Metchosin Shoreline Report 2013

Prepared by the
Metchosin Environmental Advisory Select Committee
May 2013

Table of Contents

Executive Summary

The unique values attributed to the Coastal Areas of Metchosin have been outlined at length in the Official Community Plan and other documents produced for the District. They have also been recognized both historically and by outside researchers.

The objective of the Metchosin Shoreline Report is to provide Mayor and Council with a background document and decision-making tools for issues related to Metchosin's shoreline environment: the jurisdictional boundaries are delineated; examples of ecologically sensitive areas are highlighted; and the biological and geographical values of eight zones of the 45 km of shoreline are profiled.

The values of biodiversity, education, natural capital, aesthetics, philosophy, and ecotourism are all affected by our coastal areas. Therefore, the risks from human activity on the sustainability of these areas are emphasized.

With the increasing likelihood of changing climatic events impacting on our shoreline, and in order to mitigate these risks, a number of recommendations are proposed for the Municipality to implement:

1. Create a development permit zone in the area between the end of provincial jurisdiction at the high water mark and the end of the high tide storm-driven wash on the landowner's property.
2. Prevent the human-caused hardening of the shoreline by sea walls, roadways or bulkheading, and shoreline modifications.
3. Establish Development Permit Areas on the full length of the coast of Metchosin.
4. Design a "Coastal Covenant," which landowners could voluntarily sign, in order to guarantee the protection of the integrity of their section of shoreline.
5. Establish and protect vegetation buffer zones along streams and along the total shoreline, with special attention to salt marshes and eelgrass beds.
6. Protect eelgrass and macroalgae beds by reducing damage from log booms, docks and other structures.
7. Divert the runoff from farms, which might contain fertilizers, pesticides and herbicides, away from shoreline, salt marsh, and eelgrass habitats.
8. Develop emergency response plans for the District in the event of a land or ocean-based toxic spill which could potentially threaten the shoreline.

Introduction

Metchosin is highly regarded within the Capital Regional District (CRD) for its variety of natural ecosystems balanced by its rural lifestyle. It is this unique character of Metchosin that has been valued historically and continues to be valued by its residents and visitors. The diversity of natural terrestrial ecosystems that have been preserved by the community are well represented in the numerous parks and open areas. However, while the community has the power to exert authority over terrestrial environments, the 45 km of shoreline marine environments bordering Metchosin are governed by a variety of agencies and jurisdictions, leaving the risk of key issues being overlooked.
(See Appendix 1, Metchosin's Coastal Jurisdictions)

The Metchosin shoreline has been recognized by others as having a variety of unique features and ecosystems. In the past, most of the shoreline was considered for designation as a National Marine Park by the federal government. Two extensive reports were prepared in the mid 1970's, one for Parks Canada and the other for Indian Affairs. The area off Bentinck Island and Race Rocks is now a federally recognized Rockfish Protection Area and a designated Marine Protected Area. A provincial ecological reserve was established at Race Rocks in 1980.
http://www.racerocks.com/
(See Appendix 2, Recognition by Others of the Value of Metchosin's Shoreline)

The District and residents of Metchosin are keenly aware of the benefits of living adjacent to the marine shoreline. Marine values are documented in both the Official Community Plan and the Blue Green Spaces Strategy. *(See Appendix 3, Previous Shoreline Documents Presented to Metchosin Council).* In light of the variety of potential impacts to marine shorelines, such as the predicted rise in sea level and an increase in extreme weather events associated with climate change, the District must be concerned with the preservation and protection of the environmental, social, and economic values of these shores.
(See Appendix 4, Global Risks to Shorelines)

Purpose

The purpose of this document is to:

- Identify the ecological, educational, aesthetic, and economic values of Metchosin's 45 km of marine shorelines.
- Summarize the physical and ecological risks to our shoreline environments.
- Propose actions enabling the District to prepare for, and act on, shoreline risks.
- Describe the jurisdictional boundaries of Metchosin's shorelines.
- Provide reference material for further information

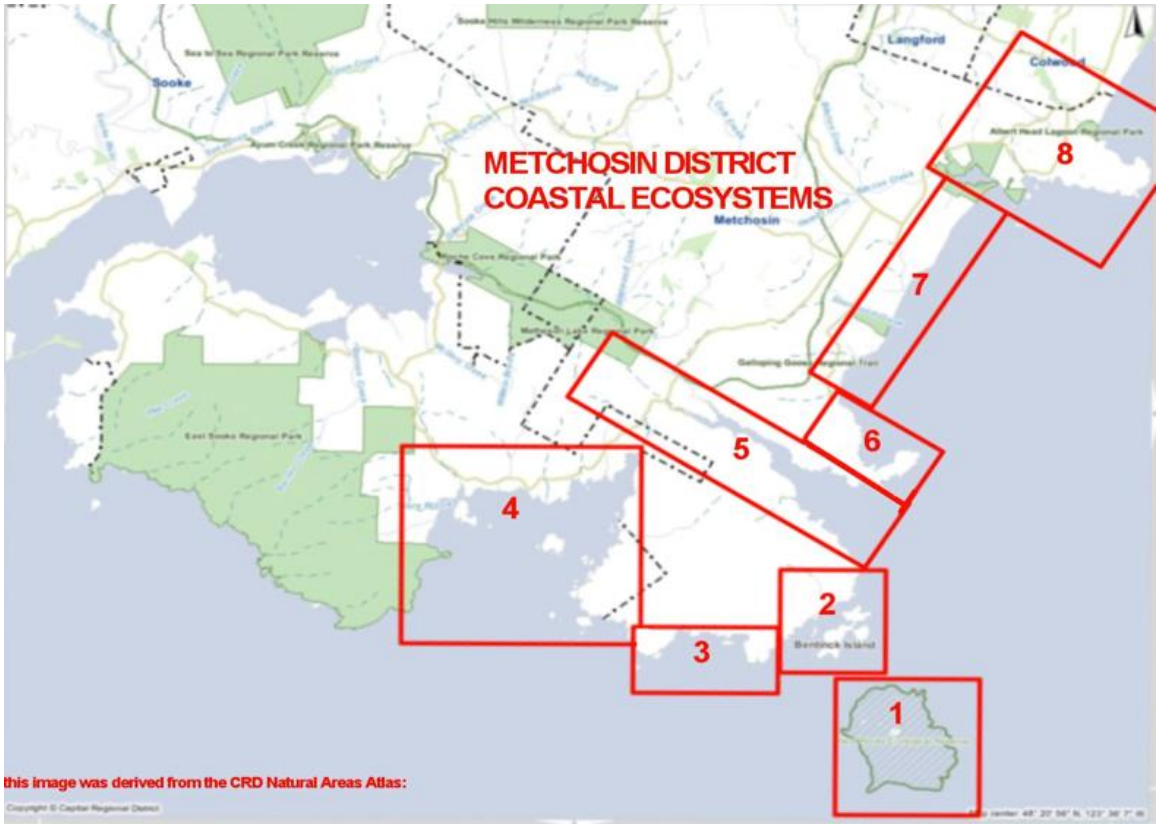
Physical Structure and Ecological Resources of the Metchosin Shoreline

In order to document various coastal features, this analysis takes the shoreline of Metchosin and divides it into eight smaller sections representing areas of similar physical and ecological make up. This approach is used in the website on Coastal Metchosin. (http://powweb.racerocks.ca/metchosinmarine/mapindex.htm)

The coastal aerial images were provided by the Integrated Land Management Bureau, GEOBC Spatial Analysis Branch.

Aerial Maps were made available courtesy of the CRD Natural Areas Atlas http://www.crd.bc.ca/regionalplanning/maps/index.htm

The following map depicts the shoreline of Metchosin divided into eight sections representing areas of similar physical and ecological characteristics:



The following images provide examples of the coastlines of these zones. When the ecology and geography of each area is studied, and the different life forms are recognized, one can start to appreciate the variety in landforms and incredible biodiversity of the areas.

See Appendix 5 Coastal Areas and Sensitive Ecosystems for maps and details of these eight zones.

Zone 1. Race Rocks. Nine islands.

Zone 2. Bentinck Island and Rocky Point. DND property, a variety of ecosystems.

Zone 3. Church Island and Whirl Bay. Island and rocky coast.

Zone 4. Beecher Bay. First Nations reserve, shoreline, DND land, private land and park.

Zone 5. Pedder Bay. The shores of the Bay with Pearson College and Pedder Bay Marina; estuary and riparian areas.

Zone 6. William Head. A rocky shore headland.

Zone 7. Parry Bay Cliffs, Taylor Beach to Weir's Beach. Cliffs and beaches.

Zone 8. Witty's Lagoon to Albert Head. Beaches and lagoons.

Shoreline Values

Biodiversity (ecological values and sensitivities)

The term "biodiversity" encompasses the processes and variety of life on earth. It includes the complete range of organisms, their genetic differences, communities and ecosystems in which they occur, and the ecological and evolutionary processes that allow them to change, adapt and persist. Biodiversity manifests itself on the genetic, species, ecosystem, and landscape levels as well as in the interactions within and among levels. It supports:

- *Resource values (e.g. agricultural crops, fisheries as a food source, and medicinal uses of plants)*
- *Ecosystem services (e.g. maintaining air and water quality)*
- *Recreational and aesthetic values*
- *Intrinsic, spiritual, and ethical values*

With global resource challenges, such as the collapse of Atlantic cod fish stocks, monoculture crop failures, and locally the devastation of the forest industry due to pine beetle infestations, the necessity of maintaining a high natural biodiversity for environmental resilience has become very apparent.

Marine environments are extremely rich in their biodiversity and the ecosystem services they provide.

Natural Capital

Natural capital refers to the indispensable resources and benefits, essential for human survival and economic activity, provided by the ecosystem. (www.businessdictionary.com/definition/natural-capital.html)

Natural capital refers to any of the many goods (e.g. food and fuel) and services (e.g. water purification and carbon cycling) provided by the natural cycles. Natural ecosystems and biodiversity provide services that we take for granted, but which have immeasurable value. Eelgrass beds, kelp beds, and estuaries, in particular, supply critical habitat for juvenile fish and migratory birds, and provide a high degree of carbon sequestration.

Educational Value

Environmental education creates awareness and understanding of the relationship between humans and their many environments – natural, man-made, cultural, and technological. Environmental education is concerned with knowledge, values, and attitudes, and has as its aim responsible environmental behaviour. (NEEAC, 1996 North American Association for Environmental Education. http://www.naaee.net/what-is-ee)

Educational opportunities present themselves in many forms, from the structured ecology field studies in high school and colleges to less formal classroom field trips and casual family outings at Witty's lagoon. All of these represent opportunities to learn about biodiversity and ecological values while engaging in outdoor physical activity. The education of our youth represents an important step in creating greater awareness of the limits of natural resources and in developing future generations of responsible citizens, natural resource managers, and scientists, i.e. custodians of our planetary resources.

Aesthetic and Philosophical Values

Shoreline aesthetics are undeniably ingrained into the psyche of the human spirit, so much so that there is an extremely high demand for shoreline property, even at high property costs and potential environmental risks (such as tsunamis). Shorelines feature prominently in artistic endeavours (e.g. poetry, verse, song, photography,

painting and other visual arts). People enjoy the experience of walking near the sea, breathing sea air, bird watching, sunbathing, and seeing the expansive vistas. The artistic, spiritual and philosophical value of such experience is unquantifiable and priceless.

