Nearshore: Restoring the Sound, One Process at a Time

National Conference on Ecosystem Restoration

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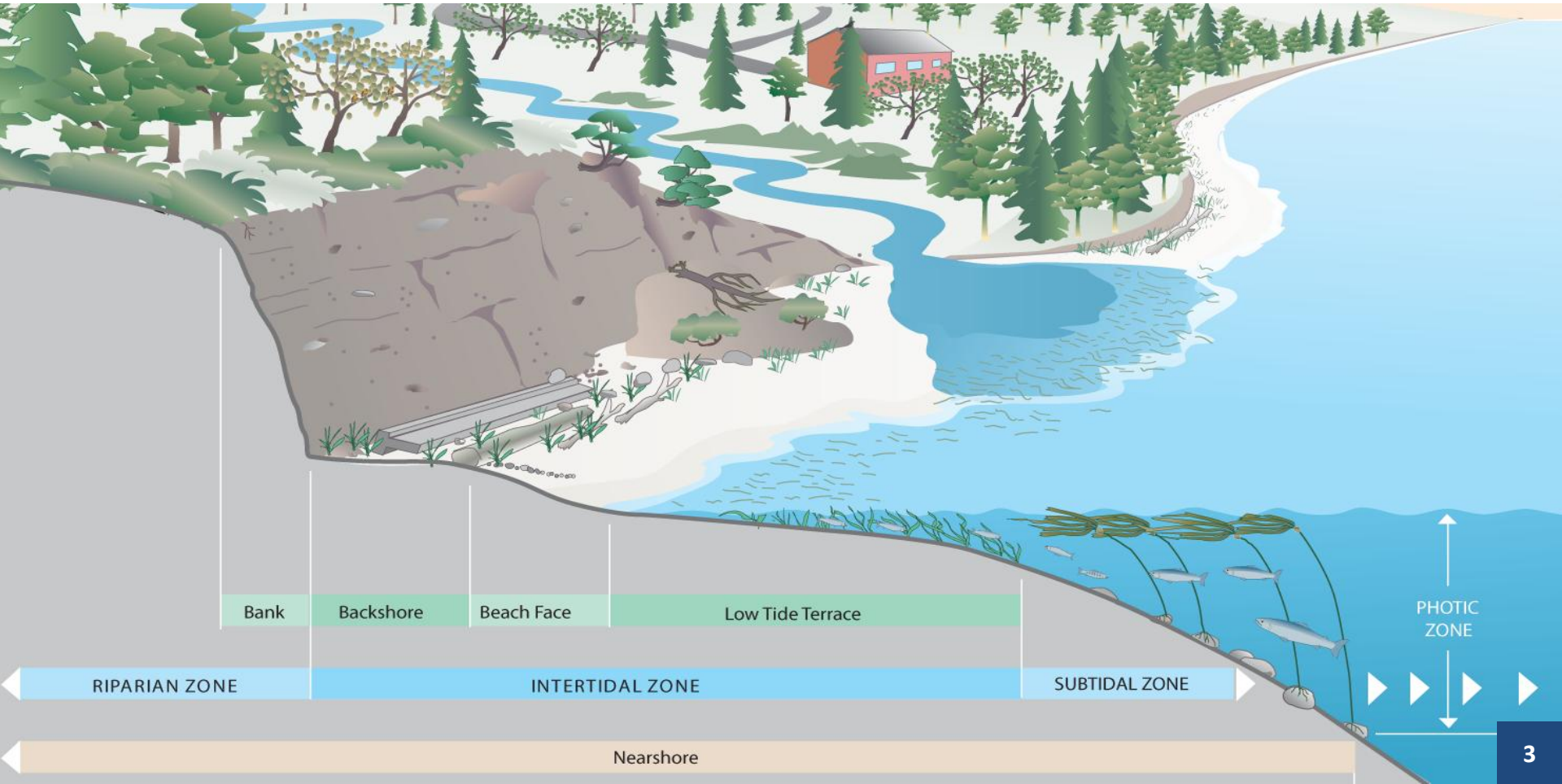
PUGET SOUND NEARSHORE
ECOSYSTEM RESTORATION PROJECT

