Challenges and Opportunities for Restoring Nearshore Habitat in Downtown Seattle

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PRESENTATION OVERVIEW

1. Elliott Bay Seawall Habitat Goals
2. Seattle’s Waterfront Habitat: Changes and Challenges
3. Recent Successful Nearby Nearshore Habitat Projects
4. Priorities for Seattle’s Waterfront Habitat
1. ELLIOTT BAY SEAWALL HABITAT GOALS

- Functional Juvenile Salmon Migration Corridor
  - Connectivity of Light & Shallow Depths
  - Improve Substrate & Riparian Conditions

- Fit Within Highly Urban Intensively Used Waterfront

- Monitoring & Adaptive Management to Ensure Effectiveness
2. SEATTLE’S WATERFRONT: CHANGES & CHALLENGES

• Puget Sound Nearshore Context
• Elliott Bay Nearshore Habitat Challenges
• Historic and Current Shoreline: A Massive Change
• Is Anything Left Alive Down There?
Puget Sound Nearshore: Approximately 2,500 miles of beaches, bays, and deltas

Source: Puget Sound Nearshore Ecosystem Restoration Project
PUGET SOUND TYPICAL NEARSHORE HABITATS
ELLIOOTT BAY NEARSHORE HABITAT CHALLENGES

- Overwater Coverage Blocks Natural Light
- Lack of Shallow Water Habitat
- Absence of Sediment Supply & Riparian Vegetation
- Significant Economic Activity
- Important Marine Shoreline for Juvenile ESA Listed Salmon
- Tourism and Recreation Destination
ELLIOOTT BAY: BIRTHPLACE OF SEATTLE

Source: UW Digital and Seattle Photograph Collections
PRESENT SEATTLE WATERFRONT ON ELLIOTT BAY

Source: Seattle Municipal Archives Photograph Collection
SEATTLE AND ELLIOTT BAY HISTORIC AND CURRENT SHORELINE: A MASSIVE CHANGE

- Historic Shoreline
- Current Shoreline
HISTORIC AND CURRENT DOWNTOWN SEATTLE SHORELINE

- **Historic Shoreline**
- **Current Shoreline**
EVOLUTION OF THE BAY

Source: Burke Museum
EVOLUTION OF THE BAY

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HISTORY: RAILROAD AVENUE AND SEAWALL CONSTRUCTION (1934-1936)
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BATHYMETRY AND PROPOSED SEAWALL
IS ANYTHING LEFT DOWN THERE?
HABITAT MAPPING IN FALL 2010
DOMINANT MACROALGAE OBSERVATIONS

- Sugar Kelp: 22.4%
- Sea Lettuce: 16.9%
- Red Algae: 11.7%
- Rockweed: 0.4%
- Irridescent Seaweed: 0.2%
- None Observed: 48.4%
INVERTEBRATE OBSERVATIONS

Red kelp crab

Sunflower star, red rock crab, and coonstripe shrimp feeding
INVERTEBRATE OBSERVATIONS

- Coonstripe Shrimp: 29%
- Sea Anemone: 21%
- Sunflower Star: 11%
- Sea Star: 14%
- Dungeness Crab: 9%
- Frosted Nudibranch: 7%
- Kelp Crab: 7%
- Red Rock Crab: 2%
3. RECENT SUCCESSFUL NEARBY NEARSHORE HABITAT PROJECTS

- Olympic Sculpture Park, Seattle, WA
- Seahurst Park Ecosystem Restoration, Burien, WA
NEARBY RESTORATION PROJECTS

• Example 1 - Olympic Sculpture Park:
  – North End of Seattle Waterfront
  – Elliott Bay 100% Modified (such as Bulkheads)
  – Sediment Sources Eliminated

• Example 2 - Seahurst Park:
  – Residential or Undeveloped Shorelines to North and South
  – 60% Modified (such as Bulkheads) within Driftcell
  – Sediment Sources Intact or Restorable
OLYMPIC SCULPTURE PARK

• Restoration & Design Goals:
  – Juvenile Salmon Focus
  – Site-appropriate Nearshore Habitats
  – Maximize Connectivity Longshore
  – Large Numbers of Visitors and
  – “Toes in Puget Sound”
  – Ease of Shoreline Permitting
  – Low Cost Seawall Stabilization
  – Maximize Sustainability /Low Maintenance
Monitoring data from 2005, 2007, and 2009 shows improved values of most measurements compared to armored shorelines.

CONCEPTUAL MODEL

https://sites.google.com/a/uw.edu/olympic-sculpture-park
RIPARIAN AND INTERTIDAL HABITAT BEACH
RIPARIAN AND INTERTIDAL POCKET BEACH
SEAHURST PARK ECOSYSTEM RESTORATION

Ecosystem Restoration Goals

• Preserve existing high-functioning nearshore habitats
• Restore and protect the natural bluff-to-beach sediment process
• Restore beach slopes and substrates
• Restore forage-fish spawning, juvenile salmon rearing, and migration intertidal habitats
• Restore upland and shallow intertidal habitat connectivity
• Diversify habitat in the freshwater/saltwater interface
• Accommodate Significant Recreation and Education Uses
**Densities**: Improvement at Restored site in 2010 where modifications were removed (+12 and +8), but densities still greater at Reference site, at +12 and +5.

**Taxa Richness**: Improvement at Restored site in 2010 at all elevations, greater than Reference at +12 and +5, less at +8.
NORTH SHORELINE RESTORATION
NORTH SHORELINE – COMPLETED BEACH
4. PRIORITIES FOR SEATTLE’S WATERFRONT HABITAT

• Developing Achievable Goals
• A Science Based Approach
DEVELOPING ACHIEVABLE GOALS

- Acknowledging Urban Context
- Developing Habitat Goals as Part of a Major Infrastructure Project (Seawall)
- Focus on Restoring Key Ecological Functions
- Prioritizing Habitats ESA Listed Species (Salmon)
- Science Based Approach Utilizing Monitoring and Adaptive Management
A SCIENCE-BASED APPROACH

- On-site Monitoring of Pilot Application Restoration Techniques
- Habitat Assessment and Monitoring within Project Area
- Off-Site Monitoring - Seattle Waterfront
- Learning from Other Similar Regional Efforts
THANK YOU!

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