Eco-tourism

Eco-tourism is tourism designed to contribute to the appreciation and protection of the environment, or at least minimize damage to it. Regions and communities which have substantial natural resources offering aesthetics, biodiversity, natural capital, and educational value have much potential for developing an eco-tourism market. As the public has become more environmentally aware, so has eco-tourism grown.

Risks to Local Shorelines

- Natural shoreline erosion/change
- Shoreline alteration/disruption (dumping, filling, hard surfaces, groynes, seawalls, piers etc.)
- Shoreline erosion from climate change, storm surges, and associated extreme weather events
- Downstream impacts from developments, including increased sedimentation, more fresh water output, and erosion from stream channeling
- Contaminants in storm sewers and seepage from septic fields (sewage, toxic cleansers, fuel, oil, detergents, cosmetic pesticides/herbicides, anti-freeze, prescription drugs, etc.)
- Agriculture runoff (pesticides, herbicides, fertilizers, manure)
- Contamination from marine traffic in Georgia Strait and the Strait of Juan de Fuca. With the increase in marine traffic, there is an increase in the likelihood of collisions, bilge dumping, spills, and marine garbage
- Flotsam on shorelines (increased potential from tsunamis)
- Disturbance by recreational boaters, including kayakers and personal watercraft, of seabird feeding and nesting areas, and marine mammal haulout and nursery colonies
- Eco-tourism/recreational impacts – tread gently, observe from a distance, minimize disturbance
- Invasive species: Minimal so far but potential for alteration of ecosystems by the green crab, certain algae, and certain tunicates

Sustainable Shoreline Guidelines

- Preserve coastal processes.
- Restrict and control shoreline modifications, which can have wide-reaching effects. (See Coastal Shore Stewardship: A Guide for Planners, Builders and Developers on Canada's Pacific Coast http://stewardshipcentrebc.ca/PDF_docs/StewardshipSeries/Coastal.pdf)
- Maintain, and when possible, enhance habitat diversity. See the description of the variety of shoreline habitats in Metchosin (Appendix 5).
- Ensure the variety of habitats is protected. Important ecological services are derived from these habitats for various plant and animal species, for foraging and spawning habitats for marine fish and invertebrates, and for breeding and feeding areas for birds.
- At a local scale, reduce pollutant input to the marine environment (e.g. boating guide, information sessions at Pedder Bay). On a broader scale, observe and report any inbound pollutants (e.g. shoreline watch).
- PLAN to avoid cumulative impacts to the coastal environment. The shore is an important part of defining Metchosin's character.

Recommendations

- Create a municipal development permit zone in the "No man's land" between the end of provincial jurisdiction at the high water mark and the end of the high tide storm-driven wash zone. This is a zone of the landowners property that may be inundated or eroded in extreme conditions. It is not possible to put an exact setback distance on this zone as the slope and substrate of the coastline determines the potential impact. As examples, a rock cliff obviously has more stability than a clay cliff; a naturally vegetated sand beach has more resistance to storm damage than one that has been hardened by compaction from human activity (building roadways or cement pathways).

- Consider a bylaw to prevent the human-caused "hardening of the natural area:" prohibit sea walls, dumping, rip-rapping, bulkheading or groyne construction, or excavator work which could lead to eventual destabilization of the shoreline. This zone could be defined as the slope of natural repose of the shoreline, or the area to which the coastline may erode when impacted by extreme ocean storm events.

- Consider establishing Development Permit Areas on the full length of the coast of Metchosin, with a 100 metre minimum distance from the natural boundary area. An increase in this distance should be implemented where alterations to near-ocean topography could result in potential impacts on sedimentation and nutrient load in the coastal area (for example installation of sewer fields and watercourse alterations due to building of roads, creation of dams etc).

- Consider designing a "*Coastal Covenant*", which landowners could voluntarily sign, in order to guarantee the protection of the integrity of their section of shoreline. The description of Metchosin's coastline, outlining the ecologically sensitive areas discussed in the report, is presented as Appendix 5. The land-sea interface along the entire coast of Metchosin exhibits a wide diversity of landforms and marine communities within a relatively confined geographical area. The eight zones shown in the map above are perhaps the most pristine, varied and ecologically sensitive sites of the entire Victoria region. It is in these areas where the coastal habitats, marine communities, and oceanographic phenomena achieve their greatest expression.

- Establish and protect vegetation buffer zones along streams and the shoreline adjacent to salt marshes and eelgrass and macroalgae beds.

- Protect eelgrass and macroalgae beds by reducing damage from log booms, docks and other structures.

- Divert the runoff from farms, which may contain fertilizers, pesticides and herbicides, away from shoreline, salt marsh, and eelgrass and macroalge habitats.

- Evaluate the role of the Municipality in the event of a land- or ocean-based toxic spill which could potentially threaten the shoreline.

References

Coastal Shore Stewardship: A Guide for Planners, Builders and Developers on Canada's Pacific Coast
http://stewardshipcentrebc.ca/PDF_docs/StewardshipSeries/Coastal.pdf

The above reference is excellent and should be required reading for all municipal employees and owners of shoreline property.

If people have limited reading time the following 4 links give valuable information

Fact Sheet: Marine Guide to Preventing Shoreline Erosion. Fisheries and Oceans Canada
http://www.dfo-mpo.gc.ca/Library/281618.pdf

Living by Water Project. Working towards healthier human and wildlife habitat along the Shorelines of Canada. Nature Canada
http://livingbywater.ca/main2.html

Ecosystems of Southern Vancouver Island.
http://metchosinmarine.ca/
There are many other links to information on the topic on this page.

Coastal Sediment Process. Capital Regional District
http://www.crd.bc.ca/watersheds/protection/geology-processes/coastalsediment.htm

And more:

Chapman, Colin R. Blue Carbon — British Columbia. The Case for the Conservation and Enhancement of Estuarine Processes and Sediments in B.C.
www.sierraclub.bc.ca
Coastal Ecosystems, South Vancouver Island
http://racerocks.ca/metchosinmarine/marineecosystems.htm

Estuaries in British Columbia.
http://www.env.gov.bc.ca/wld/documents/Estuaries06_20.pdf

Green Shores Technical and Advisory Committees http://www.greenshores.ca
http://www.stewardshipcentre.bc.ca

IOC/UNESCO, IMO, FAO, UNDP (2011). *Summary for Decision-Makers : A Blueprint for Ocean and Coastal Sustainability*. Paris: IOC/UNESCO

NEEAC, 1996 North American Association for Environmental Education (NAAEE) a network of environmental educators throughout North America & in over 55 countries around the world. http://naaee.org/

Nelleman, C., E. Corcoran, C.M. Duarte, L. Valdes, C. DeYoung, L. Forseca, G. Grimsditch (editors) (2009) Blue Carbon: The Role of Healthy Oceans in Binding Carbon: A Rapid Response Assessment. UNEP, FAO, IOC/UNESCO. http://books.google.ca/books?hl=en&lr=&id=onCVCHQl4RoC&oi=fnd&pg=PA17&dq=Nellemann,+C.+et.+al.+(2009)+Blue+Carbon&ots=ZQuieTBfoW&sig=-Yk_uu9GkEhIhcAWke9S5DIpu9Q#v=onepage&q=Nellemann%2C%20C.%20et.%20al.%20(2009)%20Blue%20Carbon&f=false

Additional Web Links

Environment Canada http://www.ec.gc.ca/envhome.html
Ocean Disposal http://www.pyr.ec.gc.ca/EN/ocean-disposal/index_e.htm
Septic Maintenance: Pure and Simple http://www.rem.sfu.ca/FRAP/p&s.pdf
Canadian Environmental Assessment Agency http://www.ceaa-acee.gc.ca
Cumulative Effects Assessment Practitioners Guide http://www.ceaa.gc.ca/0011/0001/0004/index_e.htm
Environmental Assessment: Making a Difference http://www.ceaa-acee.gc.ca
Guide to the Preparation of a Comprehensive Study http://www.ceaa.gc.ca/0011/0001/0003/comps_e.htm
Reference Guide: Determining Whether a Project is likely to Cause Significant Adverse Environmental Effects http://www.ceaa.gc.ca/0011/0001/0008/guide3_e.htm#Reference%20Guide
The Citizenís Guide: Canadian Environmental Assessment Process http://www.ceaa-acee.gc.ca/0011/0001/0002/guide_e.htm
Fisheries and Oceans Canada (DFO) Pacific Region http://www.pac.dfo-mpo.gc.ca/pages/default_e.htm
Canadian Waters ñ The Dock Primer http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/guidelines-conseils/guides/dock-primer/big_dock_e.asp
Coast Guard - Office of Boating Safety http://www.pacific.ccg-gcc.gc.ca/obs/index.htm
DFO Marine Guides/Fact Sheets http://www-heb.pac.dfo-mpo.gc.ca/english/publications.htm#Guidelines
Habitat and Enhancement Branch -http://www-heb.pac.dfo-mpo.gc.ca/
Marine Guide to Preventing Shoreline Erosion http://www-heb.pac.dfo-mpo.gc.ca/publications/pdf/erosion_e.pdf
Marine Guide to Small Boat Moorage http://www-heb.pac.dfo-mpo.gc.ca/publications/pdf/moorage_e.pdf
Navigable Waters Protection Division http://www.pacific.ccg-gcc.gc.ca/index.htm
Salish Sea: A Handbook for Educators http://www.pac.dfo-mpo.gc.ca/oceans/salishsea/default_e.htm
What you should know about Fish Habitat and Dredging http://www.dfo-mpo.gc.ca/regions/CENTRAL/pub/fact-fait/fact-fait_e.htm
Government of Canada Legislative Summaries (SARA) http://www.parl.gc.ca/common/Bills_ls.asp?lang=E&ls=c5&source=library_prb&Parl=37&Ses=1
Natural Resources Canada http://www.nrcan.gc.ca/
Geological Survey of Canada http://www.nrcan.gc.ca/gsc/index_e.html
Ministry of Environment: Develop with Care 2012: Environmental Guidelines for Urban and Rural Land Development in British Columbia http://www.env.gov.bc.ca/wld/documents/bmp/devwithcare2012/index.html

