Incorporating Sea-Level Rise into Habitat Restoration Planning and Design – An Example at Seahurst Park in Washington State

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Date: November 15, 2010

Presentation Overview

- Introduction to Puget Sound Setting
- Seahurst Park North Shoreline Restoration Project
- Sea Level Rise in Alternatives Analysis

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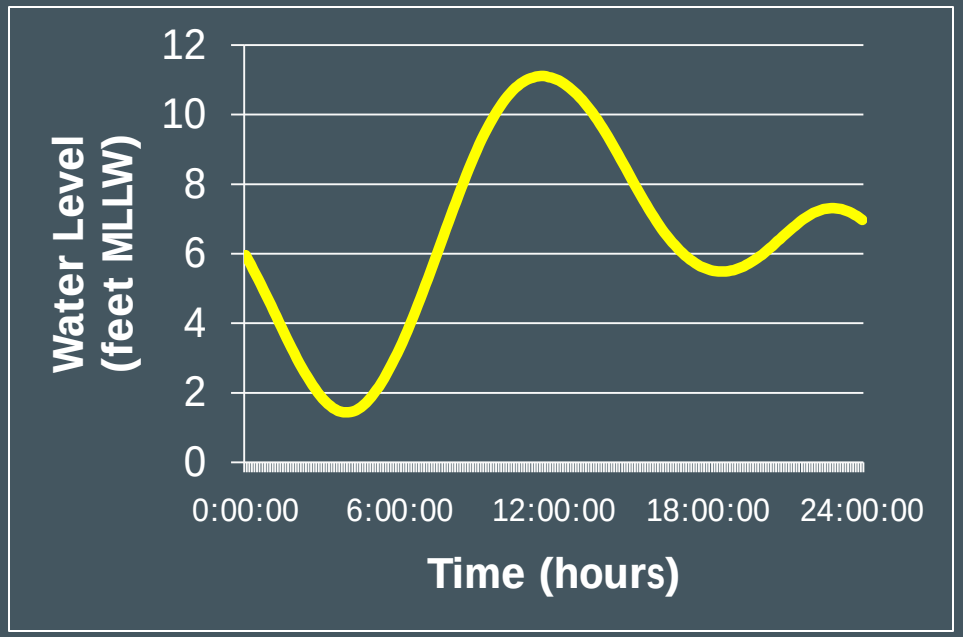
Puget Sound Tidal Conditions

- Semi-diurnal tides
- Tidal range at different locations varies from 8.5 feet to 14.5 feet between MLLW and MHHW



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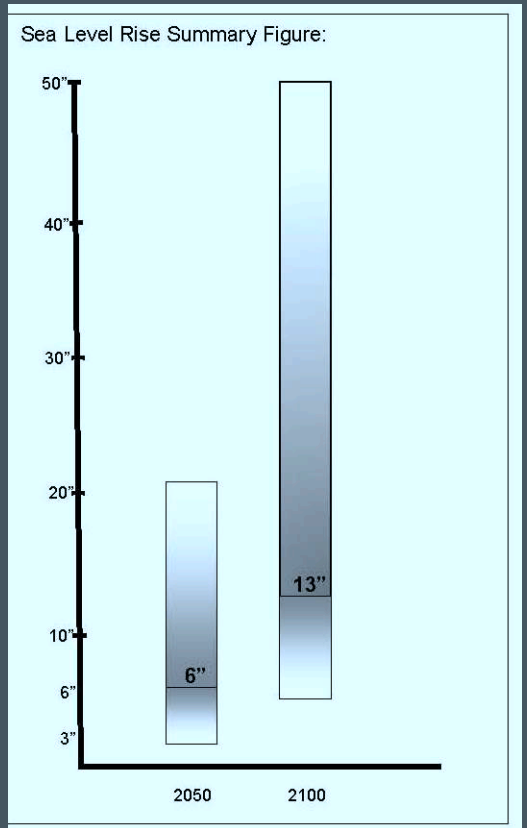
Predicted Sea Level Rise in Puget Sound



Projected sea level rise in Washington's waters relative to 1980-99, in inches. Shading roughly indicates likelihood.

