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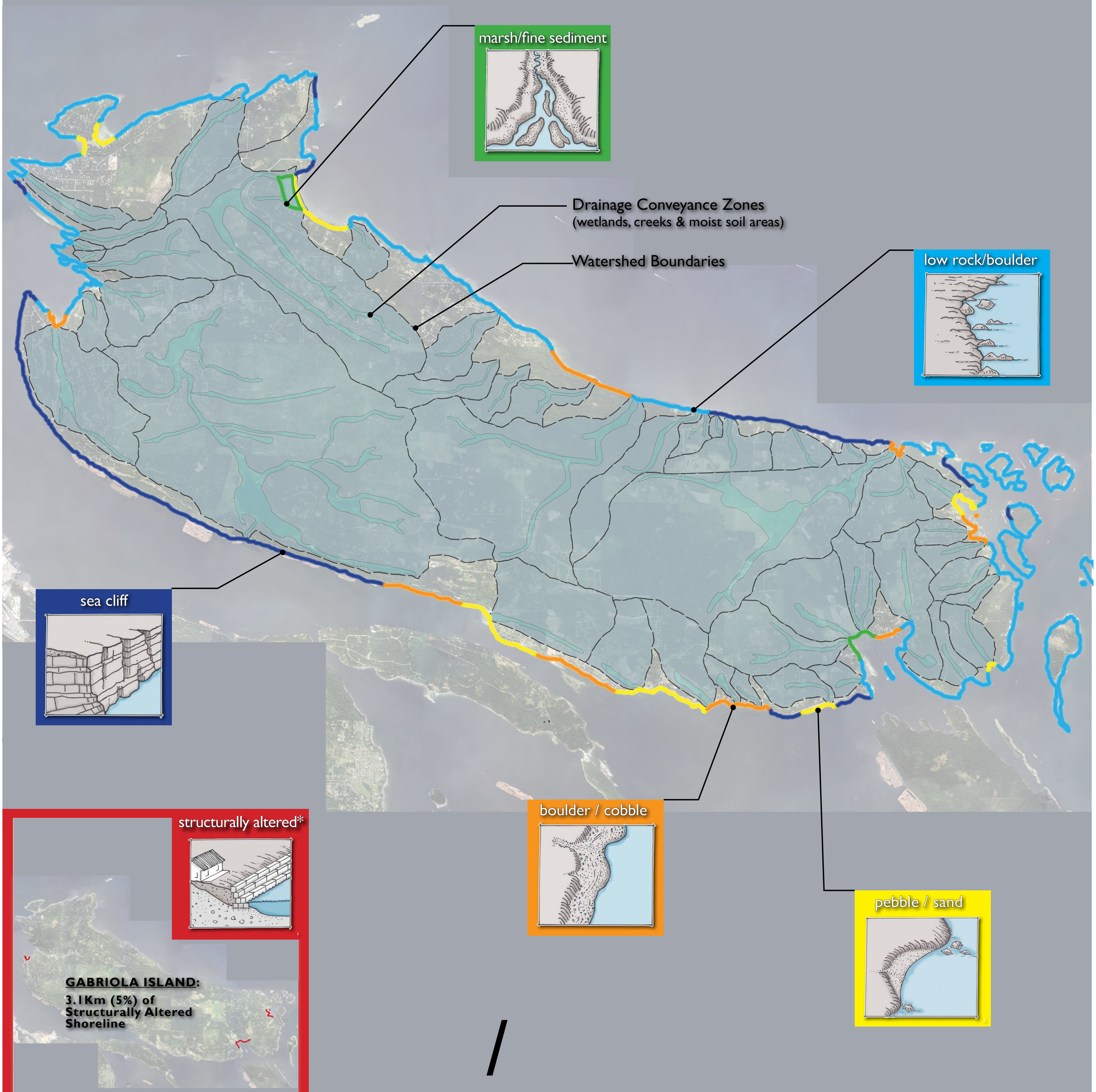
MAP 1 of 3: Distribution of Shoreline Types

The Gabriola Island shoreline is largely bedrock and resistant to erosion. There are several sand and shell pocket beaches which are very important recreationally, including Taylor, Pilot and Lock Bays as well as Percy Anchorage. The north end of Gabriola Island is exposed to northwesterly wind and waves and the northeast side of Gabriola Island is exposed to southeasterly storm winds and waves. The south side of Gabriola Island is protected by Valdes Island to the southeast, and partially protected by Mudge Island and the De Courcy group to the south, and by Vancouver Island to the west. Gabriola Island's only areas of mudflat, which are sensitive to human disturbance, are located in Degnen Bay on the southeast end, and to a lesser extent, in Silva Bay. There is a very protected saltmarsh area in Lock Bay, just to the east on the north tip of Gabriola Island, completely bounded on the east by a soft sediment (pebble/sand) spit.



