Management Plan for

HORTON BAYVIARY NATURE RESERVE

Mayne Island, BC

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EXECUTIVE SUMMARY

Horton Bayviary Nature Reserve is an Islands Trust Fund nature reserve on Mayne Island consisting of one lot, Lot A Section 2, Mayne Island, Cowichan District, Plan VIP64282. It is of regional significance by virtue of protecting 0.52 hectares of maturing Coastal Douglas-fir (CDF) ecosystem and an important First Nations cultural site. Burial cairns and a midden are located on the Nature Reserve indicating significant First Nations use. The CDF ecosystem is one of the most threatened in B.C. with less than 1% protected.

The previous landowners wished to donate the property for the purpose of conservation, especially in providing habitat for a number of bird species living in the area. The Islands Trust Fund (ITF) worked with the American Land Conservancy to ensure the landowner's wishes could be met.

It is ITF's policy to develop management plans for all properties it owns, and Searle & Associates were retained in May 2002 to provide an overview site inventory, receive public comment and develop a management plan for this property. In 2015 the Mayne Island Conservancy Society was contracted to update the management plan, site inventory, and monitoring protocol.

The principal objectives of this plan are to:

- Provide an overview of environmental features and values of the property;
- Identify management issues; and
- Make recommendations for management strategies and actions to address the identified issues and the long-term protection of environmental values and natural character of the site.

The purpose of the Nature Reserve is to protect a site with natural and cultural significance. The management objectives for the reserve are to:

- Allow natural ecological processes to function without human interference, except in the case of fire; and

- Ensure that permitted uses will not significantly impair the natural condition of the site or impact the unique natural and cultural features and resources.

TABLE OF CONTENTS

EXECUTIVE SUMMARY iii

Table of Tables vi

Table of Figures vi

1.0 Introduction 1

1.1 Nature Reserve 2
1.2 Overall Objectives 2

2.0 Background 2

2.1 Methods 2
2.2 Public Consultation 3
2.3 Legal Description 3
2.4 Site History 3
2.5 Local and Regional Context 5

3.0 Overview Environmental Inventory 6

3.1 Geology and Physiography 6
3.2 Soils 6
3.3 Watercourses 7
3.4 Biological Resources 7
3.4.1 Vegetation Communities 7
3.4.2 Wildlife and Wildlife Habitat 12
3.4.3 Nearshore and Marine Intertidal Communities 12

4.0 Management Plan 17

4.1 Management Issues 17
4.1.1 Conservation Management 17
4.1.2 Recreation Management 18
4.1.3 Research Management 19
4.1.4 Legal Management 19
4.1.5 Property Monitoring 20
4.2 Management Strategies 22
4.2.1 General Management Direction 22
4.2.2 Short-term Management Strategies 22
4.2.3 Mid- to Long-term Management Strategies 22

5.0 Conclusions 23

REFERENCES 24

Appendix 1: Figures 25

Table of Tables

Table 1. The following covenants and easement exist on the property:.....4
Table 2 Vegetation association 1:.....8
Table 3 Vegetation association 2:.....9
Table 4 Vegetation association 3:.....10
Table 5. A list of all species observed at the Horton Bay Nature Reserve as of June 10th, 2015.....13
Table 6. Species observed in the intertidal zone north of the Nature Reserve on May 13th, 2010.....16
Table 7. Photomonitoring points at the Horton Bayviary Nature Reserve.....20

Table of Figures

Figure 1. General location of the Horton Bayviary Nature Reserve on Mayne Island.....25
Figure 2. Horton Bayviary, Mayne Island B.C. LOT A Section 2 Cowichan District Plan VIP64282.....26
Figure 3. Vegetation Zones identified at the Horton Baviary in 2010 and updated in 2015.....27
Figure 4. Photo point locations at the Horton Bayviary Nature Reserve.....28
Figure 5. Photomonitoring Station #1. Photo taken February 16th, 2015.....29
Figure 6. Photomonitoring Station #2. Photo taken February 16th, 2015.....29
Figure 7. Photomonitoring Station #3. Photo taken February 16th, 2015.....29
Figure 8. Photomonitoring Station #4. Photo taken February 16th, 2015.....29
Figure 9. Photomonitoring Station #5. Photo taken February 16th, 2015.....30
Figure 10. Photomonitoring Station #6. Photo taken February 16th, 2015.....30
Figure 11. Photomonitoring Station #7. Photo taken February 16th, 2015.....30
Figure 13. Photomonitoring station #8. Photo taken February 16th, 2015.....30
Figure 14. Herring milt observed 250m east of the Horton Bayviary Nature Reserve. Photo taken April 16th, 2014 by Jessie Sparks.....31

1.0 Introduction

The Islands Trust Fund (ITF) is a conservation land trust established in 1990 to preserve and protect unique ecological or cultural properties in the Islands Trust Area. As one of British Columbia's leading land trusts, the ITF works with the community to protect special places in perpetuity through voluntary land donations, conservation covenants, land acquisition and public education. The Islands Trust Fund is mandated to carry out the object of the Islands Trust, which is 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 co-operation with municipalities, regional districts, improvement districts, other persons and organizations and the government of British Columbia." More information on the Islands Trust Fund is available at www.islandstrustfund.bc.ca.

The American Land Conservancy donated Lot A, Section 2, Mayne Island, Cowichan District Plan VIP64282 to the Trust Fund Board (TFB) in 2001. The previous owners, who donated the lot to the American Land Conservancy, named the property Horton Bayviary based on its location on Horton Bay and a combination of their grandchildren's names.

Searle & Associates were retained in May 2002 to prepare the first management plan for the Horton Bayviary Nature Reserve. In 2015, the Mayne Island Conservancy Society was contracted to update the management plan to reflect changes in vegetation and management concerns on the nature reserve. A management plan provides short-term and long-term direction and guidance for the management of values and features of significance on properties owned by the ITF. It includes a biophysical description of the property, an overview of present land use and zoning, identification and discussion of management issues, and recommendation of management strategies.

The lot is typical of a maturing second growth Coastal Douglas-fir ecosystem. The most recent logging on the site was in the 1930's when the area was clear-cut (Green, 2007). Since then, a small patch was cleared in the northeast corner at an unknown date for residential use. Some of the Douglas firs have fire scars indicating a fire swept through the area in the 1940s or 1950s.

1.1 Nature Reserve

The purpose of establishing this nature reserve is to protect land with natural and cultural significance, in particular to protect:

- an area of geographically-limited Coastal Douglas-fir biogeoclimatic zone; and;
- First Nations cultural features of note.

1.2 Overall Objectives

The objective of the Management Plan is to provide overall direction of site management that will protect the natural state of the property. The objectives for management of the Horton Bayviary Nature Reserve include:

- allowing natural ecological processes to function without human interference, except in the case of fire; and
- ensuring that permitted uses will not significantly impair the natural condition of the site or impact the special features or resources.

2.0 Background

The Horton Bayviary Nature Reserve is located adjacent to the Twin Totems on the south eastern side of Mayne Island (
Figure 1). It is located between Horton Bay and Horton Bay Road and can be reached via Horton Bay Road, which runs off of Fernhill Road (Figure 2).