Source: Mote et al. 2008

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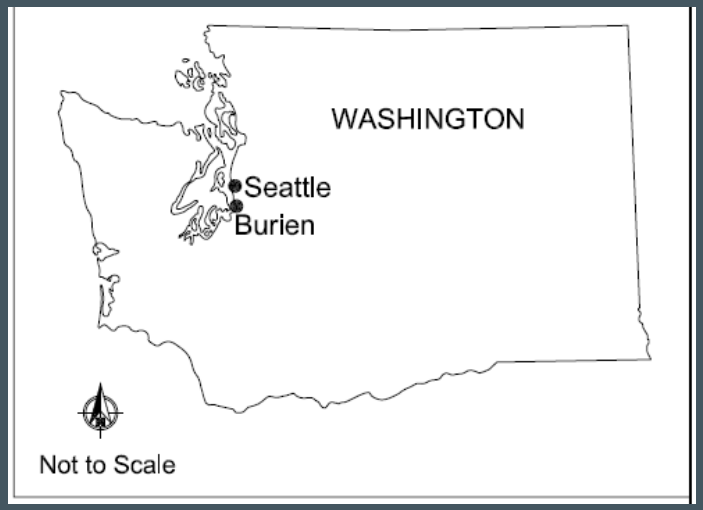
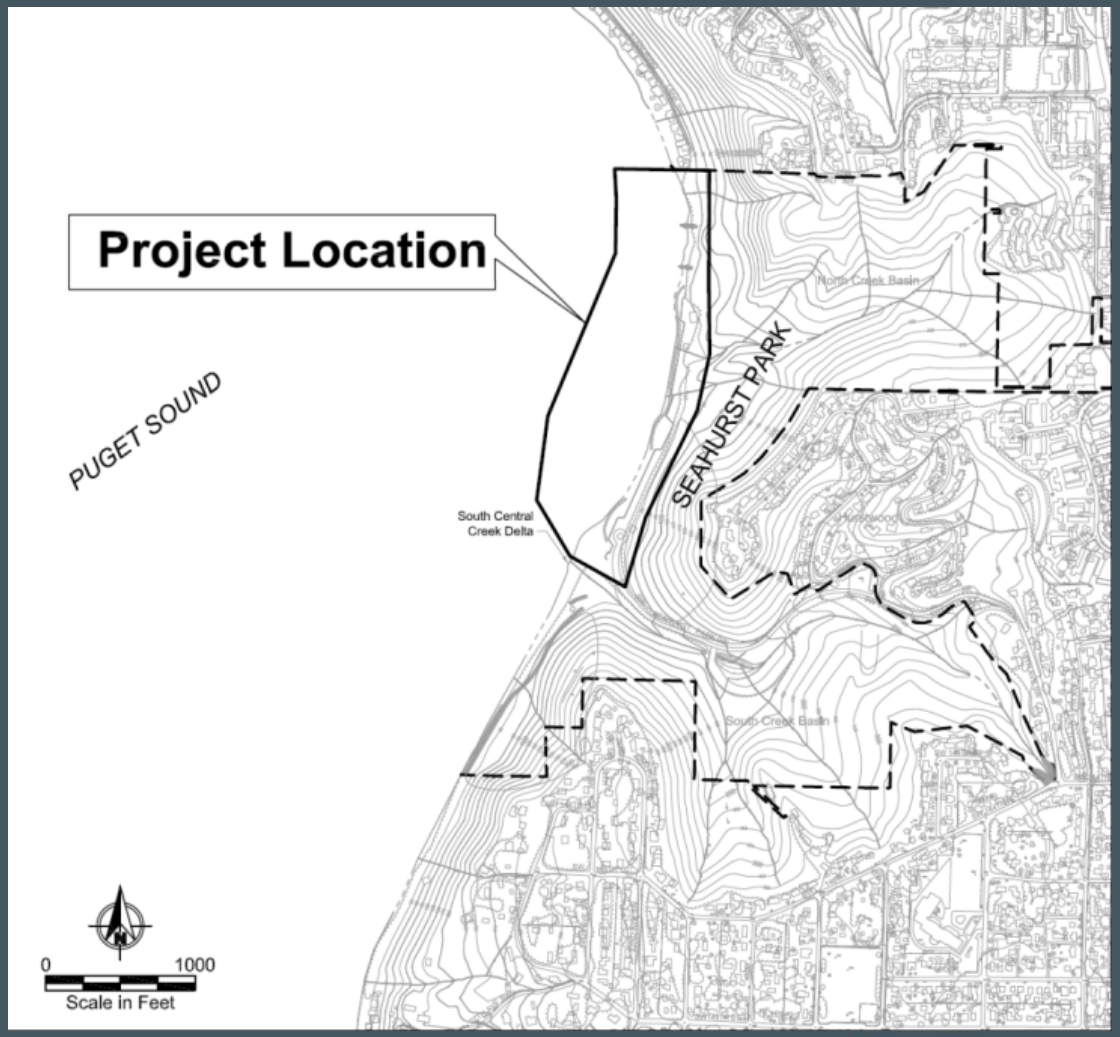
Seahurst Park Project Location