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
- 19% of shoreline (12 Km)

LOW ROCK/BOULDER
- rocky shore with low slopes
- 59% of shoreline (39 Km)

Sediment (Soft) Shorelines

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

BOULDER/COBBLE
- boulder - cobble cover on beach (often indicates eroding shoreline)
- 10% of shoreline (6.5 km)

PEBBLE/SAND
- stable or accreting pebble-sand (or shell) beaches (may be eroding where sediment supply is interrupted).
- 9% of shoreline (6 Km)

MARSH/FINE SEDIMENT
- low energy shorelines with sediment inputs from watersheds nearby
- 3% of shoreline (2 Km)

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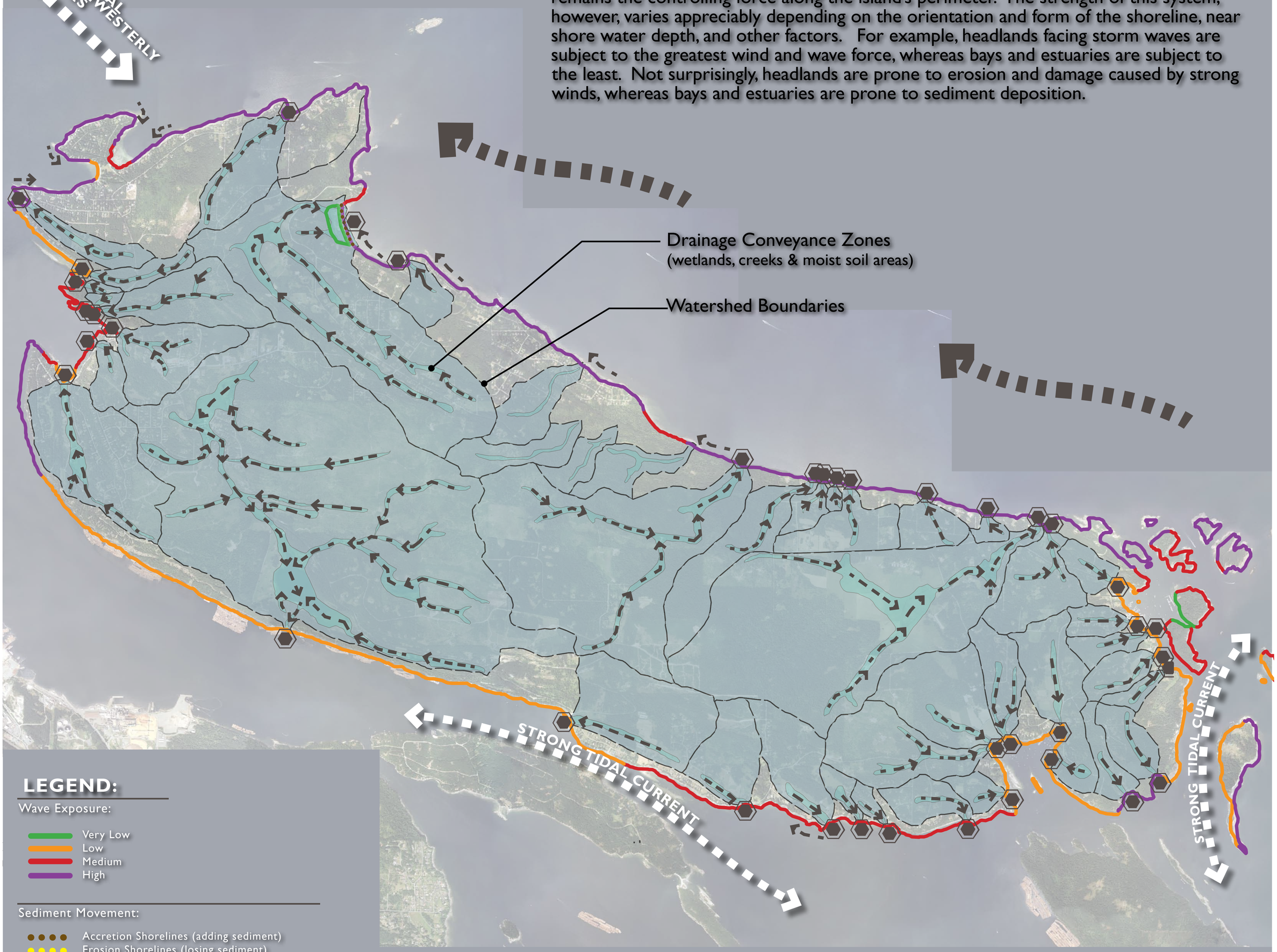
MAP 2 of 3: Energy & Sediment Movement

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.

GABRIOLA 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.



