Medicine Beach (E,HO,)
Nature Sanctuary
Management Plan
Pender Island

Prepared for

ISLANDS TRUST FUND

Prepared By:
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i. Executive Summary

The Medicine Beach Nature Sanctuary is located at the head of Bedwell Harbour on North Pender Island. The Sanctuary is 8.44 ha (20.12 acres) in size and includes a 2 ha (5 acre) brackish marsh and 201 metres (660 feet) of ocean shoreline with spectacular views. The remainder of the lot includes maturing Douglas-fir, Arbutus and Western Redcedar trees and a Red Alder swamp.

Medicine Beach, known as E,HO, to the W̱SÁNEĆ First Nations, has a long history of use by First Nations and was the historical location of a summer village site of the W̱SÁNEĆ people. There is an extensive archaeological midden that stretches along the shoreline. The beach front is one of the largest undeveloped beaches remaining on North Pender Island and has been used for many years by residents and visitors for recreation. There are hiking trails throughout the northern portion of the property.

The Pender Islands Conservancy Association (PICA) raised funds for the acquisition of Medicine Beach Nature Sanctuary and the land was transferred to the Trust Fund Board (TFB) by PICA in 1995. The Islands Trust Fund and the Pender Islands Conservancy Association work in partnership to manage and protect, in perpetuity, the marsh, upland forests, coastal bluffs and beach. A conservation covenant held by the Nature Conservancy of Canada and Habitat Acquisition Trust was registered on the property in 2000, adding an extra layer of protection.

There are ten red and blue Provincially listed ecological communities that have been identified on the property and the tidal marsh (S1- red) is of special significance because these ecosystems are extremely rare on the Gulf Islands. There are 11 red and blue Provincially listed species that have been noted on the property including five birds, one bat, one dragonfly and four plants. The Sanctuary is home to many other mammals including eight bat species and the sandy beach is important spawning area for Surf Smelt.

Threats to the property include a lack of protection to the upper watershed that provides freshwater to the marsh, and possible limits to tidal flow which maintain the brackish conditions of the marsh. Protection and survival of Henderson's Checker-mallow is of concern and invasive species are present though have been kept in check by ongoing removal by PICA. Erosion to the midden may damage the archaeological site and impact the hydrology of the marsh. The high level of public use may impact the Sanctuary by allowing dogs to disturb nesting birds, use under the license for commercial hauling on the beach would impact forage fish spawning, and human impacts from camping and associated risk of wildfire, tree harvesting, litter and excessive noise.

The Sanctuary will continue to be open to the public for hiking, use of the beach and nature appreciation. Trails and built structures including stairs, benches, fences and signs will

require ongoing maintenance to ensure public safety. Further monitoring is recommended for three of the rare plant species to confirm their presence and determine trends over time. Monitoring is recommended to determine if ecological restoration activities are required including assessment of erosion on the old logging road, to determine if the berm/archaeological midden are eroding and to determine if tidal flow is sufficient to maintain the ecological community of the marsh.

In cooperation with the PICA, invasive species removal should continue since the control efforts to date have been highly successful. Removal efforts should include Yellow Flag Iris in the marsh and Cotoneaster (next to stone block with plaque) since both these species are present in small numbers and are currently easily controlled. A volunteer warden program would be useful to conduct regular monitoring of the property and provide early detection of management concerns such as trespassing, tree cutting, camping, new invasive plant introductions, dogs off leash and other issues.

ii. Tables and Lists

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Acknowledgements

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1.0 Introduction

The Medicine Beach Nature Sanctuary is 8.44 ha (20.12 acres) in size and includes a 2 ha (5 acre) brackish marsh which is extremely rare on the Gulf Islands. Located at the head of Bedwell Harbour, the property includes 201 metres (660 feet) of beach front with spectacular views. The ocean frontage north of the Schooner Road is a bluff 23 m (75 ft) high and 76 m (250 ft) long whereas the ocean frontage south of the road is a low bank berm 115 m (377 ft) long that separates the marsh from the ocean. The remainder of the lot includes maturing Douglas-fir and Arbutus and Western Redcedar trees. The beach front is one of the largest undeveloped beaches remaining on North Pender Island and has been used for many years by residents and visitors for recreational purposes (PICA 2006).

Medicine Beach, known as E,HO, to the W̱SÁNEĆ First Nations, has a long history of use by First Nations and was the location of a summer village site of the W̱SÁNEĆ people. There is an extensive archaeological midden that stretches across the top of the beach and has been designated as a protected site under the *Heritage Conservation Act* (Archaeology Branch 1974).

The Pender Islands Conservancy Association (PICA) raised funds totaling $533,997 for the acquisition of Medicine Beach Nature Sanctuary and the land was transferred to the Trust Fund Board by PICA in 1995 (PICA 2006). PICA remains committed to the long term management of the Nature Sanctuary and works in partnership and under contract to the Islands Trust Fund to carry out management activities in accordance with the Management Plan. A conservation covenant held by the Nature Conservancy of Canada and Habitat Acquisition Trust was registered on the property in 2000, adding an extra layer of protection.

The Management Plan for the Medicine Beach Nature Sanctuary was first developed in 1997 by the PICA and was revised in 2006 by the Trust Fund Board in consultation with PICA and again in 2018.

1.1 Islands Trust Fund (ITF) and the Trust Fund Board (TFB)

In 1974 the Province of British Columbia recognized the islands between Vancouver Island and the mainland as a special place within the province where the unique beauty, rural character and diverse ecosystems should be protected for future generations. Through the *Islands Trust Act*, the province established the Islands Trust, a local government, with the following mandate (known as the Object of the Islands Trust):

> "*To preserve and protect the trust area and its unique amenities and environment for the benefit of the residents of the trust area and of British Columbia generally, in cooperation with municipalities, regional districts, improvement districts, other persons and organizations and the government of British Columbia"* (Islands Trust 2018a).

In 1990, through the enactment of a section of *Islands Trust Act*, the ITF was established as a conservation land trust to assist in carrying out the "preserve and protect" mandate. Part 6

of the *Islands Trust Act* establishes the corporate status, responsibilities, and governance structure of the TFB. The TFB is one of sixteen corporate entities[1] charged to uphold the Object of the Islands Trust. It is responsible for the actions of the ITF and since 1990 has protected over 1,184 hectares (2,926 acres) of land as nature reserves, nature sanctuaries and conservation covenants.

The vision of the ITF is that the islands and waters of the Strait of Georgia and Howe Sound will be a vibrant tapestry of culture and ecology where humans live and work in harmony with the natural world. This special place will have a network of protected areas that preserve in perpetuity the native species and natural systems of the islands. Engaged residents and conservation partners will work together to protect large natural areas and key wildlife habitat. Viable ecosystems will flourish alongside healthy island communities.

The mission of the ITF is to protect special places by encouraging, undertaking and assisting in voluntary conservation initiatives within the Islands Trust Area. ITF Nature Reserves are managed to maintain, preserve and protect the natural features and values of ecosystems. This level of protection is similar to the International Union for Conservation of Nature (IUCN) protected area Category 1B: Wilderness area:

> "*large area of unmodified or slightly modified land and/or sea; retaining its natural character and influence, without permanent or significant habitation, which is protected and managed in order to preserve its natural condition"* (Lockwood 2006).

1.2 Purpose of Islands Trust Fund Management Plans

The ITF management plans provide background information and set out the direction of property management as follows:

- Provide general and descriptive information on the property, including location, history, and land use;
- Set out the conservation goals and objectives for the property;
- Identify the property's ecological and/or cultural values and features;
- Describe the management issues associated with the property; and,
- Provide short, medium and long-term management recommendations (action items or tasks) on issues such as: Species at Risk protection; ecological restoration; public access; educational and research opportunities; invasive species management; and signage needs.

Once the management plan process is complete, the ITF will work to carry out the management actions or strategies identified in the plan, as resources allow. Following general practice and as outlined in the conservation covenant and statutory right of way, the ITF will revise the Management Plan every ten years.

[1] The Corporate entities charged to uphold the Object of the Islands Trust include the Trust Council, the Executive Committee, thirteen local trust committees, the TFB.

1.3 Protected Area Purpose

The purpose of Medicine Beach (E,HO,) Nature Sanctuary is to protect, in perpetuity, the brackish marsh, upland forest, coastal bluffs and beach for the benefit of the flora and fauna of the Sanctuary, and to allow for low impact recreation and nature appreciation opportunities for visitors to the Sanctuary.

1.4 Protected Area Objectives

The objectives for the Medicine Beach (E,HO,) Nature Sanctuary are:

1. Preserve the Medicine Beach marsh and adjacent forested areas as an undisturbed natural area and wildlife sanctuary;
2. Protect the distinct ecological communities and the species at risk that depend on them;
3. Protect the archaeologically and culturally significant feature of the berm/midden;
4. Protect and, where necessary and feasible, restore the plant and animal communities and ecological processes at the site;
5. Provide low impact public access in areas where such uses are compatible with protection of ecological and archeological values;
6. Support ongoing inventory, mapping and monitoring to guide management provided it does not interfere with Species at Risk protection; and,
7. Allow the natural ecological processes and functions to proceed unimpeded without human intervention, except in the case of wildfire or other exceptional situations where remediation is considered imperative.

2.0 Property Information

The Medicine Beach (E,HO,) Nature Sanctuary is 8.44 ha (20.12 acres) in size and includes 201 m (660 ft) of ocean shoreline. The property boundary only extends down to the high-tide line.

2.1 Location

Medicine Beach (E,HO,) is found along the southern shoreline of North Pender Island. From the Otter Bay Ferry Terminal take Otter Bay Road. Turn right on Bedwell Harbour Road which will become Canal Road and later Aldridge Road (approx. 8 km). Before the road curves sharply to the right to become Schooner Way, turn left, and bear left to the parking area at the beach.

The area can also be accessed via a hiking trail from Aldridge Road.

2.2 Legal Description

Parcel Identifier No. (PID): 004-014-171.
The Medicine Beach (E,HO,) Nature Sanctuary is described in the land registry as: Lot 1, Section 7, North Pender Island, Cowichan District, Plan 16534.

2.3 Legal Access

Legal access to the property is by Schooner Way, a public road which bisects the property, north of the marsh.

2.4 Local and Regional Context

Medicine Beach (E,HO,) Nature Sanctuary is in an area of residential lots with lot sizes ranging from 6.5 ha (16 acres) to 0.7 ha (1.7acres). The southeastern boundary is the ocean at Bedwell Harbour and the west side of the property borders Aldridge and Wallace Roads. Privately managed property is on the north and south borders (Figure 1).

It is one of several small protected areas on North Pender Island. The closest protected parcel is Prior Centennial Park (Gulf Islands National Park Reserve) which is 180m to the northwest. Pender Canal (Gulf Islands National Park Reserve) is 600m to the east and Oak Bluffs Park is 1 km to the south. Mount Norman and Beaumont (Gulf Islands National Park Reserve) is a large protected area on South Pender is just over 1 km southeast across Bedwell Harbour. There is also a Rockfish Conservation Area between North and South Pender to the southeast of the Sanctuary.

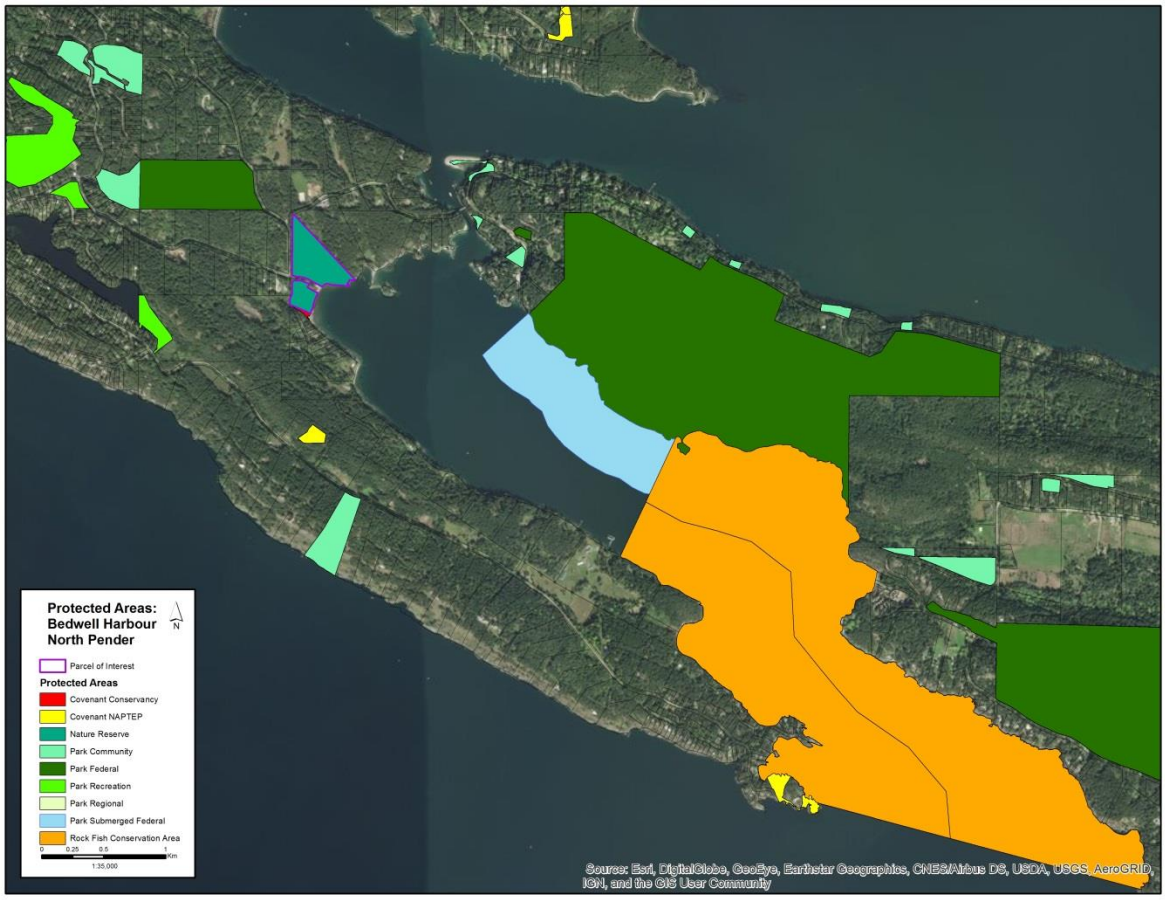

Figure 1. Map of Protected Areas near Medicine Beach Nature Sanctuary 2018

2.5 Adjacent Land Use and Connectivity

The lands adjoining the Medicine Beach (E,HO,) Nature Sanctuary are zoned for a mixture of uses including rural residential (RR), rural (R), commercial (C), and community services (CS) (North Pender Island OCP 2015). The high density of properties in the area results in high use of the Sanctuary by the public.

To the south of the marsh is a Rural Residential (RR2) subdivision; Lot A, Section 7 (Plan 46157) borders the marsh. Each lot must provide its own water and sewage disposal (North Pender Island OCP 2015). PICA holds a conservation covenant on a portion of this lot to protect the most important inflow channel and the only outflow channel for the marsh (Boffey pers. comm. 2017).

The parcel to the west (Lot 40, Section 7) is a 60-acre parcel which extends to the south end of Magic Lake with frontage on Pirates Road as well as Wallace Road. It is zoned Rural and may be subdivided into six 10-acre lots. Under the North Pender Island Official Community Plan Bylaw 171, this lot has been mapped under Schedule D: Land Potentially Subject to Park Dedication (North Pender OCP 2007). At the time of subdivision, the owner must provide parkland in an amount not exceeding 5% of the land proposed for subdivision, if more than 3 additional lots are created (North Pender Island OCP 2007).

At the corner of Schooner Way and Aldridge Road (Lot 6 Section 7 Plan 1695) is a property zoned Commercial 1, which is currently home to three businesses. The north corner of the Sanctuary is next to a lot zoned Community Service with frontage along Canal Road. The remainder of the lots adjacent to the Sanctuary are zoned Rural (North Pender Island OCP 2015).

2.6 Site History

2.6.1 First Nation Use

Medicine Beach (E,HO,) was the location of a summer village site of the W̱SÁNEĆ people. The W̱SÁNEĆ First Nations are Straits Salish People also known as the “saltwater people” and consist of the Tsartlip, Tsawout, Tseycum and Pauquachin First Nations. The Straits Salish First Nations extend beyond present-day British Columbia south of the international border into the states of Washington and Oregon.

North Pender Island, known as S,DÁYES, in the SENĆOŦEN language, was a location for summer fishing, spiritual renewal and food and medicinal plant collecting. In addition, plant materials were collected for clothing, cooking utensils, manufacturing of tools and other important functions in this hunter-gatherer society. Bedwell Harbour was the location of a reef-net fishery, a traditional form of fishing presently undergoing a revival throughout BC (Elliot pers. comm. 2016).

Evidence found following archaeological excavations at the canal site between North and South Pender Islands estimates that indigenous people have had a presence on the Pender Islands for more than 5,100 years (Carlson & Hobler, 1993).

A shell midden which stretches across the top of the beach is designated as a protected site (Site no. DeRT-15) under the *Heritage Conservation Act* (Archaeology Branch 1974). When the site was surveyed in 1974, the shell midden spit measured 190 m x 10 m and the deposit was at least 1 meter deep. The survey did not include test pits or excavation (Archaeology Branch 1974). Archaeological potential modelling indicates there are other areas on the property with high potential to contain unknown/unrecorded archaeological materials (Archaeology Branch 2017).

Studies of shell middens in the Gulf Islands suggest that some middens were formed to create a lagoon to trap and net fish as a food resource. Some of these lagoons may have developed into spawning grounds for salmon (PICA 2006).

The name Medicine Beach is thought to denote the area as a medicinal herb gathering site. It may, however, refer to Medicine Beach as a place of spiritual healing (PICA 2006).

2.6.2 Post Contact Use[2]

European settlement on Pender Islands is believed to have started with sheep farmers as early as 1877. The area was pre-empted from the Crown in 1898. Logging took place in the area until 1910. Two early families, the Adams and the Mumfords, may have used the area for grazing sheep and cattle. The Medicine Beach (E,HO,) property was held by the Atkins family from 1970–1995 and was used as a seasonal retreat (PICA 2006).

The property was purchased from the Atkins family by the Pender Islands Conservancy Association (PICA) in May 1995 and was transferred later that year to the Trust Fund Board. PICA raised a total of $533,997 for this acquisition. Of this amount, the Pender Island community contributed $267,000; the Atkins family (former owners of the property) donated $127,000; the Habitat Conservation Fund of the BC Ministry of the Environment contributed $70,000; Wildlife Habitat Canada contributed $50,000; Nature Conservancy of Canada contributed $10,000; and the Capital Regional District contributed $10,000. The total purchase cost was $477,000. The remaining funds held by PICA were put into a management account for the property (PICA 2006).

In 1996, an old cabin was removed from the property (NCC 2005a).

In 1998, PICA worked with the ITF to manage the Sanctuary based on the Management Plan which was approved by the TFB in 1997. A conservation covenant held by the Nature

[2] The Trust Fund Board recognizes that the language commonly used to refer to land may be disrespectful to First Nations. For example, notions of 'private' and 'Crown' land do not appropriately recognize aboriginal title and imply a belief in the concept of terra nullius, the idea that land was not owned prior to the assertion of European sovereignty. The Trust Fund Board acknowledges that terra nullius is a concept that doesn't apply to the Islands Trust Area. The words "provincially-managed land or federally managed land" will be used in place of "Crown". "Privately managed" will be used in place of "private" and "land holder/steward" instead of "land owner".

Conservancy of Canada and Habitat Acquisition Trust was registered on the property in 2000.

In 2002, a public meeting was held on North Pender Island to assess residents' interest in transferring the Medicine Beach (E,HO,) Nature Sanctuary to the new Gulf Islands National Park. A split vote by the public resulted in the following resolution by the Board:

> **"Resolution #TFB 02/373.** It was MOVED and SECONDED that the Board will not transfer the Medicine Beach Nature Sanctuary on Pender Island to Parks Canada. If, once the management plan for the Gulf Islands National Park Sanctuary is completed, Parks Canada submits a new conservation proposal then the Board is willing to reassess this position" (PICA 2006).

In 2002, a gate and a sign attached to the gate were installed on the trail next to Aldridge Road to prevent vehicles in the Nature Sanctuary. In 2004, a trail improvement plan was developed and implemented by the PICA. PICA installed stairs, a bench and railings on the high bank foreshore north of the road. The trail was resurfaced with gravels in 2004 (NCC 2005a). In 2004, a wire and t-post fence was erected to protect the provincially rare plant called Henderson's checker-mallow (*Sidalcea hendersonii*) from the deer population (NCC 2005b). The fence has since collapsed.