The previous landowners were American citizens who wished to donate the land for conservation purposes with special consideration for the birds that inhabit the area. They donated the land to the American Land Conservancy, who in turn, with consent from the donors, later donated the land to the Islands Trust Fund. The landowners requested that the lot be called the Horton Bayviary Nature Reserve.

The ITF has adopted Horton Bayviary Nature Reserve as the name for the site, in accordance with the wishes of the original donating landowners.

2.1 Methods

Information gathered for this report was derived from the sources below:

- two site visits (February 16th 2015 and June 10th 2015);
- a review of existing information including the 2002 Management Plan, 2010 Baseline Report, and annual monitoring reports;
- an open house and public comment;
- First Nations guidance; and
- discussions with relevant experts.

2.2 Public Consultation

An open house was held on July 9th, 2015, at the Mayne Island Conservancy Society office. This open house was advertised in the July edition of the Mayneliner and on the popular MayneNews website. The draft management plan was available, for public review, from the local Trustees on Mayne Island and on the Islands Trust Fund website (www.islandstrustfund.bc.ca). Oral and written submissions were soliciated. There was only one attendee to the public consultation.

First Nations with known traditional territories on Mayne were contacted to give input to the management plan and we received a detailed and informative reply from one group.

2.3 Legal Description

Horton Bayviary is approximately 0.52 hectares in size and is legally described as: PID 023-597-666, Lot A Section 2, Mayne Island, Cowichan District, Plan VIP64282 (Figure 2).

2.4 Site History

The presence of First Nations cultural features on the property confirms this was a historically used area of Mayne Island. On the far side of Mayne Island at Helen Point, First Nations presence has been dated to 3000 BC (Elliot, 1984). Many different First Nations were known to be active in the region, including the Semiahmoo, Tsawwassen, Tseycum, Pauquachin, Tsawout, Stz'uminus, Cowichan, Halalt, Lake Cowichan First Nation, Lyackson, Penelakut, and Tsartlip. European settlement on Mayne Island began in 1861 in Miners Bay, but it wasn't until the mid-1870 and 1880's that settlement occurred in other areas of Mayne Island, and at that time, settlement was primarily focused on prime agricultural land in the large valley bottoms (Elliot, 1984). Records indicate the property was clear-cut in the 1930's (Green, 2007), and tree core samples taken in 2015 support this date, with most trees in the upper canopy measuring approximately 80 years old. Some of the older trees have evident fire scars, likely from a fire in the 1930's or 40's.

The land was owned by an American family who donated the land to the American Land Conservancy in 2001, with the understanding that this organization could donate the land to the Islands Trust Fund.

Table 1. The following covenants and easement exist on the property:

EH66494	In Favour of	Mayne Island Local Trust Committee
	Covenant (94/05/16)	There shall be no further subdivision of the lot, except to the part formerly Lot 1, Plan VIP589333.
EH66495	In Favour of	Province of BC
	Covenant (94/05/16)	The lot shall not have any building constructed or mobile home placed within 15.0 metres from the Sea, Horton Bay, to protect from flooding danger.

EH098416	Restricted Covenant (94/07/18)	Inter alia; the lot shall not have any living vegetation within the area cut, limbed, trimmed, topped, disturbed, or removed, except in the event of constructing a driveway and then should be done so with the least amount of disturbance.
ES111746	Easement (01/12/11)	a portion of Lot A, Section 2, Mayne Island, Cowichan District Plan VIP64282 shall be available for the construction and maintenance and use of a water pump that will supply water to Lot B, Section 2, Mayne Island, Cowichan District Plan VIP64282.

FB366958	In Favour of	Mayne Island Conservancy Society and Habitat Acquisition Trust
	Covenant (2010/08/17)	To protect, preserve, conserve, maintain and enhance or restore the Land and the Amenities, in a natural state, and to prevent any occupation or use of the Land that will impair or interfere with the natural state of the Land or the Amenities
FB366959	In Favour of	Mayne Island Conservancy Society and Habitat Acquisition Trust

	Statutory Right of Way (2010/08/17)	to enter upon the Land to access and inspect the Land at all reasonable times

2.5 Local and Regional Context

In the 2014 Mayne Island Official Community Plan (OCP) (Bylaw #146), the Horton Bayviary land use designation was changed from Settlement Residential to Resource Conservation. As of 2015, the Horton Bayviary Nature Reserve was the only lot with this designation on Mayne Island. The only other land use designation in the OCP that offers some protection of natural areas is the Park designation. As of 2015 only 4.5% of Mayne Island was designated as Park or Resource Conservation.
According to the Islands Trust Fund 2011-2015 Regional Conservation Plan, more than 30% of Mayne Island has been permanently converted to landscapes for human use (ITF, 2010). With increasing population, pressures for development are expected to increase, making even small properties like the Horton Bayviary a valuable asset to conservation.

The Capital Regional District's 2015 Regional Sustainability Strategy re-iterates the importance of conserving green/blue spaces as described in the Provincial Capital Commission's and CRD Parks' 1997 Regional Green/Blue Spaces Strategy. The Horton Bayviary Nature Reserve fulfills this priority and as such is considered of regional significance within the Capital Regional District, which includes the Southern Gulf Islands.

The BC Conservation Data Centre identifies Coastal Douglas-fir and older second growth ecosystems as ecosystems of conservation concern. Past logging activity on the property is apparent and the ecosystem is clearly young second growth Douglas fir. In time, as the land regenerates, the Horton Bayviary Nature Reserve will begin to take on mature forest characteristics. Other disturbances to the site include a fire, most likely in the 1940s or 1950s and more recently the occasional dumping of refuse along Horton Bay Rd. One footpath exists but shows minimal use.

3.0 Overview Environmental Inventory

The environmental inventory includes an overview of geology and physiography, soils, watercourses, and biological resources.

3.1 Geology and Physiography

Approximately 85 million years ago a broad basin formed in the Strait of Georgia area. Mayne Island is underlain completely by the sand, gravel, and mud deposits that were made into this basin as well as a small amount of coal (Yorath and Nasmith, 1995). The island is a combination of promontories comprised of conglomerate and resistant sandstone and bays formed within shales. Agriculture Canada characterizes Mayne Island as having northeast-to-southwest dipping, overturned beds as a result of a broad fault zone. As well, Mayne is typified by differential erosion that resulted in ridges or hills with steep slopes on one side and gentle slopes on the other. The Horton Bayviary Nature Reserve is typical of the Mayne Island coastline. There is a slope dropping off from Horton Bay Road to the bay. The site slopes to the northeast with an elevation change of approximately 20m. No drainage areas were found on the Reserve.