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:

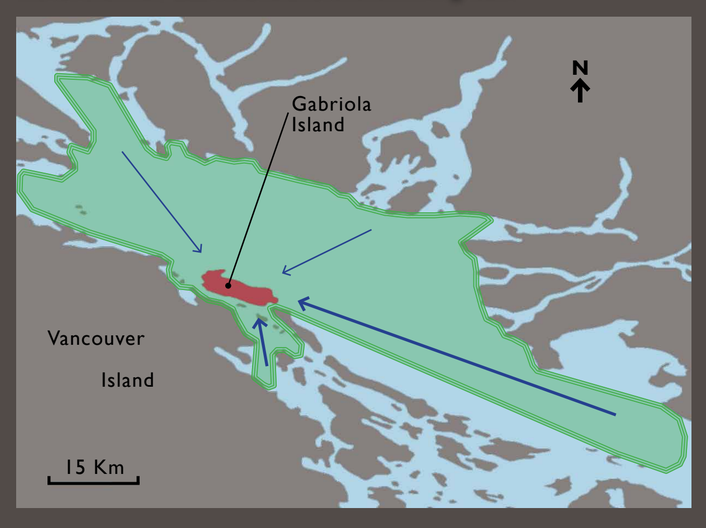
The coloured shorelines on this map indicate that for Gabriola Island, the highest wave exposures occur on the north side of the island. Yet, the arrows indicate that the predominant energy system flow direction is from south to north.

This seemingly conflicting information can be explained by examining the difference between wave exposure and prevailing storms. Wave exposure is a function of wave fetch (as described in more detail in the inset to the right) and wind strength from a given direction. Indeed the Gabriola Island shoreline facing north has a long fetch, and our region does receive periodic cold spells where strong outflow winds blow from the north - this combination of factors results in north facing beaches having a high wave exposure rating relative to other Gabriola shorelines. However, over the course of a storm season, the majority of strong winds and energy comes from the southeast. For Gabriola Island, this means that although north-facing shorelines have high exposures, the dominant sediment movement (relatively little sediment exists on the Gabriola shoreline because it is predominantly rocky) direction is driven by the southeasterly storms towards the north.

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 Gabriola Island is shown in green.



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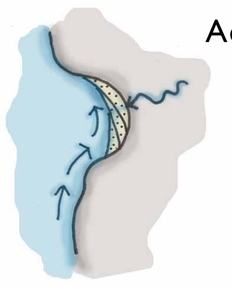
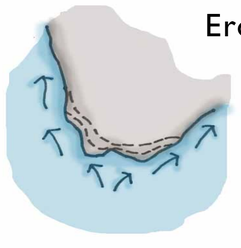


Accretion Shorelines:

Sediment accumulation (accretion) is typically associated with lower energy environment 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.

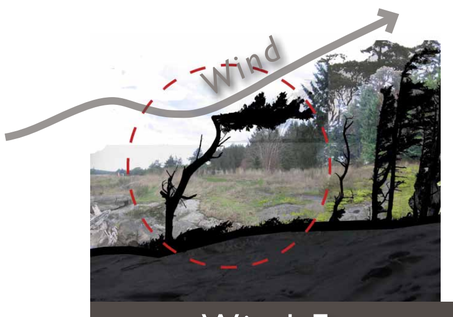


Erosion Shorelines:

Eroding shorelines are typically associated with higher energy environment 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 & Buildings

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MAP 3 of 3: Shoreline Values & Vulnerability

This map is intended to give a general impression of areas along the Gabriola 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.

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

Watershed Boundaries

Areas Draining to Sensitive Shorelines
(i.e. Very Protected Waters and Salt Marsh)

Mudge Island

Breakwater Island

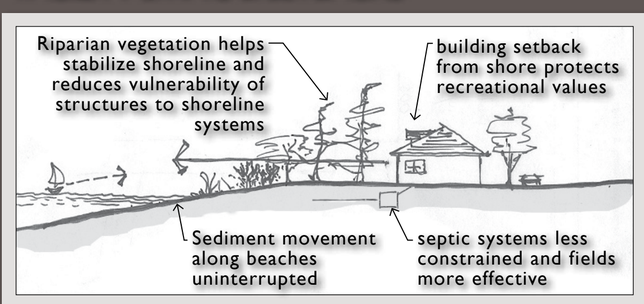
Valdes Island

1 Km

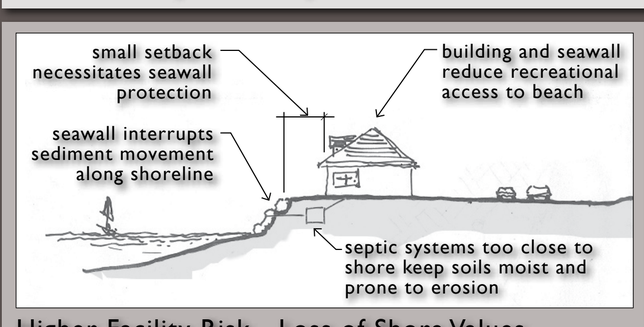
COMMUNITY INPUT

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.

FACILITY SITING & SETBACKS



Lower Facility Risk - Improved Shore Protection



Higher Facility Risk - Loss of Shore Values

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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

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