In 2007, two homes were barged on to the beach and there were concerns at this time due to evidence of oil discharged on to the road near the stream running on the side of the road and possible contamination to the marsh. There was disturbance to the beach and the logs on the beach were moved and piled to one side to accommodate the steel ramps and large flatbed trucks. Permits can be obtained from the Ministry of Transportation and Infrastructure to use Schooner Way to access the beach.

2.7 Undersurface Rights

Undersurface rights for Medicine Beach Nature Sanctuary are currently held in favour of Her Majesty the Queen in Right of the Province of British Columbia.

2.8 Notations, Charges, Liens and Interests

A Section 219 Covenant and Section 218 Statutory Right of Way (EP081049, EP081052) were registered on the land July 31, 2000 in favour of the Nature Conservancy of Canada and the Habitat Acquisition Trust. The general intent of the Agreement is to:

1) protect, preserve, conserve, maintain, enhance or restore the Land and the Amenities, in a natural state; and
2) to prevent any occupation or use of the Land that will impair or interfere with the natural state of the Land or the Amenities;
3) to preserve the land as a nature reserve in perpetuity.

2.9 Local Planning Designations

In the North Pender Official Community Plan Bylaw No. 171, 2007 (Consolidated: June 1, 2017) Schedule B the Medicine Beach (E,HO,) Nature Sanctuary is zoned Conservation (CO) . The North Pender Island Local Trust Committee Land Use Bylaw No. 103, 1996 (Consolidated: March 1, 2018) designates the Sanctuary as an Ecological (ECO) Zone which does not allow subdivision and prohibits all buildings and structures.

The foreshore is designated "M" in the Official Community Plan (OCP) which is the general marine zone and is currently classified as Water 1 (W1) Zone in the North Pender Island Local Trust Committee Land Use Bylaw No. 103, 1996 which prohibits any commercial or industrial activity or use. In 2004, the TFB asked the North Pender Local Trust Committee (LTC) to rezone the area outside the foreshore in front of the Nature Sanctuary to classify it as a "Water Conservation Zone". To date, the change in zoning has not been completed.

The ocean frontage within the Sanctuary is protected by Development Permit Area (DPA) 6 which protects intertidal sensitive ecosystems. There is a very small portion of the northeast corner of the Sanctuary that is mapped DPA 1 (Woodland) (Figure 2). A permit and adherence to DPA guidelines are required before land can be altered within the boundaries of the DPA.

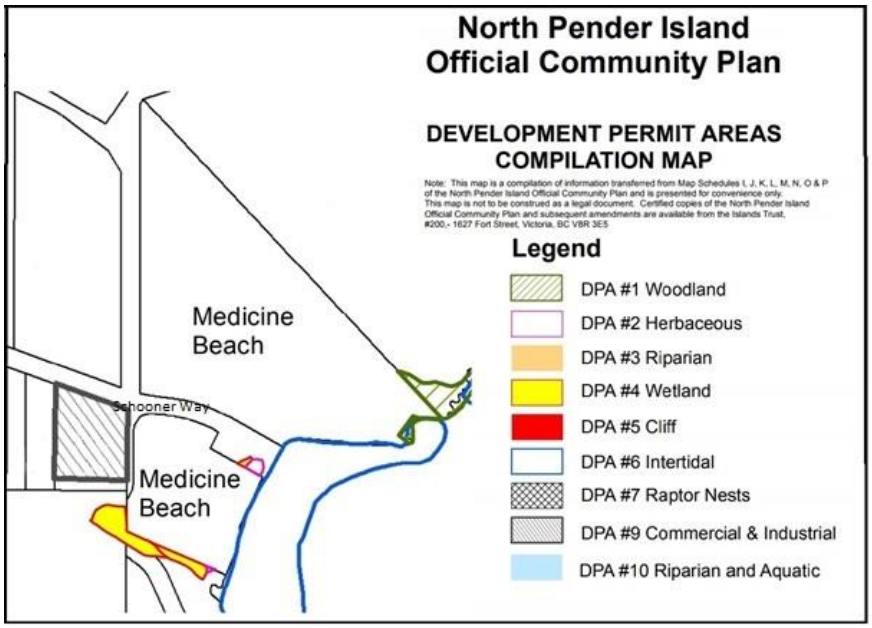

Figure 2. Map showing Development Permit Areas

A small portion of the Schooner Way right of way (which bisects the Sanctuary) is protected by DPA 4 (wetland) and DPA 2 (herbaceous) sensitive ecosystems. The property to the south of the Sanctuary is protected under both DPA4 and DPA 6 (Figure 2). The local trust committee implements the provincial Riparian Areas Regulation through the designation of DPA 10 which is not mapped in the Sanctuary (North Pender Island OCP 2007).

2.10 Existing Public Use and Anthropogenic Features

There is a well-maintained parking lot at the end of the Schooner Way next to the beach. There is a well-marked trail that leads north of the road via a stairway to the top of the bluff and from there to the Sanctuary entrance off Aldridge Road (Figure 3). The beach is used extensively by the public.

There are two benches at the top of the bluff and there is a fence along the edge of the bluff for public safety. There is also a wooden fence along the edge of the parking area to limit public access to the marsh. There is a metal gate across the old logging road at the Aldridge Road entrance to the Sanctuary to limit vehicle use (Photo 1 and Figure 3).

Photo 1. Gate and Signs at Sanctuary Entrance off Aldridge Road

Photo 2. Bench at Top of Bluff Overlooking Bedwell Harbour

Figure 3. Map of Trails and Other Features

3.0 Ecological Inventory

3.1 Ecological Significance

Medicine Beach (E,HO,) Nature Sanctuary protects a 2 ha (5 acre) brackish marsh. Tidal shoreline marshes are extremely rare on the Gulf Islands and the Medicine Beach marsh is in good condition with few invasive species (Cadrin 1994). Although the marsh is small in size, the plant community is more diverse than others of its type (Kirkby 1996). The 660 feet of beach front is a rich forage fish site (De Graaf 2013). The low beach front has an extensive midden which is protected as an archaeological site. Open rocky bluffs stretch along the remainder of the shoreline. The upland portion of the lot includes maturing Douglas-fir and Arbutus forests and there is a forested wetland in the eastern part of the property.

3.2 Climate

The Gulf Islands have a climate pattern of warm, dry summers with mild, wet winters. The maritime influence moderates the effect of elevation, latitude, and aspect on local temperature and precipitation. Annual precipitation is approximately 870 mm and most of it comes in the form of rain rather than snow (PICA 2006).

Climate Normals are not available for North Pender Island and the nearest Environment Canada weather station is on Mayne Island which is 10 km from Medicine Beach Nature Sanctuary (Environment Canada 2018). On Mayne, average daily temperatures peak in the summer months (July and August) at 17°C and are lowest in the winter at 4°C. The reverse is true for precipitation with the winter months from November to January having the highest rainfall (averaging 120-130 mm) and with July and August being the driest months (22-28 mm) (Environment Canada 2018).

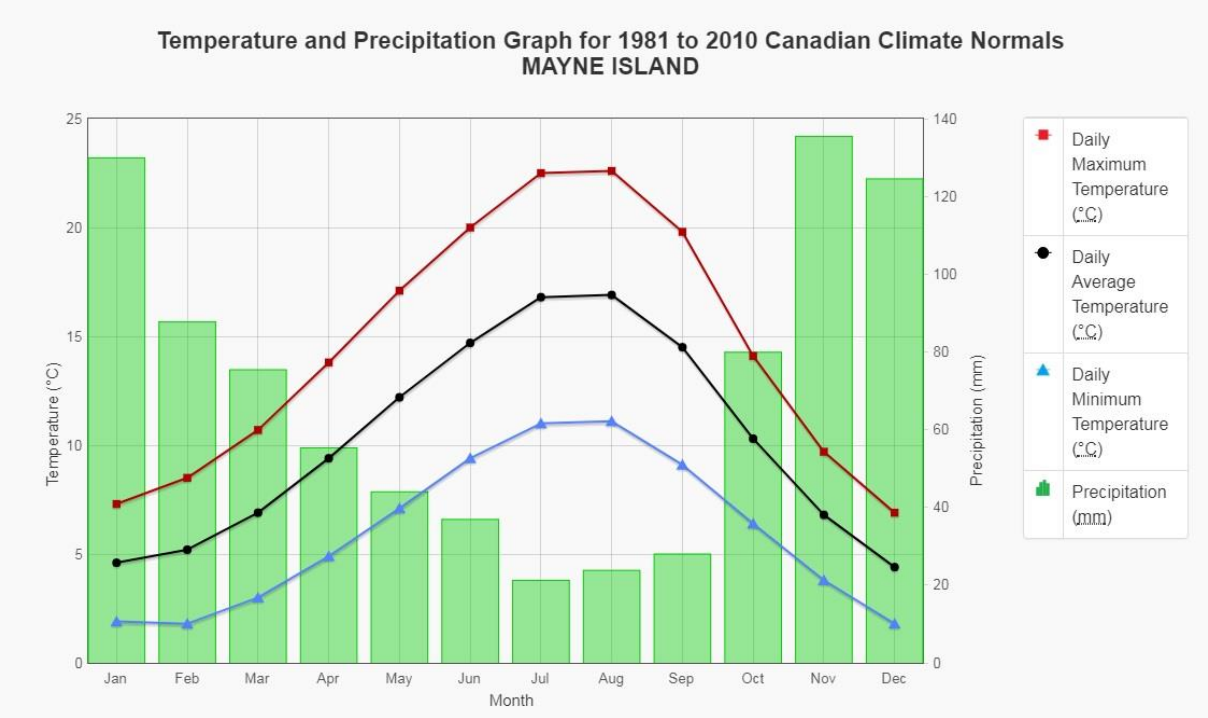

Figure 4. Temperature and Precipitation of Canadian Climate Normals

The future impacts from climate change are unknown although a summer drying trend and an increase of storm events are predicted. More powerful storms may cause increasing erosion along the shoreline and may alter the salinity of the brackish marsh, either by increasing the tidal surges or by increasing freshwater accumulation from higher than normal precipitation events. Dryer summers will impact the inland wetlands and may shift the vegetation community away from Western Redcedar, allowing the spread of Douglas-fir and Arbutus.

3.3 Geology and Physiography

North Pender Island is in the Nanaimo Lowland subdivision of the Georgia Depression physiographic unit of British Columbia (Kenney *et al.* 1988).

The Medicine Beach (E,HO,) property is roughly triangular with the base of the triangle along the shoreline. Elevation increases rapidly from sea-level to 100 meters in the upland forest area in the northern portion of the property. The marsh lies in the southwest corner. A bluff rises steeply along the northern edge of the beach front (PICA 2006).

The bedrock geology of Medicine Beach is described by Ostrinsky et al (1995 in PICA 2006) as three formations of the Cretaceous age Nanaimo Group. These formations include in ascending order: Protection (mid Campanian; 80 million years), Cedar District, and De Courcy (late Campanian state; 75 Ma). The Protection Formation comprises thin to thick bedded, medium to coarse grained sandstone with subordinate amounts of siltstone, shale, and coal. It outcrops along the ridge to the south of Medicine Beach. The Cedar District Formation, which underlies the Medicine Beach area, includes thin bedded silty shale and siltstone with minor amounts of fine grained sandstone. These sediments were deposited in a relatively deep marine setting, the bottom of which has been estimated at 200–600 meters water depth. The De Courcy Formation is composed of mostly thick bedded, medium to very coarse-grained sandstone and occasional conglomerate, consisting of chunky rocks within a finer matrix, and outcrops on the ridge to the north of Medicine Beach (Otrinsky 1995 in PICA 2006).

Topography and thus drainage are largely controlled by the bedrock geology. No major faults occur in the study area (although there are two elsewhere in the island.) The very fine grain material (clastics) of the Cedar District Formation eroded more easily leaving the valley occupied by Bedwell Harbour and the Medicine Beach area. This fine siliclastic also restricts groundwater flow and may impact the location and maintenance of the tidal marsh. The coarse-grained Protection and De Courcy formations represent the major aquifers in the area. Contacts between these formations and the Cedar District Formation may represent particularly good conduits for water flow. The steep generally easterly dip of the beds directs flow. The steep dip affects the marshy area and makes it susceptible to drying if discharge into the marsh is significantly reduced (PICA 2006).

3.4 Hydrology

Medicine Beach Marsh is fed by three main watercourses with associated watershed areas. The total watershed area was estimated from cadastral scale plans as 120 ha (Reimer and Grange 1995). The marsh has a salinity of 5-20 parts per thousand. Saltwater enters the marsh through a channel at the southern part of the marsh and through percolation through the berm (Kirkby 1996). Freshwater enters the marsh from the north and west slopes above the marsh (Kirkby 1996).

The first watershed (A) has an estimated area of 31 ha. It includes the area between Schooner Way and Magic Lake to the west and extends to the south approximately 1/3 of

the length of Wallace Road. The watershed is well treed generally and shows a low level of disturbance and there is a large (1ha) wetland. The stream is in a very natural state, with spring-fed flows persisting through the summer months. Flow was measured at +/- 3000 litres/day and the stream enters the marsh through a culvert (Reimer and Grange 1995).

The second watershed (B) lies to the north of the first, extending as far as Lively Peak in Magic Lake subdivision. It has an estimated area of 42 ha and includes a small part of Prior Park. The area contains developed lands, and ongoing land clearing and construction. There are over 20 residential lots in this watershed. This water course passes under Schooner Way and parallels the road to the marsh, where it crosses Wallace Road via culvert to enter the marsh. The stream is ephemeral (Reimer and Grange 1995).

The third watershed (C) has an estimated area of 47 ha and includes most of Prior Provincial Park. There is a large wetland (2ha) near Canal Road and the elementary school but it was unclear what proportion of the wetland flows into the marsh. This water course passes through a culvert under the school grounds and under Canal Road before passing through the upland forested area of the Nature Sanctuary and entering the marsh through a culvert under the public access road is ephemeral (Reimer and Grange 1995).

Drainage of the cliff face is moderately well to imperfect with some water trapped at the lower slope between exposed layers of mudstone. There is no apparent seepage (Kronen n.d.).

3.5 Soils

There is a diverse mix of soils at Medicine Beach Nature Sanctuary with 7 soil map units (Kenney *et al.* 1988). The brackish marsh is composed primarily of Metchosin soils which are well decomposed, organic deposits greater than 160cm deep. The soils are poorly drained and are found at a slight depression which is below sea level at high tide (Kenney *et al.* 1988).

The cliffs north of Schooner Road are mapped as Pender Island soils which are composed of channery and gravelly sandy loam, colluvial and glacial drift materials less than 100 cm deep over sandstone or conglomerate bedrock (Kenney *et al.* 1988). They are well drained and the cliffs at Medicine Beach are a convex irregular slope with an angle of 47 degrees (Kronen n.d.). The overburden is colluvial and is composed of very fine silt, sand and clay mixed with angular pebble and cobble sized blocks of mudstone (Kronen n.d.). The mudstone bedrock is a soft sedimentary rock that is cemented in thin layers by siltstone or sandstone (Kronen n.d.). The mudstone layers are angled to the direction of the slope. There does not appear to be any evidence of undercutting of the slope by wave action but there is evidence of a former debris avalanche on the bluff (Kronen n.d.).

On both sides of Schooner Road beside the ocean and further upland above the cliff face in the northern part of the Sanctuary are gradually sloping, poorly drained Parksville-Tolmie soils which are sandy loam to loamy sand marine or fluvial deposits, 30-100cm deep over

silty clay loam to silty clay marine deposits. These soils support the forested wetland in the northern part of the Sanctuary (Kenney *et al.* 1988).

Along Aldridge road is Haslam soils which are channery and shaly sandy loam to loam colluvial, residual and glacial drift materials less than 100cm deep. These soils are well drained (Kenney *et al.* 1988).

There are also small areas with Beddis soils (sandy loam to sand fluvial, marin or eolian deposits more than 150 cm deep), Galiano soils (shaly loam colluvial, residual and glacial drift less than 100cm deep) and Tolmie (loam to silty clay marine deposits more than 100cm deep) in the Sanctuary along Aldridge Road south of Schooner Road (Kenney *et al.* 1988).

3.6 Ecological Classifications

Medicine Beach Nature Sanctuary is within the Coastal Douglas-fir Biogeoclimatic Zone in the moist maritime subzone (CDFmm). It is within the Pacific Maritime Ecozone and the Georgia Puget Basin Ecoregion.

3.7 Maps of the Protected Area

A map of Medicine Beach Nature Sanctuary showing the property lines, contours, trails, roads, and built structures is included in Figure 3. A map showing natural features, ecological communities, rare species and invasive species is included in Figure 5.

3.8 Ecological Communities and Site Series

An ecological inventory of biological features was conducted in the Sanctuary on July 4th and 5th, 2017 by three consulting biologists. Four site series were identified using A Field Guide for Site Identification and Interpretation for the Vancouver Forest Region (Green and Klinka, 1994) (map in Figure 2). Four wetland site associations were identified using MacKenzie and Moran (2004). Two ecological communities (Dune Wildrye/Beach Pea and Trembling Aspen/Pacific Crab Apple/ Slough Sedge) were not classified in either of these resources but are ecological communities that are listed by the BC Conservation Data Centre (2018). These site series and the corresponding ecological communities are summarized (Table 1) and described below. Complete tables with percent cover are included in Appendix A.

There have been no significant changes to the ecological communities or site series since the last Management Plan was written, other than those expected with a maturing forest.

A list of all plant species is included in Appendix B and list of bird species observed during the July 2017 survey can be found in Appendix C. Appendix D contains a list of bat species and Appendix E lists invertebrates. Locations of photopoints and other photograph locations are given in Appendix F.

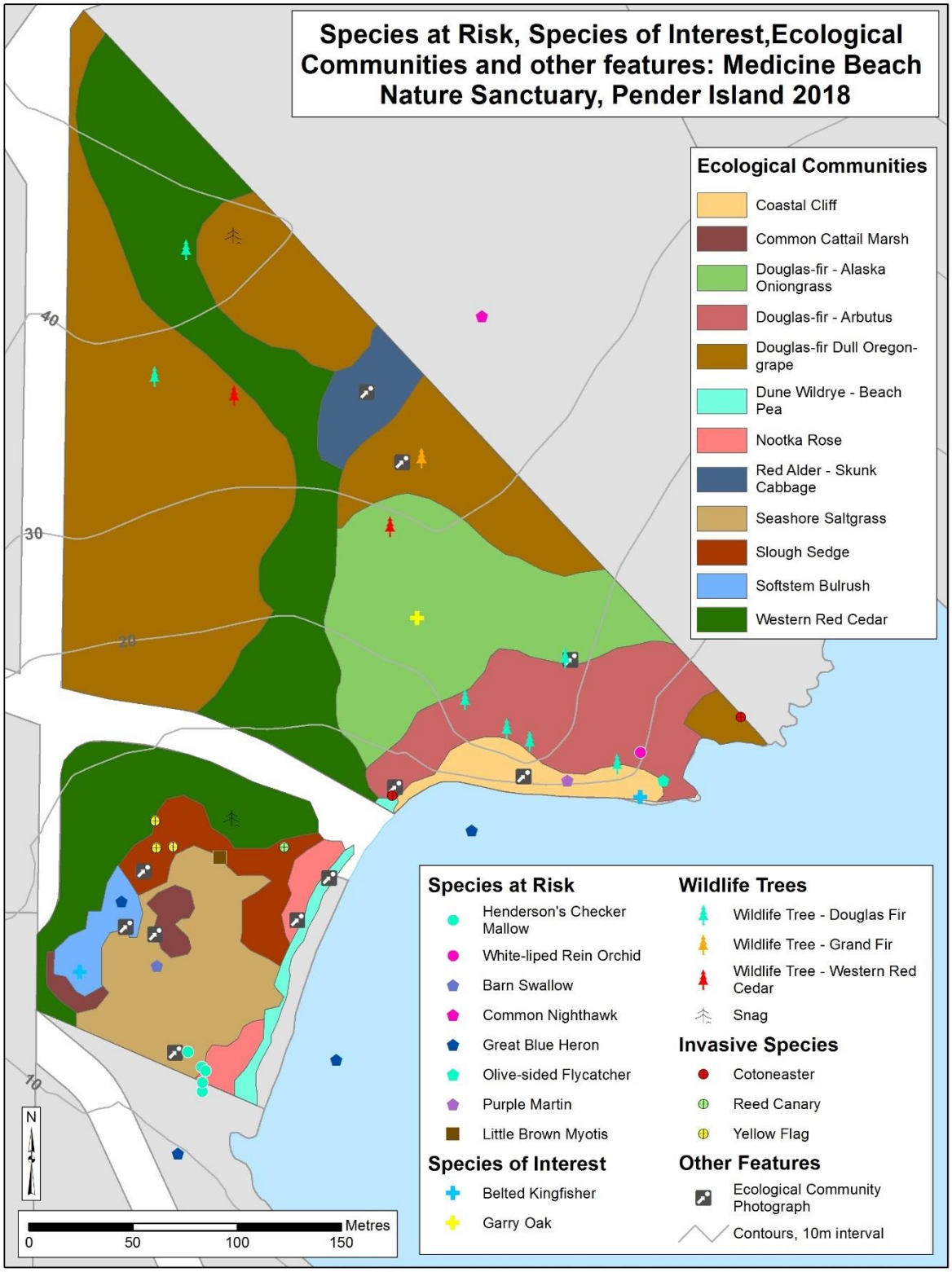

Figure 5. Map Showing Location of Ecological Communities, Species at Risk and Invasive Species

Table 1. Ecological Communities found in Medicine Beach Nature Sanctuary

Community Number	Community Name	Site Series
1	Coastal Cliff	
2	70% Douglas-fir/Arbutus 30% Douglas-fir/ Dull Oregon-grape	CDFmm/02 CDFmm/01
3	Douglas-fir/ Alaska Oniongrass	CDFmm/03
4	Douglas-fir/ Dull Oregon-grape	CDFmm/01
5	Red Alder-Skunk Cabbage	CDFmm/Ws52
6	Western Redcedar/ Douglas-fir/ Oregon Beaked Moss	CDFmm05
7	Dune Wildrye/ Beach Pea	
8	Nootka Rose berm	
9	Seashore Saltgrass herbaceous vegetation	CDFmm/Em03
10	Common Cattail marsh	
11	Hard-stemmed Bulrush deep marsh	
12	Trembling Aspen/Pacific Crab Apple/ Slough Sedge	CDFmm/ 00

3.8.1 Ecological Community 1: Coastal Cliff

Photo 3. Coastal Cliffs at Medicine Beach Nature Sanctuary

Ecological Community 1 is found in northeast portion of the Sanctuary, north of Schooner Road next to the ocean (map in Figure 2). It is dominated by a steep cliff face with thin soils and marine influence. Exposed rock/bare soil covers approximately 80% of the vegetation type. Slopes are steep, soils are shallow or non-existent except at the top of the cliff face. There are no dominant tree species due to the steep slopes, eroding soils and the influence of salt spray. The aspect is south.