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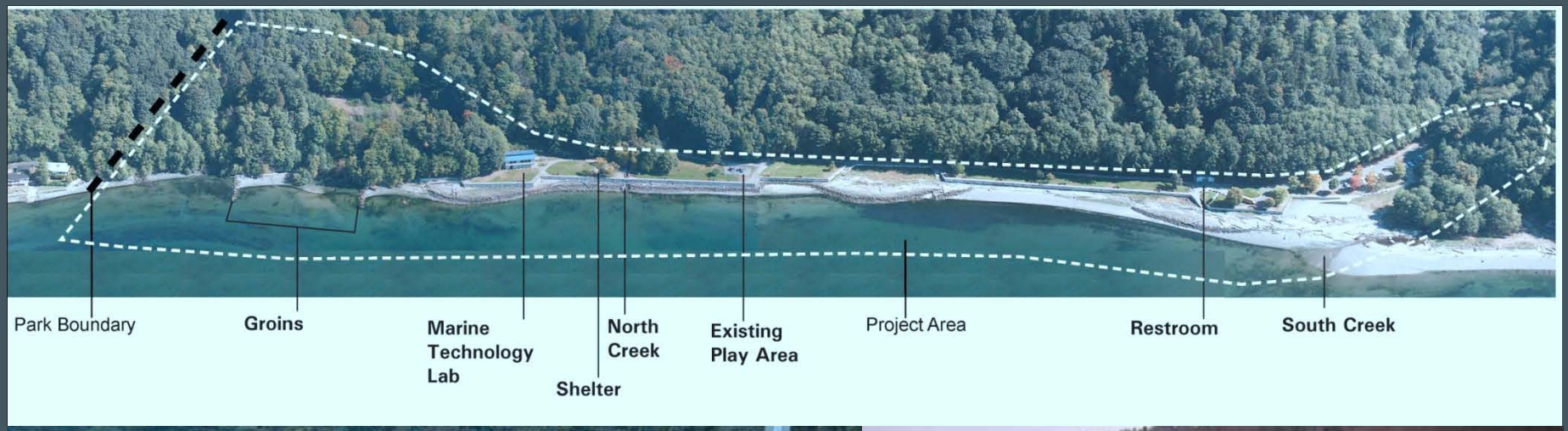
Seahurst Park North - Existing Conditions



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Seahurst Park North - Existing Conditions

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Restoration Alternatives Evaluated in USACE Feasibility Study

- Cost-effectiveness/Incremental Cost Analysis
  - Ensures lowest cost alternative is identified for each possible level of environmental output
  - Identifies subset of cost-effective plans that are superior financial investment (greatest increase in value of the output for least cost)