3.2 Soils

There are two major types of soil found on the Horton Bayviary: Galiano, which covers approximately 90% of the land, and Saturna-Qualicum, which covers the remaining land (Research Branch of Agriculture Canada and Green et al., 1988). These are described as follows:

Galiano: Well-drained, shaly loam textured soils that have developed on shallow colluvial, residual, and glacial drift materials of less than 100 cm thick. The coarse fragment content is between 20 – 50%, increasing with depth. Where this soil type exists on the Horton Bayviary Nature Reserve, the soil is in a very shallow lithic phase with associated bedrock exposures. There is often a layer of fractured bedrock between the solum and the unweathered consolidated bedrock. Because of the limited soil cover, the best use of the land is conifer growth although growth may be limited.

Saturna-Qualicum: This soil type exists on the most southeasterly portion of the Horton Bayviary. It is mainly well-drained Saturna soil, channery sandy loam to channery loamy sand with colluvial and glacial drift materials less than 200 cm deep over sandstone bedrock that is moist during the fall and winter months but dry in the summer months. The Qualicum component is comprised of gravely sandy loam to gravely sand textured soils. Compared to the Galiano soil type, this soil is better suited for vegetation growth.

3.3 Watercourses

There are no seasonal or permanent watercourses running through the Horton Bayviary Nature Reserve.

3.4 Biological Resources

The biological resources of the reserve are described under the headings of vegetation communities, wildlife and wildlife habitat, and marine intertidal communities. See Table 5 for a list of all species observed to utilize the property as of June 10th, 2015.

3.4.1 Vegetation Communities

The site lies within the Coastal Douglas-Fir Biogeoclimatic Zone. The Terrestrial Ecosystem Mapping completed in 2007 by BA Blackwell and Associates described the entire property within a larger polygon designated CDFmm01 – Fd Salal. However, a more detailed vegetation survey completed as part of the Baseline Report in 2010 and updated in 2015 describes the property as having three distinct vegetation communities (Figure 3), including two provincially ranked red-listed plant communities and one newly described community (not yet ranked);

1. CDFmm01 Douglas fir-salal plant association (*Pseudotsuga menziesii-Gaultheria shallon*). RED LISTED

2. CDFmm04 Douglas fir/grand fir–dull Oregon grape plant association (*Pseudotsuga menziesii/Abies grandis-Mahonia nervosa*). RED LISTED

3. CDFmm51 Douglas fir/arbutus-salal/hairy honeysuckle plant association. (*Pseudotsuga menziesii/Arbutus menziesii-Gaultheria shallon/Lonicera hispidula*). NOT RANKED

The upper canopy in all zones is dominated by 75-90 year old Douglas-fir trees with the occasional Western red cedar and big leaf maple. A single arbutus tree is present as well as one yew tree, one red alder, and a small number of Douglas maple. The lower canopy is composed primarily of 10-80 year old Western red cedar, with some grand fir and big leaf maple interspersed through out. The understory is dominated by salal, sword fern, and vanilla leaf depending on the vegetation zone (Tables 2, 3, and 4). There is a rectangular shaped patch of sword fern in the northeast corner of the Reserve approximately 15m by 15m; most likely resulting from previous clearing of the land and consequent regeneration. There are few invasive species present. In 2014 and 2015 approximately 30 spurge laurel (*Daphne laureola*) seedlings were removed, as well as one English holly (*Ilex aquifolium*) tree about 2m tall. For a full list of plant species observed on the Reserve as of June 10th, 2015, see

Table 5.

Table 2 Vegetation association 1:
CDFmm01 Douglas fir-salal plant association. This is a young Douglas fir dominated forest in the upper canopy with components of Western red cedar in the secondary canopy. It is less than 90 years old with a 65% canopy closure. Dull Oregon grape (*Mahonia nervosa*) is the dominant shrub species with variable density throughout the unit. Vanilla leaf (*Achlys triphylla*) and Columbia brome (*Bromus vulgaris*) dominate the herb layer. It is moderately sloped (about 16 ^{0}) to the northeast. This vegetation association covers approximately 25% of the Covenant Area.

Tree cover (primary canopy) Upper canopy species/percent cover Age (measured with increment borer) Height range DBH range Soil moisture regime Soil nutrient regime	 Douglas-fir (*Pseudotsuga menziesii*) 55% 31-85 years 28-35 m 17-100 cm 3-4 B-C
Total primary canopy cover	55%
Tree cover (secondary canopy) secondarycanopy species/percent cover Age (measured with increment borer) Height range DBH range	 Western red cedar (*Thuja plicata*) 8% big leaf maple (*Acer macrophyllum*) 2% 20-40 years 6-12 m 8-37 cm
Total secondary canopy cover	10%
Shrub layer Species and percent cover	 dull Oregon grape (*Mahonia nervosa*) 7% salal (*Gaultheria shallon*) 2%
Total shrub cover	9%
Herb layer (dominant species only)/ percent cover (See full species list attached)	 vanilla leaf (*Achlys triphylla*) 15% Columbia brome (*Bromus vulgaris*) 3% sword fern (*Polystichum munitum*) <1%
Total herb cover	19%
Bryophyte/Lichen layer Species/percent cover dominant species only	 Oregon beaked moss (*Eurhynchium oregonum*) 3% Electrified cat's tail moss (*Rhytidiadelphus triquetrus*) 2% Step moss (*Hylocomium splendens*) <1%
Total Bryophyte/Lichen cover	5%
Observed rare, threatened and locally uncommon species	None

Special features	This unit is virtually devoid of introduced species though the road verge along the southern boundary has many introduced and weedy species present. One English holly tree also was found and removed. The relatively large and dense patch of vanilla leaf in this unit is of local significance. At the upper portions of this community older and larger Douglas fir trees are present. Woodpecker use and interspersed wildlife trees are present throughout this community.

Table 3 Vegetation association 2:
CDFmm04 Douglas fir/grand fir-Oregon grape plant association. This is a Douglas-fir dominant forest that is slightly moister than the previously described zone with a canopy closure of 60%. There are Western red cedars and grand firs interspersed in the primary canopy. The secondary canopy is composed of Western red cedar, big leaf maple, and Douglas-fir. The vegetation association at its lower limits is influenced by subsurface water flows downslope and bedrock nears the surface at the shoreline. As a result large big leaf maple and Douglas maple (*Acer glabrum*) are present. This is the most diverse community in terms of forest species including Douglas-fir, grand fir, Western red cedar, big leaf maple, Douglas maple, red alder and traces of coastal western hemlock (*Tsuga heterophylla*). One veteran Western red cedar is found in this unit (DBH ~ 1+ m; ~ 150+ years). The unit has an old clearing which currently is dominated by a dense stand of Sword Fern (*Polystichum munitum*). The unit is moderately sloped to the north (17.5^0) and is the dominant unit for the Covenant Area covering over 50%.