3.8.2 Ecological Community 2: 70% Douglas-fir/Arbutus (CDFmm/02) (Pseudotsuga menziesii /Arbutus menziesii) Young Forest: 30% Douglas-fir/ Dull Oregon-grape (Pseudotsuga menziesii/ Berberis nervosa) Young Forest (CDFmm/01)

Photo 4. Douglas-fir/ Arbutus Ecological Community

Ecological Community 2 is found above the coastal cliffs north of the Schooner Road. It is a young forest of mixed Douglas-fir/Arbutus and Douglas-fir/Salal. Green and Klinka (1994) refer to the site series as Douglas-fir/Salal and on this site, it corresponds to the BC CDC ecological community of Douglas-fir/ Dull Oregon-grape (CDFmm/01). The terrain is sloped to the south with an open exposure because of the adjacent cliffs. The dominant trees are Douglas-fir and Arbutus and the trees are young (less than 40 years old). There is a diversity of native shrubs including a small amount of the non-native Scotch Broom. There is a mix of native and non-native forbs and grasses. Both the dominant and secondary ecological communities are red-listed by the BC Conservation Data Centre (BC CDC 2018).

3.8.3 Ecological Community 3: Douglas-fir/ Alaska Oniongrass (Pseudotsuga menziesii/ Melica subulata) ***(CDFmm/03)***

Photo 5. Douglas-fir/ Alaska Oniongrass Ecological Community

Ecological Community 3 is found north of Schooner road in the northeastern portion of the Sanctuary. There is a young forest of Douglas fir with small amounts of Western Redcedar. The terrain is gently sloping (15 °) with a south facing aspect (200°). There is a diverse understory with many native shrubs and a small amount of the non-native Evergreen Spurge-laurel. There is a rich layer of forbs and grasses which includes Alaska Oniongrass and a range of mosses.

3.8.4 Ecological Community 4: Douglas-fir/ Dull Oregon-grape (Pseudotsuga menziesii/ Berberis nervosa) (CDFmm/01)

Photo 6. Douglas-fir/ Dull Oregon-grape Ecological Community

Green and Klinka (1994) refer to the site series as Douglas-fir/Salal and on this site, it corresponds to the BC CDC ecological community of Douglas-fir/ Dull Oregon-grape (CDFmm/01). It is a young forest with trees that are less than 60 years old. Douglas-fir is the dominant canopy species and there is a mix of Western Redcedar, Grand Fir and Red Alder either in the main canopy or in the secondary canopy. In areas with large numbers of Grand Fir in the understory, the vegetation will transition to Grand Fir/ Dull Oregon-grape (CDF mm/04). There is a diverse native shrub layer and the only non-native shrub noted was Evergreen Spurge-laurel. The herbaceous layer and mosses are relatively limited. The slope is predominantly gradual and overall aspect is to the south. Douglas-fir/ Dull Oregon-grape is red-listed by the BC CDC (2018).

3.8.5 Ecological Community 5: Red Alder-Skunk Cabbage (Alnus rubra/Lysichiton americanus) (CDFmm/Ws52)

Photo 7. Red Alder/ Skunk Cabbage Ecological Community

This site was classified using MacKenzie and Moran (2004). The main canopy is dominated by Red Alder with a sparse secondary canopy of Grand Fir and Western Redcedar. Dominant understory shrubs include Salmonberry, Swordfern and Salal with small amounts of the non-native Evergreen Spurge-laurel and English Holly. Slough sedge and Skunk Cabbage are present in the herb layer. The area is level to slightly depressed with small degrees of slope in other areas. This ecological community is red-listed by the BC CDC (2018).

3.8.6 Ecological Community 6: Western Redcedar/ Douglas-fir/ Oregon Beaked Moss (Thuja plicata/Pseudotsuga menziesii/Eurhynchium oreganum) (CDFmm05)

Ecological Community 6 is found primarily north of Schooner Road along the creek which feeds into the marsh. The site is moisture receiving and supports larger trees than were found in the rest of the Sanctuary. This classification was applied by Linnaeus (2005) although on the Islands Trust MapIt site, the dominant community is classified as Western Redcedar/Grand Fir/Foamflower (Islands Trust 2018b).

3.8.7 Ecological Community 7: Dune Wildrye/ Beach Pea (Leymus mollis/Lathyrus japonicus) (CDFmm)

Photo 8. Dune Wildrye/ Beach Pea Ecological Community

This ecological community is found along the low-bank berm which separates the brackish marsh from the ocean. There are no trees and very few shrubs due to the influence of salt spray. There is an extensive shell midden that forms the substrate of the ecological community and the berm. There are large amounts of driftwood both on the surface and in the substrate and the driftwood accumulation has helped to create the berm. The aspect faces southeast (110°) with little to no slope (0-5°) and the elevation is at sea level. This is a red-listed ecological community (BC CDC 2018).

3.8.8 Ecological Community 8: Nootka Rose (Rosa nutkana) Berm (not SEI)

Photo 9. Nootka Rose Dominated Berm (note Beach Wildrye in foreground)

This ecological community is found along the low-bank berm which separates the brackish marsh from the ocean, just above the Dune Wildrye-Beach Pea Community. There are no trees but there are large shrubs including Douglas Hawthorn and Pacific Crab Apple which are sparse throughout the plant community. There is a thick shrub layer, composed primarily from saltspray-tolerant Nootka Rose. The aspect faces southeast (110°) with little to no slope (0-5°) and the elevation is at sea level. This ecological community has been mapped as polygon #4819 and as not Sensitive Ecosystem Inventory (SEI) since it has been classified as shrub/herb Douglas-fir/Salal (Islands Trust 2018b). The marsh was divided into smaller areas than the SEI mapping to better track vegetation composition over time.

3.8.9 Ecological Community 9: Seashore Saltgrass (Distichlis spicata) ***Herbaceous Vegetation*** *(CDFmm/ Em03)*

Photo 10. Seashore Saltgrass Herbaceous Vegetation Ecological Community

The Seashore Saltgrass is the primary classification of the brackish marsh and there are smaller inclusions of the remaining ecological communities. There are no trees and no shrubs due to the presence of brackish water that enters the marsh at high tide. There are dense patches of Seacoast Bulrush and Spiked Rush within the community. There is no slope and the elevation is at sea level. There is a small amount of scattered driftwood on the surface. This is a red-listed ecological community (BC CDC 2018).

3.8.10 Ecological Community 10: Common Cattail (Typha latifolia) Marsh

Photo 11. Common Cattail Marsh Ecological Community

The Common Cattail Marsh is a small inclusion within the dominant vegetation of Seashore Saltgrass within the brackish marsh. The area remains saturated with water for most of the growing season. There are no trees and no shrubs due to the presence of brackish water that enters the marsh at high tide. There is no slope and the elevation is at sea level. Nutrients are high and there is a well-developed layer of decomposed organic matter at the surface. There is a small amount of standing water beside the Common Cattail where the alga Stonewort (*Chara* sp.) and Common Duckweed (*Lemna minor*) occur. The ecological community Common Cattail Marsh is blue-listed (BC CDC 2018).

*3.8.11 Ecological Community 11: Hard-stemmed Bulrush **(Schoenoplectus acutus) Deep Marsh***

Photo 12. Hard-stemmed Bulrush Deep Marsh (on right) with Seashore Saltgrass (on left) and Open Water (middle)

The Hard-stemmed Bulrush is a small inclusion within the dominant vegetation of Seashore Saltgrass within the brackish marsh and next to the Common Cattail Marsh. There are no trees and no shrubs due to the presence of brackish water that enters the marsh at high tide and plant diversity is low. There is a small amount of open water next to the Hard-stemmed Bulrush. There is no slope and the elevation is at sea level. There is a small amount of standing water next to the bulrushes. The Hard-stem Bulrush ecological community is provincially blue-listed (BC CDC 2018).

3.8.12 Ecological Community 12: Trembling Aspen/Pacific Crab Apple/ Slough Sedge (Populus tremuloides/ Malus Fusca/Carex obnupta) (CDFmm/ 00)

Photo 13. Trembling Aspen/ Pacific Crab Apple/ Slough Sedge Ecological Community

This ecological community is not described by MacKenzie and Moran (2004) although it is listed by the BC Conservation Data Centre (2018). Slough Sedge is a small inclusion within the dominant vegetation of Seashore Saltgrass within the brackish marsh. There are no trees and no shrubs due to the presence of brackish water that enters the marsh at high tide. There are shrubs and small trees along the edge of the community which include Pacific Crab Apple (*Malus fusca*), Western Redcedar (*Thuja plicata*) and Pacific Willow (*Salix lucida*). No Trembling Aspen (*Populus tremuloides*) was noted. There are small patches of invasive Yellow Flag Iris (*Iris pseudacorus*) and Reed Canarygrass (*Phalaris arundinacea*). There is no slope and the elevation is at sea level. Trembling Aspen/ Pacific Crab Apple/Slough Sedge is ranked as red-listed by the BC CDC (2018).

3.9 Vegetation Type from the ITF Sensitive Ecosystem Mapping

Sensitive Ecosystem Mapping on the Islands Trust MapIt site identifies 17 ecosystem units (Islands Trust 2018b). Ground truthing in 2017 determined that on the ground, some of the ecosystems are different from what has been previously mapped.

The coastal cliff area north of the road was mapped on MapIt as herbaceous/herbaceous with the primary unit classified as *Cladina*- Wallace's Selaginella (Polygon 4363) (Islands

Trust 2018b). Although Selaginella is present in small numbers, no *Cladina* was observed and the site is better described as a Coastal Cliff (as per MacKenzie 2002).

The ecological community Douglas-fir/Alaska Oniongrass was found north of the road in MapIt polygon #3249 which was labelled as a young forest with 70% Douglas-fir/Salal and 30% Douglas-fir/Arbutus (Islands Trust 2018b). The presence of Alaska Oniongrass is distinctive in this portion of the Sanctuary. The presence of Douglas-fir/Alaska Oniongrass community was also noted in previous studies (Linnaeus 2005).

The wetter portions of the Sanctuary, north of the road were mapped as mixed forests containing primary ecosystems of either Western Redcedar/ Grand Fir/ Foam Flower or Douglas-fir/ Grand Fir/ Oregon-grape. These were identified as Western Redcedar/ Douglas-fir/ Oregon Beaked Moss by Linnaeus (2005).

On MapIt, the marsh is mapped as 80% Seashore Saltgrass with 20% Cattail (Islands Trust 2018b). In this report, these are divided into separate ecological communities in order to track changes in their distribution over time. Hard-stemmed Bulrush and Trembling Aspen/ Pacific Crab Apple/ Slough Sedge were also components of the marsh complex.

3.10 Red and Blue Listed Communities

The following ecological communities found in Medicine Beach Nature Sanctuary have been red and blue listed by the BC Conservation Data Center (BC CDC 2018).

Table 2. Red and Blue Listed Ecological Communities in Medicine Beach Nature Sanctuary

Community Number	**Ecological Community**	**Biogeoclimatic Unit**	**Provincial Rank**
Community 2 Community 4	Douglas-fir / Dull Oregon-grape (*Pseudotsuga menziesii/Berberis nervosa*)	CDFmm/01	Red List S2 (2010)
Community 3	Douglas-fir / Alaska Oniongrass (*Pseudotsuga menziesii/Melica subulata*)	CDFmm/03	Red List S1 (2006)
Community 2	Douglas-fir / Arbutus (*Pseudotsuga menziesii/Arbutus menziesii*)	CDFmm/02	Red List S2 (2004)
Community 6	Western Redcedar /Douglas-fir Oregon Beaked Moss (Linnaeus 2005)	CDFmm/05	Red-list S1 (2013)
Community 5	Red Alder / Skunk Cabbage Swamp (*Alnus rubra-Lysichiton americanus*)	CDFmm/Ws52	Red List S2 (2010)
Community 7	Dune Wildrye/ Beach Pea (*Leymus mollis* ssp. *mollis/ Lathyrus japonicus*)	CDFmm	Red List S1S2 (2008)
Community 9	Seashore Saltgrass Herbaceous Vegetation (*Distichlis spicata* var. *spicata*)	CDFmm/Em03	Red List S1S2 (2016)
Community 10	Common Cattail (*Typha latifolia*) Marsh (small pocket within Seashore Saltgrass)	CDFmm/Wm05	Blue List S3 (2004)
Community 11	Hard-stemmed Bulrush (*Schoenoplectus acutus*) Deep Marsh (small pocket within Seashore Saltgrass)	CDFmm/Wm06	Blue List S3 (2004)

Community 12	Trembling Aspen/Pacific Crab Apple/ Slough Sedge (*Populus tremuloides/ Malus Fusca/Carex obnupta*)	CDFmm/00	Red List S1S2 (2013)

3.11 Red and Blue Listed Species

The following species at risk have been found on the Medicine Beach Nature Sanctuary. These species are listed as at risk either provincially by the BC Conservation Data Centre or federally by the Committee on the Status of Endangered Wildlife in Canada. Except where otherwise noted, these species were identified during surveys for Islands Trust Fund in 2017 (Maslovat *et al.* 2017).

Table 3. Red and Blue Listed Species Found in Medicine Beach Nature Sanctuary

Species Common Name	**Species Latin Name**	**Provincial Rank[3]**	**COSEWIC Rank[4]**	**SARA Status**
Barn Swallow	*Hirundo rustica*	Blue List S3S4B (2015)	Threatened (2011)	Schedule 1 – Threatened (2017)
Common Nighthawk	*Chordeiles minor*	Yellow List S4B (2015)	Threatened (2007)	Schedule 1 – Threatened (2010)
Great Blue Heron	*Ardea herodias fannini*	Blue List S2S3B, S4N (2009)	Special Concern (2008)	Schedule 1 – Special Concern (2010)
Olive-sided Flycatcher	*Contopus cooperi*	Blue List S3S4B (2015)	Threatened (2007)	Schedule 1 – Threatened (2010)
Purple Martin	*Progne subis*	Blue List S3B (2015)		
Little Brown Myotis	*Myotis lucifugus*	Yellow List S4 (2015)	Endangered (2013)	Schedule 1 – Endangered (2013)
Western Pondhawk	*Erythemis collocata*	Blue-list S3S4 (2015)		
Carolina Meadow Foxtail*	*Alopecurus carolinianus*	Red List S2 (2015)		
Henderson's Checker-mallow	*Sidalcea hendersonii*	Blue List S3 (2015)		
Macrae's Clover**	*Trifolium dichotomum*	Red List S2 (2016)		
White-lipped Rein Orchid	*Piperia candida*	Red List S2 (2015)		

* This species was listed as an associated species in the Element Occurrence Record with data from a 1996 Royal BC Museum herbarium specimen (BC CDC 2017b). It was not observed during the 2017 survey.

** There is an element occurrence of Macrae's Clover at Medicine Beach Nature Sanctuary listed by the BC CDC (2017c).

[3] BC Conservation Data Centre (BC CDC 2018)

[4] Committee on the Status of Endangered Wildlife in Canada (Government of Canada 2017)

Photo 14. Western Pondhawk (Photo: L. Matthias

Western Pondhawk (*Erythemis collocata*) is one of six dragonflies identified in Medicine Beach (list in Appendix E).

A Henderson's Checker-mallow (*Sidalcea hendersonii*) population monitoring study was initiated by NCC in 2005 (NCC 2005a). In 2005, a total of 151 individuals were found in seven patches with 45 flowering plants. One third of the total number plants were found within the fenced area (NCC 2005a). That same year found most of the plants that were not protected either by the fence or by Nootka Rose thickets were grazed (NCC 2005b).

Plants were not counted in 2017 and a comprehensive survey was not made: however, only one plant was noted to be in bud. Comparing the current distribution to previous photographs, the number of plants appears to have declined over time and they appear less vigorous. Within the fenced area, the Nootka Rose has formed a dense thicket which may be competing with the Henderson's Checker-mallow. The fence which was installed to protect the Checker-mallow has collapsed and is no longer effective at keeping out deer.

Photo 14. Henderson's Checker-mallow in Bud

White-lipped Rein Orchid (*Piperia candida*) was noted next to the more common Royal Rein Orchid (*Piperia transversa*) during the 2017 surveys next to the trail at the top of the bluffs. It may be at risk of trampling due to its proximity to the trail.

Carolina Meadow Foxtail (*Alopecurus carolinianus*) was not observed during 2017 surveys and the appropriate vernal pool habitat was not noted. The 2017 survey was too late in the season to confirm the presence of Macrae's Clover (*Trifolium dichotomum*). In 1996, the BC CDC element occurrence record for the species noted 400 plants over the length of the slope on slaty, loose 40° slope (BC CDC 2017c).

Photo 15. White-lipped Rein Orchid in Medicine Beach Nature Sanctuary (Photo: L. Matthias)

There are active Peregrine Falcon nests in nearby locations on Pender Islands (BC CDC 2018) although none were observed during 2017 surveys. Five bird species at risk were noted in the Sanctuary but nesting habitat is not available for all species. There is some potential for Great Blue Heron to nest in the reserve as the forest matures. Olive-sided Flycatcher require openings and perch snags and as the forest matures there could be potential for this species to nest here. There is some habitat for Common Nighthawk to breed either on the upper beach and on open areas above the cliff however because of the amount of human activity, it is doubtful nesting would be attempted. Purple Martin nest in boxes on a weir north of the reserve. Barn Swallow would nest in local barns or other structures.

Virginia Rail (*Rallus limicola*) is known to breed at Medicine Beach Nature Sanctuary and are sensitive to disturbance by park visitors and dogs (NCC 2005a). Virginia Rail is ranked S4S5 and is on the yellow-list was a species of interest in previous monitoring reports (NCC 2005a).

3.12 Wildlife Species

Many different mammal species use Medicine Beach Nature Sanctuary. Black-tailed Deer (*Odocoileus hemionus*) and River Otter (*Lontra canadensis*) scat were observed during the survey to update the Management Plan (Maslovat *et al.* 2017). Harbour Seals (*Phoca vitulina*) were observed in the ocean off Medicine Beach.

Eight species of bat were detected using an acoustic bat detector set up over the marsh. Over a 7-night period, there were 838 recordings triggered by bats, with each file containing one or more bats (Table 4) (survey report in Appendix D).

Table 4. Animal Species (Excluding Birds) Observed in Medicine Beach Nature Sanctuary and Adjacent Ocean

Common Name	**Latin Name**
American Mink	*Neovison vison*
Black-tailed Deer	*Odocoileus hemionus*
Harbour Seal	*Phoca vitulina*
Raccoon	*Procyon lotor*
River Otter	*Lontra canadensis*
Big Brown Bat*	*Eptesicus fuscus*
Brazilian Free-tailed Bat*	*Tadarida brasiliensis*
California Myotis*	*Myotis californicus*
Hoary Bat*	*Lasiurus cinereus*
Little Brown Myotis*	*Myotis lucifugus*
Long-eared Myotis*	*Myotis evotis*
Silver-haired Bat*	*Lasionycteris noctivagans*
Yuma Myotis*	*Myotis yumanensis*
Northwestern Gartersnake	*Thamnophis ordinoides*
Pacific Chorus Frog	*Pseudacris regilla*
Western Terrestrial Garter Snake **	*Thamnophis elegans*
Surf Smelt	*Hypomesus pretiosus*

* Bat species were detected using an Anabat Express bat detector (serial number 314197, microphone number 314386) with a sensitivity setting of 115 and set for "night only" recording. The detector was mounted 1.7 m above the ground attached to a snag located at 10 U 480267 E 5400942 N. It was left on site from July 4th-11th. Examination of acoustic spectrograms was done by Peter Ommundsen.
** Western Terrestrial Garter Snake was noted in the NCC Monitoring Report (NCC 2005a).

