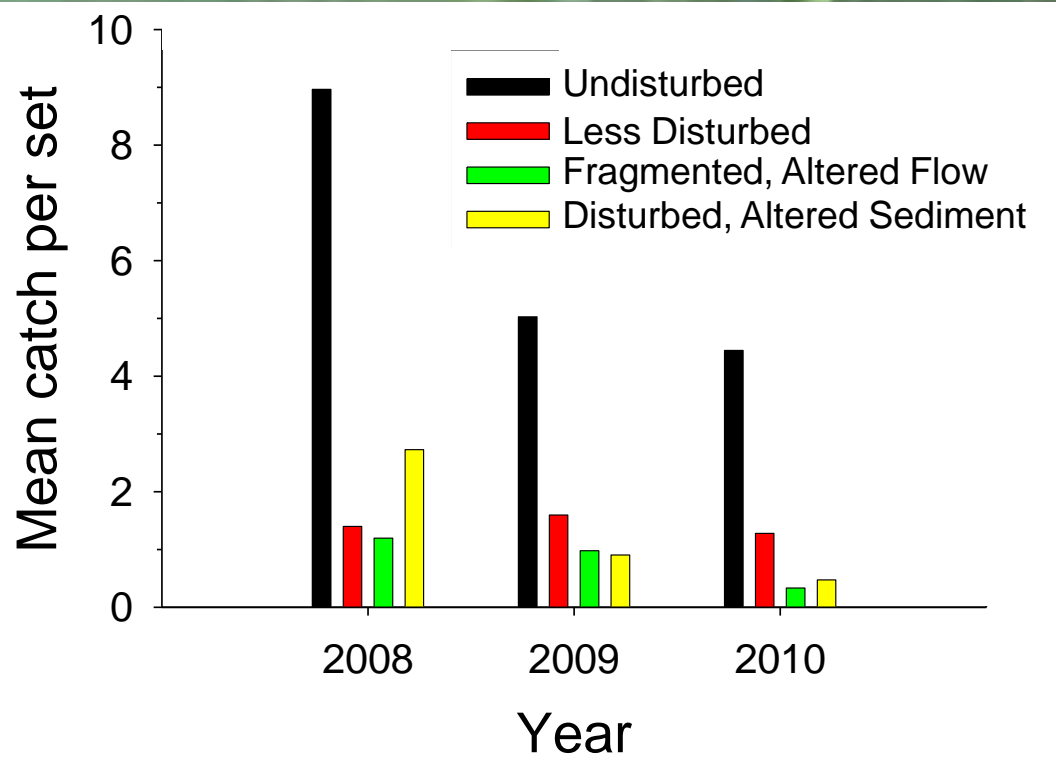




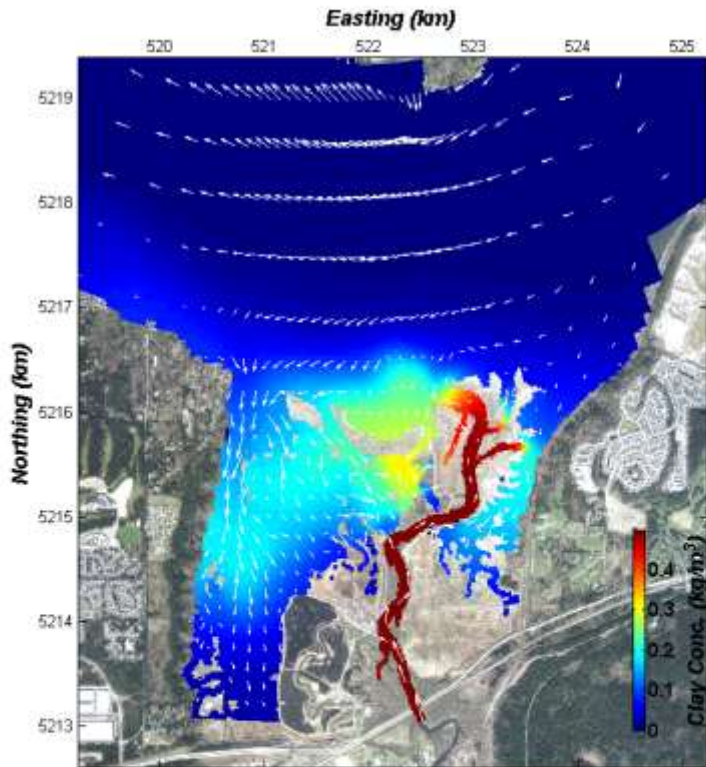
Nearshore Use & Residency



Herring Use of Eelgrass

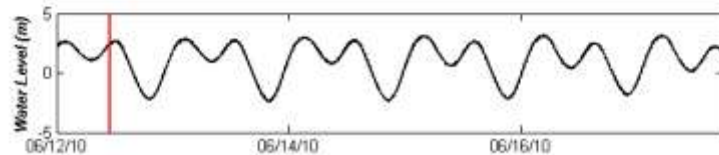


Tools and Models to Inform Adaptive Management



Nisqually Indian Tribe & USFWS
Nisqually National Wildlife Refuge
Estuary Restoration

WA-DNR
Nisqually Reach Aquatic Reserve
Management Plan



Mozilla Firefox
 http://myweb.students...oastalResilience.html
 myweb.students.wvu.edu/hornep/SkagitCoastalResilience.html

Skagit Coastal Resilience

Home Map Layers Scenarios Legend Impacts Methodology

Map Layers

Scenarios

- Current MHHW
- SLR 2050
- SLR 2100

Land Use

- Zoning
- Parcels

Infrastructure

- Public Facilities
- Roads
- Railroads
- Water Wells
- Dikes

Impacts

- Land Use
- Roads

Online tool for scientists and resource managers to assess vulnerability

Map Legend

Flooding Scenario

Water Depth (Meters)

- 0-1
- 1-2
- 2-3
- >3

- School
- Library
- Hospital
- Police Station
- Fire Station
- City Hall
- Post Office
- Airport
- Road
- Railroad

Impacts

2050 Scenario: 183 Square Km Threatened

- 87.9% Agriculture
- 6.6% Recreation
- 2.8% Urban
- 2.3% Rural
- 0.4% Commercial

Grossman et al. (2011)

Vulnerable Shoreline, Infrastructure, Ecosystem, and Resources



**Forage Fish
Spawning
Beaches**

Legend
— WDFW Smelt Spawning

Johannessen, 2006

Dynamic Geology and Oceanographic Processes

-0.7 ft/yr (1950-2003)