Tree Cover (primary canopy) Upper Canopy Species and Percent Cover Age (measured with increment borer) Height DBH range Soil moisture regime Soil nutrient regime	 Douglas-fir 55% western red cedar <1% big leaf maple 2% red alder <1% 30-80 years 38-42 m 20-92 cm 3 B
Total primary canopy cover	57%
Tree cover (secondary canopy) secondary canopy species/percent cover	 Western red cedar 5% Douglas-fir 1%

Age (measured with increment borer) Height DBH range	big leaf maple 2% 67-72 years Not measured 17.5-39 cm
Total secondary canopy cover	8%
Shrub cover Species and percent cover (dominant species only, see full list attached)	salal 40%
Total shrub cover	40%
Herb cover Species and percent cover (dominant species only, see full list attached)	sword Fern 15%
Total herb cover	20%
Bryophyte/Lichen layer Species/percent cover dominant species only	Oregon beaked moss 3% step moss 5% Electrified cat's tail moss 5%
Total Bryophyte/Lichen cover	13%
Observed rare, threatened and locally uncommon species	Douglas maple is an uncommon tree species on Mayne Island. There are presently only three known occurrences. Pacific Sideband snail (*Monadenia fidelis)* is a Blue-listed species in BC, observed in maple leaf litter. Red-legged Frog (*Rana aurora*) is a Blue-listed species in BC and was observed in this zone June 10th, 2015.
Special features	This unit because it includes the shoreline of the Covenant Area has some excellent big leaf maple specimen's (DBH 40-68 cm).

Table 4 Vegetation association 3:
CDFmm51 Douglas fir/arbutus-salal/hairy honeysuckle plant association. This is a provisional class identified for the Gulf Islands Terrestrial Ecosystem Mapping completed in 2007. This unit occupies the highest elevation of the Covenant Area and has bedrock closest to the surface. It is drier than the previous units. This association also contains some older and larger Douglas fir which dominates the main canopy with some Western red cedar. Canopy closure is 70%. This unit has the highest diversity of herbaceous species of the Covenant Area and also includes its only arbutus tree (*Arbutus menziesii*). This unit is moderately steep toward the northeast (28°) and covers about 20% of the Covenant Area.

Tree cover (primary canopy) Upper canopy species/percent cover Age (measured with increment borer) Height DBH range Soil moisture regime Soil nutrient regime	 Douglas fir 70% 60-90 years 28-34 m 15-53.5 cm 2 B
Total primary canopy cover	70%
Tree cover (secondary canopy) secondary canopy species/percent cover Age (measured with increment borer) Height DBH range	 Western red cedar 10% grand fir 2% arbutus (one individual) 3-80 years 1-19 m 0.6-33 cm
Total secondary canopy cover	12%
Shrub cover Species and percent cover (dominant species only, see full list attached)	 dull Oregon grape 3% oceanspray (*Holodiscus discolor*) <1% baldhip rose (*Rosa gymnocarpa*) <1% salal 1%
Total shrub cover	5%
Herb cover Species and percent cover (dominant species only, see full list attached)	 vanilla leaf 1% Columbia brome 1% Alaskan onion grass (*Melica subulata*) 1% sword fern <1%
Total herb cover	4%
Bryophyte/Lichen layer Species/percent cover dominant species only	 Oregon beaked moss 5% step moss 5% electrified cat's tail moss 5%
Total Bryophyte/Lichen cover	15%
Observed rare, threatened and locally uncommon species	No rarities observed. The concentration of native orchid species in this unit is of local interest and uncommon.
Special features	This unit is the highest and driest of the Covenant Area and as such has many of the drier herbaceous species. The several orchid species observed are found nowhere else in the Covenant Area. The only arbutus tree observed in the

	Covenant Area is within this unit.

3.4.2 Wildlife and Wildlife Habitat

The Horton Bayviary Nature Reserve offers a surprising variety of wildlife habitats for its 0.52ha size; with three distinct vegetation communities and nearshore interface. The structure of the forest is characteristic of a young forest with a primarily even aged upper canopy. As the forest at the Reserve matures and begins taking on habitat characteristics such as snags and fallen trees associated with a mature forest, the diversity of wildlife on the property is expected to increase. The nearshore portion of the property is heavily used by River Otters (*Lontra canadensis*) and signs of intense deer browse are present throughout the Reserve. An adult Red-legged Frog was observed near the shore on June 10th, 2015 and a diverse range of bird species have been observed at the site (

Table 5).

Rare and endangered species in British Columbia are assessed as either red- or blue-listed. Red includes any indigenous species or subspecies considered to be extirpated, endangered, or threatened in BC and blue includes any indigenous species or subspecies considered to be vulnerable in BC. Four blue listed species have been observed at the Nature Reserve including Red-legged Frog, Olive-sided Flycatcher (*Contopus cooperi*), Great Blue Heron (*Ardea herodias fannini ssp.*), and Pacific Sideband Snail. No red listed species have been observed on the property.

3.4.3 Nearshore and Marine Intertidal Communities

The shoreline of the Reserve and its adjacent intertidal zone have been classified as a Sensitive Ecosystem for Mayne Island. The intertidal area, while not part of the Reserve, is inextricably linked to the upland area and imparts certain responsibilities on the upland owner. The northern boundary, which represents the backshore, is a steep slope ranging from greater than 5m high at the northwest corner to less than 2m at the northeast corner of the Reserve. Approximately 50% of the total shore length (from west to east) is bedrock (shale) dipping to the east overlain by ~ 1m of glacial till and soil. For the remainder of its length the backshore is glacial till topped by marine washed sediments and soil.

The Horton Bay beach is comprised of mud and gravel. Mud flat beaches are typical of protected bays and have few hard surfaces for attachment. Eelgrass (*Zostera marina*) is present within Horton Bay and Pacific Herring (*Clupea pallasii*) were observed spawning approximately 250m east of the Reserve in February, 2014 (Figure 13). A biological survey of the intertidal area north of the reserve was completed on May 13th, 2010 and a species composition representative of that habitat type was observed. See Table 6 for a complete list of observed intertidal species.

Table 5. A list of all species observed at the Horton Bay Nature Reserve as of June 10th, 2015.

TREE SPECIES	
Douglas fir	*Pseudotsuga menziesii*
Western red cedar	*Thuja plicata*
Pacific yew (1 specimen)	*Taxus brevifolia*
grand fir	*Abies grandis*
bigleaf maple	*Acer macrophyllum*
Douglas maple	*Acer glabrum*
red alder	*Alnus rubra*
Scouler's willow	*Salix scouleriana*
Western hemlock	*Tsuga heterophylla*
arbutus (1 specimen)	*Arbutus menziesii*
SHRUB SPECIES	
oceanspray	*Holodiscus discolor*
baldhip rose	*Rosa gymnocarpa*
hairy honeysuckle	*Lonicera hispidula*
dull Oregon grape	*Mahonia nervosa*
salal	*Gaultheria shallon*
Saskatoon berry	*Amelanchier alnifolia*
salmonberry	*Rubus spectabilis*
trailing blackberry	*Rubus ursinus*
red huckleberry	*Vaccinium parvifolium*
English holly*	*Ilex aquifolium**
spurge laurel*	*Daphne laureola**
FERN SPECIES	
swordfern	*Polystichum munitum*
bracken fern	*Pteridium aquilinum*
lady fern	*Athyrium filix-femina*
GRASS SPECIES	
Alaskan onion grass	*Melica subulata*
orchard grass*	*Dactylis glomerata**
Columbia brome	*Bromus vulgaris*
Fescue sp.	*Festuca sp.*
HERB AND MOSS SPECIES	
Northern starflower	*Trientalis latifolia*
miner's lettuce	*Claytonia perfoliata*
cleavers	*Galium aparine*
sweet-scented bedstraw	*Galium triflorum*
veronica sp.*	(likely *V. arvense*)*
sweet cicely	*Osmorhiza berteroi*
white clover *	*Trifolium repens**
dovefoot geranium *	*Geranium molle**