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Ecological Output

- Area-weighted habitat-based approach similar to that applied in NRDA (e.g., Habitat Equivalency Analysis, Iadanza 2001)
  - Establish relevant habitat zones for target species
  - Establish relative ecological contribution of each habitat zone
  - Calculated amount of area in discrete habitat zones provided by each of six alternatives, plus no action

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Habitat Zones

- Low intertidal 0 ft to +6 ft MLLW
- High intertidal +6 ft to +12 ft MLLW
- Intertidal riprap 0 ft to +12 ft MLLW
- Backshore +12 ft to +16 ft MLLW
- Salt marsh +10 ft to +16 ft MLLW
- Freshwater wetland +14 ft to +16 ft MLLW
- Riparian vegetation within 100 ft of +12 ft MLLW
- Riparian vegetation between 100 ft and 300 ft from +12 ft MLLW

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Sea Level Rise in Alternatives Analysis

- For each alternative, necessary to predict conditions at site 50 years into future
- USACE Engineering Circular presents required method for estimating sea level rise
  - Used calculations for sea-level rise developed by Puget Sound Nearshore Ecosystem Restoration Project
  - High scenario predicts 2 ft rise in 50 years

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Sea Level Rise in Alternatives Analysis

- For each action alternative:
  - Design will increase beach elevations to account for sea level rise
  - Assessment of habitat zone areas based on 2 ft increase in water levels
- For alternatives considering a marsh:
  - Determined long-term sustainability of creating a salt marsh too uncertain
  - Added alternative with low engineered freshwater wetland

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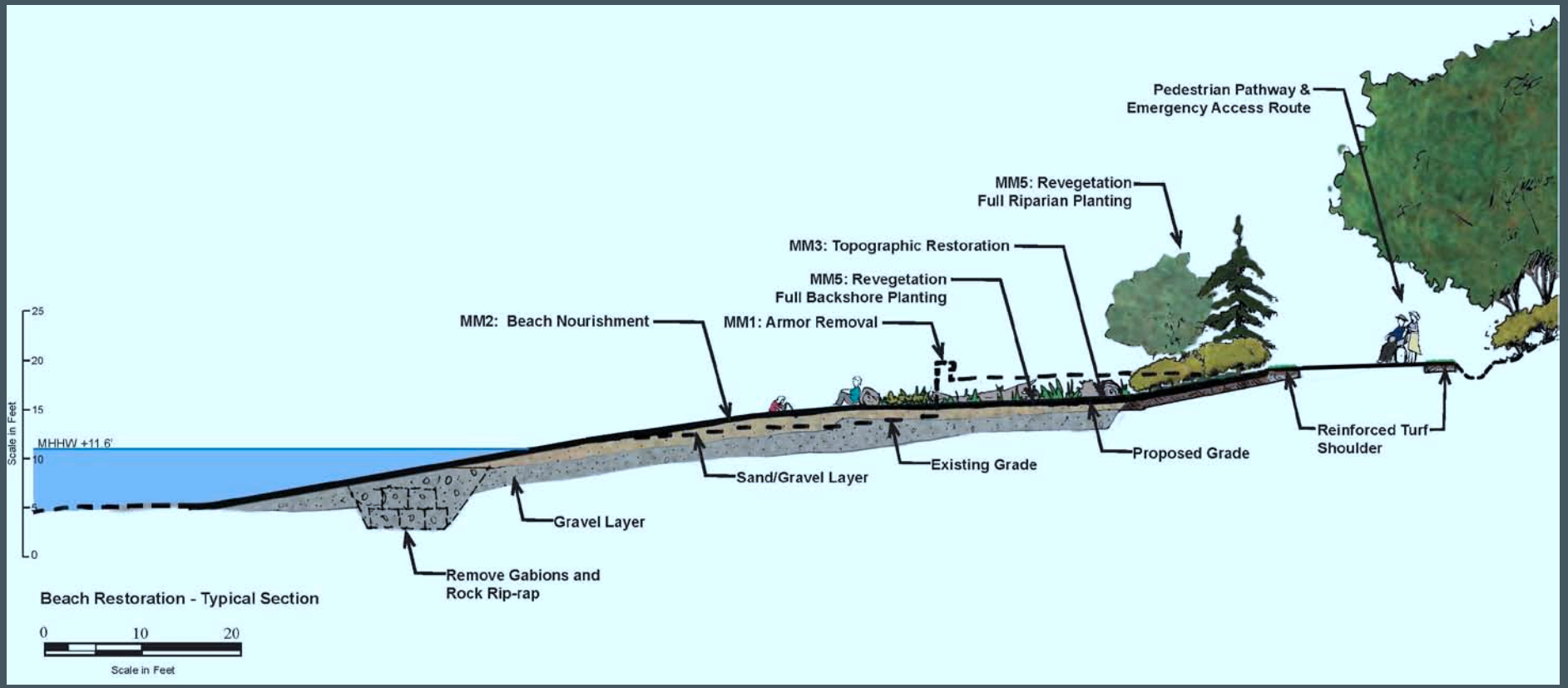
Typical Section in Armor Removal Area