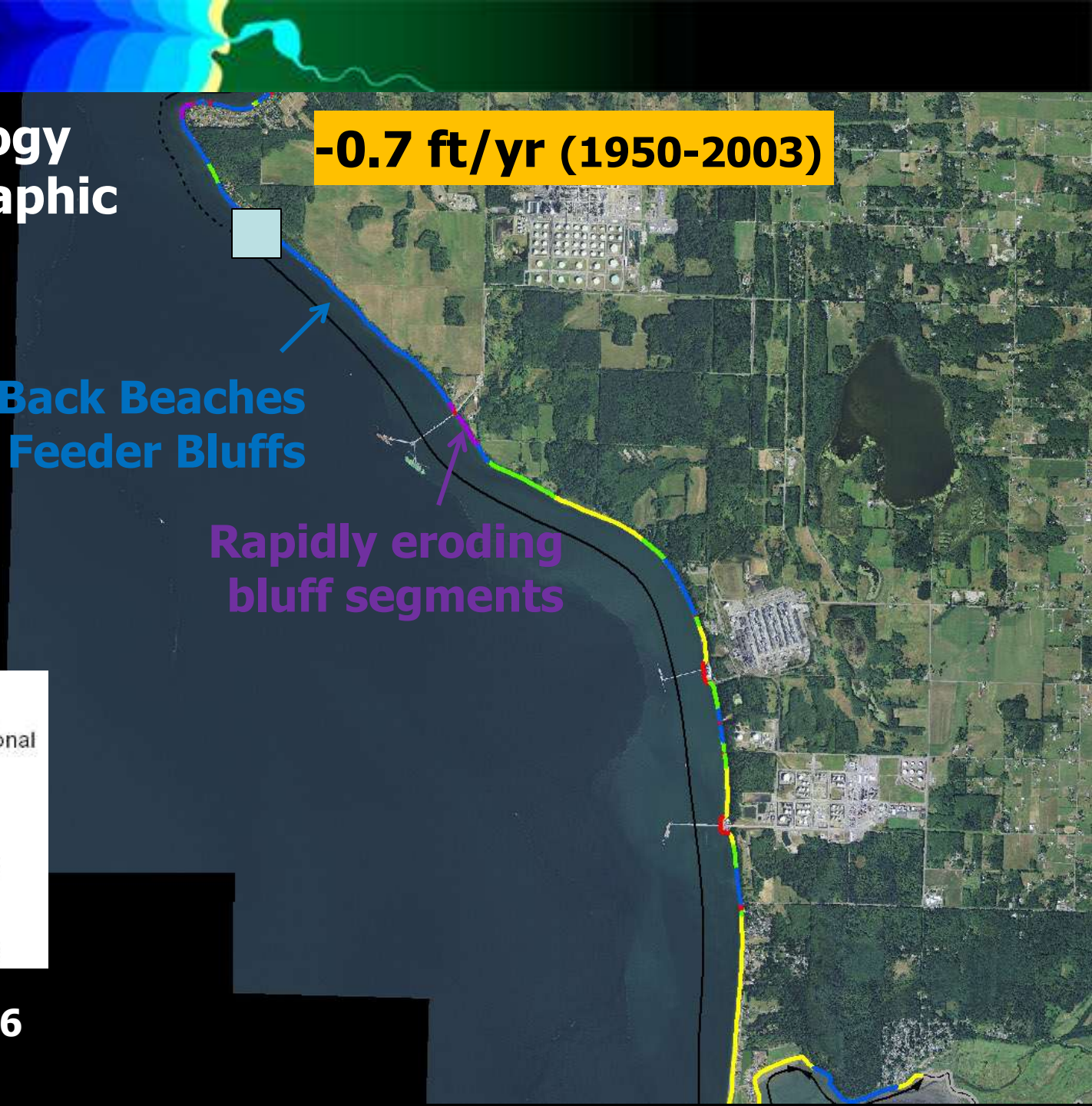
**Bluffed Back Beaches
Feeder Bluffs**

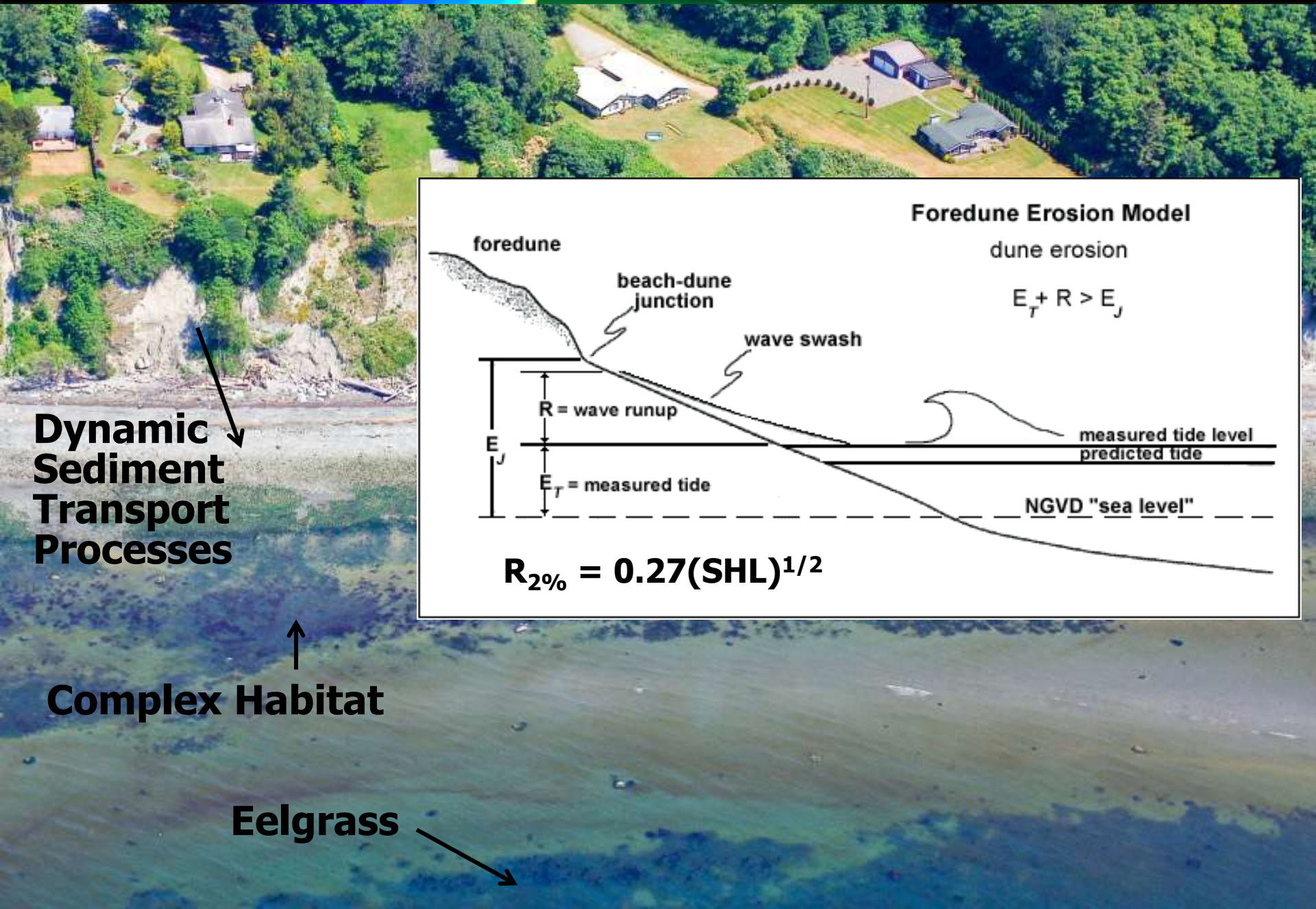
**Rapidly eroding
bluff segments**

Legend

- Feeder Bluff Exceptional
- Feeder Bluff
- Transport Zone
- Accretion Shoreform
- Modified
- No Appreciable Drift