Puget Sound Nearshore Ecosystems

Puget Sound Nearshore:
Approximately **2,500 miles** of beaches, bays, and deltas

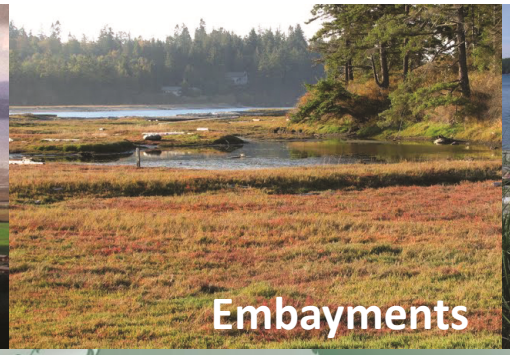
Puget Sound Nearshore Ecosystems

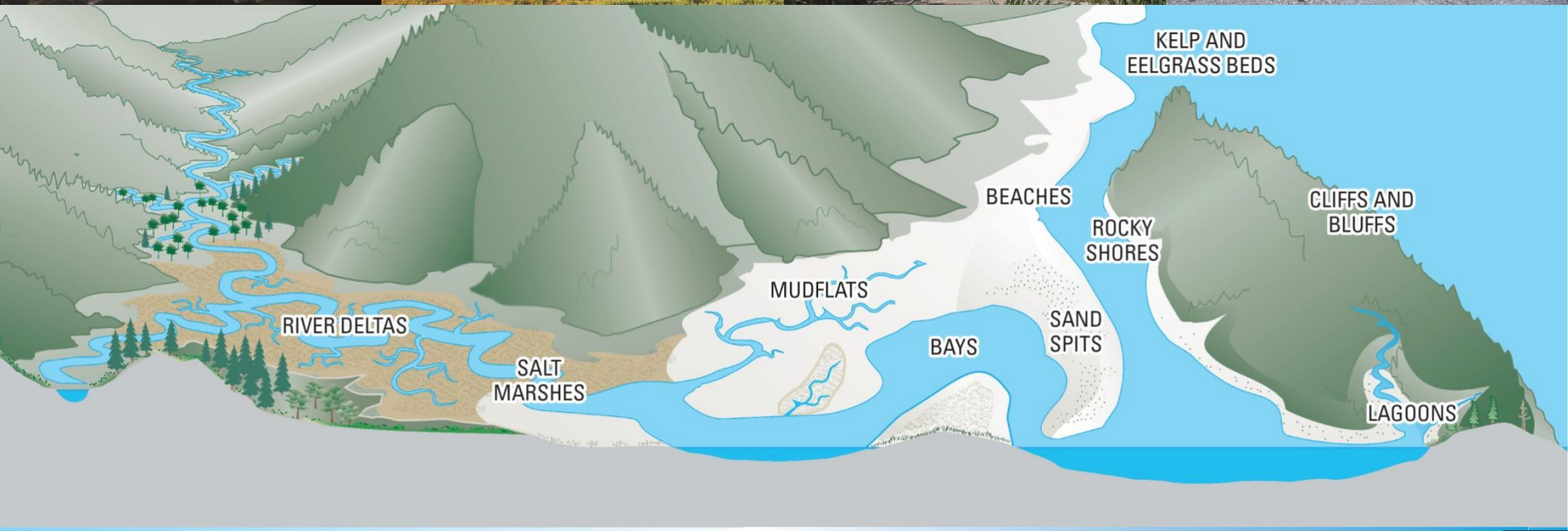
The Nearshore: The shallow water of estuarine deltas & marine shorelines, from the top of the coastal bank to water depths where light supports plant growth and up rivers to the end of tidal influence



Puget Sound Nearshore Ecosystems

Ecosystem: Interrelated complex of diverse shoreforms and associated biota.