Government-Provincial

BC Environmental Assessment Office http://www.eao.gov.bc.ca

Guide to the British Columbia Environmental Assessment Process (January 2001)- *http://www.eao.gov.bc.ca/publicat/guide-2003/guide-home.htm*
BC Fisheries Act- *http://www.qp.gov.bc.ca/statreg/stat/F/96149_01.htm*
BC Treaty Commission *http://www.bctreaty.net/*
BC Waste Management Act Finfish Aquaculture Water Control Regulation *http://www.qp.gov.bc.ca/statreg/reg/W/WasteMgmt/256_2002.htm*
Ministry of Agriculture, Food and Fisheries *http://www.gov.bc.ca/agf/*
Fisheries and Aquaculture *http://www.agf.gov.bc.ca/fisheries*
FishInfo BC *http://www.bcfisheries.gov.bc.ca/fishinfobc.html*
Ministry of Energy and Mines *http://www.gov.bc.ca/em/*
Ministry of Land, Water and Air Protection (MWLAP) *http://www.gov.bc.ca/wlap/*
Best Management Practices to Protect Water Quality
http://wlapwww.gov.bc.ca/wat/wq/nps/BMP_Compendium/BMP_Introduction/bmphome.htm
Environmental Impact Study Guideline:
A Companion Document to the Municipal Sewage Regulation *http://wlapwww.gov.bc.ca/epd/epdpa/mpp/msreg.html*
Environmental Management/Industrial Waste:
Pollution Prevention (P2) Planning program *http://wlapwww.gov.bc.ca/epd/*
Environmental Protection Division *http://wlapwww.gov.bc.ca/epdiv*
Species and Ecosystems at Risk: A Guidebook for British Columbia *http://wlapwww.gov.bc.ca/wld/serisk.htm*
StormwaterPlanning:AGuidebookforBritishColumbia
http://wlapwww.gov.bc.ca/epd/epdpa/mpp/stormwater/stormwater.html
Ministry of Sustainable Resource (MSRM) *http://www.gov.bc.ca/srm/*
Baynes Sound Shellfish Aquaculture Action Plan *http://srmwww.gov.bc.ca/rmd/coastal/south_island/baynes/index.htm*
British Columbia Biophysical Shores one Mapping System *http://srmwww.gov.bc.ca/dss/rpts/BCBiophysicalShore-ZoneMapping.pdf*
British Columbia Marine Ecological Classification System*http://srmwww.gov.bc.ca/dss/coastal/bcmec/index.htm*
CRIS Atlas *http://srmwww.gov.bc.ca/dss/coastal/mris/coast.htm*
Coastal Planning *http://srmwww.gov.bc.ca/rmd/coastal/*
Coastal Data *http://srmwww.gov.bc.ca/dss/coastal/index.htm*
Coastal Initiatives *http://srmwww.gov.bc.ca/dss/coastal/*
Coastal Resource Information System (CRIS) *http://srmwww.gov.bc.ca/dss/coastal/mris/resource.htm*
Decision Support Services ñ Coastal Initiatives *http://srmwww.gov.bc.ca/dss/coastal/*
Endangered Species and Ecosystems *http://srmwww.gov.bc.ca/atrisk/*
Resources Information Standards Committee *http://srmwww.gov.bc.ca/risc/*
Sensitive Ecosystem Inventory of Southeast Vancouver Island & the Gulf Islands *http://srmwww.gov.bc.ca/cdc/sei/index.htm*
Resources Information Standards Committee--------- *http://srmwww.gov.bc.ca/risc/*Develop with Care

Surfgrass (*Phyllospadix scouleri*) and hydrocoral (*Allopora sp.*) community which is visible at the lowest tides in high current areas.

Appendices

Appendix 1: Jurisdiction: Who owns the Shoreline Features of Metchosin?

Appendix 2: Recognition by Others of the Value of Metchosin's Shoreline

Appendix 3: Previous Shoreline Documents Presented to Metchosin Council

Appendix 4: Global Risks to Shorelines

Appendix 5: Coastal Areas and Sensitive Ecosystems of Metchosin

Appendix 1: Jurisdiction: Who Owns the Shoreline Features of Metchosin?

Marine shorelines are governed by a number of jurisdictions. *http://salishsea.ca/resources/Riparianrights/Greenshores%20JurisdictionIssueSheet_finalVer4.pdf*

The provincial government

owns the ocean floor and the foreshore (the area between the low water level and the natural boundary) along Metchosin's Coastline as well as the beds of inland seas such as the Strait of Georgia, Juan de Fuca Strait, and Johnstone Strait. The Integrated Land Management Bureau (under the Ministry of Forests and Range) administers these aquatic lands and issues permits, licences or leases for a wide range of uses – private and public moorage, wharves, marinas, aquaculture, and log storage to name a few. The Province also establishes regional coastal zone plans where these are needed.

The federal government

has jurisdiction over offshore waters – from the low water mark out to 12 nautical miles along the outer coast. The federal Department of Fisheries and Oceans is responsible for managing and protecting fish populations and fish habitat under the Fisheries Act, including shoreline "riparian" habitats, as well as for maintaining maritime safety through the Coast Guard.

Local governments (municipalities and regional districts)

hold the authority to plan and regulate land use within their respective boundaries, which may extend over foreshore and nearshore areas. They do this through official community plans, zoning, development permits, subdivision authority, building permits, and a variety of regulatory bylaws that affect land development.

First Nations

have authorities similar to provincial and local governments over upland and aquatic lands within Indian Reserves. Outside Reserves, traditional rights to marine resources are the subject of ongoing Treaty negotiations for many of the First Nations along BC's coast. The provincial and federal governments have a duty to consult with First Nations on any shoreline tenure applications to ensure that they do not significantly affect aboriginal or treaty rights.

Waterfront property owners

hold "riparian rights" in association with their upland property. Based on "common law" these rights include:

- unimpeded access from their property to deep water for navigation. Waterfront improvements cannot interfere with the right of access for neighbouring properties.
- protection of property from erosion or flooding by installing protective structures on the property holders land. Extending structures below the current natural boundary requires approval of the Province. The Land Act specifically defines the boundary between upland and foreshore as: "natural boundary means the visible high water mark of any lake, river, stream or other body of water where the presence and action of the water are so common and usual, and so long continued in all ordinary years, as to mark on the soil of the bed of the body of water a character distinct from that of its banks, in vegetation, as well as in the nature of the soil itself." In marine systems the natural boundary is generally determined as the lower elevation of terrestrial vegetation or the upper boundary of distinctive aquatic vegetation.

Public

is permitted the use of foreshore and other aquatic lands held by the Crown. When the Province issues tenures, a leaseholder may restrict public access to the leased area; a permit or license of occupation does not allow the holder to restrict access.

See the diagram on page 35 of *Coastal Shore Stewardship: A Guide for Planners, Builders and Developers on Canada's Pacific Coast*
http://stewardshipcentrebc.ca/PDF_docs/StewardshipSeries/Coastal.pdf

Appendix 2: National Recognition by Others of the Value of Metchosin's Shoreline

National Park Proposals:

Background: In 1972, a task force comprised of representatives from the Governments of Canada and British Columbia identified ten areas in the Straits of Georgia and Juan de Fuca warranting National Marine Park consideration. Federal-Provincial discussions earlier that year resulted in the selection of the "Royal Roads" site as having the highest priority for establishment as a National Marine Park. A joint Federal-Provincial study team was subsequently formed to undertake the necessary studies in order to develop a proposal in this regard.

Preliminary investigations by the study team revealed that there was little or no information on the biota occurring in the coastal waters of the proposed Royal Roads National Marine Park area making it impossible for the study team to assess its national significance or importance, and to develop a complementary management plan. Consequently, there was an urgent need for a systematic and comprehensive survey of the macroinvertebrate fauna and seaweeds which occur in the area's coastal waters in order to fill this information gap and permit the orderly completion of the proposal. The results of this study are recorded in:

A study of the benthic macroinvertebrates, fauna and seaweeds at selected sites in the proposed Juan de Fuca National Marine Park. (From: http://www.racerocks.com/racerock/rreo/rreoref2/jdfmarpk/juanmarpark.htm)

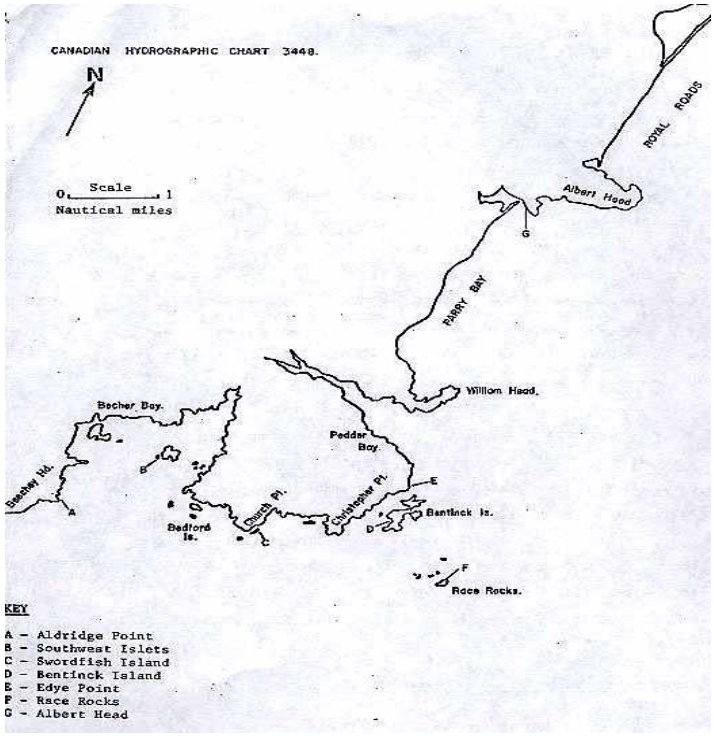
Purpose: in brief, this study included: (1) a professional discussion of the environmental factors which influence the vertical and horizontal distribution of marine organisms in the study area, e.g., type of substrate, salinity, degree of exposure to wave action; (2) a qualitative survey of the benthic macroinvertebrate fauna and seaweeds of six preselected sites within the proposed National Marine Park area.

A second federal proposal came later: Race Rocks National Marine Park: A Preliminary Proposal. Indian and Northern Affairs, Parks Canada (From: http://www.racerocks.com/racerock/rreo/rrrefer/rrnatpark.htm)

The result of these two studies was to recommend National Park Status for the coastline of Metchosin.

In reading these reports, a person who is not familiar with the marine biology of southern Vancouver Island will overlook the significance of the data presented here in support of the proposed marine park. Westwards from Race Rocks, one finds the marine flora and fauna of the partially exposed southwest coast of Vancouver Island, gradually merging with the species of the exposed (to heavy wave action) west coast of the Island. Thus, the flora and fauna of the William Head - Race Rocks - Beechey Head shoreline is not typical of conditions closer to Victoria and in Georgia Strait, but is still within a short distance of Victoria. The high current velocities around Race Rocks and towards Beechey Head tend to concentrate organisms to higher population densities than occur elsewhere. Thus some species, usually rare, may be found in this area in surprising numbers. The proposed park therefore encompasses an area which supports an unusual flora and fauna, of surprising beauty even to the non-biologist.

From Goddard, James M. 1975. The Intertidal and subtidal macroflora and macrofauna in the proposed Juan de Fuca National Marine Park. Dobrocky Seatech Ltd. (http://www.racerocks.com/racerock/rreo/rreoref2/jdfmarpk/juanmarpark.htm)



Below are some excerpts:

Proposed Park Boundaries
The proposed Park consisted of approximately twenty square miles of surface water and offshore lands defined on the west by Sooke Peninsula in a straight line from Beechey Head to Rosedale Rock and on the east by a line extending from Rosedale Rock to Fisgard Light. The proposed Park fronted on the regional land districts of Sooke, Metchosin and Esquimalt and encompassed some thirty-six miles of rugged shoreline, much of which remained in a relatively undisturbed state. The proposed shoreland component included portions of Rocky Point, Albert Head Peninsula and Aldridge Point and totaled some 2.5 square miles.

Marine Setting
The proposed Park is located in the transition zone between the Vancouver Island Inland Sea and the Pacific West Coast Marine Region. These two regions are part of a much larger oceanic system, namely the Pacific Coastal Domain, a temperate faunistic province extending from the middle of Baja California into the Bering Sea.

Tides and currents of varying velocities and direction control the exchange of waters as well as the chemical and physical properties of the water column in the Park and in Juan de Fuca Strait in general. The oceanographic phenomenon associated with this transition zone are responsible for the development of an outstanding marine environment with varied and abundant intertidal and subtidal community assemblages

A variety of erosional and depositional phenomenon characterize the coastal zone. The coastal geomorphology is controlled by the structural geology and the various facets of erosion and deposition common to the land-sea interface. The relatively undisturbed rugged volcanic coastline with secluded beaches, headlands, marshes, steep sandcliffs and offshore islands, offers a striking contrast to the more industrialized coastline surrounding Victoria to the east.