Johannessen, 2006

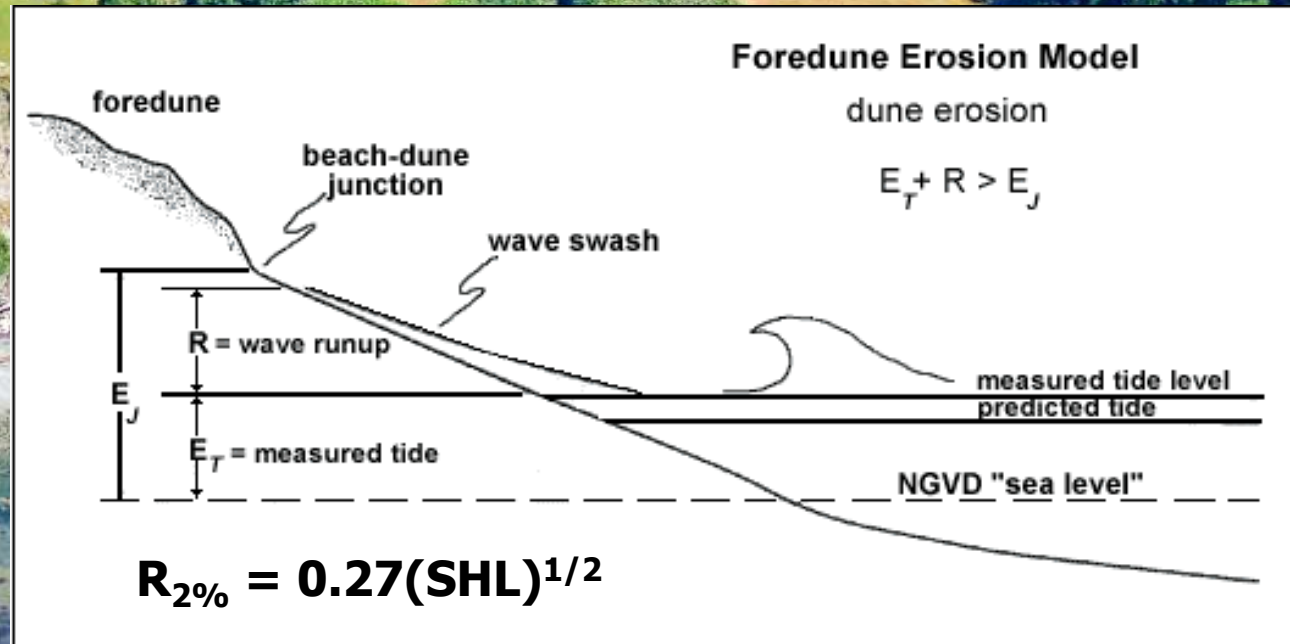




**Dynamic
Sediment
Transport
Processes**

Complex Habitat

Eelgrass



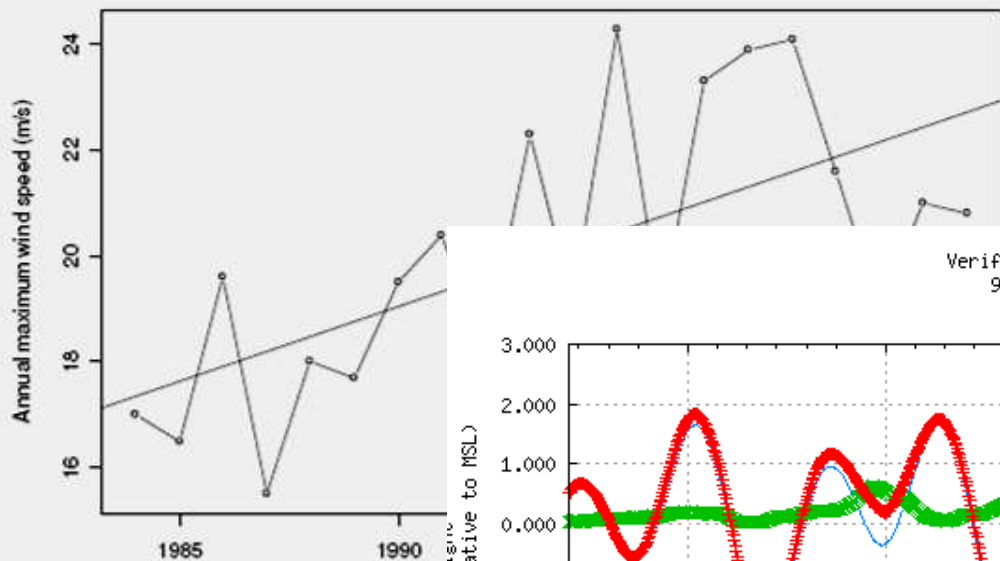
**Waves, Storm Surge
Sea-Level Rise
Groundwater Seepage
Sediment Supply/Source**



