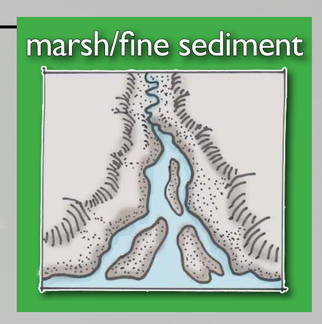
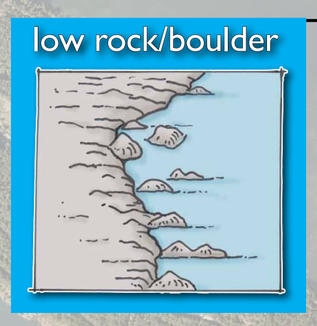
SOUTH PENDER Is.

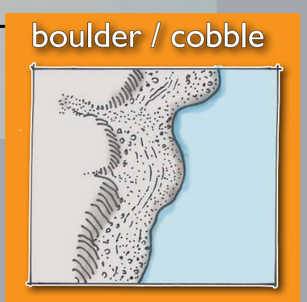
MAP 1 of 3: Distribution of Shoreline Types

The South Pender Island shoreline is largely bedrock and resistant to erosion. There are a few sand and shell pocket beaches that are very important recreationally. The northwest end of South Pender Island is protected by North Pender Island to the west and north, and partially protected by Saturna Island to the northeast. The southeast end of South Pender Island is partially exposed to south-easterly storm winds and waves.

South Pender's only areas of mudflat is located in an embayment on the southeast end of the island. There is a small, very protected saltmarsh area just to the northeast of the protected channel between North and South Pender Islands, partially surrounded by a soft sediment spit. There are several areas of archaeological and/or cultural importance along the shoreline. All of these areas are sensitive to nearby recreational activities and general human disturbance.

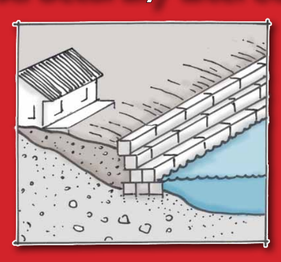






Watershed Boundaries

Drainage Conveyance Zones
(wetlands, creeks & moist soil areas)



SOUTH PENDER ISLAND:

0.9 Km (4%) of Structurally Altered Shoreline

LEGEND:

Sections of shoreline with significant structural alterations (>30% altered)

*Shorelines modified by facility development, principally boat ramps, seawalls, riprap, landfills, piers, groynes, or breakwaters.

1 Km

DATE: October 25, 2011

Refer to Islands Trust Report "Gulf Islands Shoreline Mapping - Project Methodology" July, 2011 for detailed map information.

Rock (Hard) Shorelines

SEA CLIFF
- rocky shore with steep slopes
- 18% of shoreline (4 Km)

LOW ROCK/BOULDER
- rocky shore with low slopes
- 59% of shoreline (13 Km)

BLUFF
- moderate to high slopes of sediment (often eroding)
- South Pender Island has no bluff shores

Sediment (Soft) Shorelines

BOULDER/COBBLE
- boulder - cobble cover on beach (often eroding)
- 4% of shoreline (1 Km)

PEBBLE/SAND
- stable or accreting pebble-sand (or shell) beaches (may be eroding where sediment supply is interrupted).
- 17% of shoreline (4 Km)

MARSH/FINE SEDIMENT
- low energy shorelines with sediment inputs from watersheds nearby
- 1.7% of shoreline (0.4 Km)

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MAP 2 of 3: Energy & Sediment Movement

ISLAND ENVIRONMENTS are shaped by two primary or formative systems:

1) watershed systems; and
2) longshore systems.

Watersheds are driven by runoff, and longshore systems are driven by waves and ocean currents. Any attempt to understand the islands, including discussions about land use planning, must be framed by these systems. Within this framework all other systems (natural systems like forests, wetlands, eelgrass beds etc, and human systems like roads, buildings, etc) are organized and structured.

SOUTH PENDER ISLAND belongs to a class of sea coast know as sheltered shoreline because it is not exposed to the open sea. Nevertheless, wind wave and current activity remains the controlling force along the island's perimeter. The strength of this system, however, varies appreciably depending on the orientation and form of the shoreline, near shore water depth, and other factors. For example, headlands facing storm waves are subject to the greatest wind and wave force, whereas bays and estuaries are subject to the least. Not surprisingly, headlands are prone to erosion and damage caused by strong winds, whereas bays and estuaries are prone to sediment deposition.

Watershed Boundaries

Drainage Conveyance Zones
(wetlands, creeks & moist soil areas)

LEGEND:

Wave Exposure:

- Very Low
- Low
- Medium
- High

Sediment Movement:

- Accretion Shorelines (adding sediment)
- Erosion Shorelines (losing sediment)
- Watershed Sediment Inputs to Shoreline System
- Localized Sediment Movement Direction (Small Scale)
- Predominant Direction of Wave Energy

Making Sense of the Energy Systems:

The coloured shorelines on this map indicate that for South Pender Island, the highest wave exposures occur on the southeast side of the island. The arrows indicate that the predominant wave energy system flow direction is from south to north.