Puget Sound Nearshore Ecosystems

Important Ecological Characteristics

- Critical zone of transition
  - marine, freshwater, and terrestrial ecosystems
- Created and sustained by physical processes
  - e.g. tidal flux, wave-driven bluff erosion, and longshore sediment transport
- Supports complex mosaic of habitats and associated biota
  - high productivity, complex food webs, large numbers of plants and animals
- Provides resiliency to changing sea levels

Puget Sound Nearshore Ecosystems

Important Social & Economic Characteristics

- Business and industry
  - Science and technology
  - 2nd largest contain port
  - University research centers
  - Commercial and recreational fishing
- Large military installations
- Non-profit and charitable organizations
- Native American Tribes

- Puget Sound provides a high quality of life through its economic opportunity and beautiful environment

The General Investigation

PUGET SOUND NEARSHORE ECOSYSTEM RESTORATION PROJECT

PSNERP is the Nearshore Component of the Puget Sound Partnership

- Corps of Engineers and Washington State Department of Fish and Wildlife
- The study is:
  - Identifying strategic nearshore restoration and protection needs
  - Prioritizing projects for implementation
  - Contributing data and analysis for watershed characterization
  - Providing nearshore scientific expertise for the Puget Sound Partnership's Action Agenda

PSNERP is a Cooperative Effort

Project Team:

- Nearshore Steering Committee
- Nearshore Science Team
- Implementation Team

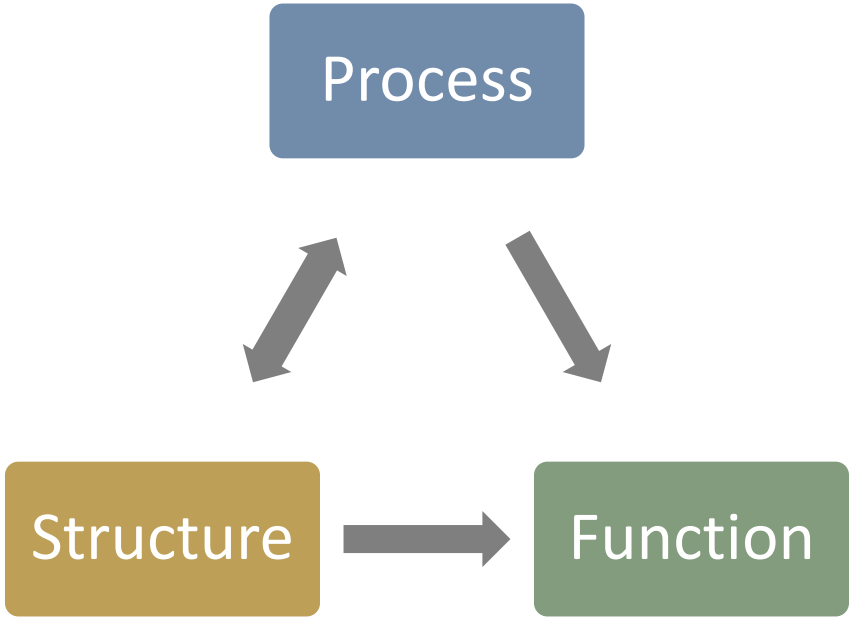
Current and Future Partners:

- Washington State Agencies
- Non-Profit Organizations
- Native American Tribes
- Puget Sound Federal Caucus

PSNERP's process-based approach to restoration :

Natural **processes** create the **structure** of habitats, which support ecological **functions** for species and people.

