Nearshore Habitats in the Salish Sea

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Coastal Landforms

- Delta
- Beaches
- Estuaries and Lagoons
- Rocky Shore
- Artificial
- Stream Mouth
- Bluff
- Lagoon
- Estuary
- Barrier Beaches
- Pocket Beach

Hugh Shipman
Diverse Shoreline Types - Linear...

Eroding bluffs and sand-gravel beaches, narrow or broad

High-current rocky areas

Low-bank shores with armoring

http://apps.ecy.wa.gov/shorephotos
Big deltas with marsh

And less-linear...

Lagoons with marshes

Quiet muddy bays

Broad sand-mud deltas
Not much rock!

Percent of Linear Shoreline of each Substrate Type

- man-made
- rock
- rock, gravel, and sand
- pebble
- pebble and sand
- sand
- mud and fines

Washington Shorezone Data
Substrate type + Energy Level = Marine Community

[salinity, some other factors]
Communities in Soft, Uniform Mud

- Relatively depauperate
- Largely anaerobic
- Tube-building amphipods
- Ghost shrimp
- Deposit-feeding clams
- A few worms
- In the past... oysters
Olympia Oysters

- Once dominant in South-Sound bays with mud or gravelly mud
- Now rare, being restored
- Some dense populations in remote BC areas
Clean Sand to Somewhat Muddy Sand

• In the intertidal, often depauperate, unstable
• Relatively sparse clams and worms, sometimes abundant amphipods
• In some places:
  Geoduck clams

Also:
Eelgrass beds
Sand dollar beds
Eelgrass beds

• Most in the shallow subtidal zone
• Added productivity and 3-D cover
• Harbor juvenile crabs, fishes, shrimp…
• Used as feeding and nursery grounds by outmigrating juvenile salmon
• Stabilize sediment, may have richer infauna than plain sand

Nancy Sefton image
Sand dollar beds

• Intertidal and shallow subtidal

• Dense aggregations; tend to exclude other species, disturb the sand
Cobble-Pebble-Sand Beaches

• High shore often finer gravel and sand, unstable
• Low-shore cobbles often ‘armor’ the substrate
• Substrate thus stabilized and biota are rich.
Clams!
Many species and a lot of them...
Predators have a hard time digging in this coarse and mixed substrate... unless they have shovels or clam rakes
Tiny clams, worms, and even sand dollars live in the sediment and are prey for other species.
• **Patches** of sand vs. cobble are very common along even ‘uniform’ shorelines

• Cobble substrate results in much higher-diversity beaches

  ➢ complexity of the biotic community can vary enormously along one stretch of beach
The nearshore is ‘in the middle’ connecting food webs from land to sea

- Insects and organic matter drop from riparian vegetation onto shore and sea
- Beach biota such as beach hoppers are key to ‘recycling’ of organic matter
- Land birds, shorebirds, and some mammals (bears, foxes!) feed on the beach
- Fishes feed over the shore at high tide
- Other marine predators similarly move up from the subtidal zone
- Nearshore waters bring food (plankton), spores, seeds, and larvae to the shore
- It’s where most of the primary productivity is!
Other organisms that use beaches...
“Valued Ecosystem Components” in the nearshore and their connections
What do we know about how shoreline armoring affects these nearshore communities?

‘SHORELINE ARMORING’ =

Erosion control practices using hard structures (e.g. concrete or wood walls, or rock riprap) that stabilize the shore and the bank or bluff behind it.
And how do we study this problem?

Our research method for documenting impacts of armoring on these messy shores:

Rapid surveys of many parameters at 65 paired armored and unarmored sites (within a drift cell) around the Salish Sea

Example of a Pair
Poverty Bay, south of Redondo
Types of Impact

- Placement loss
- Land-Sea connectivity
- Sediment processes
- Hydrodynamic processes

Armored Shoreline

Hugh Shipman photo
Temporal Scale

(Seasons to Years)

Fast Slow

Local (m)

Broad (Drift cell)

Spatial Scale

Terrestrial bird use

Juvenile fish use

Log accumulation

Forage fish spawning

Beach profile change

Sediment grain size change

Wrack accumulation

Arthropods and other wrack associates

In some places, maybe broadly?

Still working on this…

= demonstrated impacts of armoring

= demonstrated impacts of armoring

Wrack accumulation

Fast (Days)

Temporal Scale

Slow (Seasons to Years)