Pacific Chorus Frogs (*Pseudacris regilla*) were heard calling and tadpoles and froglets were seen in the marsh (Maslovat *et al.* 2017). Sharp-tailed Snakes (*Contia tenuis*) are known to occur on North Pender. Although there are suitable sites within the open bluff habitats that may support the endangered Sharp-tailed Snake, none were observed. Older residents describe historical runs of Cutthroat Trout at the south end of the marsh (Kirkby *pers. comm.* 2018). Questionnaire respondents also noted Muskrat.

The diverse shrub and tree layer around the marsh is excellent habitat for nesting birds. Avian surveys in 2017 identified a total of 50 avian species (list in Appendix C) (Maslovat *et al.* 2017). Breeding was confirmed for Dark-eyed Junco (*Junco hyemalis oreganus*), Brown-headed Cowbird (*Molothrus ater*), Yellow-rumped Audubon's Warbler (*Setophaga coronata auduboni*), Common Yellowthroat (*Geothlypis trichas*), Orange-crowned Warbler (*Oreothlypis celata*), American Robin (*Turdus migratorius*), Marsh Wren (*Cistothorus palustris*), Brown Creeper (*Certhia americana*), Chestnut-backed Chickadee (*Poecile rufescens*), Pacific-slope Flycatcher (*Empidonax difficilis*) and Virginia Rail (*Rallus limicola*).

A wide range of invertebrate species were noted in 2017 including three gastropods, 6 dragonflies, 3 butterflies and 3 insects (survey results in Appendix E).

Medicine Beach is an important site for forage fish, which are a critical prey source for marine predators including marine fish, seabirds and marine mammals (De Graaf 2013). It was mapped as suitable habitat for both Surf Smelt (*Hypomesus pretiosus*) and Pacific Sandlance (*Ammodytes hexapterus*) (De Graaf 2013) and recent monitoring by the Pender Island Conservancy Association confirms that Surf Smelt are spawning at Medicine Beach Nature Sanctuary (PICA 2017; Boffey pers. com. 2018).

3.13 Expected Change over Time

3.13.1 Changes to the Marsh

The marsh ecosystem is in good quality and condition and has a high diversity of ecological communities for its small size. There have been small changes to zonation and species composition as a function of natural successional processes (Linnaeus 2005). From 1993 to 2005, there was an increase in Creeping Bentgrass (*Agrostis stolonifera*), an introduced grass that is common in brackish marshes. There was also an increase in Creeping Spike-rush (*Eleocharis palustris*) and Slough Sedge (*Carex obnupta*) (Linnaeus 2005). Eutrophication was noted as a concern in 2005 due to the blockage of the inflow/outflow stream limiting tidal flow. Further studies are required to determine if this trend continues.

In comparing photographs from 2005 to 2018, the amount of standing water has decreased substantially. Comparing maps prepared by the BC CDC (in MacDonald 2000), the area covered by Common Cattail (*Typha latifolia*) and Slough Sedge have increased.

3.13.2 Changes to the Upland Forest

The second growth forests in the upland portions of the Sanctuary are in good condition and will continue to mature and diversify over time. In some areas, the Douglas-fir may eventually be replaced by Grand Fir which is dominant in the secondary canopy. Over-browsing by deer will continue to affect biodiversity.

3.13.3 Changes to Henderson's Checker-mallow

The 2005 monitoring report described the Checker-mallow population as stable (Linnaeus 2005). There was also a 2005 Monitoring Report for Medicine Beach Nature Sanctuary and addendum (Nature Conservancy of Canada 2005a; 2005b) which contained a full population enumeration for Henderson's Checker-mallow and concluded that deer/herbivore browse was the primary factor regulating the population at that time. A fence was built around some of the patches and some were left outside the fencing. Follow up monitoring visits by the author Ian Giesbrecht where completed and in 2009 he concluded that the population outside the fence had not drastically increased or decreased in number since 2005 (they showed signs of browse with flowering stalks gone but also looked unhealthy with signs of disease in addition to herbivory) while plants inside the fence were large, quite vigorous and had a high rate of flower production (Giesbrecht pers. comm. 2009).

Without a comprehensive survey, it is difficult to determine recent trends; however, comparing photographs from 2005 to 2018, the population appears to be much reduced in vigour, flowering capacity and distribution. The area within the fence has much denser Nootka Rose (*Rosa nutkana*) growth. Although the rose protects the Checker-mallow to some extent, it also competes with it for light and resources and no flowering plants were observed under the roses.

4.0 Threats

The following threats were identified in previous versions of the Management Plan. The threat, the status in 2005, the current condition and expected changes are described.

Table 5. Threats and Management Issues from 1996-2018

Threat	**Prior Status**	**Status in 2018 and Expected Changes**
Natural Resource Protection		
Freshwater Watershed Integrity/ Recharge	Water flow into the marsh is restricted by culverts; Larger watershed still unprotected which may impact integrity of the marsh; No monitoring of water quality in watershed; Possibility of water	No observable change from 2005; Larger watershed still unprotected; No monitoring of water quality. Upslope clearing could increase

	flow diversion towards Browning Harbour associated with development in Watershed B.	erosion, siltation and nutrient loading to the marsh.
Saltwater Flow into Marsh	Basic report recommended baseline studies to monitor salinity in the marsh (Kirkby 1996). Logs at entrance to marsh may be limiting tidal flow and berm erosion may impact inflow and outflow.	Unknown if there are changes from 2005. Salinity studies have not been done due to resource constraints. Further studies by a coastal engineer are recommended to evaluate berm erosion and the associated impacts to inflow/outflow of salt water to the marsh. Studies should include an evaluation of the driftwood which changes the inflow and outflow channels. A rise in sea level associated with climate change may increase salt water intrusion.
Removal of Driftwood	Removal of driftwood was mentioned by Kirkby (pers. comm.) 2018 and Boffey (pers. comm.) 2018. Formerly RCMP placed a public notice in the newspaper asking the public to not take driftwood. Driftwood is also moved to create forts. Both driftwood removal and fort making may lead to greater berm erosion and issues related to salt water inflow/outflow.	Currently, there are many logs on the beach although fort building continues. Removal of logs, sand and seaweed was noted as a threat in a public questionnaire.
Watershed Pollution	Increased storm water runoff in marsh with increased nutrient inflow probable cause of eutrophication; Marsh is surrounded by road on two sides upslope which may be source of pollution; No monitoring of activities in or near inflow streams (drum of chemicals with lid off was observed ~3 feet from stream off Wallace Rd.); Pig farm, motorcycle repair, gravel pit activity in watershed; Garbage left within few feet of streams.	There is now monitoring of activities in the watershed and the pig farm, motor cycle repair and chemical garbage are no longer present. Landowner education program in 2008 has raised awareness of the watershed areas and how to protect these areas. Ongoing potential threat of pollution of oil and other pollutants from the road above the marsh.
Ocean-borne Pollutants	5 mooring buoys offshore invite boaters; Toxic and disintegrating creosote-treated pilings were lashed together and anchored to one of the buoys over the winter (now removed); Boating traffic and anchoring close to beach increasing with	There has been a reduction in the number and use of mooring buoys. Ongoing potential threat of pollution from boating traffic; Risk of pollution from ocean spills;

	popularity of and space limitations at Poet's Cove Marina.	Debris including Styrofoam, floats and garbage wash up on the beach; Derelict boats.
Protection of Checker-mallow	The larger population of Henderson's Checker-mallow was fenced in 2005 but a small population remained unfenced.	The fence has collapsed and is not protecting plants from deer grazing; Nootka Rose has expanded into a dense thicket to the edge of the fenced area. Species-specific monitoring recommended. NCC was in discussions with ITF and PICA about fencing a larger exclosure in 2011 but some parties had concerns about the size and location of the exclosure. More discussion and research is recommended. Ongoing declines may lead to extirpation.
Hyperabundant Deer	Deer grazing was noted on Henderson's Checker-mallow.	Over-grazing limits biodiversity in the reserve by selecting for less palatable species. This is a pervasive threat on all of the larger Gulf Islands.
Invasive Plant Species	Invasive plants recorded include Scotch Broom, Evergreen Spurge-laurel, English Ivy, English Holly, Himalayan Blackberry, Thistles, Orchard-grass and Creeping Bentgrass (NCC 2005a). Scotch Broom was previously abundant in the dry bluff portion of the Sanctuary but removal efforts by PICA have helped keep this and other invasive plants from spreading in the Sanctuary (NCC 2005a).	No English Ivy nor Himalayan Blackberry was observed; Small numbers of all other invasive species were seen but current control efforts by PICA appear to be very effective. Ongoing removal will be required because these invasive species form large seed banks.
Amphibian Protection/ Bullfrog Invasion	Decline of local frog population was noted but causes are unknown (NCC 2005a).	Population size of frogs unknown. Further studies required. Bullfrogs are on North Pender Island and have recorded 2.3 kilometers away, east of Buck Lake Reservoir.
Cultural Resource Protection		
Damage to Midden	Midden erosion noted as early as 1974 (Archaeology Branch 1974); Erosion ongoing as evidenced by exposed soils and sparse vegetation; Erosion likely exacerbated by human activities such as	Logs being used to build forts on beach may increase midden erosion; Large logs in front of the berm continue to offer some protection from winter storms;

	removing driftwood and/or soil-disturbing foot traffic; Monitoring techniques were established to determine changes to the midden/berm over time prior to 2005 (NCC 2005a).	Monitoring should be continued to determine if erosion has increased since 2005. More information and data collection is needed.
Public Use		
Disturbance of Marsh Nesting Birds and foraging Great Blue Herons by Dogs	Disturbance by dogs has been reduced by installation of signage and educational approach (NCC 2005a); Residents still run their dogs off-leash in beach area (Linnaeus 2005)	No change from 2005; No evidence of trampling by people or dogs in marsh but dogs off leash was mentioned as a management issue at the Open House.
Commercial Hauling	Browning Harbour Beach, which has easier access is generally preferred for hauling.	No change from 2005; No legislation exists to prevent the use of the beach area for hauling. Permission is given by the Ministry of Transportation and Infrastructure by a permit process.
Trails: Use and Erosion Potential	Construction of steps to the bluff disturbed the sensitive habitat but overall net gain in protection of coastal bluff ecosystem because the steps and trail keep hikers on the trail; Steps up to bluff, fencing, and a seating area have greatly reduced risk to hikers; New steps allow older residents access to the bluff portion for the first time; Soil erosion and incised gully noted on the old logging road; Gully may divert water from adjacent ephemeral stream and change hydrology (NCC 2005a).	No erosion noted on bluff and visitors appear to keep to the trail except for small path next to stairs; Minor erosion on the trail leading to the shell beach at the east side of the property; Small section of trail closed and signed but still receives small amount of use; If public use increases due to establishment of GINPR, erosion may increase; Bushwacking and shortcuts noted as a threat to the reserve in a questionnaire; Road and parking lot maintenance requested in public questionnaire.
Boat Launch from Beach	Not mentioned in previous Management Plan.	Noted as a threat in public questionnaire.
Camping	No formal monitoring program for the Sanctuary; Campers in the forested area above the marsh can easily escape detection.	Annual covenant monitoring looks for camping damage; PICA have been acting as sanctuary warden but a more official voluntary warden would be a welcome addition; Beach fires (which may harm forage fish) noted as threat in public questionnaire; several public respondents requested an outhouse whereas others saw construction of any kind as a threat.

Excessive Noise	No increase in noise –not a concern.	No change from 2005.
Tree Felling	In 2003, a resident took fallen trees from the Sanctuary; no harvest since.	No obvious tree felling or collection observed in 2017.
Fire Risk	High risk from campfires in bluff area.	High risk from cigarettes or escaped fires.
Garbage/ Littering	Beach clean-up days sponsored by PICA help to control garbage at the site.	No garbage was observed during 2017 surveys; PICA continues to sponsor annual beach cleaning days and does frequent checks to remove garage on site and to report derelict vessels which are a concern after large storms. Garbage left on beach is still noted as a threat in public questionnaire; Dogipot installed in parking area with waste removed every two weeks or every week from June-September by Pender Island Waste Management Ltd. although dog waste still noted as a concern in questionnaires.
Traffic	Still manageable; increased commercial activity (island tours) a concern.	Still manageable.
Trespassing on Adjacent Lands	Signage on the south side of the marsh near boathouse and sign at end of the trail on the top of the bluff has helped to reduce trespass; Sanctuary boundary sign required in upland portion.	Signage at south side of marsh and at gate on Aldridge Road still in place; Adequate signage at Aldridge Road entrance.
Vandalism	No recent reports of vandalism.	No evidence of vandalism.

5.0 Stakeholder Consultation

5.1 Adjacent Landowners

In 2008 a Medicine Beach Watershed Awareness and Landowner Contact was executed by PICA and ITF to educate landowners in the three Medicine Beach watershed areas about what they can do to protect the watersheds. A pamphlet and map were developed to distribute to the landowners as part of this initiative and can be found in Appendix G. Stakeholder Contact 2008. The total number of landowners/tenants/managers contacted were 87 including 52 properties visited. There was also an outreach event held on July 4, 2008 with displays from ITF, PICA and Pender Straitkeepers with 50 people attending who were engaged by their love of the area and awareness was raised about the importance of the watershed throughout the community. There have been no issues reported to the ITF since 2008 from neighbour damage to the watersheds.

In 2017, in preparations for the revised Management Plan, letters were sent to all adjacent land holders and neighbours on January 3, 2018. A total of 19 letters were sent by mail to residents on Schooner Way, Canal Rd and Wallace Rd. The letters contained information on

the Medicine Beach Nature Sanctuary, a link to the current Management Plan and a link to the online survey (see Appendix H).

5.2 First Nations

Letters via email were sent to the following 14 First Nations on January 3, 2018:
Cowichan Tribes
Halalt First Nation
Lake Cowichan First Nation
Lyackson First Nation
Malahat Nation
Pauquachin First Nation
Penelakut Tribe
Semiahmoo First Nation
Songhees First Nation
Stz'uminus (Chemainus) First Nation
Tsartlip First Nation
Tsawout First Nation
Tsawwassen First Nation
Tseycum First Nation

The letters asked how the Islands Trust Fund's management planning and actions for this protected areas on North Pender Island can acknowledge and respect the cultural significance and traditional use of this area. The letters contained information on the Medicine Beach Nature Sanctuary, a link to the current Management Plan and a link to the online survey (see Appendix I). To date, there has been no response from any of the First Nations Tribes.

5.3 Conservation Partners and Community Members

Islands Trust Fund held a public consultation meeting on February 17th, 2018 to seek input on the draft Management Plan and discuss management planning for the reserve. Maps and photographs were on display and residents were asked for their input at that time. There were 8 people who attended the meeting.

An online survey was also made available and was completed by 39 people.

5.4 Consultation Results

The consultation results were summarized by Survey Monkey. Respondents were primarily residents with only 10% living off-island. Most respondents (56%) visit the marsh once a month or more and most engage in accessing the beach (82%), hiking/walking (79%) and wildlife viewing (62%). The most important values were conservation for the intrinsic value of nature (82%), protection of habitat for species at risk (82%) and ecosystem services (51%), with recreational opportunities valued by only 26% of respondents.

6.0 Management Plan

The first Management Plan for the property was drafted in 1996, revised in 2006 and again in 2018.

6.1 Discussion

The purpose of Medicine Beach Nature Sanctuary is to protect, in perpetuity, the brackish marsh, upland forest, coastal bluffs and beach for the benefit of the flora and fauna of the Sanctuary, and to allow for low impact recreation and nature appreciation opportunities for visitors. Ongoing monitoring and management is required to ensure that ecosystems and species continue to remain protected from threats and to ensure public safety. All management activities within the protected area must consider the specific sensitivities of the Species at Risk and their habitat found on the property.

6.2 Management Roles

The Trust Fund Board is the land steward of the Sanctuary but will rely on its partnership with the Pender Islands Conservancy to assist with on the ground management. Covenant holders, Nature Conservancy of Canada and Habitat Acquisition Trust, will monitor the property to ensure compliance with the conservation covenant.

6.3 Permitted and Prohibited Uses

The Sanctuary is open to the public for hiking, use of the beach and nature appreciation. Visitors are requested to keep dogs on a leash, keep them out of the marsh area and to pick up after their dogs.

The following activities by the public are prohibited:

- Use of motorized vehicles
- Bicycling
- Horseback riding
- Camping
- Fires
- Forestry
- Livestock grazing
- Trail development (outside of established trails)
- Tree cutting
- Collection of plants or animals
- Mooring of watercraft including tenders

6.4 Public Access

There is a trail from the parking lot beside the plaque that leads up to the bluff and then down to the sandy beach at the eastern corner of the property. This trail doubles back and connects to an old logging road that leads to Aldridge Road on the western boundary of the property (refer to map in Figure 3).

6.5 Signage

Advertising of the site will not be undertaken and it will not be promoted as an attraction. No major sign will identify the Nature Sanctuary to motorists passing through the area on Schooner Way or Aldridge Road.

Next to the parking lot is a kiosk with three signs explaining the First Nations history of the site, information on forage fish and the ecological importance of the Sanctuary. There is a second wooden kiosk with a welcome to Medicine Beach sign. The two kiosks are connected by a wooden fence along the edge of the parking area which limits access to the marsh. On the fence, there is a welcome sign outlining prohibited activities (fires, camping) and requests that visitors pick up after their dogs and leave beach logs in place. There is also a wooden sign attached to the fence requesting visitors to keep their dogs out of the marsh.

Photo 16. Trail Head Signs at Medicine Beach Nature Sanctuary

Between the fence and the beach, there is a sign outlining the sensitivities of intertidal areas with a warning sign about the risk of paralytic shellfish poisoning. In the same location, there is a container with dog bags and a sign outlining permitted uses of the Sanctuary. At the trail head, there is a large stonework block with a plaque recognizing the funders that helped acquire Medicine Beach Nature Sanctuary.

Photo 17. Trail Head Signs Describing the Risk of Shellfish Poisoning, Permitted Uses and Pet Waste Disposal

Photo 18. Stonework Block with Plaque at Trail Head to Top of Cliff

6.6 Trail Maintenance:

There is a low-impact hiking trail that leads from the parking lot north up the cliff by way of a set of stairs. There are two benches and a guard rail along the top of the cliff. The trail follows along the top of the cliff and then backtracks and travels north to connect with Aldridge Road. There is a gate with a sign at the trail entrance off Aldridge Road.

Photo 19. Stairs Leading from Parking Area to Top of Cliff

Major maintenance and safety issues have been addressed through the construction of stairs and the fences at the top of the cliff. There is a small trail parallel to the stairs which is causing a small amount of erosion and the old logging road shows signs of erosion. A small portion of the trail has been closed and it appears to receive only limited use. The closed trail should be monitored and signs replaced as necessary. No further trails are necessary in the Sanctuary.

Photo 20. Lookout Site with Bench and Fence Along Top of Cliff

6.7 Protection Initiatives for Sensitive Ecosystems and Species at Risk

The fence that was installed to protect the patch of Henderson's Checker-mallow has collapsed and is no longer functional. Henderson's Checker-mallow are highly palatable and grazing was observed on most flowering stems that were not protected (NCC 2005b). The fencing that was installed in 2005 has also protected the Nootka Rose from grazing and the rose has expanded almost to the edge of the fenced area. The dense roses may be

competing with the Checker-mallow. Further species-specific monitoring is recommended to determine if Checker-mallow is declining in the Sanctuary. The Checker-mallow population extends on to the adjacent neighbour's property and the landowner should be contacted prior to any work.

Photo 21. Henderson's Checker-mallow (round leaves in center of photo) at the edge of dense Nootka Rose thicket

Surveys should be done to confirm the presence of the two plant species not noted during the 2017 survey: Macrae's Clover (*Trifolium dicotomum*) and Carolina Meadow Foxtail (*Alopecurus carolinianus*).

Maintaining the marsh and upland forest should be sufficient to protect the Little Brown Myotis (*Myotis lucifugus*), Western Pondhawk (*Erythemis collocata*) and the five at risk birds that were noted in the Sanctuary.

6.8 Ecological Restoration Options

Restoration activities should focus on the old logging road to prevent future erosion of the bed surface and to protect natural hydrology of the adjacent stream and downslope catchment areas (NCC 2005a).