Sea Level Rise in Alternatives Analysis

- For the no action alternative:
  - Used data on scour at site over last 40 years (i.e., since bulkhead constructed) and included same rate in next 50 years (1 ft to 1.5 ft)
  - Assessment of habitat zone areas based on 2 ft increase in water levels
  - Also assumed accelerated scour due to more frequent inundation of bulkhead, existing topography, and geometry of shoreline (1 ft to 1.5 ft)

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Sea Level Rise in Alternatives Analysis

- The three factors combine to equal a 4 to 5 ft difference in beach elevations relative to water levels
- Application of 4 ft total change results in estimated decrease from 12.5 acres intertidal habitat to 7.7 acres (nearly 40 percent decrease) over next 50 years

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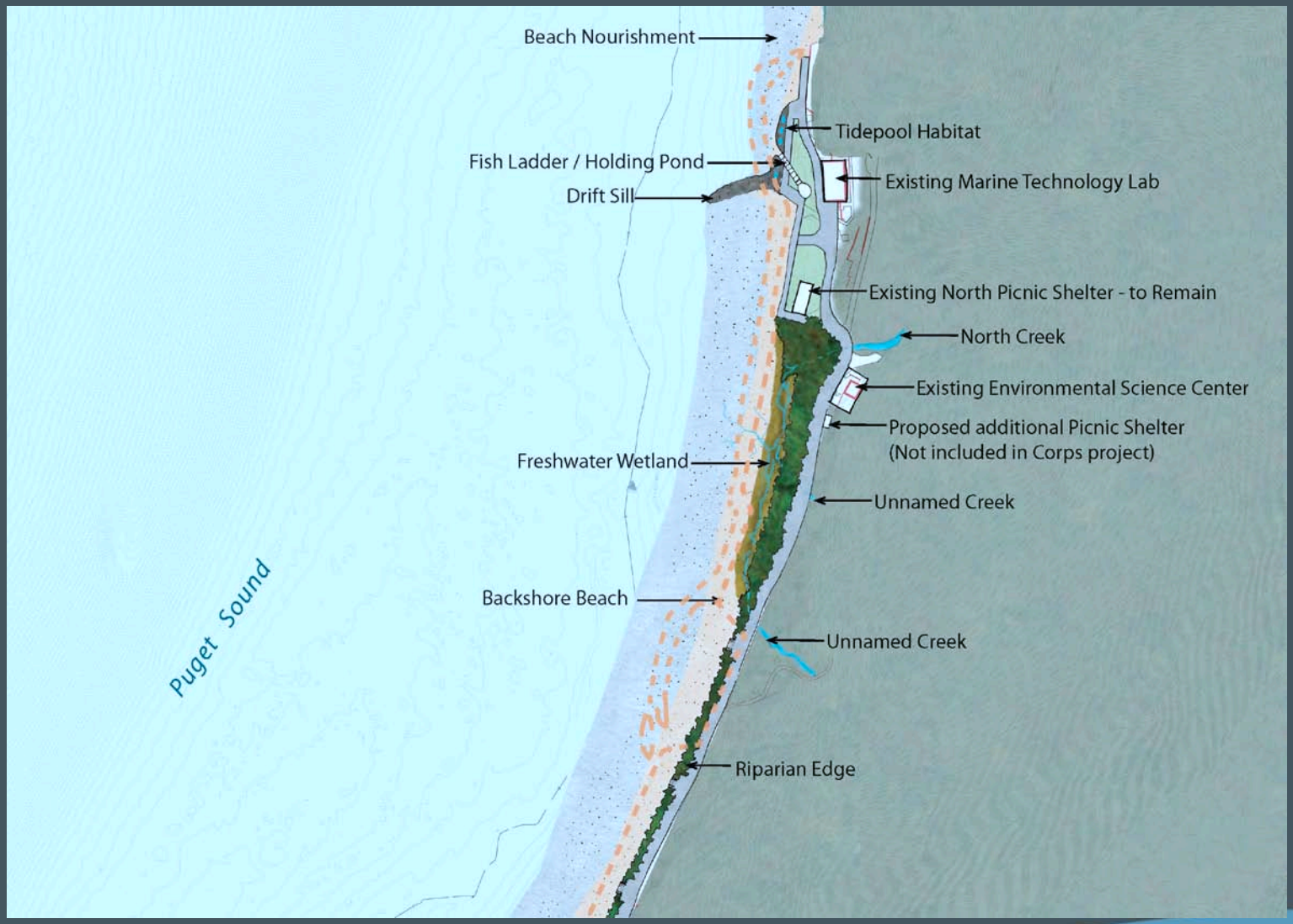
Recommended Plan