December 25, 2011

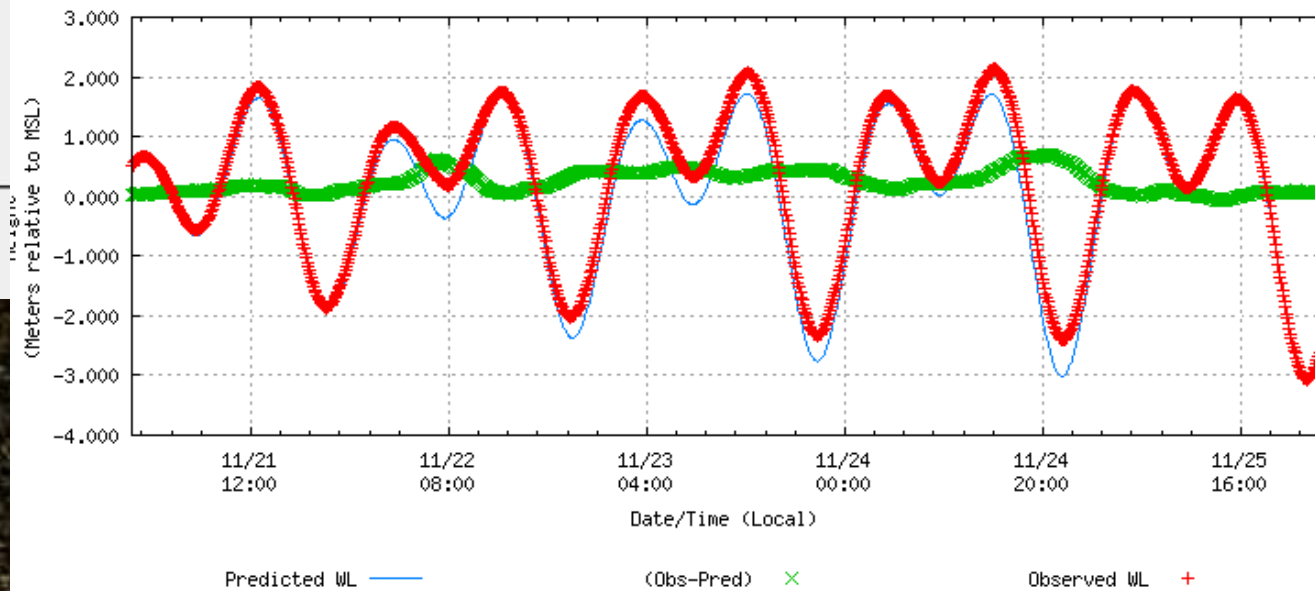
Winds and waves

West Point Annual Max Wind (1984 – 2003)