The berm and archaeological midden are subject to wave action and erosion has been noted. The extent of berm erosion should be determined by comparing erosion to measurements made in 2005 and if possible, comparing measurements taken in the 1974 archaeological survey to current conditions. Berm erosion may be exacerbated by the removal of driftwood to build log forts (Photo 23). With the high tides and winter storms of 2017 and 2018 there was an increase in driftwood in the area. To gain a better understanding of the site specific dynamics involved research is needed to determine if the driftwood is protecting the berm from erosion, or increasing erosion when the winter storm tides batter the berm with driftwood.

Work being done by the Capital Regional District on regional climate modelling and sea level prediction mapping with the Coastal Sea Level Rise Risk Assessment Report 2015 should be utilized to predict change over time for this area and to inform decision making into the future.

A more comprehensive coastal engineer erosion study would be needed to determine the impact of berm erosion on saltwater inflow and outflow. The engineer's study would also be required to evaluate tidal flow and to determine the frequency of salt water intrusion at high tide and if the logs at the shoreline are limiting the inflow and outflow of salt water. A clear rationale for the study would have to be discussed as well as the potential actions such as a marine shoreline restoration plan. This would require a baseline of salinity data and then salinity monitoring in the marsh overtime and would be a large scale project that would require many years to complete and would require additional funding sources. There is also the option to allow natural processes unimpeded by human intervention, then the potential for the berm to eventually erode completely with the brackish marsh becoming a salt marsh.

Photo 22. One of Several Log Forts on Medicine Beach

6.9 Scientific Research/Education

In 2005, the ITF hired a contractor to evaluate the health of the Nature Sanctuary and NCC performed an extensive evaluation of the property. The resulting reports are titled: *Measuring Ecosystem Health at the Medicine Beach Nature Sanctuary: The State of the Sanctuary in 2005* (Linnaeus 2005) and *2005 Monitoring Report for Medicine Beach Nature Sanctuary* (Nature Conservancy of Canada 2005a; 2005b).

Scientific research plays a critical role in understanding natural processes and shaping potential management options. All research in the Sanctuary should be approved by ITF and should ensure there is no associated harm to Species at Risk and/o their habitat.

If funding is available, ongoing monitoring of water quality and flow rates is recommended.

6.10 Exotic and Invasive Species Removal

There has been ongoing removal of invasive species from the Sanctuary by the PICA. These efforts have been effective at controlling woody invasive species and should be continued to remove plants that grow from the seed bank. Only small isolated Scotch Broom and Evergreen Daphne persist in the Sanctuary.

If possible, removal efforts should also focus on Yellow Flag Iris which is present in very small numbers in the Sanctuary. The plants will need to be dug out by hand and all of the roots removed. If removal of the plants is not immediately feasible, annual removal of flowers and seeds before seeds spread (around July) will help to contain the spread of the plant. See information available through the Coastal Invasive Species Committee for details on containment of Yellow Flag Iris.

There is a single Cotoneaster plant next to the stonework block with the plaque that should be removed before it spreads.

Photo 23. Invasive Species Reed Canary Grass (left) and Yellow Flag Iris (right) in Marsh

6.11 Wildfire Planning

Wildfire and wildfire suppression can be extremely damaging to sensitive ecosystems. Campfires on the beach can impact forage fish and other intertidal species and can spread to adjacent forests. Beach fires also remove driftwood and may impact tidal inflow and outflow to the marsh. Developing a fire management plan in consultation with the Pender Island

Volunteer Fire Department and the BC Wildfire Service who have done similar plans for sensitive ecosystems such as these, is recommended.

7.0 Action Items

Management Plan action items are measurable and achievable tasks that the ITF and partners can complete to ensure that the protected area is managed in the best possible way. The following management action items are based on the recommendations made in this Management Plan and listed in priority sequence, subject to available funding resources.

7.1 Immediate Actions (1-2 years)

1. Designate a volunteer warden who visits the site regularly to work with PICA or may be a member of PICA, to monitor the property and identify management concerns such as trespassing, tree cutting, camping, beach fires, dogs in marsh and other issues. The warden would have the appropriate contact numbers and criteria for alerting RCMP, Report all Poachers and Polluters (RAPP), Conservation Officer contacts etc.
2. Continue to keep adjacent landowners informed on the importance of the area and be aware if a local stream monitoring group develops on the Penders or other potential partner groups to help implement water quality monitoring (especially flows at culverts on Wallace Road and Canal Way) and to educate about the sensitivity of shoreline habitats and the impacts from pollution.
3. Send a letter and a copy of the Management Plan to the North Pender Local Trust Committee to state the importance of good land use planning for the upstream areas.
4. Investigate placing a Rockfish Conservation Area sign to inform users of the area and to raise awareness.
5. Consider the feasibility and rationale to start a baseline of salinity monitoring and to evaluate erosion of the berm and the impacts of driftwood to determine the impacts of saltwater inflow and outflow to the marsh. Obtain partner input, explore CRD sea level rise predictions, zoning and permit and/or archaeological assessment requirements.
6. Assess how best to monitor Henderson's Checker-mallow to determine long-term trends and evaluate fencing removal or replacement. Cutting of Nootka Rose is prohibited by the conservation covenant and would require a special waiver if recommended.
7. Continue communications with the North Pender Local Trust Committee to determine the status of the rezoning of the foreshore.
8. Communicate with companies that we know have asked for a permit to use Schooner Way, Bedwell Harbour Road and the foreshore of the Sanctuary to transport houses explaining the ecological impacts. A copy of all correspondence should also be sent to all parties who manage the foreshore including the Ministry of Transportation and Infrastructure.
9. Consider a survey for Western Screech-Owl to determine if this species is present on the Sanctuary.

7.2 Short term Actions (3-5 years)

1. Depending on results of the feasibility and rationale study take next steps: no human intervention or investigate funding to employ a coastal engineer to evaluate or conduct berm/midden monitoring to determine long-term erosion rates, all in partnership with the PICA, HAT and NCC.
2. Set up a monitoring program of the Henderson's Checker-mallow if funding allows. If the population is declining, consider development of a restoration plan, including consideration of fence removal, as a short-term action.
3. If necessary, develop a restoration plan for Henderson's Checker-mallow
4. Assess how best to monitor native amphibian populations to determine population trends and provide early detection of Bullfrog invasion.
5. Prepare a wildfire management plan that considers both forest ecology and prevention of damage to surrounding neighbourhoods in consultation with the Pender Island Volunteer Fire Department and the BC Wild fire Service.

7.3 Long term Actions (5+ years)

1. Work with PICA and any landowners of adjacent land who would like to achieve protection mechanisms (such as covenants) to create a buffer zone on neighbouring properties to protect the quality and quantity of water flowing to the Nature Sanctuary.

7.4 Ongoing or Annual Action Items

1. Conduct annual monitoring to monitor covenant compliance and identify management concerns including public use (e.g. trail monitoring) and invasive species.
2. Communicate annually with NCC and HAT to provide updates on the Sanctuary, seek approvals for stewardship activities as necessary and maintain compliance with the conservation covenant.
3. Continue to remove invasive, non-native species in cooperation with PICA. Target Yellow Flag Iris and Cotoneaster for removal and continue to remove re-sprouts.
4. Conduct ongoing maintenance and management of structures, signs and trails.
5. Continue to monitor garbage on the Sanctuary and support continued PICA coordinated beach cleanups.
6. Continue to monitor the need to provide a dog waste disposal service.
7. Support PICA and volunteer wardens to monitor the property and identify management concerns such as trespassing, tree cutting, camping, dogs in marsh, trail and sign damage and other issues.
8. If funding allows conduct monitoring of Henderson's Checker-mallow to determine long-term population trends.
9. Maintain communication with North Pender Local Trust Committee to determine the status of the rezoning of the foreshore.

10. Continue to inform the general public of the natural values of the site and the permitted and prohibited uses through information placed in local publications from time to time by the management group.

8.0 Conclusion

Medicine Beach Nature Sanctuary is an important protected area which is surrounded by privately managed land. It provides habitat for 11 rare species and a range of other native species.

The ITF will act on the management action items identified in this plan to achieve the vision, objectives and purpose of the Medicine Beach Nature Sanctuary. Future management issues may lead to further action items that will be identified in work plans and in future revisions of this plan.

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10.0 Appendices

Appendix A. Ecological Community Descriptions

An inventory of biological features was conducted in the Sanctuary on July 4th and 5th, 2017 by three consulting biologists. Four site series were identified using A Field Guide for Site Identification and Interpretation for the Vancouver Forest Region (Green and Klinka, 1994) (map in Figure 2). Four wetland site associations were identified using MacKenzie and Moran (2004). Two ecological communities Dune Wildrye/Beach Pea and Trembling Aspen/Pacific Crab Apple/ Slough Sedge) were not classified in either of these resources but are ecological communities that are listed by the BC Conservation Data Centre (2018). Two of the communities are not considered to be part of the Special Ecosystem Inventory. These site series and the corresponding ecological communities are described below.

Ecological Community 1: Coastal Cliff (CDFmm/00-Rc).

Description: Ecological Community 1 is dominated by a steep cliff face with thin soils and marine influence. Exposed rock/bare soil covers approximately 80% of the vegetation type. Slopes are steep, soils are shallow or non-existent except at the top of the cliff face. The dominant tree type is Arbutus and the aspect faces south. Understory vegetation was observed from the top of bank. There is potential for the endangered Sharp-tailed Snake (*Contia tenuis*) to be found at the top of the cliff face.

The Islands Trust MapIt site lists this unit as Herbaceous/Herbaceous and the primary unit classification as *Cladina/* Wallace's Selaginella (Islands Trust 2018b). Although Wallace's Selaginella is present on the site, it is not dominant and community is not typical of *Cladina* /Wallace's Selaginella. The site is better characterized as coastal cliff as per MacKenzie (2002).

FLORA

Main Canopy Species & percent cover	Douglas-fir (*Pseudotsuga menziesii*) and Arbutus (*Arbutus menziesii*) are found at top of bank. There is a Bigleaf Maple (*Acer macrophyllum*) mid-bank but there is no significant canopy coverage.
Total Canopy Cover	0%
Understory (species & percent cover) Shrubs, including trees <10 m Herbs, ferns, grasses, mosses, etc.	Shrubs: 2% Hairy Honeysuckle (*Lonicera hispidula*), 1% Saskatoon (*Amelanchier alnifolia*), 1% Scotch Broom* (*Cytisus scoparius*) Herbaceous Plants: 30% Barren Fescue* (*Vulpia bromoides*), 20% Rip-gut Brome* (*Bromus rigidus*), 5% Blue Wildrye (*Elymus glaucus*), 5% Death Camas (*Toxicoscordion venenosum*), 3% Silver Hairgrass* (*Aira caryophllea*), 3% Early Hairgrass* (*Aira praecox*), 3% Wallace's Selaginella (*Selaginella wallacei*), 2% California Brome (*Bromus carinatus*), 2% Thimble Clover (*Trifolium microdon*), 2% Ribwort Plantain

	(*Plantago lanceolata*), 2% American Wild Carrot(*Daucus pusillus*), 2% Hairy Cat's-ear* (*Hypochaeris radicata*), 1% Small Hop-clover* (*Trifolium dubium*), 1% White Hawkweed (*Hieracium albiflorum*), 1% Large-flowered Hawkweed (*Agoseris grandiflora*), <1% Big-leaved Sandwort (*Moehringia macrophylla*), <1% Nodding Onion (*Allium cernuum*), <1% Mountain Sweet Cicely (*Osmorhiza berteroi*), 1% Tarweed (*Madia* sp.), <1% Sweet Vernalgrass* (*Anthoxanthum odoratum*), <1% Common Vetch* (*Vicia sativa*), <1% Small-headed Clover (*Trifolium microcephalum*), <1% Royal Rein Orchid (*Piperia transversa*), <1% Clover (*Trifolium* sp.), <1% Broad-leaved Stonecrop (*Sedum spathulifolium*), <1% Woolly Sunflower (*Eriophyllum lanatum*). 25% Litter and bare soil.
Observed rare/threatened species & locally uncommon species	Macrae's Clover (*Trifolium dichotomum*) has been mapped along the coastal cliffs but it was not observed in the survey prior to the Management Plan because the timing was too late.
Special Features	Steep cliff next to ocean shoreline with diverse assemblage of herbaceous plants, inaccessible to deer.
Expected Changes	Some erosion to be expected due to the steep bank and impact from storm surges.
Disturbance History	Trees were logged at top of bank which may have increased erosion from cliff face.

FAUNA

Wildlife Habitat / Features	South facing slope with exposed rock ledges is good habitat for snakes & lizards. Diverse herbaceous plants provide nectar sources for birds and butterflies.
Observed Species	**BIRDS** Refer to Appendix C for complete list of birds observed in the Sanctuary. **MAMMALS** Harbour Seal observed in ocean next to ecological community
Rare/threatened species & locally uncommon species	Olive-sided Flycatcher (*Contopus cooperi*) Possible nest cavity of Belted Kingfisher (*Megaceryle alcyon*)

Ecological Community 2: 70% Douglas-fir/Arbutus (CDFmm/02) Young Forest: 30% Douglas-fir/Salal Young Forest (CDFmm/01)

Description

The young forest of mixed Douglas-fir/Arbutus and Douglas-fir/Salal is found above the coastal cliffs north of the road. Green and Klinka (1994) refer to the site series as Douglas-fir/Salal and on this site, it corresponds to the BC CDC ecological community of Douglas-fir/ Dull Oregon-grape (CDFmm/01). The terrain is sloped to the south with open exposure because of the adjacent cliffs. The dominant trees are Douglas-fir and Arbutus and the trees are young (less than 40 years old). There is a diversity of native shrubs including a small amount of the non-native Scotch Broom. There is a mix of native and non-native forbs and grasses. This portion of the Sanctuary has a large number of built structures including fencing, stairs and benches.

Both the dominant and secondary ecological communities are red-listed by the BC Conservation Data Centre (BC CDC 2018).

FLORA

Main Canopy Species & percent cover Age (estimated) Height DBH	Douglas-fir (*Pseudotsuga menziesii*) 20%, Arbutus (*Arbutus menziesii*) 15% Uneven-aged, 20-40 yrs 5-17 m 17-30 cm
Secondary Canopy Species & percent cover Age (tree core of sample tree and estimated) Height DBH	 Grand Fir (*Abies grandis*), 3% 10-15 yrs 3-4 m 6 cm
Total Canopy Cover	35-40%
Understory (species & percent cover) Shrubs, including trees <10 m Herbs, ferns, grasses, mosses, etc.	Shrubs/Ferns: 5% Hairy Honeysuckle (*Lonicera hispidula*), 4% Trailing Blackberry (*Rubus ursinus*), 1% Salal (*Gaultheria shallon*), 1% Baldhip Rose (*Rosa gymnocarpa*), <1% Scotch Broom* (*Cytisus scoparius*), <1% Douglas-fir seedlings (*Pseudostuga menziesii*), Herbaceous Plants: 2% Orchard-grass (*Dactylis glomerata*), 2% Rip-gut Brome* (*Bromus rigidus*), <1% Sweet Vernalgrass* (*Anthoxanthum odoratum*), <1% Nipplewort* (*Lapsana communis*), <1% Pacific Brome (*Bromus vulgaris*), <1% Tarweed (*Madia* sp.), <1% Pacific Sanicle (*Sanicula crassicaulis*), <1% Blue Wildrye (*Elymus glaucus*), <1% Hairy Cat's-ear*

	(*Hypochaeris radicata*), <1% Tiny Vetch* (*Vicia hirsuta*), <1% White Hawkweed (*Hieracium albiflorum*), <1% Big-leaved Sandwort (*Moehringia macrophylla*), <1% Mountain Sweet Cicely (*Osmorhiza berteroi*), <1% Fescue (*Festuca* sp.), <1% Common Vetch* (*Vicia sativa*), <1% Ribwort Plantain (*Plantago lanceolata*), <1% Barren Fescue* (*Vulpia bromoides*), <1% Small Hop-clover (*Trifolium dubium*), <1% Sticky Chickweed (*Cerastium glomeratum*) Mosses include: Oregon Beaked-moss (*Eurhynchium oreganum*) Broom Moss (*Dicranum scoparium*), Step Moss (*Hylocomium spendens*)
Observed rare/threatened species & locally uncommon species	None found
Special Features	Maturing woodland forest with marine influence.
Expected Changes	Forest will mature over time and species composition will slowly change with maturity.
Disturbance History	Built structures include benches, signs and fences along cliff edge.

FAUNA

Wildlife Habitat / Features	Maturing open forest. Arbutus berries an important food source for a range of birds.
Observed Species	Refer to Appendix C for complete list of species observed in the Sanctuary.
Rare/threatened species & locally uncommon species	None Observed

Ecological Community 3: Douglas-fir/ Alaska Oniongrass (CDFmm/03)
Description
This ecological community is a maturing forest of Douglas-fir with small amounts of Western Redcedar. The trees are small (estimated to be less than 40 years old) and the terrain is gently sloping (15°) with a south-facing aspect (200°). There is a diverse understory with many native shrubs and a small amount of the non-native Evergreen Spurge-laurel. There is a rich layer of forbs and grasses which includes Alaska Oniongrass and a range of mosses.

Mapping on the Islands Trust MapIT site does not include this plant community and polygon 3249 is mislabeled as a young forest with a mix of 70% Douglas-fir/Arbutus and 30% Douglas-fir/Salal (Islands Trust 2018b). This ecological community is red-listed by the BC CDC (2018).

FLORA

Main Canopy Species & percent cover Age (estimated) Height DBH	Douglas-fir (*Pseudotsuga menziesii*) 30%, Western Redcedar (*Thuja plicata*) 10% Uneven-aged, 25-40 yrs 10-15 m 30-55 cm
Secondary Canopy Species & percent cover Age (tree core of sample tree and estimated) Height DBH	 Grand Fir (*Abies grandis*), 5% 15-20 yrs 5 m 10cm
Total Canopy Cover	30-50%
Understory (species & percent cover) Shrubs, including trees <10 m Herbs, ferns, grasses, mosses, etc.	Shrubs/Ferns: 10% Dull Oregon-grape (*Berberis nervosa*), 5% Hairy Honeysuckle (*Lonicera hispidula*), <1% Evergreen Spurge-laurel* (*Daphne laureola*), <1% Swordfern (*Polystichum munitum*), <1% Douglas-fir seedlings (*Pseudostuga menziesii*), <1% Arbutus seedlings (*Arbutus menzeisii*) <1% Red Huckleberry (*Vaccinium parvifolium*), <1% Baldhip Rose (*Rosa gymnocarpa*) <1% Saskatoon (*Amelanchier alnifolia*), < 1% Scotch Broom* (*Cytisus scoparius*), 1% Salal (*Gaultheria shallon*), <1% Trailing Blackberry (*Rubus ursinus*), <1% Tall Oregon-grape (*Berberis aquifolium*), <1% Oregon Boxwood (*Paxistima myrsinites*) Herbaceous Plants: 6% Alaska Oniongrass (*Melica subulata*), 6% Brome (*Bromus* sp.), 3% Tarweed (*Madia* sp.), 2% Yerba Buena (*Micromeria douglasii*), 1% Sweet Vernalgrass* (*Anthoxanthum odoratum*), <1% Northern

	Starflower (*Trientalis latifolia*), <1% Rattlesnake Plantain (*Goodyera oblongifolia*), <1% Pacific Sanicle (*Sanicula crassicaulis*), <1% Scouler's Harebell (*Campanula scouleri*), <1% Western Fescue (*Festuca occidentalis*), <1% Cleavers (*Galium* aparine), <1% Wood Strawberry (*Fragaria vesca*), <1% Blue Wildrye (*Elymus glaucus*), <1% Hairy Cat's-ear* (*Hypochaeris radicata*), <1% Tiny Vetch* (*Vicia hirsuta*), <1% Fescue (*Festuca* sp.), <1% Spotted Coralroot (*Corallorhiza maculata*), <1% White Hawkweed (*Hieracium albiflorum*), <1% Big-leaved Sandwort (*Moehringia macrophylla*), <1% Nodding Onion (*Allium cernuum*), <1% Mountain Sweet Cicely (*Osmorhiza berteroi*), <1% Common Vetch* (*Vicia sativa*), <1% Broad-leaved Stonecrop (*Sedum spathulifolium*), Mosses 70% include: Oregon Beaked-moss (*Eurhynchium oreganum*), Electrified Cat's-tail (*Rhytidiadelphus triquestrus*), Broom Moss (*Dicranum scoparium*), Step Moss (*Hylocomium spendens*), Haircap Moss (*Polytrichum juniperinum*)
Observed rare/threatened species & locally uncommon species	White-lipped Rein Orchid (*Piperia candida*)
Special Features	Maturing coniferous forests. Some snags present for wildlife values.
Expected Changes	Forest will mature over time and species composition will slowly change with maturity.
Disturbance History	Trees previously logged and stumps are present.