Despite the consistency between exposure rating and sediment flow direction for this island, it is important to note that wave exposure and the predominant energy flow direction are measuring two very different effects. Wave exposure is a function of wave fetch (as described in the inset to the right) and wind strength from a given direction. The southeast shore of South Pender Island has a long fetch relative to other South Pender Islands shorelines, and our region receives strong storm winds from the south – this combination of factors results in southeast facing beaches having a high wave exposure rating. Predominant energy flow direction on the other hand, is the cumulative effect of storms over time. Our region receives some winter outflow winds from the north, but the majority of strong winds and storms come from the southeast. For South Pender Island, this means that the dominant sediment movement (relatively little sediment exists on the South Pender Shoreline because it is predominantly rocky) direction is northward, driven by the south-easterly storms.

1 Km

Wave Fetch & Energy:

Waves are generated by wind. Wave fetch is the distance over which wind can push water to generate waves - generally, the longer the fetch, the larger the waves. In the diagram below, the wave fetch for South Pender Island is shown in green.

DATE: October 25, 2011

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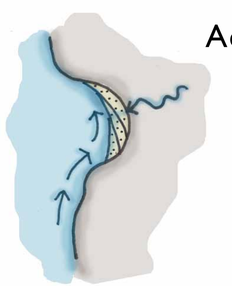
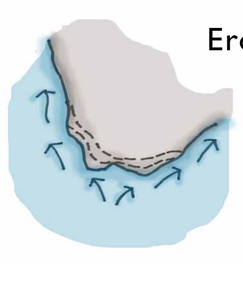


Accretion Shorelines:

Sediment accumulation (accretion) is typically associated with lower energy environments along the shorelines.

Accretion features include sandy beaches, beach berms, pocket beaches or storm berms, and are often high value recreation features or wildlife habitats.



Erosion Shorelines:

Eroding shorelines are typically associated with higher energy environments along the shorelines, like headlands, high exposure sediment shorelines or points of land.

Eroding shorelines feed the sediment transport system and halting erosion can have severe impacts on the shoreline sediment movement system and 'downstream' beaches. Adequate setbacks for buildings and facilities are critical.

Wave Exposure & the Sediment System

Trees and vegetation damaged or shaped by the wind along shorelines are good indicators of high wind exposure.

Caution should be exercised when siting buildings and facilities in these locations to ensure they are adequately set back from the shoreline.

Wind Exposure & Buldings

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MAP 3 of 3: Shoreline Values & Vulnerability

This map is intended to give a general impression of areas along the South Pender Island shoreline that are considered valued and/or vulnerable to change.

Value refers to areas or features of high ecological or recreational significance.

Vulnerability refers to:
1) Natural areas or features vulnerable to human disturbance; or
2) Buildings or facilities, vulnerable to disturbance from natural or human-altered system processes.

It is important to note that the various features highlighted on this map are in many cases both vulnerable in some way, *and* valued. Saltmarshes for example are of high ecological value, *and* are also vulnerable to accumulation of pollutants potentially contained in island runoff.

Watershed Boundaries

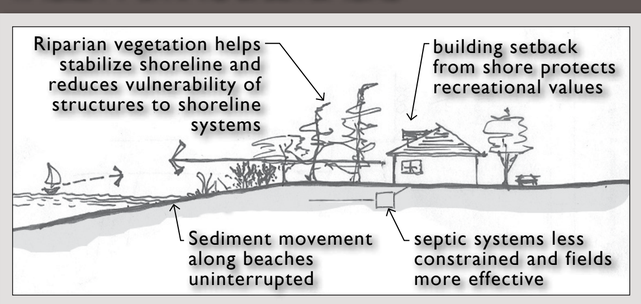
Drainage Conveyance Zones
(wetlands, creeks & moist soil areas)

COMMUNITY INPUT

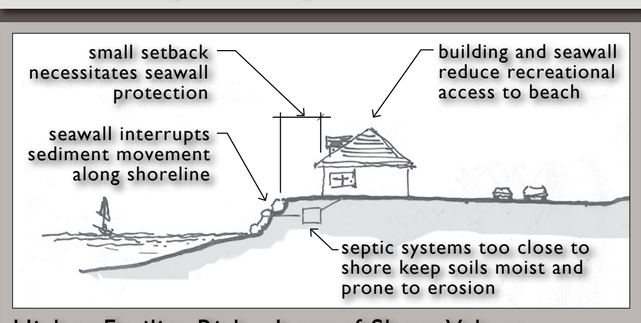
THIS IS YOUR SPACE - tell us what we have missed or where you think the mappers have erred to help us build a more comprehensive values and vulnerability resource! Feel free to make notes right on the map also.

1 Km

FACILITY SITING & SETBACKS



Lower Facility Risk - Improved Shore Protection



Higher Facility Risk - Loss of Shore Values

DATE: October 25, 2011

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LOW LYING AREAS

- Areas 0-4 m in elevation above existing Mean Sea Level and greater than 50 m of width from the shore are mapped as 'vulnerable' to sea level rise.

Current BC Provincial Government guidelines suggest up to 1 metre of sea level rise over the next 100 years (www.env.gov.bc.ca). Sea level rise may cause increased shoreline vulnerability to land-based activities by causing such effects as increased flooding in low lying areas or softening of sediment shorelines and increased shoreline erosion. These effects could be further exacerbated by storm surges and changing climatic conditions.

SOFT SHORELINES

- Sediment shorelines are typically associated with high recreational values and high ecological values (pocket beaches, estuaries, etc).

VERY PROTECTED WATERS

- Shorelines highly protected from wave exposure
- Poor water circulation increases vulnerability to water pollution

SALT MARSH

- Valued ecological features
- Vulnerable to pollution from land-based activities

ISLETS

- Often important ecologically, islets can be vulnerable to disturbance from recreational users

Areas of High Ecological or Recreational Significance

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