Conceptual Model



Source Conceptual Model: Simenstad et al. 2006,

Conceptual Model:
The role of Puget Sound nearshore beaches in sustaining Pacific sand lance

Wave energy
Sediment delivery
Sediment transport

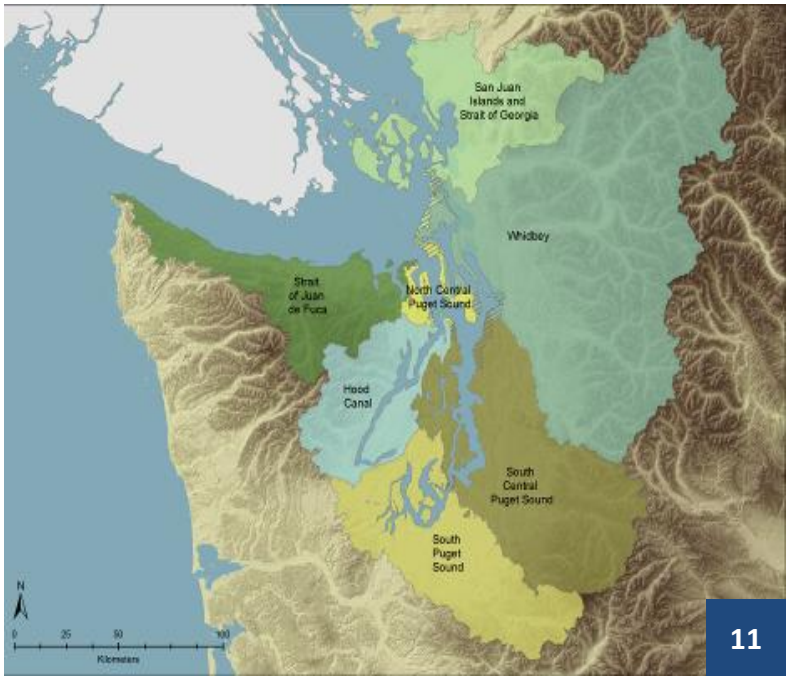
Beach profile
Sediment grain size
Beach temperature

Forage fish spawning & production
Food web support

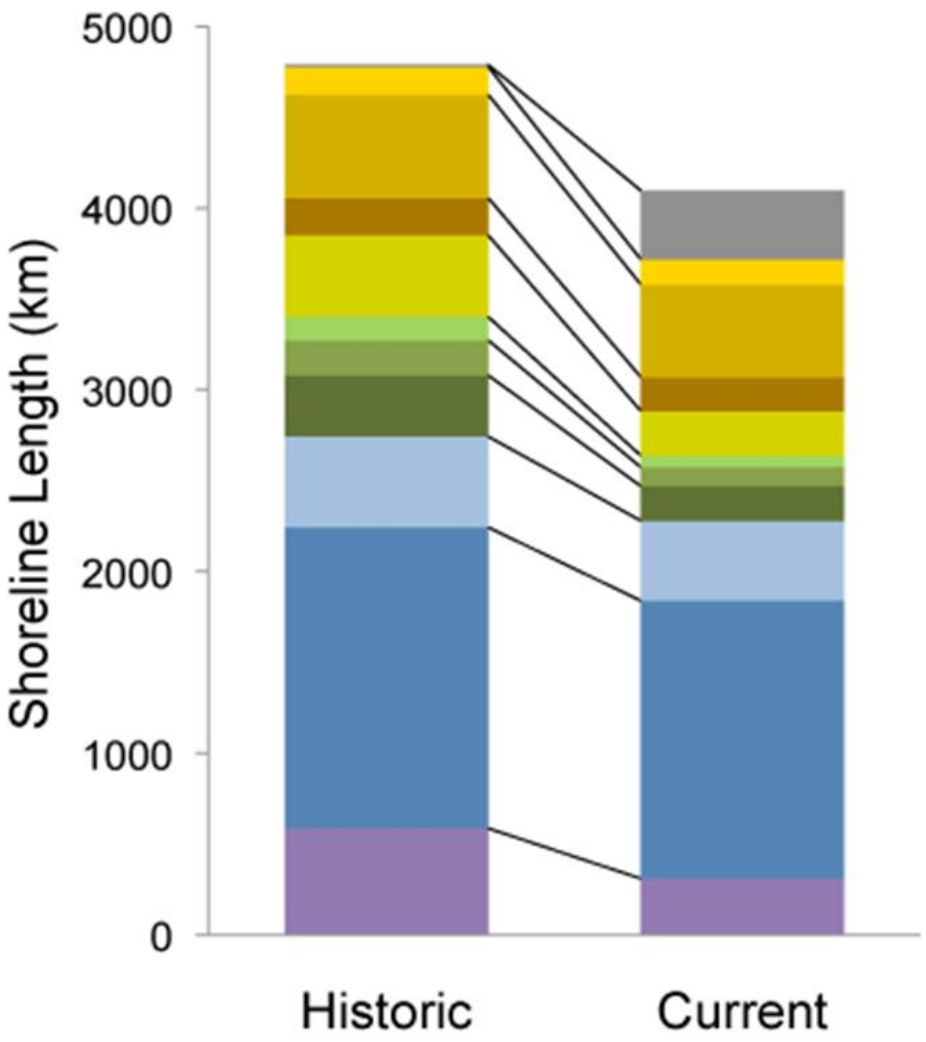
Source Conceptual Model: Simenstad et al. 2006, Penttila, 2007