“A rich coastal and natural marine history combined with a congenial climate makes the Race Rocks area an excellent setting for Canada's first National Marine Park.”

The politicians who endorsed the study and supported the park were indeed visionaries but unfortunately only Race Rocks is protected.

Appendix 3: Previous shoreline documents presented to Metchosin Council

There is a history of concern about the values associated with the coastal part of Metchosin and the recognition of these values. The following examples illustrate this.

1. Sustainability Report

A large section of the **Sustainability Report** to Council of 2011 is devoted to marine systems:

Recommendations from Sustainability 2011 Report:

Metchosin's existing shoreline slopes development permit area, large lots and low density zoning have helped to reduce development impacts along coastlines, and have protected marine coastal habitat and its ability to store and sequester carbon.

Metchosin will help achieve sustainability and resiliency in its coastal areas by implementing the following:

- Lobby senior governments to recognize that municipalities are often the first to notice problems along their marine coasts and municipalities need the authority to protect these ecosystems;
- Consider zoning all marine shorelines in Metchosin as a development permit area in order to protect their natural values;
- Establish a program to document and monitor coastal resources, including eelgrass and kelp beds, and forage fish habitat, with the goal of ensuring no net loss of those resources;
- Identify and map areas important to forage fish and consider a method of restricting beach fires and other damaging activities in these areas at times of the year which are sensitive for forage fish.
- Emergency Preparedness Program – know who to contact, how, when where, why and in what circumstances
- Produce a pamphlet and help to educate both the public, and land owners with property bordering on the shoreline, of the sensitivity of coastal ecosystems, in order to reduce harmful impacts on coastal ecosystems.
- Post essential messages from and distribute Transport Canada's boaters guide at key locations to educate public.

2. The Blue Green Spaces Document

The Blue Green Spaces Document of 2008 emphasized the need for recognition of the Coastal Area. From Part 5 of this document:

> Marine areas.
> a. Nearshore marine areas. These areas occur along the coastlines of Metchosin. They are productive nursery areas and habitat for marine life, and include eelgrass beds, kelp beds, and subtidal rocky areas.
> b. Marine shorelines. These are areas of natural shoreline on land. They are an important part of the scenic character of the community, contain recreational trails or beach access points, and provide a buffer between buildings and natural dynamic processes such as shoreline erosion. Examples include: rocky marine shorelines and beaches (especially between Albert Head and Church Island), tidal lagoons, estuaries and offshore islands.

3. The Official Community Plan

The Official Community Plan (1995) makes reference to the Marine Area of Metchosin.

2.6 Marine Shorelands:

Definition: Within Metchosin, there are Rocky Shores, Drift Sector Beaches, Pocket Beaches, Low- Energy Shores and Lagoon Ecosystems…. In addition, the two types of beaches are further categorized into three distinct classes of beach based on the accretion and erosion characteristics. The combinations of shore categories and distinct beach classes produce a diverse range of marine shorelands. Most of the geotechnical and environmental concerns about shores relate to the processes of drift and accretion along the shore and the process of slope regression above the shores.

(a) General Marine Shoreland Policies:

2.6.1 The District of Metchosin may give consideration to the following:

(1) discuss with senior levels of government for coordinating future land use policies as they pertain to the management of Metchosin's marine shorelands.

(2) monitor shore processes with particular concern for slope regression rates, lateral drift rate and stability of Class I accretion beaches.

(3) determine, in conjunction with the Ministry of Environment, Lands and Parks, ways and means of undertaking:

(a) where desirable and feasible, a program of beach stabilization using natural nonstructural techniques, such as the planting of dune grasses where appropriate;

(b) beach enhancement programs wherever it is possible to upgrade a Class II beach to a Class I beach (see Definitions of beaches); and

(c) the removal or reduction of development intrusions not consistent with the maintenance of the shoreline.

2.6.2. The set-back requirements specified in this Section may be increased as local conditions warrant.

2.6.3 The improvement of public access should be ensured in the course of land development where such access is not detrimental to Sensitive Environments.

2.6.4 Any desired works to be placed on foreshore lands from the mean high water mark seaward requires application to the appropriate provincial and/or federal government agency responsible.

2.6.5 Public recreational use of marine shorelands should be consistent with the suitability of each shore type for the proposed use.

(b) Rocky Shores:

Definition: Rocky shores are stable shores comprised of exposed bedrock with an absence of unconsolidated material at extreme low tide. Relative to other types of shores, they are low in biological productivity but rich in biotic diversity and aesthetic quality and are characterized by lichens, snails, barnacles, mussels, seaweeds, anemones and sea stars.

2.6.6 No building or structure shall be located and no fill shall be placed or removed from any site within 15 horizontal metres (50 feet) of mean high water on Rocky Shore slopes except where engineering and resource management studies indicate that a lesser setback is acceptable.

2.6.7 Although the biological capability of Rocky Shore slopes to support life is relatively low, the natural biota may provide habitat for rare species of animal life and that value should be considered with each development proposed.

(c) Drift-Sector Beaches:

Definition: A Drift-Sector is an integrated and independently operating erosion beach system which may extend for many miles in length and be separated from adjacent drift-sectors by either natural or artificial boundaries. Metchosin contains one large drift-sector extending from Weir Beach to Witty's Lagoon. A drift-sector generally contains the following three classes of beaches:

Class III Beaches are erosional beaches located at the base of coastal bluffs or cliffs from which sand and gravel is provided for accretion of Class I beaches further along the drift-sector. Class III beaches are totally submerged at high tide with no dry backshore berm.

Class II Beaches are marginal erosion beaches located at the base of coastal bluffs or cliffs from which sand and gravel is eroded providing a secondary source of beach material for accretion on Class I beaches further along the drift-sector. Class II beaches are largely submerged at high tide with only a limited amount of walkable dry backshore under such conditions.

Class I Beaches are the accretion terminals of a drift-sector where material eroded from Class II and III beaches is deposited. Class I beaches remain dry and walkable at high tide and have a large backshore berm permitting ease of public access and use. They constitute the most important recreational beaches. Biotically, beach shores are of intermediate productivity and diversity relative to the other shore types.

2.6.8 The use and management of the Drift-Sector Beaches should be based on the maintenance of the present natural system of erosion, transport and build-up of beach material along the length of the Drift-Sector designated on Map 5 (*see OCP)*.

2.6.9 Because the existence and maintenance of the Class I beaches are dependent on the supply of material eroded from Class II and III beaches, no bulkheading or placement of any shore protection structures will be permitted within a drift-sector except where engineering and resource management studies indicate otherwise.

2.6.10 To ensure that material eroded from Class II and III beaches is transported the full length of the shoreline to Class I beaches, docking or other facilities which impede the natural processes will not be permitted within drift-sectors.

2.6.11 Due to active slope recession with considerable sloughing and slide evidence, no building or structure will be permitted within a minimum of 60 horizontal metres (200 feet) from mean high water adjacent to Class II and Class III drift-sector beaches except where geotechnical engineering and resource management studies indicate a lesser setback is acceptable.

2.6.12 On the slopes adjacent to Drift Sector Beaches, no material of any kind shall be removed within a minimum of 60 horizontal metres (200 feet) landward of mean high water.

2.6.13 The location of the mean high water mark and the establishing of setbacks from Class II and Class III slopes should be reviewed at 5 year intervals, or as required, to determine if slope regression has placed residences at risk.

(d) Pocket Beaches:

Definition: A Pocket Beach is a sand and gravel beach along which no lateral drift of beach material takes place because it is contained between two headlands. The Pocket Beach is formed by the onshore and offshore movement of material. Pocket beaches are generally between 30.5 metres (100 feet) and 91.5 metres (300 feet) in length.

With Pocket Beaches, as with Drift-Sector Beaches, there are three classes. However, unlike the classes of Drift-Sector Beaches which are contained adjacent to one another within the Drift- Sector, each class of Pocket Beach exists independently.

Class III Beaches are erosional beaches located at the base of coastal bluffs or cliffs with no dry backshore berm. Such beaches are totally submerged at high tide.

Class II Beaches are marginal erosion beaches located at the base of coastal bluffs or cliffs that supply the upper foreshore with a fairly heavy drift berm without creating a stable dry backshore zone above high tide.

Class I Beaches are rollback pocket beaches characterized by a backshore wetted only under extreme tide and wave conditions permitting ease of public

access and use. They constitute the most important recreational class of beach.

2.6.14 No building or structure shall be located and no fill shall be placed or removed from any site within 15 horizontal metres (50 feet) of mean high water adjacent to Class I and Class II pocket beaches except where engineering and resource management studies indicate that a lesser setback is acceptable.

2.6.15 Because Class III pocket beaches are located at the base of cliffs which are subject to erosion, no building or structure, no placing or removal of fill or other material will be permitted within 15 horizontal metres (50 feet) landward of mean high water adjacent to Class III pocket beaches.

2.6.16 No bulkheading or placement of any shore protection structures will be permitted on Class I, Class II or Class III pocket beaches except where engineering and resource management studies indicate otherwise.

(e) Low-Energy Shore Zone

Definition: Low-Energy Shores are estuarine shores which form part or all of a cove or inlet. They may be characterized by marshy shores, shallow and muddy foreshores, and generally having low banks. As with Pocket Beaches, there are three classes of Low-Energy Shores each existing independently. However, in Metchosin, there is only one Low-Energy Shore - entirely a Class III (erosional) located at the head of Pedder Inlet.

Similar to a Lagoon Ecosystem, the estuarine shore also provides a unique biological environment. Fresh-water creeks and streams flowing into the cove or inlet offer rather unusual habitat. There is currently insufficient information available relating to the protection and preservation of the Low-Energy Shore zones. Therefore, further research is recommended.

2.6.17 No building or structure shall be located and no fill shall be placed or removed from any site within 15 horizontal metres (50 feet) of mean high water adjacent to the Low-Energy Shore, except where engineering and resource management studies indicated that a lesser setback is acceptable.

2.6.18 No bulkheading or placement of any shore protection structures will be permitted on a Low- Energy Shore except where engineering and resource management studies indicate otherwise.

(f) Lagoon Ecosystems:

Definition: The central component of a Lagoon Ecosystem is a body of salt water which has been cut off from the ocean by a barrier or spit of land and which allows the formation of a sheltered biological environment. This unique environment frequently includes a salt-water marsh and estuarine area into which flows fresh water from upland creeks and streams. This combination of fresh and salt water has very high biological productivity and diversity. It offers significant aesthetic and habitat attributes.

2.6.19 Only such uses as limited agriculture and low intensity recreational uses, which do not require structural intrusion, will be permitted in Lagoon Ecosystems.

The Official Community Plan. Development Permit Areas. 2.16

The Municipal Act provides that a community plan may designate development areas to be protected from hazardous conditions. The Municipal Act further provides that in such areas land shall not be altered in any way or subdivided, and structures cannot be built or added to until a Development Permit has been issued. (see: http://www.retooling.ca/_Library/docs/WCEL_climate_change_FINAL.pdf *Preparing For Climate Change: An Implementation Guide for Local Governments in British Columbia* Page 35 Development Permit Areas)

There are well-established practices and many examples in BC with respect to using Development Permit Areas (DPAs) to manage land use in areas with defined hazards, such as slope stability issues. DPAs can also be used to restrict development and protect and/or restore natural features and areas, and to help protect key natural ecosystems in the face of climate change.

DPAs can offer local governments a more flexible approach to regulating development than zoning because guidelines can specify results and allow site-specific solutions.