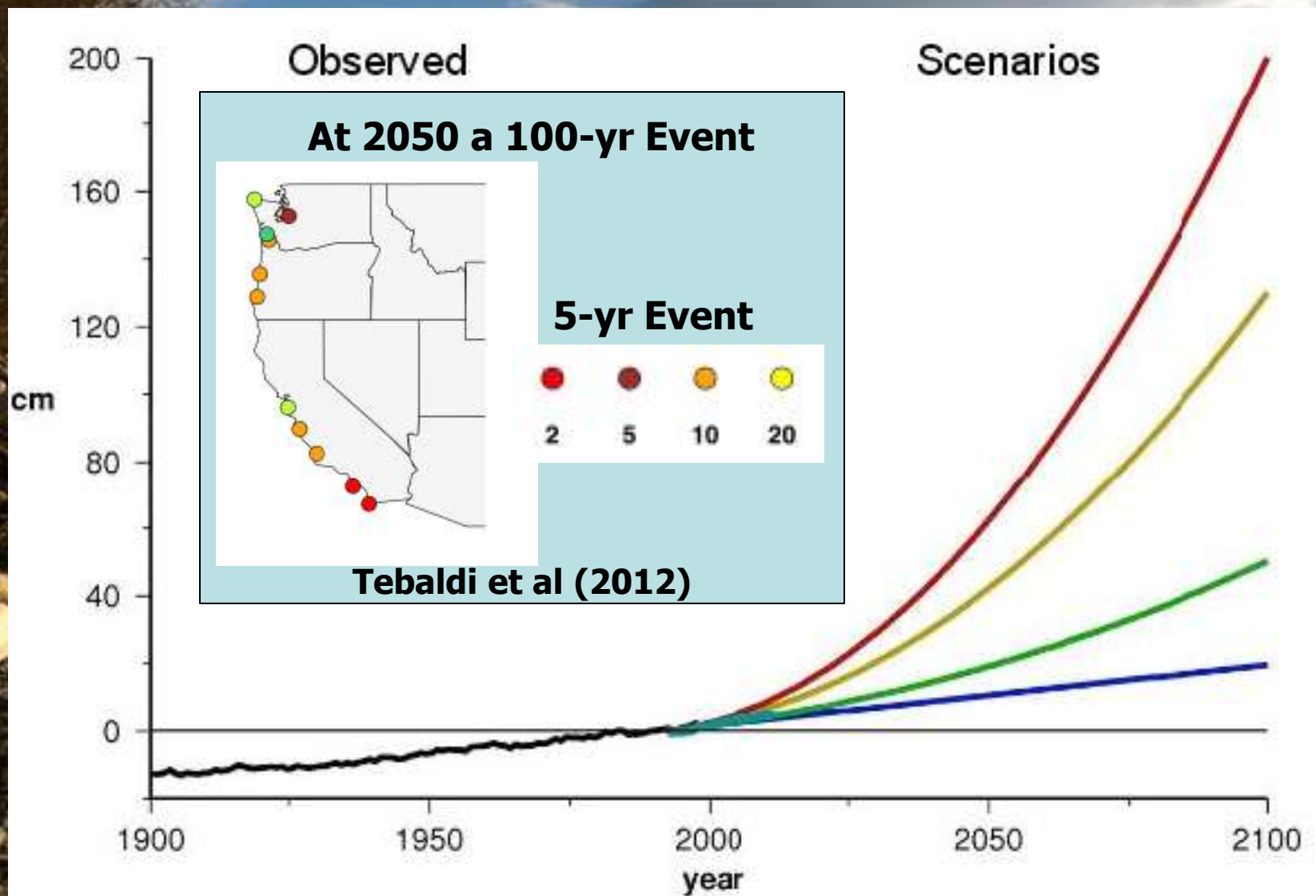


Inverse Barometer

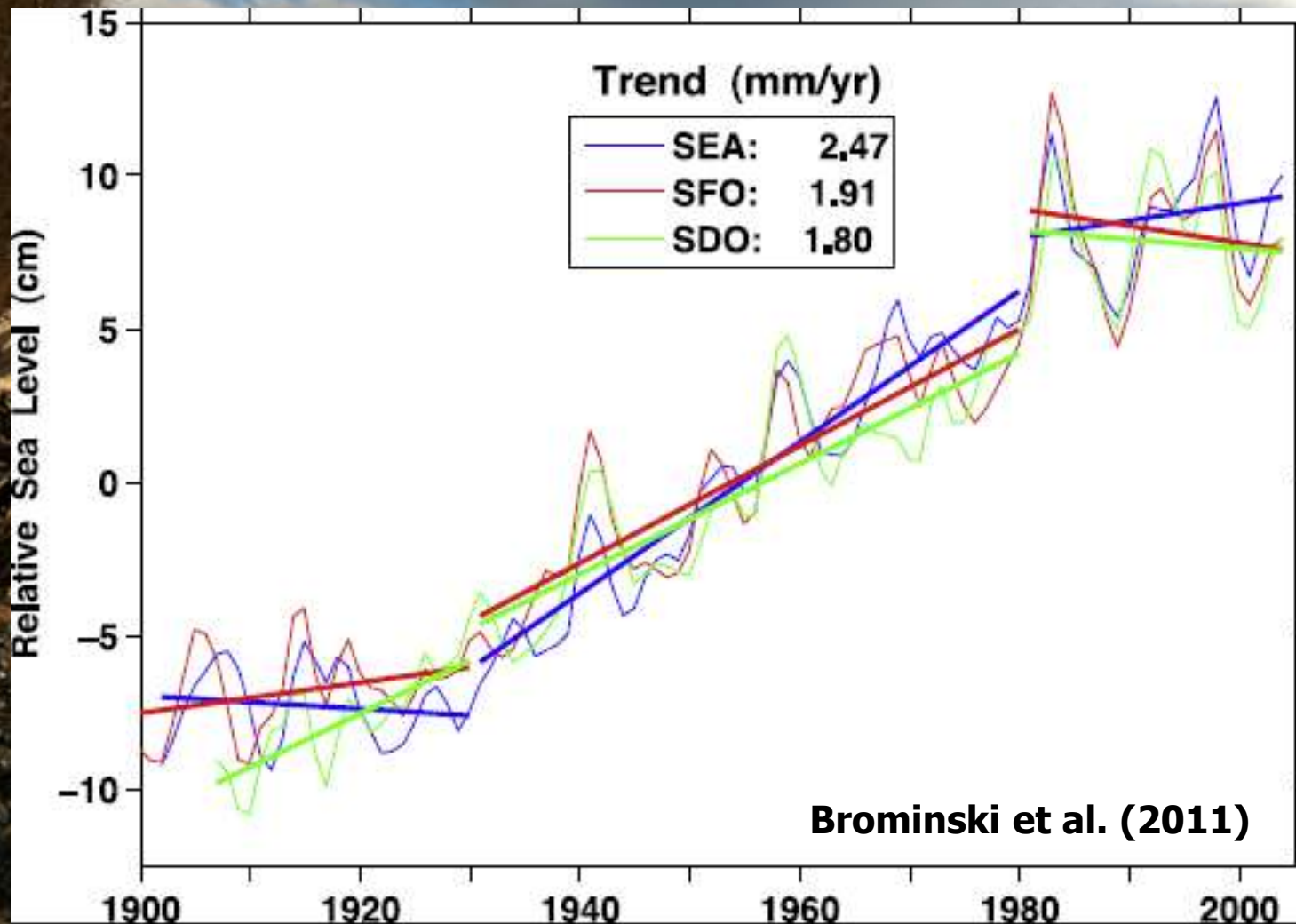
NOAA/NOS/CO-OPS
Verified Water Level vs. Predicted Plot
9447130 Seattle, Puget Sound, WA
from 2011/11/21 - 2011/11/25