FAUNA

Wildlife Habitat / Features	Maturing forest with snags and woody debris for wildlife.
Observed Species	**BIRDS** Brown Creeper (*Certhia americana*) Chestnut-backed Chickadee (*Poecile rufescens*) Dark-eyed Junco (*Junco hyemalis oreganus*) Northern Flicker (*Colaptes auratus*) Pacific-slope Flycatcher (*Empidonax difficilis*) Yellow-rumped Audubon's Warbler (*Setophaga coronata audubonii*) Refer to Appendix C for complete list of birds observed in the Sanctuary. **MAMMALS** Black-tailed Deer (*Odocoileus hemionus*) scat River Otter (*Lontra canadensis*) scat
Rare/threatened species &	None Observed

locally uncommon species	

Ecological Community 4: Douglas-fir/ Dull Oregon-grape (CDFmm/01)
Description
Green and Klinka (1994) refer to the site series as Douglas-fir/Salal and on this site, it corresponds to the BC CDC ecological community of Douglas-fir/ Dull Oregon-grape (CDFmm/01). There are a number of ecological communities in Medicine Beach Nature Sanctuary that are dominated by Douglas-fir/Dull Oregon-grape. Within the Sanctuary all are young forest with trees less than 60 years old. Douglas-fir is the dominant canopy species and there is a mix of Western Redcedar, Grand Fir and Red Alder either in the main canopy or in the secondary canopy. In areas with large numbers of Grand Fir in the understory, the vegetation will transition to Grand Fir/ Dull Oregon-grape (CDF mm/04). There is a diverse native shrub layer and the only non-native shrub noted was Evergreen Spurge-laurel. The herbaceous layer and mosses are relatively limited. The slope is predominantly gradual and overall aspect is to the south.

The ecological community described here includes several polygons identified by the Islands Trust MapIt including #3914, #2636 and #2696. Both #3914 and #2636 are listed as having 100% Douglas-fir/Salal (Islands Trust 2018b) (which on this site corresponds to the BC CDCs Douglas-fir/ Dull Oregon-grape). Polygon #2696 is mapped as 30% Douglas fir/ Salal with 60% Douglas-fir/ Grand Fir /Oregon-grape.

Douglas-fir/ Dull Oregon-grape is red-listed by the BC CDC (2018).

FLORA

Main Canopy Species & percent cover Age (estimated) Height DBH	Douglas-fir (*Pseudotsuga menziesii*) 30%, Western Redcedar (*Thuja plicata*) 10%, Uneven-aged, 30-60 yrs 15-20 m 40-70 cm
Secondary Canopy Species & percent cover Age (estimated) Height DBH	Grand Fir (*Abies grandis*), 15%, Western Redcedar 5%, Red Alder (*Alnus rubra*) 3% 10-20 yrs 10-15 m 11-21 cm
Total Canopy Cover	50-60%
Understory (species & percent cover) Shrubs, including trees <10 m Herbs, ferns, grasses, mosses,	Shrubs/Ferns: 70% Salal (*Gaultheria shallon*), 4% Red Huckleberry (*Vaccinium parvifolium*), 2% Swordfern (*Polystichum munitum*), <1% Hairy Honeysuckle (*Lonicera hispidula*), <1% Evergreen Spurge-laurel*

etc.	(*Daphne laureola*), <1% Trailing Blackberry (*Rubus ursinus*), <1% Snowberry (*Symphoricarpos albus*) Herbaceous Plants: <1% Cleavers (*Galium* aparine), <1% Spotted Coralroot (*Corallorhiza maculata*), <1% Mountain Sweet Cicely (*Osmorhiza berteroi*), <1% Pacific Brome (*Bromus vulgaris*), <1% Vanilla-leaf (*Achyls triphylla*), <1% Pathfinder (*Adenocaulon bicolor*), <1% Northern Starflower (*Trientalis latifolia*) Mosses 5% include: Oregon Beaked-moss (*Eurhynchium oreganum*)
Observed rare/threatened species & locally uncommon species	None observed.
Special Features	Maturing coniferous forests. Some snags present for wildlife values.
Expected Changes	Forest will mature over time and species composition in some areas will slowly change with maturity.
Disturbance History	Trees previously logged and stumps are present.

FAUNA

Wildlife Habitat / Features	Maturing forest with small snags and woody debris for wildlife.
Observed Species	**BIRDS** Hutton's Vireo Western Tanager Refer to Appendix C for complete list of birds observed in the Sanctuary. **MAMMALS** Black-tailed Deer (*Odocoileus hemionus*) scat River Otter (*Lontra canadensis*) scat
Rare/threatened species & locally uncommon species	None Observed

Ecological Community 5: Red Alder-Skunk Cabbage (CDFmm/Ws52)

Description

This site was classified using MacKenzie and Moran (2004) and is considered a treed swamp. The main canopy is dominated by Red Alder with a sparse secondary canopy of Grand Fir and Western Redcedar. Dominant understory shrubs include Salmonberry, Swordfern and Salal with small amounts of the non-native Evergreen Spurge-laurel and English Holly. Slough sedge and Skunk Cabbage are present in the herb layer. The area is level to slightly depressed with small degrees of slope in other areas. This ecological community is red-listed by the BC CDC (2018).

FLORA

Main Canopy Species & percent cover Age (estimated) Height DBH	Red Alder (*Alnus rubra*) 40% 20-30 yrs 15-20 m 35 cm
Secondary Canopy Species & percent cover Age (estimated) Height DBH	Grand Fir (*Abies grandis*), 2%, Western Redcedar 2% 5-10 yrs 3-4 m 5-10 cm
Total Canopy Cover	45-50%
Understorey (species & percent cover) Shrubs, including trees <10 m Herbs, ferns, grasses, mosses, etc.	Shrubs/Ferns: 5% Swordfern (*Polystichum munitum*), 3% Salal (*Gaultheria shallon*), 3% Salmonberry (*Rubus spectabilis*), 1% Red Huckleberry (*Vaccinium parvifolium*), 1% Evergreen Spurge-laurel* (*Daphne laureola*), 1% English Holly* (*Ilex aquifolium*), 1% Lady Fern (*Athyrium filix-femina*), <1% Trailing Blackberry (*Rubus ursinus*), <1% Oceanspray (*Holodiscus discolor*) Herbaceous Plants: 7% Slough Sedge (*Carex obnupta*), 4% Skunk Cabbage (*Lysichiton americanus*), 1% Pacific Water-parsley (*Oenanthe sarmentosa*), 1% Hedge-nettle (*Stachys chamissonis*), <1% Cleavers (*Galium* aparine), <1% Vanilla-leaf (*Achyls triphylla*), <1% Pathfinder (*Adenocaulon bicolor*), <1% Wall Lettuce (*Mycelis muralis*), <1% Common Rush (*Juncus effusus*), <1% Field Mint (*Mentha arvensis*), <1% Enchanter's-nightshade (*Circaea alpina*), <1% Large-leaved Avens (*Geum macrophyllum*), <1% Creeping Bentgrass* (*Agrostis stolonifera*), <1% Short-stemmed Sedge (*Carex brevicaulis*), <1% Giant Horsetail (*Equisetum*

	telmateia), <1% Smooth Scouring Rush (*Equisetum laevigatum*), <1% Horsetail (*Equisetum* sp.)
Observed rare/threatened species & locally uncommon species	None observed.
Special Features	Deciduous dominated swamp
Expected Changes	Forest will mature over time and species composition will slowly change with maturity.
Disturbance History	Site previously logged.

FAUNA

Wildlife Habitat / Features	Maturing forest with diverse understory.
Observed Species	**BIRDS** Brown Creeper (*Certhia americana*) Downy Woodpecker (*Picoides pubescens*) Orange-crowned Warbler (*Oreothlypis celata*) Pacific-slope Flycatcher (*Empidonax difficilis*) Red-breasted Nuthatch (*Sitta canadensis*) Song Sparrow (*Melospiza melodia*) Refer to Appendix C for complete list of birds observed in the Sanctuary.
Rare/threatened species & locally uncommon species	None Observed

Ecological Community 7: Dune Wildrye-Beach Pea (CDFmm)

Description

This ecological community is found along the low-bank berm which separates the brackish marsh from the ocean. There are no trees and very few shrubs due to the influence of salt spray. There is an extensive shell midden that forms the substrate of the ecological community and the berm may have been created by First Nations to enhance fishing (PICA 2006). The midden is mapped as archaeological site DeRT-15. There are large amounts of driftwood both on the surface and in the substrate and the driftwood accumulation has helped to create the berm. The aspect faces southeast (110°) with little to no slope (0-5°) and the elevation is at sea level. This is a red-listed ecological community (BC CDC 2018).

FLORA

Total Canopy Cover	0%
Understory (species & percent cover) Shrubs, including trees <10 m Herbs, ferns, grasses, mosses, etc.	Shrubs/Ferns: 1% Nootka Rose (*Rosa nutakana*), <1% Trailing Blackberry (*Rubus ursinus*) Herbaceous Plants: 90% Dune Wildrye (*Leymus mollis*), 2% Beach Pea (*Lathyrus japonicus*), 2% Silver Burweed (*Ambrosia chamissonis*), 2% Cleavers (*Galium* aparine), 1% Orchard-grass* (*Dactylis glomerata*), 1% Perennial Ryegrass* (*Lolium perenne*), 1% Hedge Bindweed (*Calystegia sepium*), <1% Nipplewort* (*Lapsana communis*), <1% American Sea Rocket* (*Cakile edentula*), <1% Lamb's-quarters (*Chenopodium album*), <1% Sow Thistle (*Sonchus* sp.), <1% Bull Thistle* (*Cirsium vulgare*), <1% Common Dandelion (*Taraxacum officinale*)
Observed rare/threatened species & locally uncommon species	None observed.
Special Features	Sensitive midden site with archaeological significance. Berm protects the brackish marsh from ocean waves.
Expected Changes	
Disturbance History	Berm may have been created by First Nations. The beach is used by the public and some of the driftwood has been used to build forts. This may cause erosion of the berm in the future.

FAUNA

Wildlife Habitat / Features	Thick vegetation next to shoreline provides important refuge and feeding site for wildlife. Thick vegetation also protects the sensitive brackish marsh.
Observed Species	**BIRDS**

	Orange-crowed Warbler (*Oreothlypis celata*) Song Sparrow (*Melospiza melodia*) Refer to Appendix C for complete list of birds observed in the Sanctuary. **MAMMALS** Black-tailed Deer (*Odocoileus hemionus*) scat
Rare/threatened species & locally uncommon species	Barn Swallow (*Hirundo rustica*)

Ecological Community 8: Nootka Rose Berm (not SEI)

Description

This ecological community is found along the low-bank berm which separates the brackish marsh from the ocean, just above the Dune Wildrye-Beach Pea Community. There are no trees but there are large shrubs including Douglas Hawthorn and Pacific Crabapple which are sparse throughout the plant community. There is a thick shrub layer, composed primarily from saltspray-tolerant Nootka Rose. The aspect faces southeast (110°) with little to no slope (0-5°) and the elevation is at sea level. This ecological community has been mapped as polygon #4819 and is not Sensitive Ecosystem Inventory since it has been classified as shrub/herb Douglas-fir/Salal (Islands Trust 2018b).

FLORA

Total Canopy Cover	0%
Understory (species & percent cover) Shrubs, including trees <10 m Herbs, ferns, grasses, mosses, etc.	Shrubs/Ferns: 80% Nootka Rose (*Rosa nutakana*), 5% Black Hawthorn (*Crataegus douglasii*), 5% Pacific Crab Apple (*Malus fusca*), 1% Bigleaf Maple (*Acer macrophyllum*) Herbaceous Plants: 2% Orchard-grass* (*Dactylis glomerata*), 1% Stinging Nettle (*Urtica dioica*), <1% Dune Wildrye (*Leymus mollis*), <1% Cleavers (*Galium* aparine), <1% Hairy Cat's-ear (*Hypochaeris radicata*), <1% Rip-gut Brome (*Bromus rigidus*), <1% Bull Thistle* (*Cirsium vulgare*), <1% Wild Carrot (*Daucus carota*)
Observed rare/threatened species & locally uncommon species	Henderson's Checker-mallow (*Sidalcea hendersonii*) found along edge of Ecological Community 8: Seashore Saltgrass.
Special Features	Sensitive midden site with archaeological significance. Berm protects the brackish marsh from ocean waves.
Expected Changes	
Disturbance History	Berm may have been created by First Nations. The beach is used by the public and some of the driftwood has been used to build forts. This may cause erosion of the berm in the future.

FAUNA

Wildlife Habitat / Features	Thick vegetation next to shoreline provides important refuge and feeding site for wildlife. Thick vegetation also protects the sensitive brackish marsh.
Observed Species	**BIRDS** Orange-crowed Warbler (*Oreothlypis celata*) Song Sparrow (*Melospiza melodia*) Refer to Appendix C for complete list of birds observed in the Sanctuary. **MAMMALS** Black-tailed Deer (*Odocoileus hemionus*) scat
Rare/threatened species & locally uncommon species	Barn Swallow (*Hirundo rustica*)

Ecological Community 9: Seashore Saltgrass Herbaceous Vegetation (*Distichlis spicata* var. *spicata*) (CDFmm/ Em03)

Description

This wetland is classified as Seashore Saltgrass, an estuarine ecosystem, according to MacKenzie and Moran (2004). The Seashore Saltgrass is the primary classification of the brackish marsh and there are smaller inclusions of the remaining ecological communities. There are no trees and no shrubs due to the presence of brackish water that enters the marsh at high tide. There are dense patches of Seacoast Bulrush and Spiked Rush within the community. There is no slope and the elevation is at sea level. There is a small amount of scattered driftwood on the surface. Seashore Saltgrass Herbaceous Vegetation is a red-listed ecological community (BC CDC 2018).

FLORA

Total Canopy Cover	0%
Understory (species & percent cover) Shrubs, including trees <10 m Herbs, ferns, grasses, mosses, etc.	Herbaceous Plants: 85% Seashore Saltgrass (*Distichlis spicata*), 2% Common Silverweed (*Potentilla anserina*), 2% Spike-rush (*Eleocharis* sp.), 1% Marsh Peavine (*Lathyrus palustris*), 1% Seacoast Bulrush (*Bolboschoenus maritimus*), <1% Henderson's Checker-mallow (*Sidalcea hendersonii*), <1% Cleavers (*Galium* aparine), <1% European Bittersweet* (*Solanum dulcamara*), <1% Creeping Bentgrass* (*Agrostis stolonifera*)
Observed rare/threatened species & locally uncommon species	Henderson's Checker-mallow (*Sidalcea hendersonii*) found on driftwood log and along edge of Ecological Community 7: Nootka Rose
Special Features	Brackish marsh is an uncommon community in the gulf islands.

Expected Changes	None expected.
Disturbance History	The berm may have been built by First Nations which would have created the conditions for a brackish marsh.

FAUNA

Wildlife Habitat / Features	Excellent habitat for birds such as the Virginia Rail and Marsh Wren. The Saltgrass provides habitat for numerous insects which in turn supports Pacific Chorus Frog and a rich diversity of bat species.
Observed Species	**The following list of species is for all animals observed south of the road in the Brackish Marsh Area** **BIRDS** Belted Kingfisher (*Megaceryle alcyon*) Common Yellowthroat (*Geothlypis trichas*) Marsh Wren (*Cistothorus palustris*) Northern Rough-winged Swallow (*Stelgidopteryx serripennis*) Orange-crowed Warbler (*Oreothlypis celata*) Song Sparrow (*Melospiza melodia*) Violet-green Swallow (*Tachycineta thalassina*) Virginia Rail (*Rallus limicola*) Warbling Vireo (*Vireo gilvus*) Wilson's Warbler (*Cardellina pusilla*) Yellow-rumped Audubon's Warbler (*Setophaga coronata auduboni*) Refer to Appendix C for complete list of birds observed in the Sanctuary. **MAMMALS** American Mink (*Neovison vison*) Black-tailed Deer (*Odocoileus hemionus*) scat Pacific Chorus Frog (*Pseudacris regilla*) Raccoon (*Procyon lotor*)
Rare/threatened species & locally uncommon species	Barn Swallow (*Hirundo rustica*)

Ecological Community 10: Common Cattail (*Typha latifolia*) Marsh

Description

According to MacKenzie and Moran (2004), the small pockets dominated by Cattail can be categorized as Cattail Marsh. The Common Cattail is a small inclusion within the dominant vegetation of Seashore Saltgrass within the brackish marsh. The area remains saturated with water for most of the growing season. There are no trees and no shrubs due to the presence of brackish water that enters the marsh at high tide. There is no slope and the elevation is at sea level. Nutrients are high and there is a well-developed layer of decomposed organic matter at the surface. There is a small amount of standing water beside the Common Cattail where the alga Stonewort (*Chara* sp.) and Common Duckweed (*Lemna minor*) occur. The ecological community Common Cattail Marsh is blue-listed (BC CDC 2018).

FLORA

Total Canopy Cover	0%
Understory (species & percent cover) Shrubs, including trees <10 m Herbs, ferns, grasses, mosses, etc.	Herbaceous Plants: 55% Common Cattail (*Typha latifolia*), 40% Seashore Saltgrass (*Distichlis spicata*), 1% Seacoast Bulrush (*Bolboschoenus maritimus*), <1% Clustered Dock* (*Rumex conglomeratus*), <1% Cleavers (*Galium* aparine), <1% Stonewort (*Chara* sp.), <1% Common Duckweed (*Lemna minor*)
Observed rare/threatened species & locally uncommon species	None found
Special Features	Brackish marsh is an uncommon community in the gulf islands.
Expected Changes	None expected.
Disturbance History	The berm may have been built by First Nations which would have created the conditions for a brackish marsh.

FAUNA

Wildlife Habitat / Features	Excellent habitat for birds such as the Virginia Rail and Marsh Wren. The Common Cattail provides habitat for numerous insects which in turn supports swallows, Pacific Chorus Frog and a rich diversity of bat species.
Observed Species	**The following list of species is for all animals observed south of the road in the Brackish Marsh Area** **BIRDS** Belted Kingfisher (*Megaceryle alcyon*) Common Yellowthroat (*Geothlypis trichas*) Marsh Wren (*Cistothorus palustris*)

	Northern Rough-winged Swallow (*Stelgidopteryx serripennis*) Orange-crowed Warbler (*Oreothlypis celata*) Song Sparrow (*Melospiza melodia*) Violet-green Swallow (*Tachycineta thalassina*) Virginia Rail (*Rallus limicola*) Warbling Vireo (*Vireo gilvus*) Wilson's Warbler (*Cardellina pusilla*) Yellow-rumped Audubon's Warbler (*Setophaga coronata auduboni*) Refer to Appendix C for complete list of birds observed in the Sanctuary. **MAMMALS** American Mink (*Neovison vison*) Black-tailed Deer (*Odocoileus hemionus*) scat Pacific Chorus Frog (*Pseudacris regilla*) Raccoon (*Procyon lotor*)
Rare/threatened species & locally uncommon species	Barn Swallow (*Hirundo rustica*)

Ecological Community 11: Hard-stemmed Bulrush (*Schoenoplectus acutus*) Deep Marsh

Description

MacKenzie and Moran (2004) classify this ecological community as a Great Bulrush Marsh. The Hard-stemmed Bulrush is a small inclusion within the dominant vegetation of Seashore Saltgrass within the brackish marsh and next to the Common Cattail Marsh. There are no trees and no shrubs due to the presence of brackish water that enters the marsh at high tide and plant diversity is low. There is a small amount of open water next to the Hard-stemmed Bulrush. There is no slope and the elevation is at sea level. There is a small amount of standing water next to the bulrushes. The Hard-stem Bulrush ecological community is provincially blue-listed (BC CDC 2018).

FLORA

Total Canopy Cover	0%
Understory (species & percent cover) Shrubs, including trees <10 m Herbs, ferns, grasses, mosses, etc.	Herbaceous Plants: 95% Hard-stemmed Bulrush (*Schoenoplectus acutus*), 1% Seashore Saltgrass (*Distichlis spicata*), 1% Clustered Dock* (*Rumex conglomeratus*), <1% Spike-rush (*Eleocharis* sp.), <1% Common Silverweed (*Potentilla anserina*), <1% Slough Sedge (*Carex obnupta*), <1% Cleavers (*Galium* aparine), <1% Common Duckweed (*Lemna minor*)
Observed rare/threatened species & locally uncommon	None found

species	
Special Features	Brackish marsh is an uncommon community in the gulf islands.
Expected Changes	None expected.
Disturbance History	The berm may have been built by First Nations which would have created the conditions for a brackish marsh.