common vetch*	*Vicia sativa**
vanilla leaf	*Achlys triphylla*
pathfinder	*Adenocaulon bicolor*
small-flowered alumroot	*Heuchera micrantha*
wall lettuce*	*Lactuca muralis**
calypso orchid	*Calypso bulbosa*
spotted coralroot	*Corallorhiza maculata*
rattlesnake plantain	*Goodyera oblongifolia*
purple peavine	*Lathyrus nevadensis*
Pacific sanicle	*Sanicula crassicaulis*
woodland strawberry	*Fragaria vesca*
Indian pipe	*Monotropa uniflora*
yerba buena	*Satureja douglasii*
many-flowered woodrush	*Luzula multiflora*
Western buttercup	*Ranunculus occidentalis*
creeping buttercup*	*Ranunculus repens**
stinging nettle	*Urtica dioica*
Oregon beaked moss	*Kindbergia oreganum*
tree moss	*Climacium dendroides*
step moss	*Hylocomium splendens*
electrified cat's tail	*Rhytidiadelphus triquetrus*
MAMMAL SPECIES	
River Otter	*Lontra canadensis*
Black-tailed Deer	*Odocoileus hemionus var. columbianus*
Fallow Deer*	*Dama dama*
Red Squirrel	*Tamiasciurus hudsonicus var. lanuginosus*
AMPHIBIAN SPECIES	
Red-legged Frog (B)	*Rana aurora*
BIRD SPECIES	
Orange-crowned Warbler	*Vermivora celata*
Dark-eyed Junco	*Junco hyemalis var. oreganum*
Pacific Slope Flycatcher	*Empidonax difficilis*
Song Sparrow	*Melospiza melodia*
White-crowned Sparrow	*Zonotrichia leucophrys*
American Robin	*Turdus migratorius*
Rufous Hummingbird (nesting pair)	*Selasphorus rufus*
Chestnut-backed Chickadee	*Parus rufescens*
Pacific Wren	*Troglodytes troglodytes*
Red-breasted Nuthatch	*Sitta canadensis*
Spotted Towhee	*Pipilo erythophthalmus*
Golden-crowned Kinglet	*Regulus satrapa*
Downy Woodpecker	*Picoides pubescens*

Common Raven	*Corvus corax*
Turkey Vulture	*Cathartes aura*
Bald Eagle	*Haliaeetus leucocephalus*
Varied Thrush	*Ixoreus naevius*
Olive-sided Flycatcher (B)	*Contopus cooperi*
Black-capped Chickadee	*Parus atricapillus*
Pileated Woodpecker	*Dryocopus pileatus*
Purple Finch	*Carpodacus purpureus*
Pine Siskin	*Carduelis pinus*
Red Crossbill	*Loxia curvirostra*
Great Blue Heron (beach area) (B)	*Ardea herodias var. fannini*
Mallard (pair) (beach area)	*Anas platyrhynchos*
Townsend's Warbler	*Setophaga townsendi*
Western Tanager	*Piranga ludoviciana*
Brown Creeper	*Certhia americana*
INVERTEBRATE SPECIES	
Pacific Sideband (B)	*Monadenia fidelis*
Northwestern Hesperian	*Vespericola columbianus*
Lancetooth Snail	*Ancotrema-Haplotrema sp.*
Pacific Banana Slug	*Ariolimax columbianus*

Table 6. Species observed in the intertidal zone north of the Nature Reserve on May 13th, 2010.

PLANTS	
Eelgrass	*Zostera marina*
MARINE ALGAE	
Sea Lettuce	*Ulva lactuca*
Flat-tube Sea Lettuce	*Ulva linza*
Sea Cauliflower	*Leathesia difformis*
Bull Kelp	*Nereocystis leutkeana*
Rockweed	*Fucus gardneri*
Sargassum*	*Sargassum munitum**
Red Spaghetti Seaweed	*Gracilaria/Gracilariopsis sp.*
Red Fringe	*Smithora naiadum*
INVERTEBRATES	
Acorn Barnacle	*Balanus glandula*
Thatched Barnacle	*Semibalanus cariosus*
Little Brown Acorn Barnacle	*Chthamalus dalli*
Pacific Oyster *	*Crassostrea gigas*
Butter Clam	*Saxidomus gigantean*
Horse Clam (Fat Gaper)	*Tresus capax*
Softshell Clam	*Mya arenaria*
Nuttall's Cockle	*Clinocardium nuttallii*
Dark mahogany clam *	*Nutallia obscura**
Lewis' Moonsnail	*Euspira lewisii*
Periwinkle	*Littorina sp.*
Dungeness Crab	*Cancer magister*
Hairy Hermit Crab	*Pagurus hirsutiusculus*
Purple Shore Crab	*Hemigrapsus nudus*
Green Shore Crab	*Hemigrapsus oregonensis*
Orange Ribbon Worm	*Tubulanus polymorphus*
Fifteen-scaled Scale Worm	*Harmothoe imbricata*
Orange Featherduster Tubeworm	*Chone aurantiaca*
Bamboo Worm	*Axiothella rubrocincta*
Mossy Chiton	*Mopalia muscosa*
Ochre Seastar	*Pisaster ochraceus*
Mottled Star	*Evasterias troschelii*
Giant Pink Star	*Pisaster brevispinus*
Long-armed Brittle Star	*Amphiodia occidentalis*
FISHES	
Tidepool Sculpin	*Oligocottus maculosus*
Staghorn Sculpin	*Leptocottus armatus*
Black Prickleback	*Xiphister atropurpureus*
Sculpin sp.	*Oligocottus sp.*

4.0 Management Plan

Management plans are used to provide short and long-term direction and guidance for the management of values and features of significance on properties owned by the Trust Fund Board.

It is the policy of the ITF to develop a management plan for each of its properties and then work with a Management Group, where possible, to implement the plan. A volunteer warden also monitors the Reserve for any evidence of dumping or trespassing and reports to the Mayne Island Conservancy Society, the Management Group, who would then contact the owner (Islands Trust Fund).

Section 4.1 identifies and discusses management issues while section 4.2 outlines management strategies and associated action items to address them and guide long term management of the sanctuary.

4.1 Management Issues

The management issues identified for the Horton Bayviary Nature Reserve can be categorized according to conservation management; recreation management; interpretation/education and research management; and legal management.