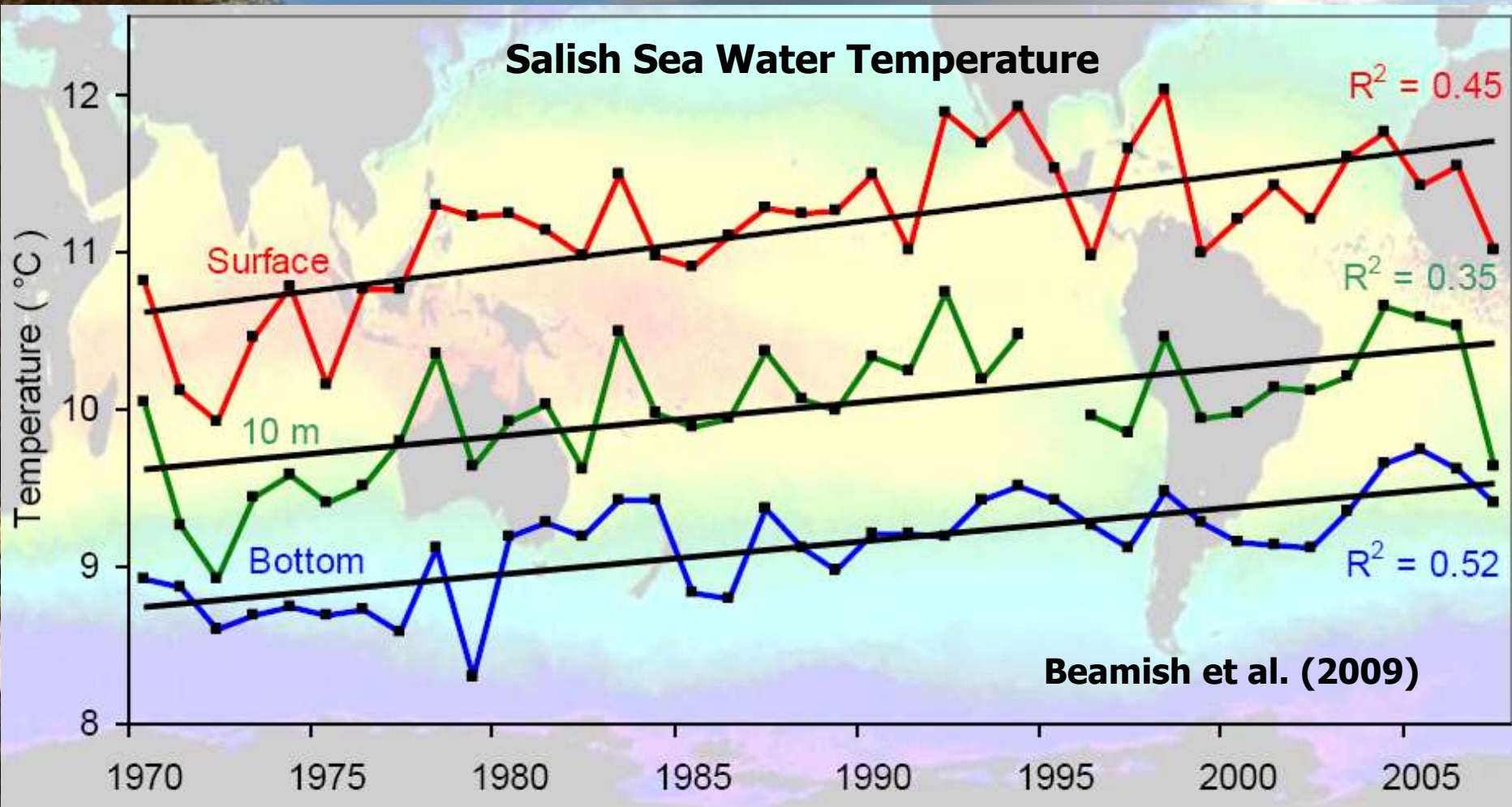


National Research Council National Climate Assessment (2012)

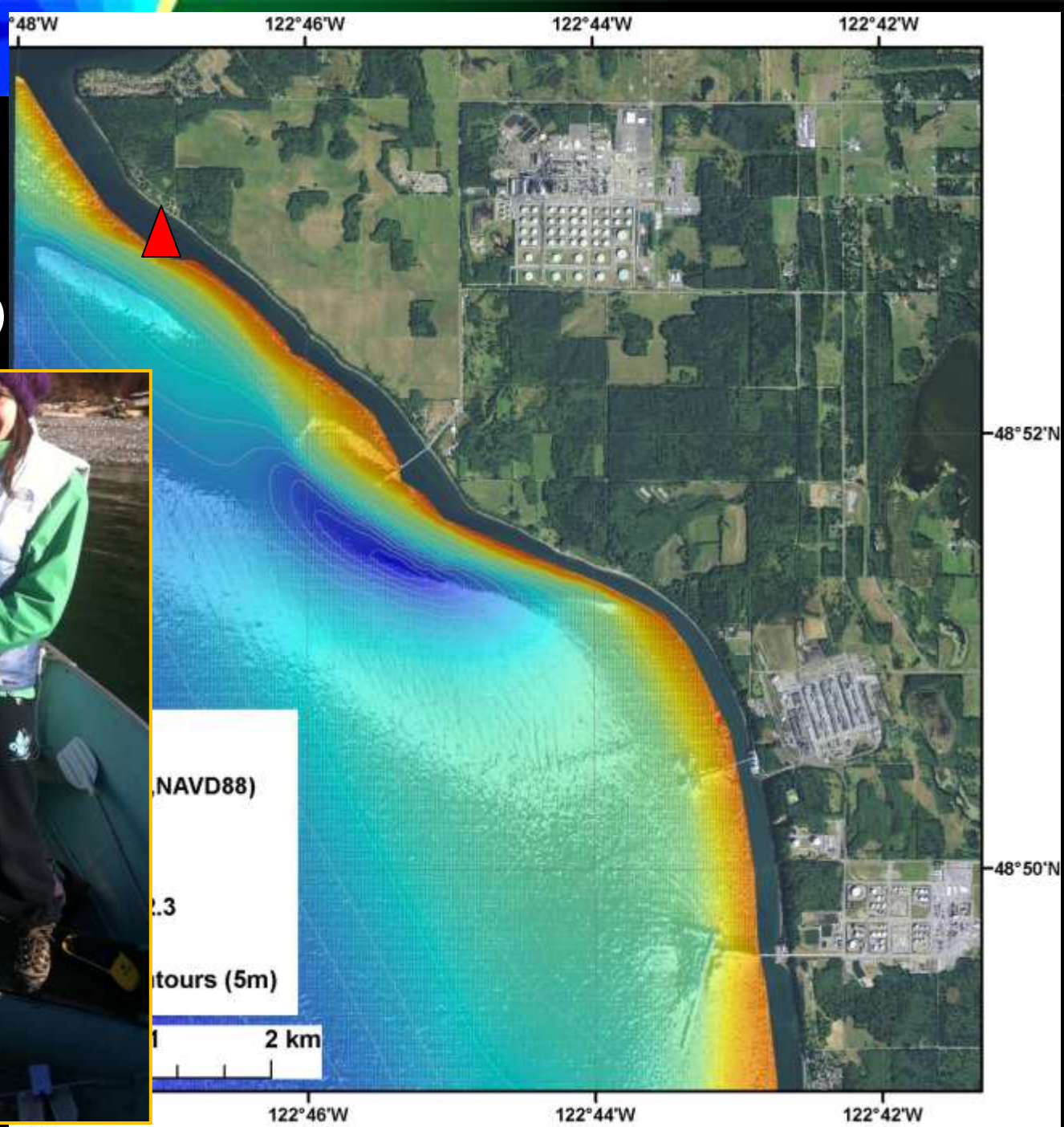


Imminent Acceleration of Sea-Level Rise with change in PDO? Wind stress?