Change Analysis of nearshore conditions

- Detect and describe changes from past to present
  - In Puget Sound's deltas, embayments, and beaches
  - In human-built stressors in the nearshore
  - In adjacent upland and watershed conditions
- Sound-wide nearshore geo-database of shoreline conditions
- Informs assessment of nearshore restoration needs for Puget Sound



Example: Shoreform Transitions



Science based problems resulting in Planning Objectives

Problem 1. Barriers in large river deltas restrict the movement of fresh water and tides.

Problem 2. Small coastal inlets have been blocked off and filled in.

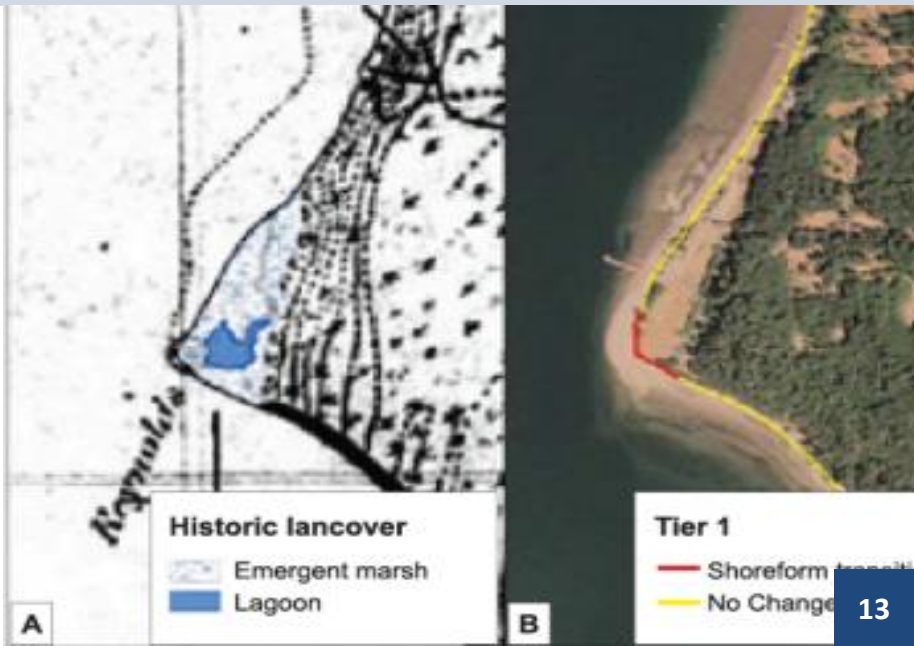
Problem 3. Armoring along beaches and bluffs prevents sand and gravel from replenishing beaches and intertidal areas.