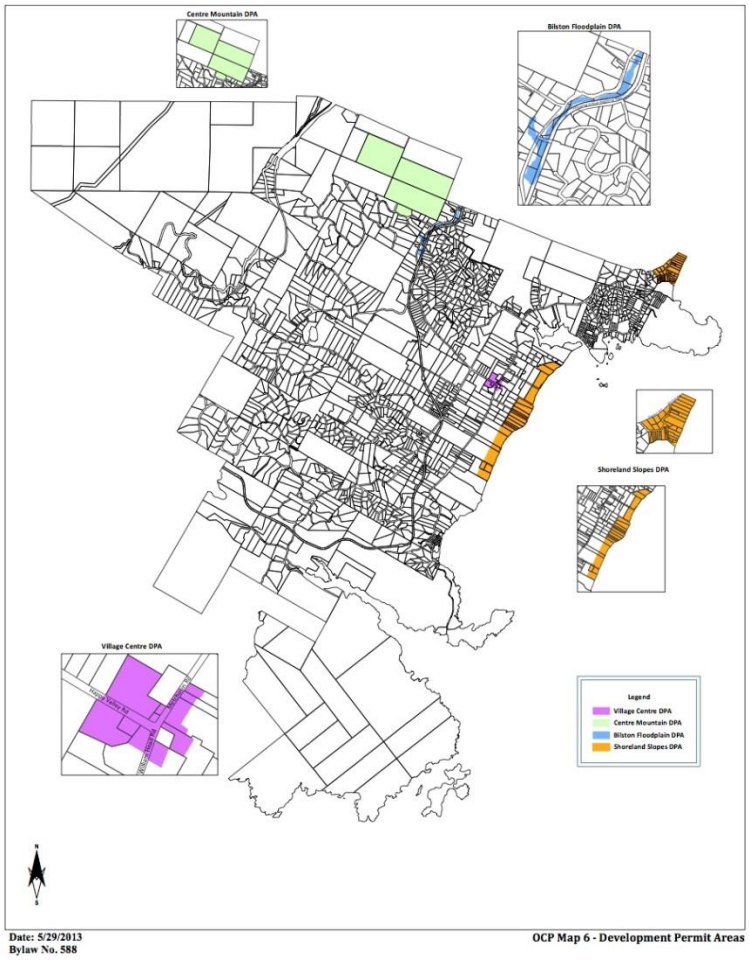
Metchosin's OCP has good provisions for establishing DPA's in sensitive areas. Unfortunately the District has not extended the DPAs to all of the sensitive areas of the coast and has not been entirely successful in enforcing development restrictions on existing DPA's.

From: District of Metchosin Official Community Plan Section on Shoreline Slopes Development Permit Areas:

"Designation: (Bylaw 418, 2004)

The 1993 Hazard Land Management Plan has identified areas of the Metchosin shoreland slopes as having erosion, land sloughing and drainage problems.

Map 6 (See website http://metchosinmarine.ca/gf/?tag=development-permit-areas)

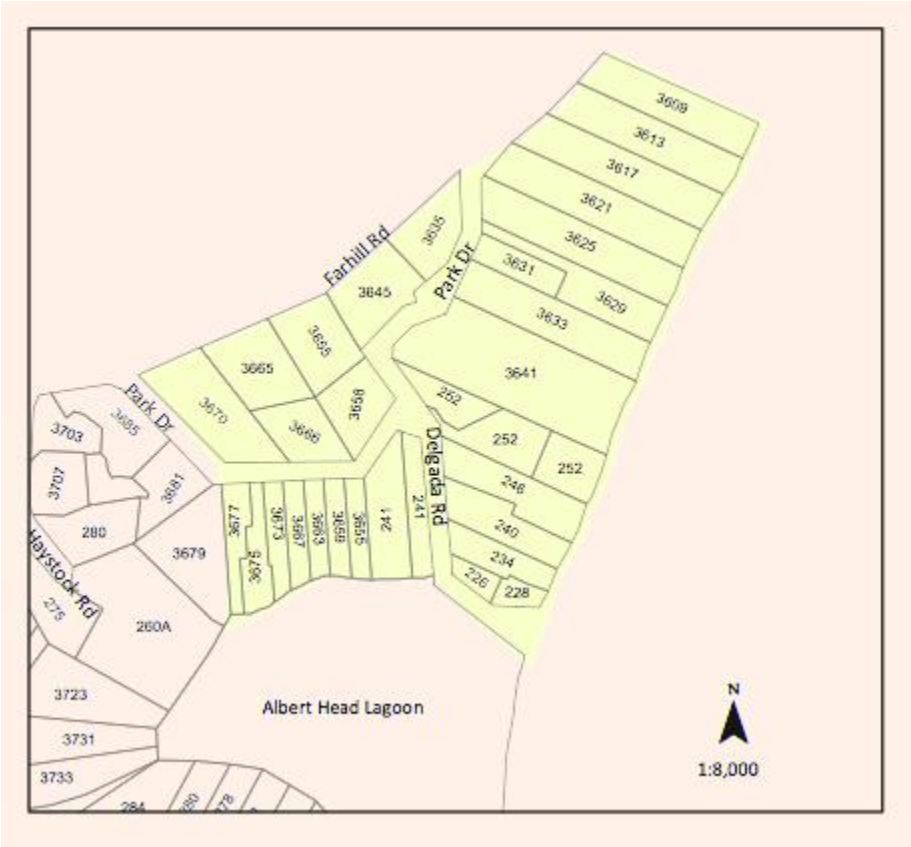


The Shoreland Slopes areas are shown on Map 6 Shoreline Slopes DPA, and are hereby designated as areas for the protection of development from hazardous conditions pursuant to Section 919.1(1)(b) of the Local Government Act.

The Plan has identified three Shoreland Slope classification zones, based on the degree of slope instability and surface erosion potential. Slopes classified as zone 2 and 3 are slopes with the greatest potential for sloughing, slumping and debris flows and have been included in the Development Permit Area.

2.16.2 Special Conditions:

The major concern is that lands, particularly in the **Park Drive – Farhill Road area,** have experienced a dramatic rise in ground water levels due to adjacent developments during the last two decades. Other areas of the Shoreland slopes have experienced significant slope erosion in the past. There is a community desire to mitigate any further development related impacts on the marine shorelands.



2.16.3 Policies Development Permits issued shall be in accordance with the following:

(1) The construction or alteration of buildings on existing lots shall be permitted subject to the Building Permit process when Council is satisfied that the Development Permit Guidelines (Section 2.14.4) have been met, and, when required, Council is satisfied with the Engineer's Report (Section 2.14.5).

(2)Where a Development Permit is applied for in conjunction with an application for subdivision approval, rezoning, or both, the Development Permit shall be conditional on the successful completion of those other permits and shall lapse if the subdivision or rezoning is not approved.

2.16.6 Municipal Response

The District should

(1) evaluate the feasibility of purchasing environmentally sensitive shorelands for use as park, forest reserve, or greenbelt;
(2) initiate programs to monitor both surface and ground water to establish patterns of change;
(3) work with proximate agencies to establish erosion and land sloughing control measures."

Parry Bay (Taylor Beach) section of DPA lands

Information and maps on DPA's in Metchosin are found at
http://metchosinmarine.ca/gf/?tag=development-permit-areas

Taylor Beach looking towards William Head

Appendix 4: Global risks to shorelines

Perhaps one of the most compelling arguments for the value of marine environments came in 2011 from IOC/UNESCO, IMO, FAO, UNDP. A Blueprint for Ocean and Coastal Sustainability. Paris: IOC/UNESCO. (http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/interagency_blue_paper_ocean_rioPlus20.pdf)

"…*Maintaining the quality of life that the ocean has provided to humankind while sustaining the integrity of ocean ecosystems, requires changes in how we view, manage, govern and use ocean resources and coastal areas. Ocean and coastal areas provide many benefits to sustainable development, including both human (social and economic) and environmental (ecosystem services). This includes benefits to economic sectors such as fisheries, energy, tourism, and transport/shipping, as well as 'non-market' benefits such as climate regulation, carbon sequestration, habitat and biodiversity, among many others. The scale and intensification of the stresses on the ocean mean that deferring action will increase costs in the future leading to even greater losses of benefits. Many traditional economic and consumer values that formerly served society well, when coupled with current rates of population increase and economic growth, are not sustainable.*

Sustainable development is defined as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs.' Sustainable development is the approach recognized by the international community to deal with environmental, social and economic issues the world has faced in the past 20 years....Problems, for example, include the fact that very little of the world's ocean is monitored or protected; coastal habitats continue to be lost or degraded; the majority of global fish stocks are under pressure; invasive species are expanding; hypoxic zones are increasing; the ocean is acidifying; sea level is rising."

The IOC/UNESCO document puts forth three major objectives for ocean and coastal sustainability. The first objective identifies "…Actions to reduce stressors and maintain or restore the structure and function of marine ecosystems for equitable and sustainable use of marine resources and ecosystems…"

Two of the main actions are to:

- Develop and Execute a Global Program aimed at Greater Protection and Restoration of Vital Ocean and Coastal Habitats, and develop a Global Blue Carbon Market as a means of Creating Direct Economic Gain through Habitat Protection

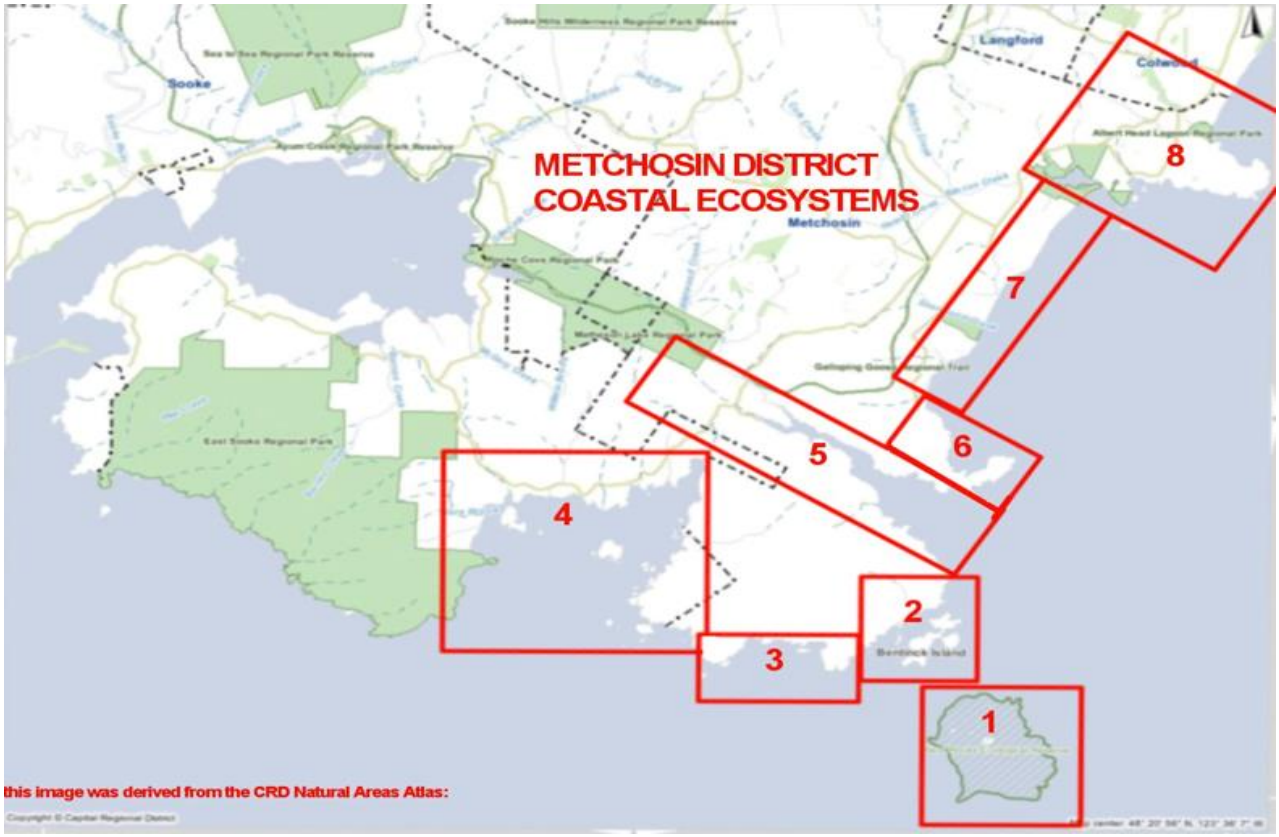
- Strengthen the Legal Framework to Effectively Address Aquatic Invasive Species

These same principles can be considered and applied to local shorelines.