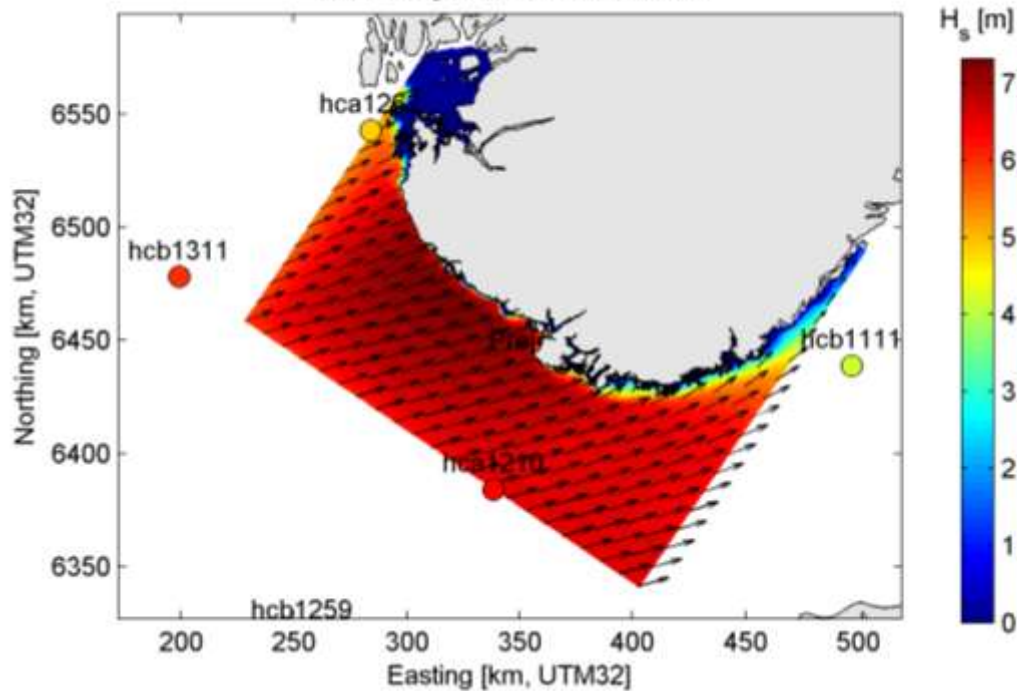




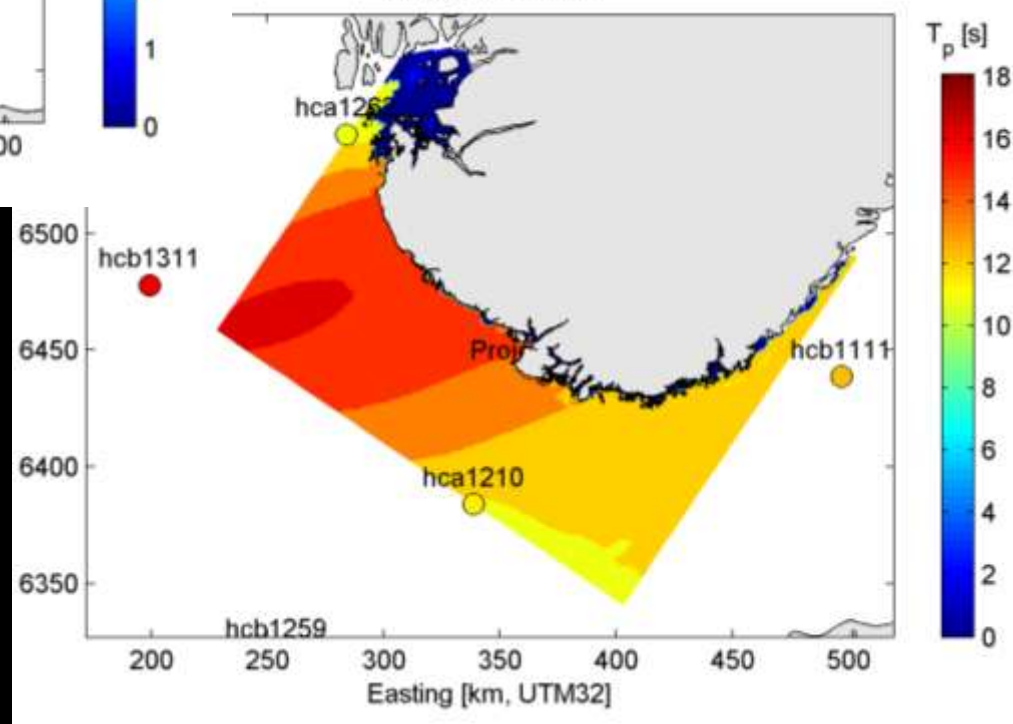
Wave Sensor
(Jan – April, 2012)
Tides @ 15 min
Waves @ 1hr (8 min)