4.1.1 Conservation Management

4.1.1.1 Site Restoration

The site has had little recent disturbance that requires restoration. Five or six percolation holes (approximately 3'x4'x5') were identified within the Reserve by the original management plan. These holes have been filled to remove the risk of someone falling into them and as of 2015 vegetation had become established and the disturbance areas were nearly indistinguishable from the surrounding forest floor. As well, any trails found in 2010 have been allowed to revegetate to further discourage public use of the property. Historic dumping of refuse has occurred multiple times on the property, and to date no thorough effort has been made to remove this debris. Historic dumping is evident by the presence of many old glass containers in the northeast corner of the Reserve, and a pile of old asphalt shingles (approximately $1m^3$) at the same location. It is recommended this debris be removed in the near future. A wire fencing material was discovered laying along the ground and mixed in with the understory vegetation during a monitoring visit in 2014. This fencing material was removed by the Management Group on the day it was detected.

4.1.1.2 Removal of Non-Indigenous Vegetation

The Reserve currently has a dense enough canopy to exclude sun-loving exotic species such as Scotch broom (*Cytisus scoparius*), Canada thistle (*Cirsium arvense*), Himalayan blackberry (*Rubus armeniacus*), and agronomic grasses. As the forest matures and windfall events take place creating gaps in the canopy, the presence of sun loving exotics may change. Shade tolerant invasive species such as spurge laurel (*Daphne laureola*) and English holly (*Ilex aquifolium*) have been observed at the site in low numbers during annual monitoring. All occurrences have been removed at the time of detection by the management group; the Mayne Island Conservancy Society. To date, approximately 30 daphne plants have been removed and one English holly. Daphne is increasing in abundance on Mayne Island and this bird dispersed species is expected to be continually re-introduced into the Nature Reserve.

4.1.2 Recreation Management

4.1.2.1 Access

There is access by the neighbouring property owners to the east in order to access a well head, which is located on the easterly edge of the Nature Reserve. This access is allowed under easement ES111746 (Table 1). There is a slightly indented area along Horton Bay Road that can be utilized as parking for one vehicle. Vehicles are rarely observed at the parking site and are not parked for the purpose of accessing the Nature Reserve.

4.1.2.2 Trails

Currently, there is one small footpath (deer path) within the Reserve that has not been heavily used. The footpath starts at the southeast corner of the site and runs roughly parallel to Horton Bay Road and then slightly veers to the northeast until reaching Horton Bay. The path picks up again at the northeastern corner of the Nature Reserve and loops through the sword fern patch until coming back to the first part of the trail. This trail is thought to primarily be used by deer and at the shore edge, River Otter. There is a steep drop off from the vegetation to the beach, which makes the property undesirable as a beach access point.

The Horton Bayviary Nature Reserve will likely continue to have little human use. Thus, the current management goal of letting the trails revegetate should continue and no new trail work is required.

4.1.2.3 Interpretation/Public Awareness

At this time, there is no need for interpretive initiatives at this site given the Nature Reserve's purpose and the site's resources. In addition, no broad advertising of the site

is recommended beyond the Trust Fund Board's general communications (e.g. newsletters, articles in area newspapers, listed on the ITF website, and other databases of protected areas). This may be revisited as required if recreational use increases or evidence of human impact is observed by monitors.

4.1.3 Research Management

Based on the size of the site and the nature of the biological resources noted, it is unlikely that Horton Bayviary would attract any volume of research. No specific management requirements around research are needed beyond the Trust Fund Board's standard policies and procedures.

With respect to the cultural resources, the site does have some cultural feature of note. As such, there may be some interest in cultural research related to these features. It is recommended that the ITF review any requests for such research on a case by case basis and within the context of the Reserve's existing restrictions both in its designation and the covenant terms.

4.1.4 Legal Management

4.1.4.1 Liabilities

There are few concerns regarding liability at the site because it is not utilized by the public, and is located in an area of Mayne Island with low human population density. There have been discussions within the Mayne Island recreational boating community around increasing the marine docking facilities at Horton Bay, and if this should occur that area of the island could see an increase in recreational users.

4.1.4.2 Land Use Planning

The current OCP designation and zoning for the Horton Bayviary Nature Reserve is "Resource Conservation" with the only permitted land use being nature protection.

4.1.4.3 Easements and Covenants

Currently there are three covenants and one easement on the site. The covenants restrict subdivision of the lot; the disruption (by means of cutting, limbing, trimming, topping, disturbing, or moving) of any of the vegetation within the area unless, and then only as is truly necessary, for the purpose of building a driveway to a dwelling on the lot; and that no building will be constructed, or mobile home placed, within a specified distance or elevation from the natural boundary of sea at Horton Bay or if one is, then the Capital Regional District is not responsible for damages. The overarching conservation covenant held by the Mayne Island Conservancy and Habitat Acquisition Trust ensures the long-term protection, preservation, and conservation of the land and

its amenities in a natural state and prohibits any development and prevents any occupation that will impair or interfere with the natural state of the lands and its amenities.

The easement (ES111746) states that the registered owners of Lot B, Section2, Mayne Island, Cowichan District Plan VIP 64282 have an easement over a portion of the Reserve on the southeastern side that provides the right to enter into the easement area and install, use, maintain, repair or replace, a water pipeline, pump, electrical connection, and small shelter for the water pump, in order to draw water from the well located on the Easement Area (Figure 2). As of 2015, the well was actively used by the owners of Lot B as their primary water source.

The covenants and easements generally state that the Nature Reserve shall not be developed for any purpose other than nature protection except to maintain the well.

4.1.5 Property Monitoring

An annual site visit should be conducted to monitor the condition of the Horton Bayviary Nature Reserve to ensure management objectives are meet and the ecological health of the land is being maintained. Compliance with the conservation covenant terms will also be completed annually. It is recommended that the monitoring visit should include walking the property boundaries on each side to ensure that there is no encroachment concerns from adjoining properties. Invasive species such as daphne, English holly, and English ivy (*Hedera helix*) should be documented and removed as part of the annual monitoring. The best time to monitor the site would be during the spring months when the majority of floral vegetation is identifiable. Recommended monitoring routes are loosely described as: along the trail to the beach, along the beach and back up through the sword fern patch and loop back onto the trail, as well as a walk along Horton Bay Road following the edge of the Horton Bayviary Nature Reserve. There are eight photo locations as shown in Figure 4 and described in

Table 7 below. It is recommended a copy of the 2015 photos (Figures 5-13) and a copy of

Table 7 be taken into the field during monitoring so that photos can be replicated as closely as possible. The photographs provide an objective view of the entire site from multiple directions, thus providing the ITF with visual observations of the site over time.

Table 7. Photomonitoring points at the Horton Bayviary Nature Reserve.

Photo Point Number	Geographic Location NAD83 UTM 10 (northing, easting)	Bearing to Photo Center (true north)
1	5408098.3, 481845.2	314º
2	5408031.2, 481878.5	3º

3	5408042.4, 481889.8	300º
4	5408140.5, 481805.8	334º
5	5408103.9, 481776.6	316º
6	5408112.1, 481815.4	65º
7	5408135.7, 481844.2	180º
8	5408117.4, 481810.7	316º

4.2 Management Strategies

4.2.1 General Management Direction

The general management direction is to allow natural processes to continue throughout the Nature Reserve and ensure uses made of the site do not impair the natural condition of the site.