FAUNA

Wildlife Habitat / Features	Excellent habitat for birds such as the Virginia Rail and Marsh Wren. The Bulrush provides habitat for numerous insects which in turn supports Pacific Chorus Frog and a rich diversity of bat species.
Observed Species	**The following list of species is for all animals observed south of the road in the Brackish Marsh Area** **BIRDS** Belted Kingfisher (*Megaceryle alcyon*) Common Yellowthroat (*Geothlypis trichas*) Marsh Wren (*Cistothorus palustris*) Northern Rough-winged Swallow (*Stelgidopteryx serripennis*) Orange-crowed Warbler (*Oreothlypis celata*) Song Sparrow (*Melospiza melodia*) Violet-green Swallow (*Tachycineta thalassina*) Virginia Rail (*Rallus limicola*) Warbling Vireo (*Vireo gilvus*) Wilson's Warbler (*Cardellina pusilla*) Yellow-rumped Audubon's Warbler (*Setophaga coronata auduboni*) Refer to Appendix C for complete list of birds observed in the Sanctuary. **MAMMALS** American Mink (*Neovison vison*) Black-tailed Deer (*Odocoileus hemionus*) scat Pacific Chorus Frog (*Pseudacris regilla*) Raccoon (*Procyon lotor*)
Rare/threatened species & locally uncommon species	Barn Swallow (*Hirundo rustica*)

Ecological Community 12: Trembling Aspen/Pacific Crab Apple/ Slough Sedge (*Populus tremuloides/ Malus fusca/Carex obnupta*) (CDFmm/ 00)

Description

This ecological community is not described by MacKenzie and Moran (2004) although it is listed by the BC Conservation Data Centre (2018). Slough Sedge is a small inclusion within the dominant vegetation of Seashore Saltgrass within the brackish marsh. There are no trees and no shrubs due to the presence of brackish water that enters the marsh at high tide. There are shrubs and small trees along the edge of the community which include Pacific Crab Apple (*Malus fusca*), Western Redcedar (*Thuja plicata*) and Pacific Willow (*Salix lucida*). No Trembling Aspen (*Populus tremuloides*) was noted. There are small patches of invasive Yellow Flag Iris (*Iris pseudacorus*) and Reed Canarygrass (*Phalaris arundinacea*). There is no slope and the elevation is at sea level. Trembling Aspen/ Pacific Crab Apple/Slough Sedge is ranked as red-listed by the BC CDC (2018).

FLORA

Total Canopy Cover	0%
Understory (species & percent cover) Shrubs, including trees <10 m Herbs, ferns, grasses, mosses, etc.	Herbaceous Plants: 90% Slough Sedge (*Carex obnupta*), 2% Skunk Cabbage (*Lysichiton americanus*), 1% Clustered Dock* (*Rumex conglomeratus*), <1% Pacific Water-parsley (*Oenanthe sarmentosa*), <1% Spike-rush (*Eleocharis* sp.), <1% Common Silverweed (*Potentilla anserina*), <1% Small-flowered Bulrush (*Scirpus microcarpus*), <1% Marsh Peavine (*Lathyrus palustris*), <1% Pacific Willow (*Salix lucida*), <1% Seashore Saltgrass (*Distichlis spicata*), <1% American Brooklime (*Veronica beccabunga*)
Observed rare/threatened species & locally uncommon species	None found
Special Features	Brackish marsh is an uncommon community in the gulf islands.
Expected Changes	None expected.
Disturbance History	The berm may have been built by First Nations which would have created the conditions for a brackish marsh.

FAUNA

Wildlife Habitat / Features	Excellent habitat for birds such as the Virginia Rail and Marsh Wren. The Slough Sedge provides habitat for numerous insects which in turn supports Pacific Chorus Frog and a rich diversity of bat species.
Observed Species	**The following list of species is for all animals observed south of the road in the Brackish Marsh**

	Area **BIRDS** Belted Kingfisher (*Megaceryle alcyon*) Common Yellowthroat (*Geothlypis trichas*) Marsh Wren (*Cistothorus palustris*) Northern Rough-winged Swallow (*Stelgidopteryx serripennis*) Orange-crowed Warbler (*Oreothlypis celata*) Song Sparrow (*Melospiza melodia*) Violet-green Swallow (*Tachycineta thalassina*) Virginia Rail (*Rallus limicola*) Warbling Vireo (*Vireo gilvus*) Wilson's Warbler (*Cardellina pusilla*) Yellow-rumped Audubon's Warbler (*Setophaga coronata auduboni*) Refer to Appendix C for complete list of birds observed in the Sanctuary. **MAMMALS** American Mink (*Neovison vison*) Black-tailed Deer (*Odocoileus hemionus*) scat Pacific Chorus Frog (*Pseudacris regilla*) Raccoon (*Procyon lotor*)
Rare/threatened species & locally uncommon species	Barn Swallow (*Hirundo rustica*)

Appendix B. Plant Species Observed in Medicine Beach Nature Sanctuary

Plant list taken from Linnaeus Environmental Consulting (2005) with Latin names added by Maslovat in 2018. Question marks are included when the species referred to by the common name may refer to more than one species (the most likely species is included).

*Indicates non-native species

+indicates species added by C. Maslovat

Common Name	**Latin Name**	**Rank**
Alaska Oniongrass	*Melica subulata*	
American Glasswort	*Salicornia pacifica*	
American Searocket	*Cakile edentula*	
Arbutus	*Arbutus menzeisii*	
Baldhip Rose	*Rosa gymnocarpa*	
Barren Brome	*Bromus sterilis*	
Beach Pea	*Lathyrus japonicus*	
Bigleaf Maple	*Acer macrophyllum*	
Big-leaved Sandwort	*Moehringia macrophylla*	
Black Hawthorn	*Crateagus douglasii*	
Black Raspberry	*Rubus leucodermis*	
Blue Wildrye	*Elymus glaucus*	
Blue-eyed Grass	*Sisyrinchium ?littorale?*	
Blue-eyed Mary	*Collinsia parviflora*	
Bracken Fern	*Pteridium aquilinum*	
Broad-leaved Starflower	*Trientalis latifolia*	
Broad-leaved Stonecrop	*Sedum spathulifolium*	
California Oatgrass	*Danthonia californica*	
Canada thistle*	*Cirsium arvense*	
Cattail	*Typha latifolia*	
Chickweed Monkeyflower	*Erythranthe alsinoides*	
Cleavers*	*Galium aparine*	
Coastal Strawberry	*Fragaria chiloensis*	
Columbia Brome	*Bromus vulgaris*	
Common Draba*	*Draba verna*	
Common Forget-me-not*	*Myosotis discolor*	
Common Groundsel*	*Senecio vulgaris*	
Common Rush	*Juncus effusus*	
Common Salsify*	*Tragopogon porrifolius*	
Common Silverweed	*Potentilla anserina*	
Common Spike-rush	*Eleocharis palustris*	
Common stork's-bill*	*Erodium circutarium*	
Creeping bentgrass*	*Agrostis stolonifera*	
Curled Dock*	*Rumex crispus*	
Death Camas	*Toxicoscordion venenosum var. venenosum*	

Douglas-fir	*Pseudostuga menziesii*	
Dovefoot Geranium*	*Geranium molle*	
Dull Oregon-grape	*Berberis nervosa*	
Dunegrass	*Leymus mollis*	
Dwarf Owl-clover	*Triphysaria pusilla*	
Early Blue Violet	*Viola adunca*	
Early Hairgrass*	*Aira praecox*	
Enchanter's Nightshade	*Circaea alpina*	
European Bittersweet*	*Solanum dulcamara*	
Fairyslipper	*Calypso bulbosa*	
Falsebox	*Paxistima myrsinites*	
Field Chickweed	*Cerastium arvense*	
Garry Oak	*Quercus garryana*	
Grand Fir	*Abies grandis*	
Hairy Cat's Ear*	*Hypochaeris radicata*	
Hairy Honeysuckle	*Lonicera hispidula*	
Hard-stemmed Bulrush	*Schoenoplectus acutus*	
Hedge Mustard*	*Sisymbrium officinale*	
Hedgehog Dogtail*	*Cynosurus echinatus*	
Henderson's checker-mallow	*Sidalcea hendersonii*	Blue List (S3)
Herb-robert*	*Geranium robertianum*	
Hooker's onion	*Allium acuminatum*	
Horsetail	*Equisetum* sp.	
Lady's Mantle*	*Alchemilla mollis*	
Large-leaved Sandwort	*Moehringia macrophylla*	
Licorice Fern	*Polypodium glycyrrhiza*	
Long-stoloned Sedge	*Carex inops*	
Marsh Peavine	*Lathyrus palustris*	
Miner's Lettuce	*Claytonia perfoliata*	
Nodding Onion	*Allium cernuum*	
Nootka Rose	*Rosa nutkana*	
Northern Starflower	*Trientalis latifolia*	
Oceanspray	*Holodiscus discolor*	
Orache*	*Atiplex* patula	
Orchard Grass*	*Dactylis glomerata*	
Pacific Crab Apple	*Malus fusca*	
Pacific Hemlock-parsley	*Conioselinum gmelinii*	
Pacific Sanicle	*Sanicula crassicaulis*	
Pacific Water-parsley	*Oenanthe sarmentosa*	
Pacific Willow	*Salix lucida*	
Pathfinder	*Adenocaulon bicolor*	
Puget Sound Gumweed	*Grindelia stricta*	

Rattlesnake Plantain	*Goodyera oblongifolia*	
Red Alder	*Alnus rubra*	
Red Elderberry	*Sambucus racemosa*	
Red Goosefoot	*Chenopodium rubrum*	
Red Huckleberry	*Vaccinium parvifolium*	
Ribwort Plantain*	*Plantago lanceolata*	
Rocky Mountain Juniper	*Juniperus maritima*	
Rose Campion*	*Lychnis coronaria*	
Salal	*Gaultheria shallon*	
Salmonberry	*Rubus spectabilis*	
Saskatoon	*Amelanchier alnifolia*	
Scotch Broom*	*Cytisus scoparius*	
Sea Blush	*Plectritis congesta*	
Seacoast Bulrush	*Bolboschoenus maritimus*	
Seashore Saltgrass	*Distichlis spicata*	
Seaside Plantain	*Plantago maritima*	
Shepherd's Purse*	*Capsella bursa-pastoris*	
Siberian Miner's Lettuce	*Claytonia sibirica*	
Silver Burweed	*Ambrosia chamissonis*	
Silver Hairgrass*	*Aira caryophyllea*	
Skunk Cabbage	*Lysichiton americanus*	
Slough Sedge	*Carex obnupta*	
Small Hop-clover*	*Trifolium dubium*	
Small-flowered Alumroot	*Heuchera micrantha*	
Small-flowered Bulrush	*Scirpus microcarpus*	
Small-flowered Fringecup	*Lithophragma parviflorum*	
Snowberry	*Symphoricarpos albus*	
Sow-thistle*	*Sonchus* sp.	
Spike Bentgrass	*Agrostis exarata*	
Spurge-laurel	*Daphne laureola*	
Stinging Nettle*	*Urtica dioica*	
Suksdorf's Mugwort	*Artemesia suksdorfii*	
Sweet Vernalgrass*	*Anthoxanthum odoratum*	
Sword Fern	*Polystichum munitum*	
Tall Oregon-grape	*Berberis aquifolium*	
Tansy Ragwort*	*Senecio jacobaea*	
Thimbleberry	*Rubus parviflorus*	
Trailing Blackberry	*Rubus ursinus*	
Twinflower	*Linnaea borealis*	
Vanilla Leaf	*Achlys triphylla*	
Wall Lettuce*	*Mycelis muralis*	
Wallace's Selaginella	*Selaginella wallacei*	

Western Buttercup	*Ranunculus occidentalis*	
Western Coralroot	*Corallorhiza mertensiana*	
Western Fescue	*Festuca occidentalis*	
Western Redcedar	*Thuja plicata*	
Western Yew	*Taxus brevifolia*	
White-flowered Hawkweed	*Hieracium albiflorum*	
Wild Carrot*	*Daucus carota*	
White-lipped Rein Orchid+	*Piperia candida*	Red List (S2)
Woodland Tarweed	*Anisocarpus madioides*	
Yarrow	*Achillea millefolium*	
Yerba Buena	*Clinopodium douglasii*	
Mosses		
Awned Haircap Moss	*Polytrichum piliferum*	
Badge Moss	*Plagiomnium insigne*	
Broom Moss	*Dicranum scoparium*	
Electrified Cat's-tail Moss	*Rhytidiadelphus triquetrus*	
Hoary Rock Moss	*Racomitrium lanuginosum*	
Juniper Haircap Moss	*Polytrichum juniperinum*	
Lanky Moss	*Rhytidiadelphus loreus*	
Large Leafy Moss	*Rhizomnium glabrescens*	
Oregon Beaked Moss	*Eurhynchium oreganum*	
Roadside Rock Moss	*Racometrium* canescens	
Slender Beaked Moss	*Eurhynchium praelongum*	
Step Moss	*Hylocomium splendens*	

Appendix C. Avian Species Observed in Medicine Beach Nature Sanctuary

Ren Ferguson surveyed Medicine Beach to compile a preliminary bird species list and identify any Species at Risk present. Surveys were done during the day, evening and dawn during July 4th and 5th. The timing of the survey was too late in the season to create a full species list and would have missed over-wintering species including waterfowl.

An evening survey was done on July 4th to confirm the presence of the crepuscular species, Common Nighthawk. Call playback was done to determine if Western Screech-owl was present. No response was heard however, Western Screech-owl is not consistent in responding to playback and it was late in the season for surveying for this species.

A total of 50 avian species were observed including 6 that are provincially- and/or federally-listed.

Common Name	**Scientific Name**	**Federal Status (COSEWIC)**	**Provincial Status**
Great Blue Heron*	*Ardea herodias fannini*	Special Concern	Blue
Turkey Vulture	*Cathartes aura*		
Osprey*	*Pandion haliaetus*		
Bald Eagle	*Haliaeetus leucocephalus*		
Cooper's Hawk*	*Accipiter cooperii*		
Virginia Rail**	*Rallus limicola*		
Common Nighthawk*	*Chordeiles minor*	Threatened	Yellow
Rufous Hummingbird*	*Selasphorus rufus*		
Belted Kingfisher*	*Megaceryle alcyon*	Candidate	Yellow
Red-breasted Sapsucker*	*Sphyrapicus ruber*		
Downy Woodpecker*	*Picoides pubescens*		
Hairy Woodpecker*	*Picoides villosus*		
Northern Flicker*	*Colaptes auratus*		
Pileated Woodpecker*	*Dryocopus pileatus*		
Olive-sided Flycatcher*	*Contopus cooperi*	Threatened	Blue
Pacific-slope Flycatcher**	*Empidonax difficilis*		
Hutton's Vireo*	*Vireo huttoni*		
Warbling Vireo*	*Vireo gilvus*		
Northwestern Crow*	*Corvus caurinus*		
Common Raven*	*Corvus corax*		
Purple Martin*	*Progne subis*		Blue
Violet-green Swallow*	*Tachycineta thalassina*		
Northern Rough-winged Swallow*	*Stelgidopteryx serripennis*		
Barn Swallow*	*Hirundo rustica*	Threatened	Blue
Chestnut-backed Chickadee**	*Poecile rufescens*		

Red-breasted Nuthatch*	*Sitta canadensis*		
Brown Creeper**	*Certhia americana*		
House Wren*	*Troglodytes aedon*		
Pacific Wren*	*Troglodytes pacificus*		
Marsh Wren**	*Cistothorus palustris*		
Swainson's Thrush*	*Catharus ustulatus*		
American Robin**	*Turdus migratorius*		
Cedar Waxwing*	*Bombycilla cedrorum*		
Orange-crowned Warbler**	*Oreothlypis celata*		
MacGillivray's Warbler*	*Geothlypis tolmiei*		
Common Yellowthroat**	*Geothlypis trichas*		
Yellow-rumped Audubon's Warbler**	*Setophaga coronata auduboni*		
Townsend's Warbler*	*Setophaga townsendi*		
Wilson's Warbler*	*Cardellina pusilla*		
Spotted Towhee*	*Pipiolo maculatus*		
Song Sparrow*	*Melospiza melodia*		
White-crowned Sparrow*	*Zonotrichia leucophrys*		
Dark-eyed Junco**	*Junco hyemalis oreganus*		
Western Tanager*	*Piranga ludoviciana*		
Black-headed Grosbeak*	*Pheucticus melanocephaus*		
Brown-headed Cowbird**	*Molothrus ater*		
Purple Finch*	*Carpodacus purpureus*		
House Finch*	*Carpodacus mexicanus*		
Red Crossbill*	*Loxia curvirostra*		
American Goldfinch*	*Spinus tristis*		

**Confirmed Breeding– Observed nest building, distraction display, used nest, recently fledged young, adults leaving or entering confirmed nest site, adult carrying faecal sac, adult carrying food for young, nest with eggs, nest with young.
*Possible Breeding – Species observed during its breeding season in suitable nesting habitat, singing male present, or breeding calls heard during breeding season in suitable nesting habitat.

List Order: Species names and order follows the American Ornithologist Union Checklist of Birds of North America, Seventh Edition, 1998 and supplements to August 2011.

Public questionnaires also noted the following species: Red-winged Blackbird, Swan, Black Oystercatcher, Loon, Hooded Merganser, Bufflehead, Pelagic Cormorant and Harlequin Duck.

Appendix D. Bat Acoustic Survey in Medicine Beach Nature Sanctuary, July 2017

Overview:

Half of BC's bat species are considered Species at Risk (vulnerable or threatened). As top predators of nocturnal insects (including mosquitoes), bats are a critical part of our ecosystems and are sensitive to land use changes. Globally, they play a vital role in the health of our ecosystems and economies by providing services such as pest control, pollination, seed dispersal and cycling nutrients (through guano) from wetlands to forests. With the very real threat of White Nose Syndrome arriving in BC in the foreseeable future, collecting baseline data about our local bat populations will increase the awareness of the important ecological and economic role these species play.

Summary:
Seven nights were sampled using an Anabat Express bat detector (serial number 314197, microphone number 314386) with a sensitivity setting of 115 and set for "night only" recording. The detector was mounted 1.7 m above the ground attached to a snag located at 10 U 480267 E 5400942 N.

838 recordings (digital files) were triggered by bats, each file containing one or more passing bats. The interpretation of the recordings was done by Peter Ommundsen. The presence of eight species was inferred from examination of the acoustic spectrograms:

Common Name	**Scientific Name**	Status
Big Brown Bat	*Eptesicus fuscus*	
Hoary Bat	*Lasiurus cinereus*	
Silver-haired Bat	*Lasionycteris noctivagans*	
California Myotis	*Myotis californicus*	
Long-eared Myotis	*Myotis evotis*	
Little Brown Myotis	*Myotis lucifugus*	Endangered
Yuma Myotis	*Myotis yumanensis*	
Brazilian Free-tailed Bat*	*Tadarida brasiliensis*	

*The first confirmed record of the Brazilian Free-tailed Bat in Canada was documented by Peter Ommundsen, Laura Matthias and Cori Lausen in 2016 on Salt Spring Island (Ommundsen *et al.* 2017). for Northwestern Vertebrate Biology https://doi.org/10.1898/NWN16-24.1}

Number of bat files by date.

Night	Number of bat files	Temperature degrees C evening/morning	Time of first/last bat pass
2017 07 04/05	136	19.5 / 11.5	2143 / 0440
2017 07 05/06	142	20.5 / 13.0	2156 / 0440
2017 07 06/07	133	20.5 / 12.75	2155 / 0437
2017 07 07/08	128	18.5 / 12.5	2145 / 0434
2017 07 08/09	106	20.75 / 14.0	2147 / 0436
2017 07 09/10	118	20.5 / 14.5	2149 / 0423
2017 07 10/11	75	17.5 / 11.0	2146 / 0334

Appendix E. Invertebrate Species Observed in Medicine Beach Nature Sanctuary

A gastropod survey was completed by Laura Matthias on July 4, 2017. A time-constrained opportunistic search occurred throughout a significant portion of the property in various ecosystem types. The thin soil deposition may contribute to the relatively low diversity at this site, and the timing of surveys was less conducive to detecting gastropods in the dry season. Gastropods play an important role in the ecosystem as dispersers of mycorrhizal fungi spores that form symbiotic relationships with roots of trees. Freshwater snails were noted in the marsh ponds.

A Cutworm Moth was found hiding in the bat acoustic detector and was photographed by Peter Ommundsen and subsequently identified by K Willard on Bug Guide (2017). The Syrphid Fly was photographed by Ren Ferguson and subsequently identified by Dr. Jeffery Skevington and Andrew Young of the Canadian National Collection of Insects, Arachnids and Nematodes.