Appendix 5: Ecologically Sensitive Areas and the Ecology of the Eight Zones of Metchosin Shoreline

The land-sea interface along the coast of Metchosin exhibits a wide diversity of landforms and marine communities within a relatively confined geographical area. It is in these areas, where the coastal habitats, marine communities and oceanographic phenomenon achieve their greatest expression.

For descriptive purposes, the map below (also on page 7) divides the coastal part of Metchosin into eight zones.



Each of the zones is described in more detail in the following pages, and some of the notable features are outlined. This is based on the Metchosin District Coastal maps of the Coastal South Vancouver Island website done by Garry Fletcher (2003) http://powweb.racerocks.ca/metchosinmarine/ecoareas.htm

We have started our descriptions at Zone 8 since Zones 5 – 8 will be more familiar to most readers.

Zone 8: Albert Head Beach to Witty's Beach.

On the Zone 8 map above: Areas 1 and 2: Albert Head Lagoon and Beach

Ecosystems represented	Importance (these overlap)
Lagoon ecosystem (intermittent salt water intrusions)	Migratory and resident seabird habitant. Nursery and rearing area for marine invertebrates, fish, and waterfowl
Sand spit and dune ecosystems	Sensitive dune vegetation
Sand-gravel beaches	Waterfowl and shorebird feeding and breeding area
Tide flats	Shellfish habitat – high concentration of univalves
Sand, mud, silt subtidal habitats	High nutrient and detritus production

Comments

This area is closest to the former gravel pit which is slated for high density development, and will be severely impacted by increased human traffic.

The south end of Albert Head on the inland side is a bird sanctuary where species such as killdeer and sandpipers nest. Native vegetation struggles hard with the human traffic. Gumweed grows on the upper part of the berm and Sand Burr, a native species, has a woody root deeply anchored in the sand. The American Sea Rocket grows closest to the ocean and, along with beach grass with its long underground root stems, helps to stabilize the beach.

Eco notes

The most stable shorelines which are resistant to erosion are those that have an unconsolidated berm of sand, pebbles, rocks and logs, and a vegetated backshore area, with sea grasses and other plants adapted with long and intertwined roots which anchor the sand. Natural areas have evolved through thousands of years and are able to absorb the impact of storms, as well as provide essential habitat for invertebrates and fish.

On the Zone 8 map above: Areas 3 - 9: Albert Head, Tower Point, and Duke Road waterfront

Coastal Islands with harbour seal haulouts

Ecosystems represented	Importance
Islets	Migratory seabird resting areas; nesting areas for resident birds
Geologically significant “pillow lava” islands	Harbor seal haulouts
Rocky intertidal and subtidal habitats	Rocky shore tide pools; kelp forests

Comments:
The islands provide good habitats for marine mammals and birds including protection from predators and food in the form of algae, fish, and invertebrates.

On the Zone 8 map above: Areas 10, 11: Witty's lagoon, estuary and beach spit

Coastal lagoon, migratory and resident seabird habitat.

Ecosystems represented	Importance (these overlap)
Salt water marsh	Specialized vegetation communities; example of natural succession
Fresh water estuary	Nursery area; waterfowl and shorebird feeding and roosting area; important for overwintering birds; nutrient supply for marine ecosystem
Tidal flats	Nursery area; shorebird feeding area
Sandspit and beach	Marine life adapted to sandy beaches; plant life adapted to bind sand.
Arbutus-Garry oak stands	Both are endangered tree species
Aspen parkland	One of the plants found on a complex coastal beach area

Comments

Witty's beach is an accretional beach with materials supplied from long shore drift from the cliffs to the south. Behind the beach is a large tidal lagoon, and estuary fed by Bilston Creek.

Salt pans form in the upper reaches of the lagoon where only the highest tides reach. In the fall, concentric layers of salt tolerant plant species form intriguing patterns in these pans. Two of these salt tolerant species are *Salicornia* sp.and *Distichlis spicata*. The dune grass, *Leymus mollis*, has underground creeping rootstocks that bind the sand together and can absorb heavy wave impact. Unfortunately, the introduced species scotch broom, *Cytisus scoparius*, has colonized the area, suppressing the natural beach vegetation and possibly leading to instability in high storm surges.

The edge of the lagoon gets flooded at high tide. The nutrients accumulated in the marsh are important to nourish the marine ecosystem. Runoff from golf courses, septic systems, and agriculture carry nutrients which cause algal growth and eutrophication when the lagoon is poorly flushed.

Seabirds frequent the lagoon throughout the year but are more abundant in migration periods.

Eco notes

Lagoons and salt marshes are a type of estuary - bodies of water that form at the mouths of rivers, where tidal water and fresh water meet and mix. They are among the earth's most productive environments providing an extremely rich and important habitat for a great variety of life. They support more plant and animal growth per unit of area than even the best agricultural lands. (Pacific Coast by Bayard H. McConnaughey and Evelyn McConnaughey, 1994). The interaction of salt water and fresh water result in fluctuating conditions and make this habitat an unstable and demanding one. Plants and animals that live in estuaries must be able to cope with these fluctuations. Plant growth consists of small to microscopic algae that live in the water, and most of the animals are either very small or are concealed in burrows within the mud or the sand.

The rich variety of seashore and underwater life along the coast of Metchosin is partly due to the many different habitats that are represented. Each habitat has a characteristic assemblage of organisms. Some of the biological interactions that go on in a particular situation are obvious, as when a sea star attacks a mussel, or when a limpet grazes on seaweed. More often, however, the interactions are subtle and many are still not understood.

Each environment has its own challenges for the organisms, both plant and animal, living there. For example, rocky shores often have surf or large waves so the plants and animals need to have good methods of attachment; sandy beaches shift and leave little space between grains of sand to live so the animals there need to make burrows or tubes with some substance, and the plants are mostly microscopic; pebbly beaches move so the organisms need to be able to withstand crushing; high speed current channels require organisms with special means of attachment and the animals need special ways to obtain food.

Each animal species has needs – food, oxygen, excretion, reproduction, protection. Each habitat is different and the organism inhabiting it has adaptations that allow it to live in that habitat. Some organisms are generalists and can live in several habitats; other organisms can only live under very specific conditions.

If any environment is changed, either naturally or by people, many organisms living there will not be able to meet their needs and will perish.

Zone 7: Parry Bay cliffs, Taylor Beach to Weir's Beach

On the Zone 7 map above: Area 1: Parry Bay cliffs north of Taylor Beach and south of Witty's Beach with boulder foreshore

Ecosystems represented	Importance (these overlap)
Subtidal boulders	Provide a stable substrate for a variety of attached green, brown and red algal species such as *Fucus*, *Ulva* and *Iridea*.
Intertidal rocky area	Habitat for many species of snails, chitons and tubeworms (which when submerged are a valuable food resource for fish)

Comments:
At the toe of the cliff, there is natural erosion caused by wave action. As sea levels rise, the risk of further cliff erosion increases.

In addition to natural erosion, the effects of grazing, water diversion, tree removal, and development on the top of the cliffs is evident in the increased slumping of soil and vegetation. As an example, the destabilization of the bluff at the north end of Taylor Beach, just south of the Witty's beach area resulted in a massive slide in the fall of 2007. Clay deposits covered the intertidal zone for 20 to 50 metres. Erosional deposits like this smother intertidal life.

On the Zone 7 map above: Areas 2,3,4: North end of Taylor Beach-Gooch Creek to cliffs; Gooch Creek and Lagoon; Taylor road to Gooch Creek

Ecosystems represented	Importance (these overlap)
Fresh water lagoon	Habitat for blue-listed coastal cutthroat trout and red-legged frogs
Fresh water estuary	High nutrient and detritus production; nutrient supply for marine ecosystem
Sand / gravel / rock beaches	River otter habitat; overwintering shorebirds, and shallow water feeders, (western and eared grebes, buffleheads and scoters, with pacific loons appearing occasionally). Several species of gulls feed in large numbers in the fall
Subtidal sand / gravel / rock	subtidal species adapted to the various habitats; green, brown and red algae; offshore concentration of eelgrass beds; Commercial crab fishing offshore

Comments:

Gooch Creek and associated ecosystems provides habitat for two provincially blue-listed species: coastal cutthroat trout (*Oncorhynchus clarki clarki*) and red-legged frog (*Rana aurora*) as well as three-spine stickleback (*Gasterosteus aculeatus*). The cumulative effects of land conversion, land use, livestock usage, invasive species encroachment, and road practices have altered the aquatic health of this system.

Eco note

The algae which ends up on the beach in the autumn is homogenized by wave action into small pieces. In this state, nutrients are more easily released in the decomposition process. They are then recycled offshore. An important part of energy conversion is the large numbers of amphipods or beach hoppers which use the cover of the algae to feed on decomposing material.

On the Zone 7 map above: Areas 4, 5 and 6: Devonian Park cobble beach and lagoon (south of Taylor Road), rocky shore of lower Taylor Beach to Weir's Beach

Ecosystems represented	Importance (these overlap)
Fresh water pond	Red-winged blackbird habitat; swan nesting habitat; sea-run cutthroat trout
Gravel / rock beaches	River otter habitat; waterfowl and shorebird feeding
Rocky intertidal and subtidal habitats	Subtidal species adapted to the various habitats; green, brown and red algae; offshore concentration of eelgrass beds; Commercial crab fishing offshore; sports fishing offshore
Pocket cobble beaches	Forage fish spawning areas
Rocky cliffs	Intertidal and subtidal organisms adapted to steep rocky habitats; plants adapted to rocky exposed habitats; Garry oak meadows with camas

Comments

The southern part of Taylor beach is made of coarse and fine cobbles. The profile of the beach changes from winter to summer as the wind patterns change. Behind the berm on the south end of Taylor beach lies Sherwood Pond. Devonian Park protects the riparian zone along the creek feeding Sherwood Pond. This is an important habitat for preservation of sea-run cutthroat trout. Sherwood Creek is held back from the ocean by a high ridge of coarse gravel. Throughout the early winter and late spring, the water seeps through the berm of gravel. After heavy rains the creek will often break out and erode the beach and the next big storm will fill the gravel berm back in again. From Taylor Beach to Weir's Beach there is a series of cliffs and pocket beaches.

Eco Notes

The gradient of living conditions for shore organisms is partly determined by the topography and substratum which affect the water-retaining capacity of the shore. As the tide recedes, the intertidal areas start to dry out. The rate of drying depends, firstly, upon the slope of the shore, with steeply sloping rock faces draining more rapidly than undulating platforms or shallow slopes. Cracks and crevices provide micro-environments in which the rate of drainage and the drying effects of sun and wind are greatly reduced, and permit colonization to higher levels on the shore than occurs on the open rock faces in the same location.