Specific management initiatives for Horton Bayviary Nature Reserve have been grouped into short-term and mid- to long-term management strategies and actions.

4.2.2 Short-term Management Strategies

Short-term management strategies include initiatives that should be implemented during the first two years of management.

Action Item 1: Contact the existing volunteer site warden to re-confirm his interest and commitment in continuing as site warden.

Action Item 2: Remove old debris from the site such as old asphalt shingles, bottles, wire fencing, etc. with particular focus on the north end of vegetation zone 2. Approximately 2-3 wheelbarrow of debris were observed during the site visit on June 10th, 2015.

4.2.3 Mid- to Long-term Management Strategies

Mid- to long-term management strategies include initiatives that should be implemented within three to ten years.

Action Item 3: Removal of any non-indigenous vegetation that appears on the site.

Action Item 4: Review the need for signage and fencing based on any increase in human activity in the area surrounding the Reserve.

5.0 Conclusions

Horton Bayviary Nature Reserve is of regional significance by virtue of protecting a young second growth Coastal Douglas-fir ecosystem with little non-indigenous vegetation. The site will become increasingly significant for wildlife habitat and vegetation complexes characteristic of mature Coastal Douglas-fir stands as long as there is little human impact on the Nature Reserve.

Key management directions identified in this Plan include leaving the site to natural processes, removing remaining debris from the northern section of the property, and continuing annual monitoring to ensure the ecological and cultural features of the Nature Reserve are maintained.

REFERENCES

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Green, R., 2007. Terrestrial Ecosystem Mapping of the Southern Gulf Islands. Prepared for Parks Canada Agency by BA Blackwell and Associates.

Islands Trust Fund, 2010. Islands Trust Fund Regional Conservation Plan 2011-2015.

Yorath, C.J. and H.W. Nasmith, 1995. The geology of Southern Vancouver Island. Pacific Section, Geological Association of Canada., Vancouver, BC.

Appendix 1: Figures

Figure 1. General location of the Horton Bayviary Nature Reserve on Mayne Island.

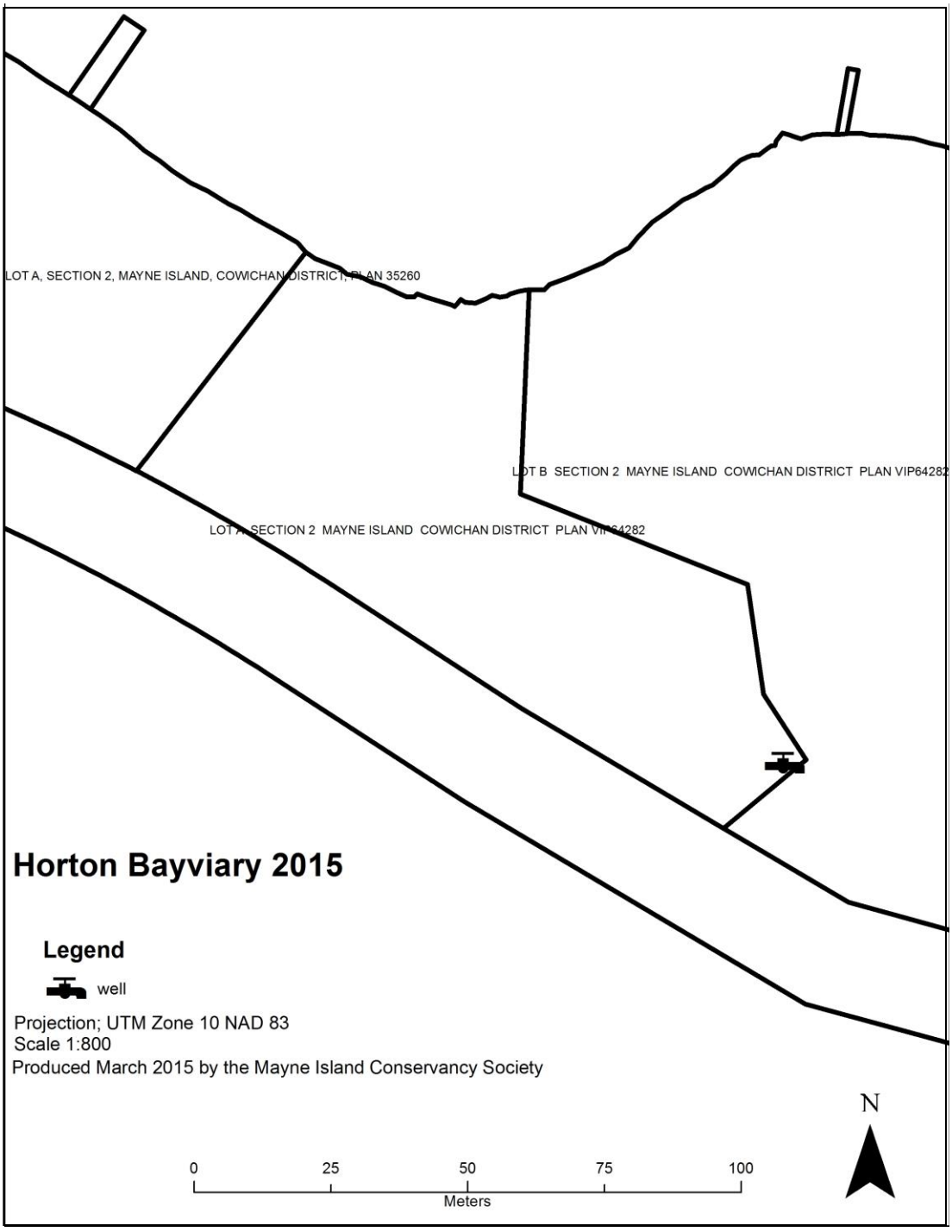

Figure 2. Horton Bayviary, Mayne Island B.C. LOT A Section 2 Cowichan District Plan VIP64282.