Common Name	**Scientific Name**	**Status**
Pacific Bananaslug	*Ariolimax columbianus*	
Reticulate Taildropper	*Prophysaeon andersonni*	
Beaded Lancetooth	*Ancotrema sportella*	
Western Pondhawk	*Erythemis collocata*	Blue-list BC
Common Spreadwing	*Lestes disjunctus*	
Four-spotted Skimmer	*Libellula quadrimaculata*	
Eight-spotted Skimmer	*Libellula forensis*	
Common Whitetail	*Plathemis lydia*	
Red-veined Meadowhawk	*Sympetrum madidum*	
Lorquin's Admiral	*Limenitis lorquini*	
Western Tiger Swallowtail	*Papilio rutulus*	
Cabbage White	*Pieris rapae rapae*	
Long Water Scorpion	*Ranatra* sp.	
Cutworm Moth	*Graphiphora augur*	
Syrphid Fly	*Polydontomyia curvipes*	
Western Tent Caterpillar*	*Malacosoma californicum pluviale*	

* Western Tent Caterpillar was noted in NCC Monitoring Report (NCC 2005a).

Appendix F. Locations of Photographic Documentation

PHOTO NUMBER	DIRECTION OF PHOTO	UTM EAST	UTM NORTH	DATE	COMMENTS
1	90°	480213	5401164	July 4, 2017	Gate and signs at entrance off Aldridge Road
2	180°	480477	5400966	July 4, 2017	Bench at top of bluff overlooking Bedwell Harbour
3	70 °	480425	5400969	July 4, 2017	Ecological Community 1. Coastal Cliffs
4	120°	480346	5400970	July 4, 2017	Ecological Community 2. Douglas-fir/Arbutus
5	60°	480431	5401031	July 4, 2017	Ecological Community 3. Douglas-fir/Alaska Oniongrass
6	150°	480350	5401126	July 4, 2017	Ecological Community 4. Douglas-fir/Dull Oregon-grape
7	45°	480333	5401159	July 4, 2017	Ecological Community 5. Red Alder- Skunk Cabbage
8	210°	480316	5400923	July 5, 2017	Ecological Community 7. Dune Wildrye- Beach Pea
9	10°	480300	5400906	July 5, 2017	Ecological Community 8. Nootka Rose Berm
10	290°	480240	5400842	July 5, 2017	Ecological Community 9. Seashore Saltgrass herbaceous vegetation
11	200°	480248	5400906	July 5, 2017	Ecological Community 10. Common Cattail Marsh
12	230°	480218	5400903	July 5, 2017	Ecological Community 11. Hard-stemmed Bulrush Deep Marsh
13	60°	480226	5400929	July 5, 2017	Ecological Community 12. Slough Sedge Trembling Aspen/ Pacific Crab Apple/ Slough Sedge Ecological Community
14	Western Pondhawk	480342	5400959	July 5, 2017	On beach
15	Henderson's Checker-mallow	10 U 480247	5400843	July 5, 2017	Plant flowering on driftwood log in marsh
16	White-lipped Rein Orchid	480464	5400987	July 5, 2017	Next to trail
17	225°	480322	5400947	July 5, 2017	Trail head signs
18	180°	480328	5400945	July 5, 2017	Trail head signs (shellfish poisoning, permitted uses and

					pet waste disposal
19	45°	480342	5400964	July 5, 2017	Stonework block with plaque at trail head
20	60°	480346	5400970	July 4, 2017	Stairs
21	270°	480398	5400989	July 4, 2017	Lookout with bench and fence at top of bluff
22	180°	480257	5400835	July 5, 2017	Henderson's Checker-mallow at edge of Nootka Rose thicket
23	315°	480275	5400823	July 4, 2017	Log fort
24	Reed Canary Grass	480293	5400941	July 5, 2017	In marsh
24	Yellow Flag Iris	480240	5400954	July 5, 2017	In Marsh

Appendix G. Stakeholder Contact Brochure

Medicine Beach Watershed Areas

Watershed Area A

Second growth and old growth forests provide a groundwater recharge area upstream of Wallace Road. This fragile landscape needs special care and landowner stewardship.

Watershed Area A contains a spring-fed stream, one of only two year-round streams on North Pender!

Watershed Area B

The majority of developed residential lots in the watershed exist here. Reducing the sediment and pollutants from your property will help protect the rare species in Medicine Beach marsh.

By caring for the natural features of your property, you can reduce your impact on fragile ecosystems.

Watershed Area C

Key features of Area C include Prior Centennial Park (Gulf Islands National Park) and the Pender Elementary/Secondary School.

School children participate in nature programs in the Medicine Beach Nature Sanctuary and continue to care for their part of the watershed.

Henderson's checker-mallow (*Sidalcea hendersonii)* found in Medicine Beach marsh is listed provincialy as a species of special concern.

What is threatening the marsh?

- **Sediment** from run off and stormwater.
- **Toxic run off** from pesticides, oil, etc. from impervious surfaces like roads and driveways.
- **Decreased water flow** due to large quantities of water diverted in the watershed.
- **Invasive species** such as Scotch broom, spurge-laurel, thistle, and orchard-grass.

The integrity of the Medicine Beach marsh is dependent on the quality and quantity of water flowing into it from upland.

The Medicine Beach watershed was mapped as part of the *1995 Medicine Beach Marsh Watershed Study* authored by Reimer and Grange. The map in this brochure will help you see the connection between your property and the entire watershed area, including the Medicine Beach marsh.

What is a Watershed?

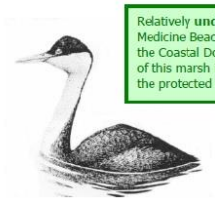
A watershed is the entire area of land that drains into a partcular watercourse or body of water (stream, marsh, wetland, etc.). Around every watershed is a moisture-dependent area known as a *riparian zone*. Watercourses and their riparian zones are like veins in the body of the landscape.

A **healthy** watershed will:

- **Slow** water flow
- **Minimize** soil erosion
- **Purify** and cool water
- **Transmit** water vapour into the atmosphere

What is the Medicine Beach Watershed?

The Medicine Beach watershed is approximately 120 hectares (264 acres) and has three separate areas, as indicated on the map. The 8.44 hectare (20.12 acres) Medicine Beach Nature Sanctuary includes a two-hectare marsh, a forested upland area and a coastal bluff.



Relatively **undisturbed** marshes like the Medicine Beach marsh are uncommon in the Coastal Douglas-fir Zone. **Protection** of this marsh is a valuable contribution to the protected areas in the Gulf Islands.

How Can You Help?

- **Leave a buffer of vegetation along streams and around wetlands** to filter run off and prevent erosion.
- **Re-establish riparian vegetation buffers** with red-oser dogwood, native willows, red alder, and western red cedar.
- **Store and dispose of toxic products safely** to prevent toxic run off from leaving your property.
- **Avoid using synthetic pesticides, herbicides, and fertilizers on your property.**
- **Control invasive species and use native plants in your garden.**
- **Resist the urge to "tidy up" waterways.** Boulders and fallen branches create habitat for fish and wildlife.
- **Design and plan construction activities with nature in mind to prevent damage to waterways.** Maintain vegetation and build during the dry season to avoid runoff of sediment into water courses.
- **Contact your local conservancy** for more information on the Medicine Beach Nature Sanctuary and how you can help protect this special legacy.

For more information contact:

Pender Islands Conservancy Association
pica@gulfislands.com

Islands Trust Fund
itfmail@islandstrust.bc.ca
www.islandstrustfund.bc.ca
250.405.5186

This brochure is printed on recycled paper.

Medicine Beach Nature Sanctuary North Pender Island

Help us care for this natural legacy

The Pender Islands Conservancy Association and Islands Trust Fund are working together to care for the Medicine Beach Nature Sanctuary so that future generations can enjoy this special natural area. The Medicine Beach marsh is a rare habitat in the dry climate of the Gulf Islands and is home to endangered plant communities and countless bird species.

Join us in our effort to continue to protect this unique sanctuary and marsh. Learn how the Medicine Beach watershed supports the Medicine Beach marsh and how your actions can help us care for this fragile area.

Islands Trust Fund

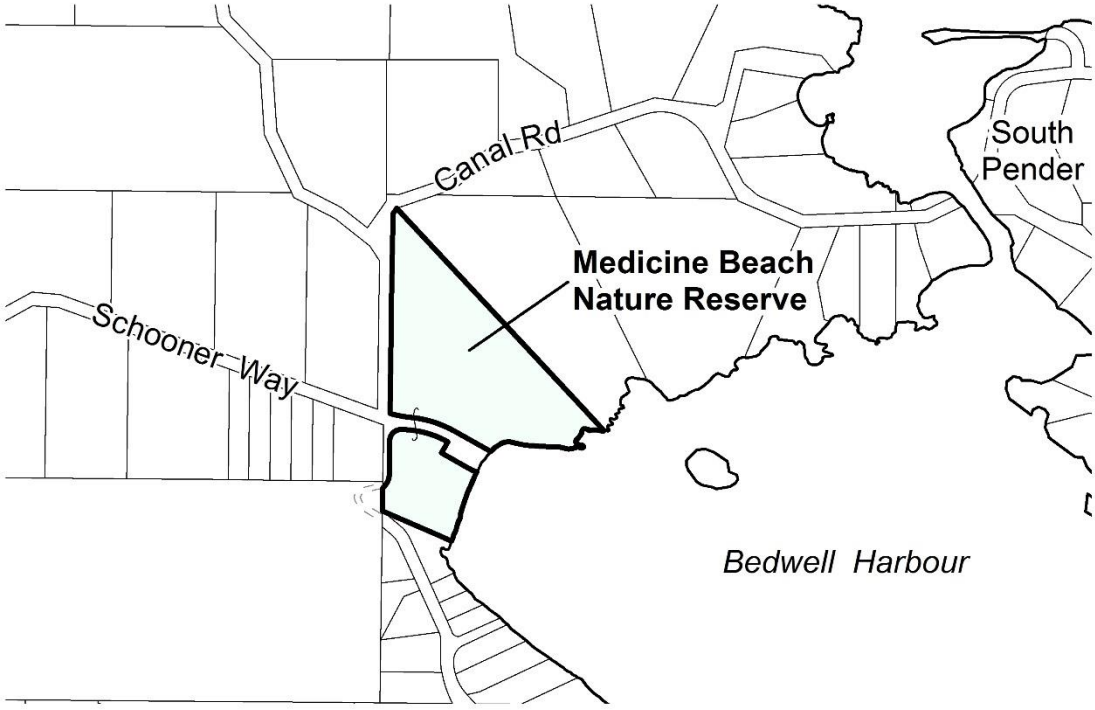
PENDER ISLANDS CONSERVANCY

Appendix H. Letter to Neighbours

January 3, 2018

Dear Neighbour,

The Islands Trust Fund is updating the management plan for the Medicine Beach Nature Sanctuary on North Pender Island and we are interested in hearing from you.



Medicine Beach Nature Sanctuary (PID 004-014-171, LOT 1, SECTION 7, PENDER ISLAND, COWICHAN DISTRICT, PLAN 16534) is a 8 hectare (20 acre) protected area located at the head of Bedwell Harbour at the end of Schooner Way. The Islands Trust Fund works with the Pender Islands Conservancy Association (PICA) to manage the property in order to protect its unique ecological values. This property includes a 2 hectare brackish marsh which is rare in the Gulf Islands, as well as 237 metres of shoreline including bluffs. The upland area is comprised of Douglas-fir, western red cedar and grand fir forest.

The management for the nature sanctuary focuses on protecting the natural values of the property. Development of any kind, including disturbance to native vegetation, soils, and water flow, is prohibited. There are restrictions on the use of the property outlined in a conservation covenant that is held by Habitat Acquisition Trust and the Nature Conservancy of Canada, put in place to protect all of the native plants and animals on the reserve. The most recent management plan was written in 2006 and it can be found on our website: http://www.islandstrustfund.bc.ca/media/10379/itfmgmtplanmbeach.pdf

In order to update the plan, your input is requested. We would like to hear from the neighbours of the Medicine Beach Nature Sanctuary with your ideas and concerns regarding the long-term management of this special place. Please complete a questionnaire on our website: http://www.islandstrustfund.bc.ca/surveymb.aspx or complete the enclosed questionnaire and scan and send it to me by email or mail, or drop off at the open house. There will be an open house on February 17, 2018 at 11:00 am at Fireside Room, Anglican Church (4703 Canal Road) with a walk to follow at the Nature Sanctuary.

Many thanks for taking the time to consider the management of this nature sanctuary. For more information, please contact me at the number or email below.

Yours sincerely,

Nuala Murphy
Property Management Specialist, Islands Trust Fund
Phone: 250-405-5193
Email: nmurphy@islandstrust.bc.ca

Appendix I. Letter to First Nations

January 3, 2018

Cowichan Tribes
Halalt First Nation
Lake Cowichan First Nation
Lyackson First Nation
Malahat Nation
Pauquachin First Nation
Penelakut Tribe
Semiahmoo First Nation
Songhees First Nation
Stz'uminus (Chemainus) First Nation
Tsartlip First Nation
Tsawout First Nation
Tsawwassen First Nation
Tseycum First Nation

Dear Chief and Council,

The Islands Trust Fund is updating the management plan for the Medicine Beach Nature Sanctuary on North Pender Island. We would like to better understand the historical and current connection First Nations have with this area of North Pender Island. We would be very interested in learning from you how the Islands Trust Fund's management planning and actions for this protected areas on North Pender Island can acknowledge and respect the cultural significance and traditional use of this area.

Medicine Beach Nature Sanctuary (PID 004-014-171, LOT 1, SECTION 7, PENDER ISLAND, COWICHAN DISTRICT, PLAN 16534) is a 8 hectare (20 acre) protected area located at the head of Bedwell Harbour at the end of Schooner Way (please see map enclosed). The Islands Trust Fund works with the Pender Islands Conservancy Association to manage the property in order to protect its unique ecological values. This sanctuary includes a 2 hectare brackish marsh which is rare in the Gulf Islands, as well as 237 metres of shoreline including bluffs and a registered archaeological site. The upland area is comprised of Douglas-fir, western red cedar and grand fir forest.

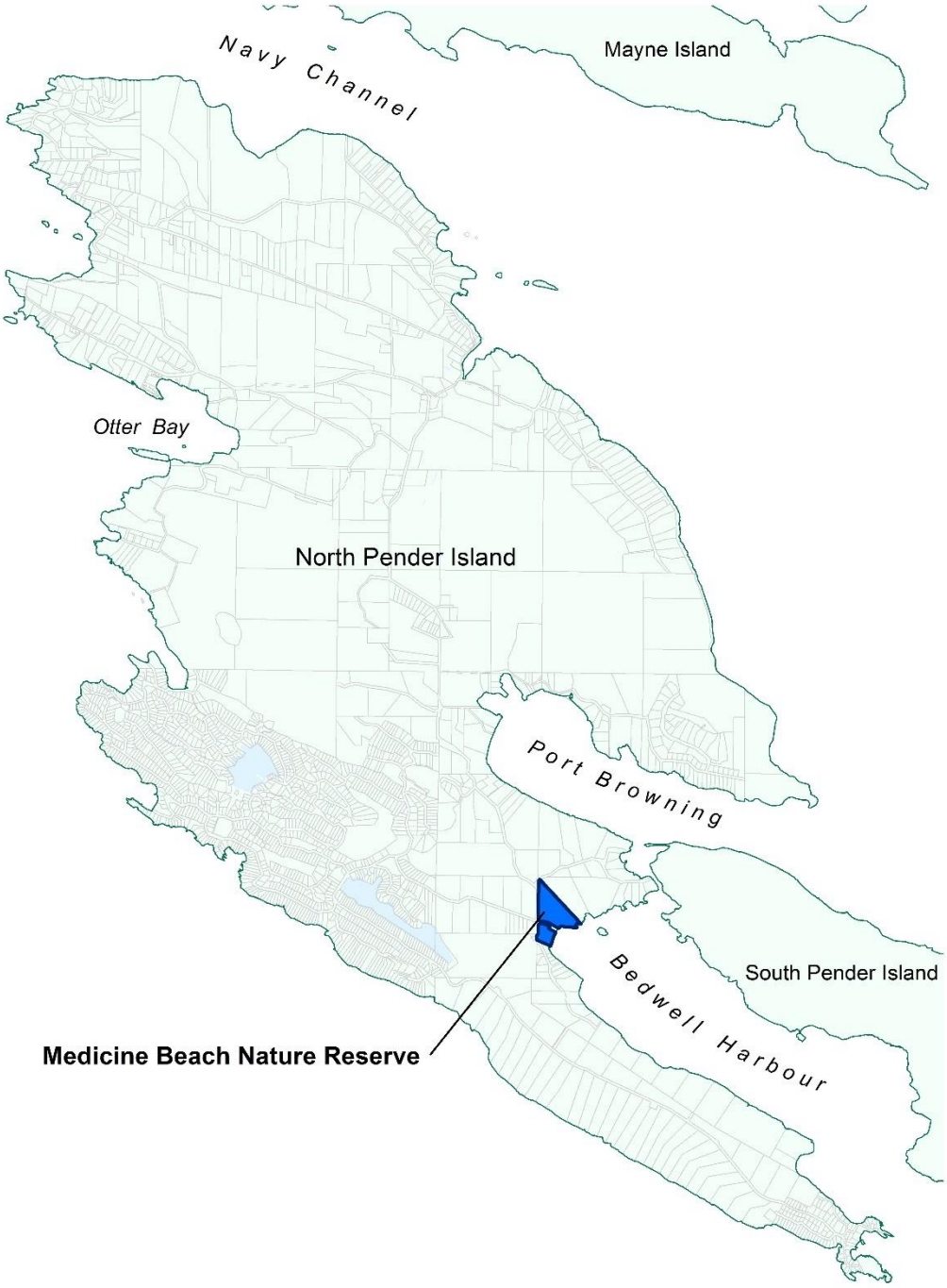
The management for the nature reserve focuses on protecting the natural values of the property. Development of any kind, including disturbance to native vegetation, soils, and water flow, is prohibited. Please consider filling out a questionnaire available on our website to assist us in gathering information: http://www.islandstrustfund.bc.ca/surveymb.aspx

There will be an Open House on February 17, 2018 at 11am at Fireside Room, Anglican Church (4703 Canal Road), with a walk to follow at the nature sanctuary. If you would like to have more information or to meet to discuss, please contact me at the email or number below.

Thank you for your consideration.

Yours sincerely,

Nuala Murphy
Property Management Specialist, Islands Trust Fund
Phone: 250-405-5193
Email: nmurphy@islandstrust.bc.ca


Navy Channel
Mayne Island
Otter Bay
North Pender Island
Port Browning
South Pender Island
Bedwell Harbour
Medicine Beach Nature Reserve

MEDICINE BEACH NATURE SANCTUARY QUESTIONNAIRE

Medicine Beach Nature Sanctuary is an 8.4 hectare protected area at the head of Bedwell Harbour. It includes beach front and a two hectare brackish marsh, with the remainder in coastal bluff and forested uplands.

The Islands Trust Fund received the land as a donation in 1995 and the first management plan for the Medicine Beach Nature Sanctuary was written in 1997 and was revised in 2006. The Islands Trust Fund's primary goal is to protect and nurture the sensitive ecosystems on this land. To do that, we revise our management plans approximately every 10 years to guide the management of the property. We are asking you to help us develop this plan. Please share your thoughts on the protection and long-term management of the Medicine Beach Nature Sanctuary.

1. Where do you live?

- ◯ North North Pender
- ◯ Mid North Pender
- ◯ South North Pender
- ◯ South Pender
- ◯ Off-island

2. Have you ever visited Medicine Beach Nature Sanctuary? If so, how often?

- ◯ No, never
- ◯ Once
- ◯ A few times
- ◯ Once a year or less
- ◯ Once a month or more

3. If you have visited Medicine Beach Nature Sanctuary, what did you do there?

- ◯ Hiking/walking
- ◯ Dog walking
- ◯ Wildlife viewing
- ◯ Accessing the beach
- ◯ Other (please list)

4. Please list any wildlife and unique plant species you have seen at or near Medicine Beach Nature Sanctuary?

5. What do you believe to be the most important values of nature reserves (choose three)

- ◯ Protection of habitat for at-risk species

- ◯ Ecosystem services (e.g. clean water and air, erosion control, groundwater recharge, etc.)
- ◯ Recreational opportunities
- ◯ Education and research opportunities
- ◯ Tourism
- ◯ Aesthetic appeal
- ◯ Conservation for the sake of the intrinsic value of nature
- ◯ Other (please specify):

6. What activities do you believe are incompatible with the protection of natural features, and should not be allowed within the Medicine Beach Nature Sanctuary?

7. What do you feel could be the greatest threat to the health of this nature reserve, and should be the highest management priority for the Islands Trust Fund?

8. Please provide any other relevant information that will help us make the best management decisions for Medicine Beach Nature Sanctuary.

9. Please share with us any history you know about this property (or south North Pender Island) or any knowledge you have about unique cultural or other special features on the property.

10. If you would like to receive periodic updates from the Islands Trust Fund on this and other conservation projects on the islands, please provide your name and email address:

Thank you for your time spent helping us plan the future of the Medicine Beach Nature Sanctuary.