Wave Height and Wave Direction

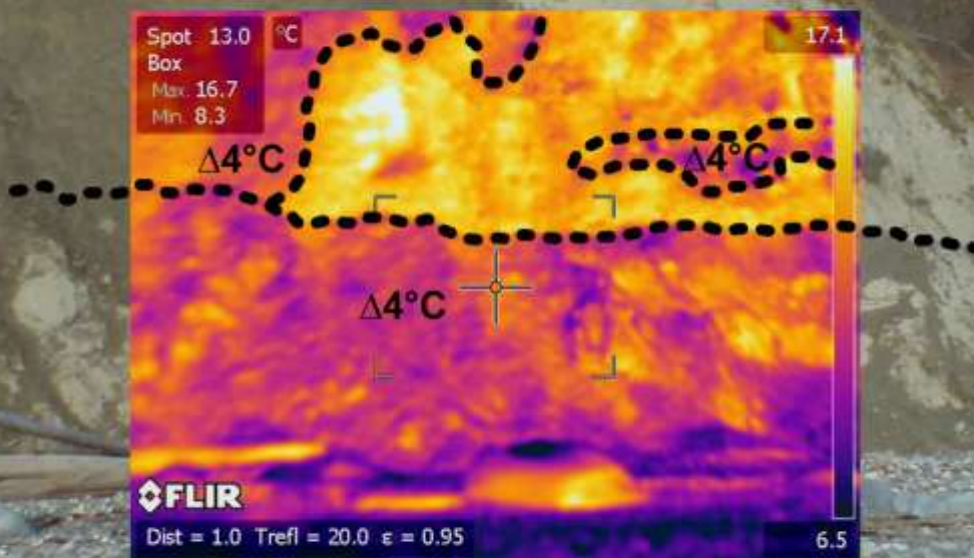


Wave Peak Period





1. Erosion, Sediment production processes
2. Temperature/salinity inputs alongshore

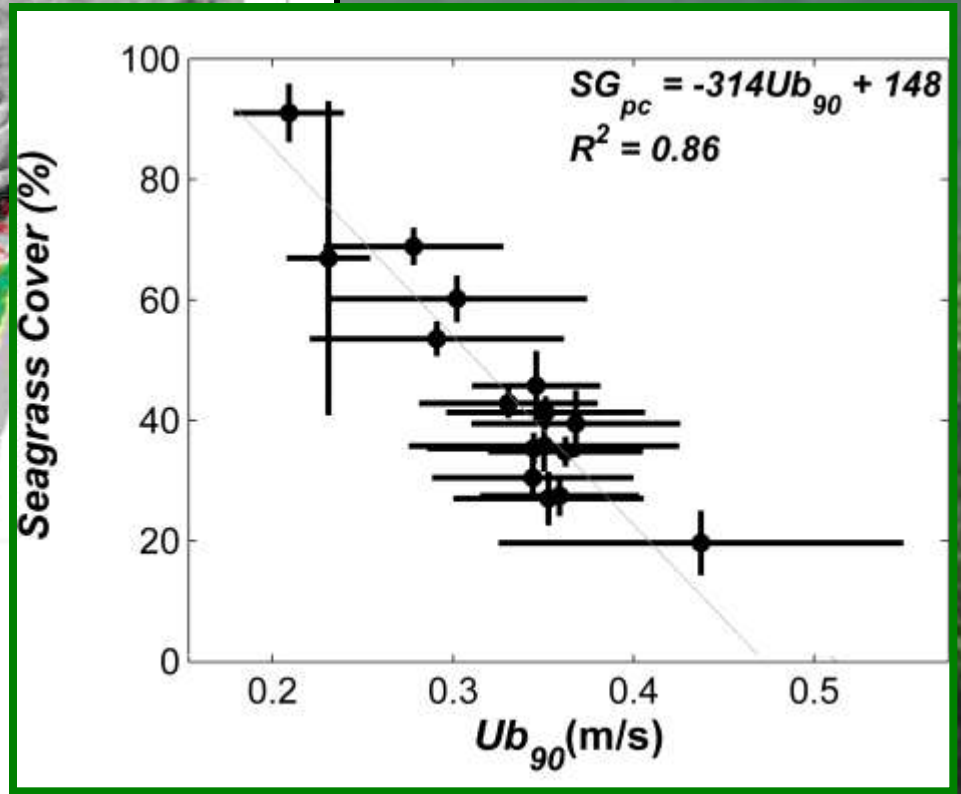
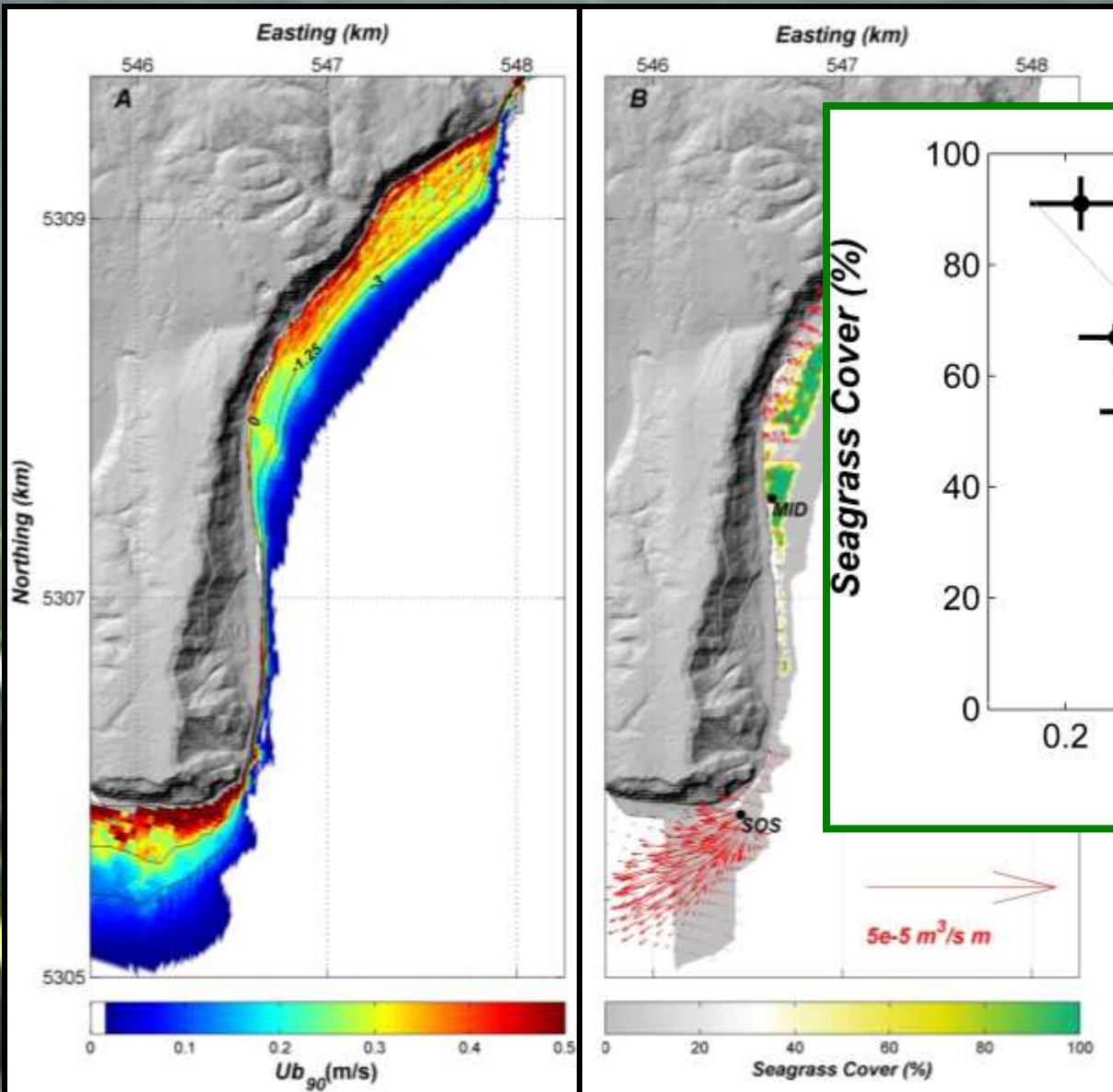


Purple areas are on average 4°C lower than gold



Next Steps:

- 1. Identify needs of Workgroup, Community**
- 2. Fill Information Gaps**
 - Nearshore elevation, habitat structure**
 - Physical processes and nearshore response**
 - Habitat Use (eelgrass, complex habitat)**
- 3. Develop Predictive Tools to will help plan for resilience**



Stevens and Lacy
(In Press)