The vertical distribution of subtidal organisms is largely dependent upon illumination. Most of the green and brown algae are restricted to situations within 15 feet of the lowest tide level, whereas certain red algae may be found down to 50 feet in depth. Animals which graze upon the green and brown algae will thus be found only near the surface. The deeper-living species of invertebrates are primarily filter-feeders, predators or scavengers, rather than grazers.

On the Zone 7 map above: Area 7: Weir's beach and ponds

Ecosystems represented	Importance (these overlap)
Fresh water ponds	Nesting and feeding habitat for various duck species and swans; river otter habitat
Sand beach	Great variety of waterfowl and shorebirds feeding; several species of gulls feed in large numbers in the fall; high nutrient and detritus production from decomposing seaweed; seaweed collecting by local farmers and gardeners of the fall die-off of the sea lettuce, *Ulva lactuca*
Subtidal sand / gravel	offshore concentration of eelgrass beds; Commercial crab fishing offshore; sportsfishing offshore

Comments

Weir's Beach was originally a Class I beach with undisturbed porous berm and backshore lagoon. It has been heavily impacted by human modification.

Eco Note

Eelgrass (*Zostera marina*) is a seed-producing marine plant. It grows in flat shallow underwater muddy or sandy habitats.

- Eelgrass is not a seaweed; it is a blooming underwater grass which spreads by rhizomes or roots.
- Eelgrass meadows build up in the spring and summer, then decay in the fall and winter.
- Eelgrass blades can grow up to 3 feet long.

(http://www.ecy.wa.gov/programs/sea/pugetsound/species/eelgrass.html

- Eelgrass is protected by law, under the Federal Fisheries Act, due to its high fisheries value (primary production, substrate for food organisms, spawning substrate and cover).

Why are eelgrass beds important?

- Eelgrass beds assist with coastal protection by providing a physical baffle (leaves) and reducing erosion (roots & rhizomes).
- The beds support a high biodiversity of species. It has been estimated that over 80% of all commercial fish and shellfish species depend on eelgrass habitat for at least part of their lifecycle. Damage to eelgrass affects whole populations of fish (including salmon), waterfowl, shellfish, and other animals.
- Eelgrass contributes to marine food webs, and is carried by tides and currents throughout the ocean.
- Seagrasses, such as eelgrass, play a critical role in global climate and ocean cycles. Recent reports by the United Nations Environmental Protection Department demonstrate the value and urgency of seagrass conservation: "We are becoming aware of the role that seagrass plays in the climatic and oceanic carbon cycles and in coastal protection. The true economic value is difficult to measure, but work suggests it is immense. Seagrass beds have been overlooked by conservationists and coastal development planners throughout their range. Biosphere restoration must include seagrass conservation and restoration."

http://www.stewardshipcentre.bc.ca/static/eelgrass/eelgrassrestoration.html

Zone 6: William Head

On the Zone 6 map above: Areas 1 to 4: Rocky headland

Ecosystems represented	Importance (these overlap)
Rocky shore habitats	Arbutus - Garry oak stands
Pocket beaches	Protected areas for migrating birds
Protected bays	Rocky tide pools; kelp forests (seasonal)
Shallow subtidal habitat	Important shellfish regeneration area
Deepwater habitats	Rich subtidal marine life; marine mammals (harbour seals and killer whales)

Comments

The shoreline surrounding William Head is a rich and productive area due to the upwelling wave action from the Strait of Juan de Fuca and current patterns around the Head. Due to this productivity, biological diversity of marine life is high in and amongst its shores. As recently as 1997 there were studies on the feasibility of making William Head a Marine Protected Area.

Since its establishment, the William Head Institution has provided *de facto* protection of marine life around William Head from fishermen and divers. Recent survey dives around William Head have revealed this area to be very productive with high biological diversity. For example, Northern Abalone *(Haliotis kamtschatkana),* a commercially extinct species in British Columbia, are possibly much larger and more abundant around William Head than anywhere else on the West coast. In addition, there is an abundance of marine mammals and plants, crustaceans, echinoderms, sponges, kelp beds, seaweeds, and fish. There are several valuable references illustrating the underwater diversity of this area:

http://www.racerocks.com/racerock/INVERTS/dgibbs.htm. This gives the species list from Dive 431 of Donna Gibbs (Vancouver Aquarium), William Head, June 12, 1997

http://www.racerocks.com/racerock/rreo/rrrefer/wmhead.htm (paper by Julie Barr, 1996 Interests of Stakeholders and Options for Establishing a Marine Protected Area at William Head - A Discussion Paper)

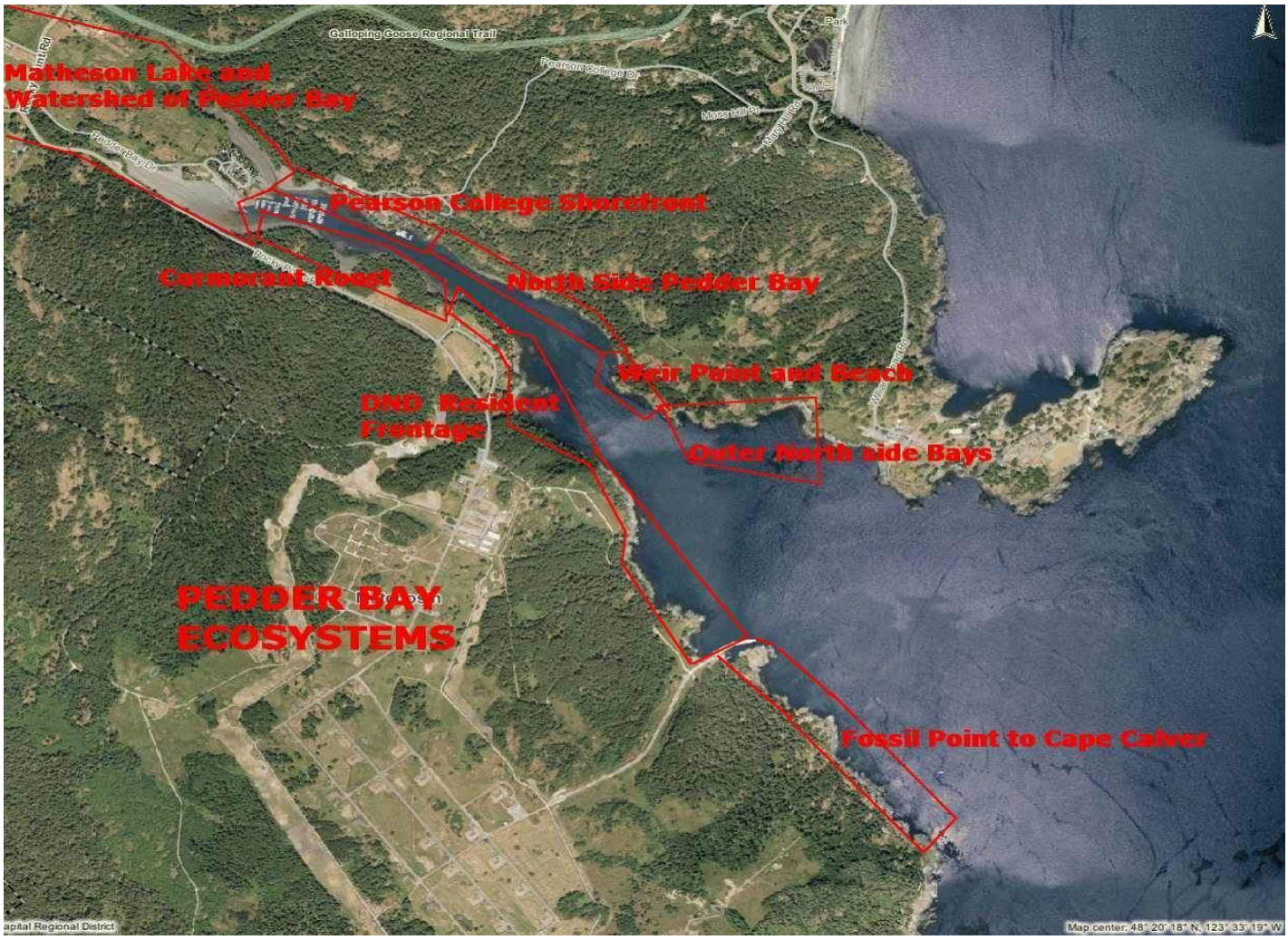
http://www.racerocks.com/racerock/rreo/rreoref2/jdfmarpk/juanmarpark.htm (Goddard, James M. 1975)

Econotes

Bull kelp (*Nereocystis luetkeana*) grows in large “forests” off the coast of William Head and other areas in this region. It is attached to the seafloor by a holdfast and can grow up to 60 cm/day, hence the fastest growing seaweed in the world. They have a high rate of photosynthesis and fix significant carbon.

Kelp beds provide ecosystem services including shelter and habitat for many species of fish and invertebrates including urchins, sea stars, snails, and crabs. They are an important food source for sea urchins and a feeding ground for seals, sealions, and birds.

Zone 5: Pedder Bay



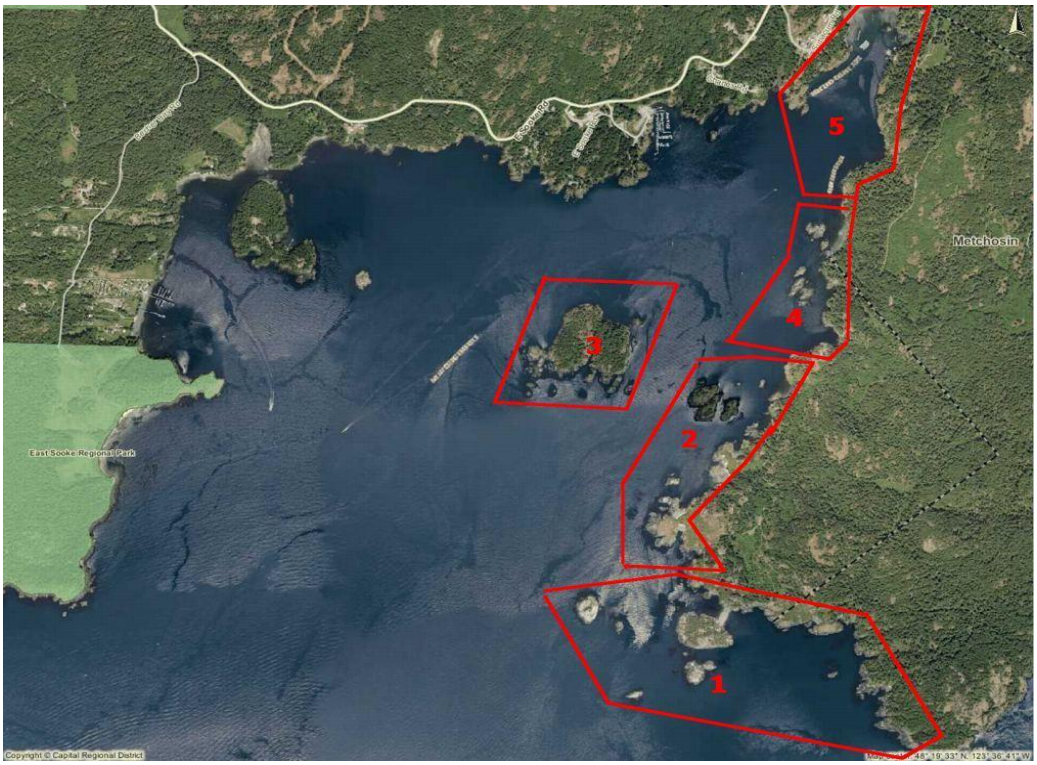
Ecosystems represented	Importance (these overlap)
Estuary mudflat at upper end	a valuable source of food for waterfowl throughout the year; habitat for burrowing organisms adapted to mud such as cockles and marine worms
Fresh water estuary	overwintering shorebirds such as Western Grebes, Scoters, and Buffleheads; Cormorant wintering roosting colony
Protected rocky intertidal shoreline	larva of organisms living here contribute to the rich planktonic mix in the waters of the bay

Comments:

The geography of Pedder Bay and the exposure of its shores to the marine environment results in a number of contrasting ecosystems on the upland part of the shores. It also contributes significant materials to the marine environment and through four or five months of the year contributes a large volume of freshwater, acting more like an estuary than a regular bay.

