Sea Level Rise Implications, Adaptation, and Restoration/Conservation Tools in Salish Sea

How our shores will respond and what we can do about it

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Overview: What to expect, how to adapt, and tools

How will this shore change with SLR?

What are appropriate ways to adapt?

How will SLR affect Restoration & Conservation projects?
Different shoreforms will respond differently

- Shoretype
- Topography
- Geology
- Sediment supply
  - Littoral drift cells
  - No Appreciable Drift
- Space to move landward
  - Septic?
Shoreform Response – Rocky Shores

Vertical shift upwards/landward shift in tidal elevation
Similar shift in intertidal habitats

Created by CGS for Friends of the San Juans
Landward shift of entire beach profile
Bluff erosion enables local and down-drift beaches to adjust
Crest of berm will build higher and shift landward via overwash.

Landward shift in habitats, dune grass, driftwood, intertidal spawners.

Habitat/beach loss can occur where landward constrains limits natural migration of beach features.
Static shoreline armor prevents landward migration of shoreline and habitats resulting in habitat and beach loss
Appropriate Adaptation Approaches

- Geomorphic response
- Planning horizon
- Cost of infrastructure
- Maintenance
- Opportunities
  - Habitat conservation / restoration
  - Increased resilience
Appropriate Adaptation Approaches - Relocate

- Effective for managing erosion and inundation in the long-term
- Requires adequate upland area for relocation

- Often cheaper than engineered solutions
- Most effective for septic, outbuildings, and highly vulnerable primary structures
Appropriate Adaptation Approaches - Elevate

- Only effective for managing coastal flooding, not erosion
- Driftwood can damage pilings, elevated structures etc.

Created by CGS for Friends of the San Juans
Shore armor has limitations:

- Only effective for managing erosion, not flooding
- Will not curb all bluff erosion
- Will lead to beach habitat loss
Appropriate Adaptation Approaches - Nourish

• Nourish entire beach profile

• Build a storm berm, to absorb wave energy

• Compensate (short-term) for lost sediment supply or habitat loss
Appropriate Adaptation Approaches - Toolbox

- **Bluffs**
  - Relocate structures
  - Nourish entire beach profile

- **Barrier Beaches**
  - Nourish storm berm
  - Nourish waterward of armor
  - Elevate

- **Pocket beaches**
  - Fortify

- The most appropriate approach depends on site-specific conditions.
Enhanced need for Strategic Restoration & Conservation

- **Shoreline Translation** requires sediment supply & room to move
  - Conserve intact feeder bluffs
  - Restore/remove armor to enhance resilience and prevent habitat loss
  - Remove armor to prevent forage fish habitat loss
  - Mitigate for lost sediment supply
- Proactive outreach to reduce perceived need for armor
- Consider moving structures and infrastructure
- Identify priority areas and develop long-term strategies
Plan for accelerated erosion rates

- **Long-term bluff recession rates will increase**
  - Increase precipitation
  - More frequent “change events”
  - Higher water levels
- **Armor wont solve the problem**
- **Accelerated erosion tied to rate of SLR**
  - Uncertainty in WAIS melt

Download the CGS Bluff Recession report:
http://coastalgeo.com/publications/bluffrecession/
Restoration & Conservation Considerations & Tools

Beach Strategies Geodatabase – Phase 1
Obtain from WDFW

- Updated Shoretype Mapping
  - Includes historic shoretypes for all armored shores
- Updated drift cell mapping
  - With linear referencing routes for drift direction
- Updated shore armor mapping
  - Ltd additional data on: toe elevation, condition,
  - Additional armor mapping info: data age, resolution, etc
Restoration & Conservation Considerations & Tools

Beach Strategies Geodatabase – Phase 2 available end of 2019

- Identify priority beaches for conservation & restoration
  - Sediment Supply
  - Forage Fish Spawning
  - Embayment Support
  - Pocket Beaches
- Multi-scalar, nested geographies
- Queries describing on-the-ground conditions. No black box.
- Linked with hypothesis, justification and supporting principles
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Beach Strategies Geodatabase

Armored Sediment Supply (% Length)

- 0 - 20%
- 20 - 40%
- 40 - 60%
- 60 - 80%
- 80 - 100%
Restoration & Conservation Considerations & Tools

Beach Strategies Geodatabase – Phase 2
Restoration & Conservation Considerations & Tools

Beach Strategies Geodatabase – Phase 2

Armored Feeder Bluffs with Down-drift Surf Smelt Spawning Habitat (Spawning Length in FT)

- Yellow: 0 - 2,647
- Orange: 2,647 - 7,915
- Red: 7,916 - 15,736
- Purple: 15,737 - 31,195
- Blue: 31,196 - 68,051

Hood Canal
Seabeck
Restoration & Conservation Considerations & Tools

Beach Strategies Geodatabase – Phase 2

Length Co-located Armor and Forage Fish Spawning (FT)

- 0 - 253
- 253 - 630
- 830 - 1,867
- 1,867 - 5,569
- 5,569 - 12,035

Hood Canal
Seabeck
Inset B

Drift Cell
Restoration & Conservation Considerations & Tools

Restoration Project Design & SLR

- Biophysical habitats
- Infrastructure
- Socio-political
- Timeframe and Risk
- Information Needs: Elevations, parcel boundaries
- Added erosion, precipitation and stormwater
- Changes in groundwater
- Adaptable Designs, Monitoring
- Opportunities to increase adaptation, restoration

Want to learn more?

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