Problem 4. Nearshore wetlands have been eliminated**.**

Problem 5. The shoreline has become shorter, simpler, and more artificial.

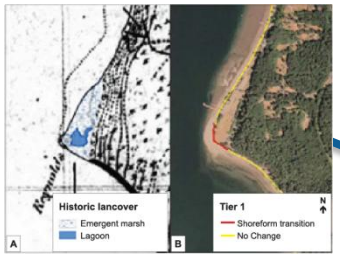
Significance

The loss of nearshore habitat has ecological, economic, recreational, and cultural effects: there are fewer salmon to catch, fewer clams to harvest, and fewer sandy beaches to enjoy.

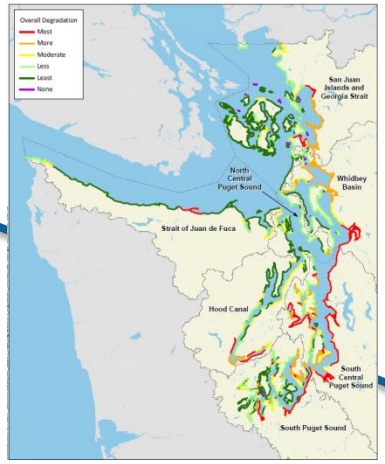


Taking Action

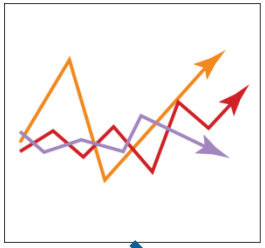
How has the nearshore changed?



Where are the most problematic changes and why?

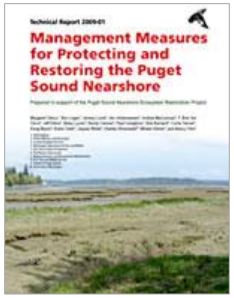


How might future growth and development affect the nearshore?