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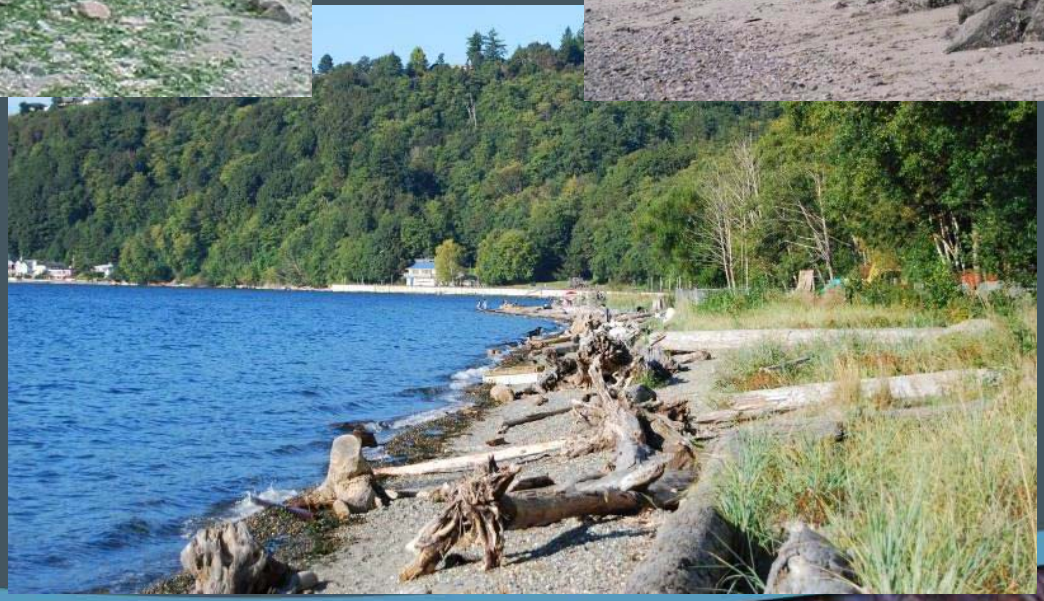
Questions

Before and After Photos of Restoration in South Portion of Seahurst Park



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