Zone 4: Beecher Bay and islands

Island ecosystems with significant invertebrate and kelp beds



Zone 4:
Area1: Swordfish Island to Bedford Island
Area 2: North West corner of Beecher Bay
Area 3: Islands in Beecher Bay
Area 4: East side of Beecher Bay
Area 5: North east inner corner of Beecher Bay

Ecosystems represented	Importance (these overlap)
Protected bays	Garry oak – arbutus habitat; Western hemlock forest
Sand beaches	Valuable habitat for forage fish
Spectacular headland and steep sea cliffs	Interesting geologic formations; salmon fishery; marine mammals (harbour seals, sea lions, killer whales and other cetaceans)
Parkland shoreline	Rocky tide pools; First Nations cultural remains
Rocky and sand subtidal habitats	Eelgrass beds; unique subtidal benthos including dense populations of the soft coral, *Gersemia rubiformis,* and the anemone, *Metridium farcimen,* in seacave

Comments:

Although much of this part of the Coast borders on First Nations Land, some of the islands are crown land and some of the shoreline is DND and privately owned land. Parts of the area have been used for years as log booming grounds and dock areas where some impacts are evident.

James M. Goddard (1975) gives a detailed description of the animal populations of Aldridge Point in Beecher Bay.
(http://www.racerocks.com/racerock/rreo/rreoref2/jdfmarpk/juanmarpark.htm)

Zone 3: Whirl Bay Area

Island and shoreline ecosystems swept with strong currents and bearing significant underwater invertebrate colonies

Several important areas are in Zone 3:

Christopher Point
Shelter Island
Whirl Bay
Swordfish Island
Church Island

Ecosystems represented	Importance (these overlap)
Steep nearshore topography	Vertical intertidal zonation
Surge channels	Rich subtidal flora and fauna
Strong ocean currents	Salmon fishery
Cold water upwelling	Rich subtidal flora and fauna; salmon fishery
Underwater caves and cliffs	Specialized flora and fauna
Protected bays and shallows	Waterfowl and seabirds; eelgrass, and kelp forests (seasonal)
Offshore islands, islets, shoals and reefs	Kelp forests; seabirds; harbor seals

Comments

Swordfish Island

A rare hydroid species, *Tubularia* sp., occurs near Swordfish Island. This species has been found in only two locations: here and in Norway. In the waters at Swordfish Island it grows in association with colonial ascidians and is as large as 15 cm in height. Pearson College students, observing this species over the last twenty years report that is has very limited distribution, with no more than one or two polyps appearing at any one time.

This area also contains populations of the soft pink coral, *Gersemia rubifromis,* at unusually shallow depths.

Church Island

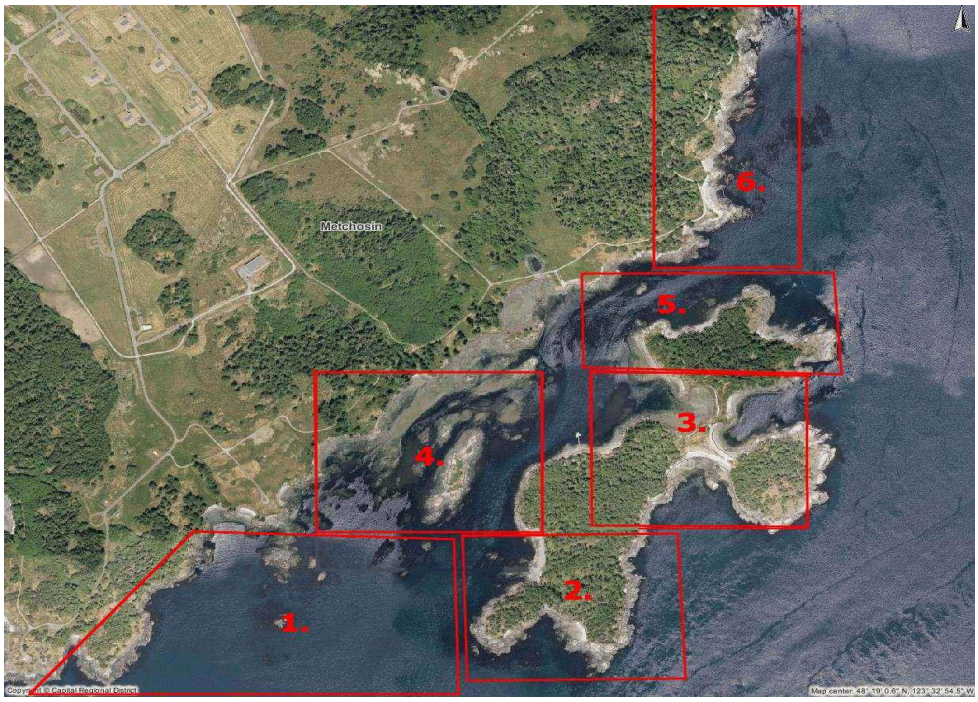
A large patch of the rare blue-listed seaside plant, *Romanzoffia tracyi,* (Tracy's mist maiden) sits on the north facing ridge at the top.

Eco Notes

This area is an example of the semi-exposed outer coast ecosystems. It has a relatively unsettled climate due to the influence of the outer coast climatic patterns and frequent southwesterly gales. The shoreline is exposed and experiences pronounced and continuous wave swells and tide surge due to the extended fetch across Juan de Fuca Strait.

The vegetation on the islands is considerably influenced by salt spray, resulting in flag-form and stunted vegetation, including mature trees of Gary Oak and Douglas-fir which grow uphill close to the ground for several metres.

Zone 2 Rocky Point and Bentinck Island



Important Areas of Zone 2 shown on the above map

Area 1: South entrance to Eemdyk Pass
Area 2: South Bentinck Island
Area3: Central bays and east wing of Bentinck Island
Area 4: Central Island in Eemdyk Passage
Area 5: North Bentinck Island
Area 6: Rocky Point shoreline between Cape Calver and Edye Point

Ecosystems represented	Importance (these overlap)
Steep nearshore topography	Good zonation of intertidal habitats; marine mammals (killer whales, porpoises and other whales)
Shoals and reefs	Rich subtidal flora and fauna; kelp forests (and over 30 species of macroalgae), marine mammals (harbor seal, sea lions)
Shingle beaches	Waterfowl and seabirds; otters, mink
Strong ocean currents; high current channels	Specialized invertebrates
Rocky shore tide pools	Variety of invertebrates; birds

Rocky salt-sprayed headlands	Populations of mist maiden, *Romanzoffia tracyi*, and highly coloured crustose lichens
Shallow high current velocity (Areas 2 & 4)	Specialized subtidal ecosystems
Protected Bays	Winter feeding grounds for seabirds; harbor seals

Comments

Sports fishery is closed due to Rockfish Conservation
Area 5 has historic burial cairns

Eco Notes

This marine area is an example of a "transition coast" with a variable climate pattern, frequent fogs and unsettled weather. The shoreline is exposed and experiences pronounced wave action and tide surge.

Offshore areas are subject to strong current and tide action; tide range approximates 1.86m (6.1 feet) but may reach 3.02m (9.9 feet); tide occurrence is similar to inner coast; 7˚C to 9˚C surface water temperature; water subject to constant mixing; whirlpools common in passages; variable water clarity (seasonal); mean salinity approximates 31 parts /1000 yearly; steep forested shoreline topography; rugged intertidal zone; offshore islands and islets occur throughout the area.

Currents are of relatively minor importance in influencing the local distribution of intertidal organisms. It matters little whether the currents are strong or weak so long as food and nutrients are supplied, and reproductive stages are dispersed to colonize or replenish distant as well as nearby areas. In subtidal situations, however, the magnitude of the current does have a marked influence upon the biotic communities. Certain species assemblages are found only where high-velocity currents occur, whereas other forms are characteristic of quiet, sheltered waters. Many of these areas show the species characteristic of moderate to high-velocity areas.

Zone 1 Race Rocks Ecological Reserve

This Ecological Reserve serves as a fish and invertebrate nursery which helps to provide species diversity to the nearby Metchosin Coastline.

Ecosystems represented	Importance (these overlap)
Strong ocean currents	Huge biodiversity of the community of organisms that live on, in or near the seabed; surf grass, *Phyllospadix scouleri* habitat
Shoals and reefs	Kelp forests (seasonal); seabird feeding
Rocky islands	Marine mammal feeding and resting area, (harbour seals, sea lions, elephant seals); birthing colonies for elephant seals and harbour seals; nesting areas for four species of seabirds
Current upwelling around the islands	Provides nutrients for high species diversity
Abundant subtidal flora and fauna community assemblages	High biodiversity values with several rare species, and a source of food for many fish, birds and mammals including killer whales and other cetaceans, seals, sealions, elephant seals

Comments

All areas subtidal to 40 metres is a rockfish conservation area (see below)
Area 4 and 5 - Elephant seal and harbour seal pupping
Area 5 - Black oystercatcher, Pigeon guillemot and Glaucous-winged gull nesting area
Area 5 - *Romanzoffia tracyi*, a rare plant (on the Blue list) often referred to as mist maiden. (http://www.racerocks.com/racerock/eco/taxalab/genevieve.htm)
Area 5 – an important wintering habitat for many species of marine seabirds and an important stopover for migrant birds.
Area 5 - historic lighthouse built in 1860 and also First Nations Burial Cairns

The Race Rocks website (http://www.racerocks.com/) has a large collection of historical and current information as well as documentation of its role as an Ecological Reserve, with photo and video galleries. A log is kept of significant events in the area.

For information on the Ecosystems see:
http://www.racerocks.com/racerock/eco/ecosystem.htm
This includes a list of animal and plant species recorded at Race Rocks as either residents or transients. The list is currently at 332 species, 87 of those being vertebrates. This is an incredible number of species in a very small area.

The ocean environment in the area of Race Passage has also been recognized as an important habitat for the regeneration of Rockfish stock leading to the creation of a DFO rockfish conservation area where all fishing is prohibited.
http://www.pac.dfo-mpo.gc.ca/fm-gp/maps-cartes/rca-acs/rca-acs/south-sud/BentinckRaceRocksChart3461-eng.htm

Eco Notes

At Race Rocks, the other marine flowering plant, the Surf Grass, *Phyllospadix scouleri*, is found. This is largely because of the different environmental factors: eelgrass prefers shallow sandy-bottomed inlets with some current as it cannot withstand the pounding surf of the rocky coast.

The islands now have the world's most northerly breeding colony of the northern elephant seal, *Mirounga angustirostris*.