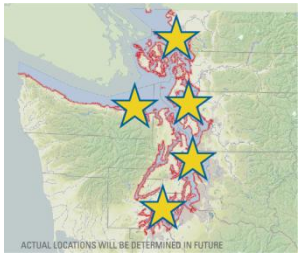


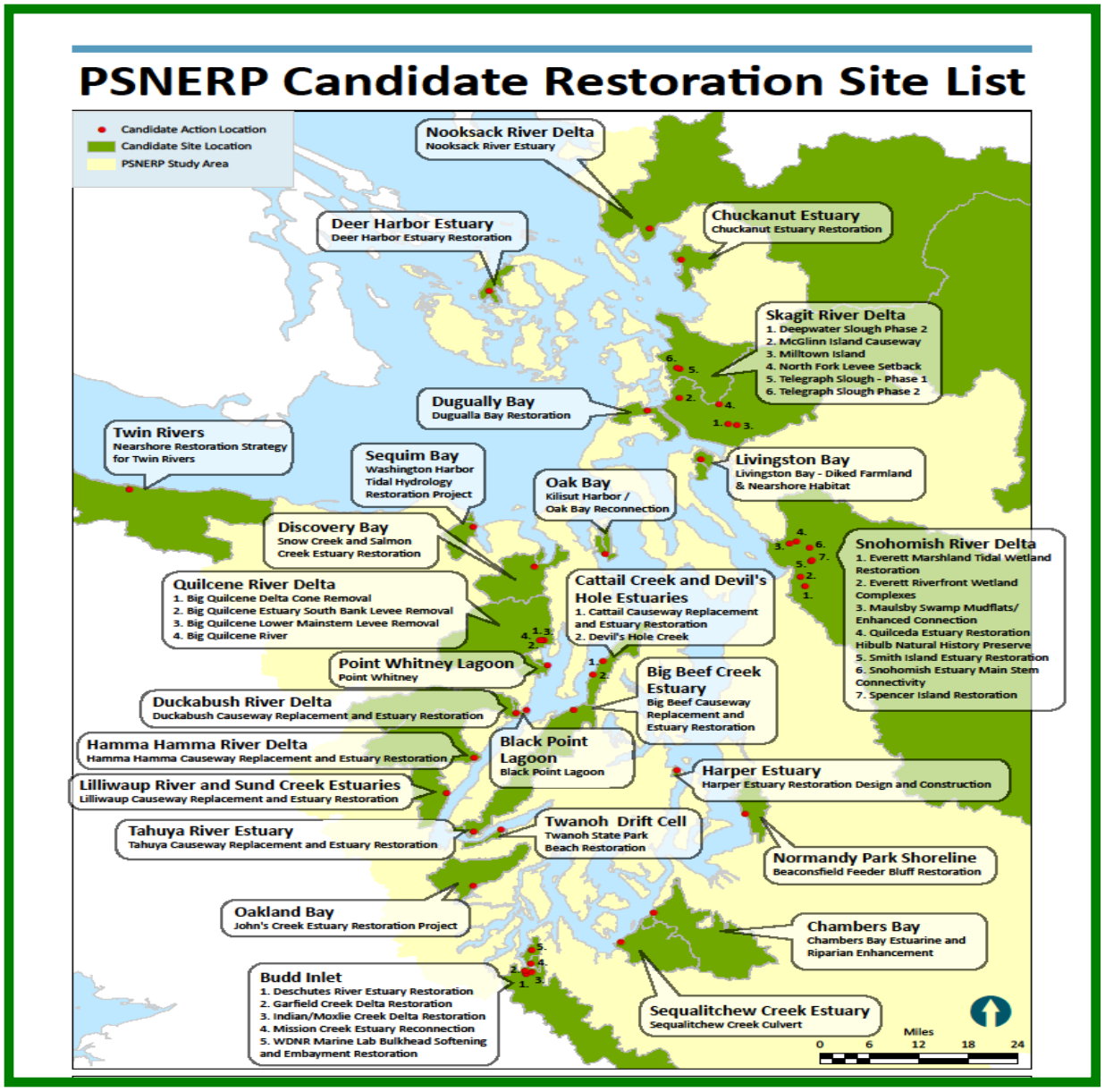
What are guiding restoration principles from literature and practice?

What can we do to protect and manage the nearshore?



What actions should we take and where?

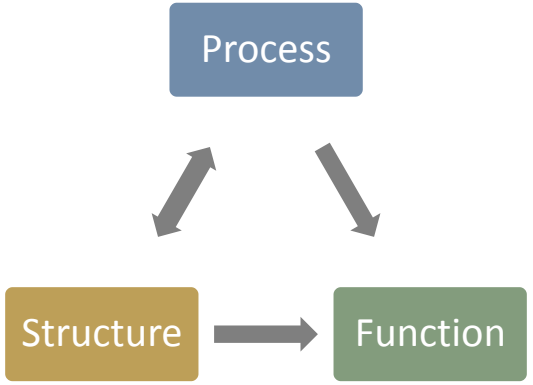




- **26 Sites**
- **36 Actions**
- **2 Alternatives per Action:**
  - **Formulated**
  - **Scoped**
  - **Designed**

Ecosystem Output (EO) = Quantity * Quality

$EO = A * [P^2 + (S + F)]$



Where:

A= area of restored process

P= process degradation score

S= summation of natural structure indices

F= ecological functions goods & services impaired at the shoreline

Next Steps

- Select the National Ecosystem Restoration Plan – October, 2011
- Seek Congressional Authorization to implement plan
- Continue applying PSNERP products to Puget Sound Ecosystem Restoration

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