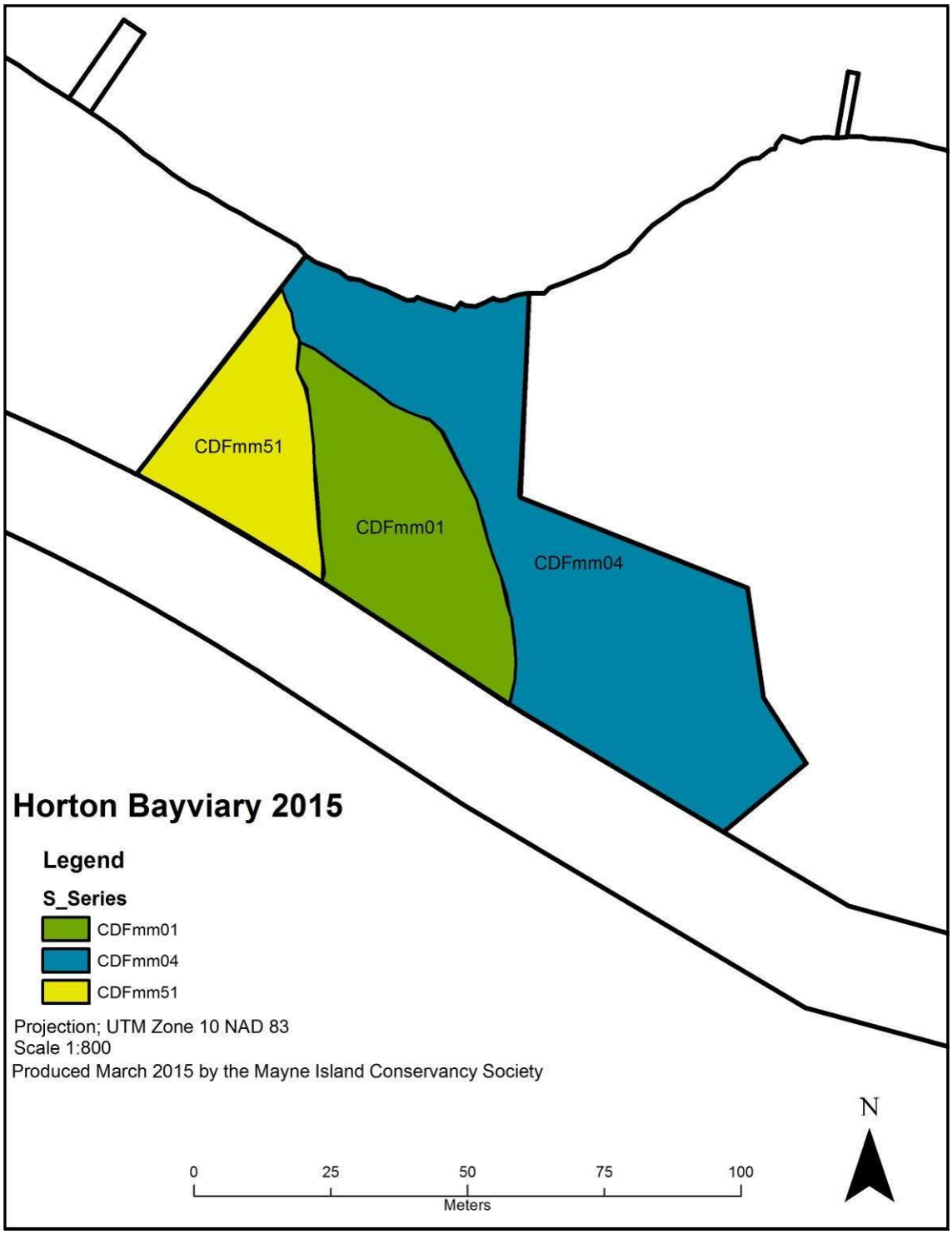

Figure 3. Vegetation Zones identified at the Horton Baviary in 2010 and updated in 2015.

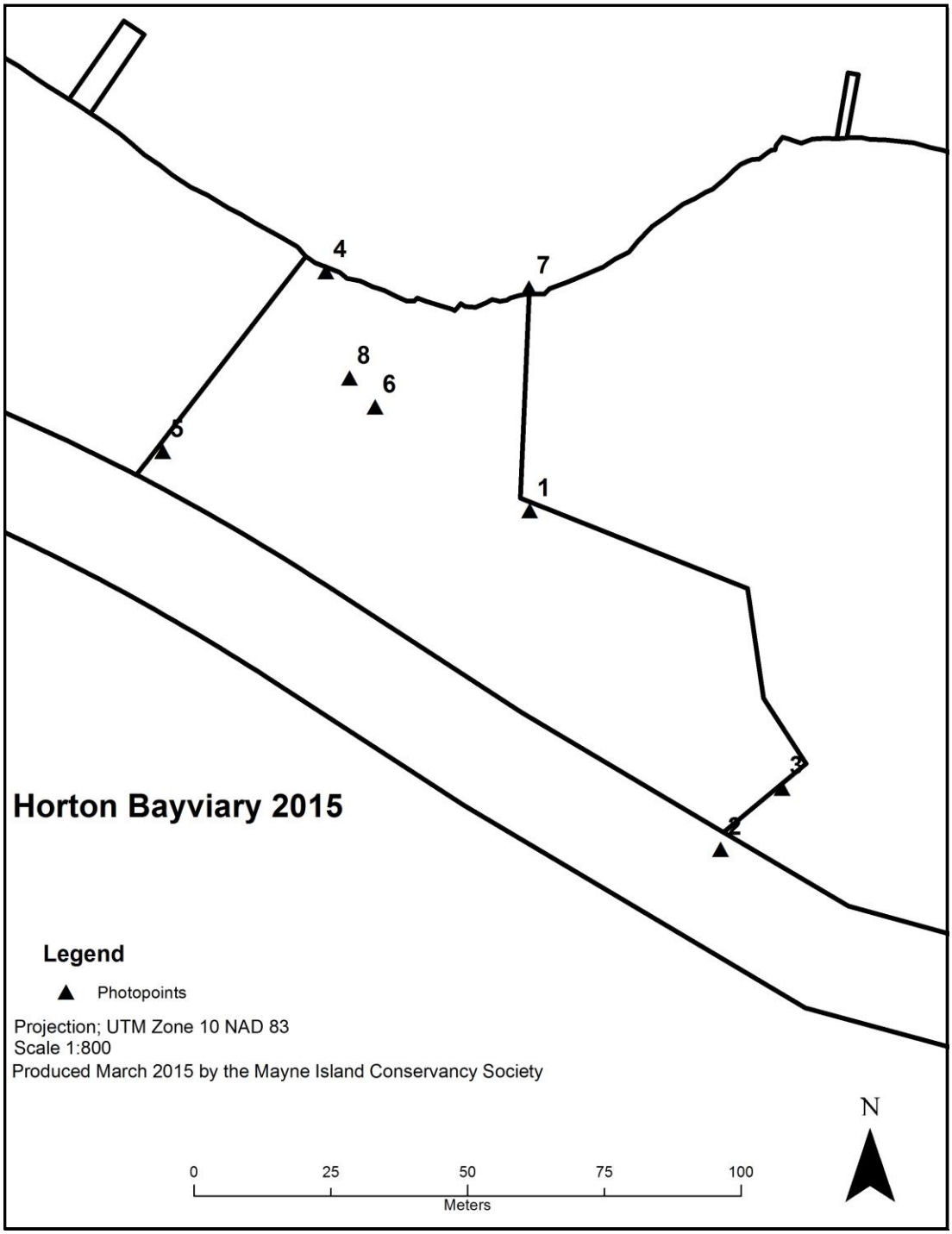

Figure 4. Photo point locations at the Horton Bayviary Nature Reserve.

Figure 5. Photomonitoring Station #1. Photo taken February 16th, 2015.

Figure 6. Photomonitoring Station #2. Photo taken February 16th, 2015.

Figure 7. Photomonitoring Station #3. Photo taken February 16th, 2015.

Figure 8. Photomonitoring Station #4. Photo taken February 16th, 2015.

Figure 9. Photomonitoring Station #5. Photo taken February 16th, 2015.

Figure 10. Photomonitoring Station #6. Photo taken February 16th, 2015.

Figure 11. Photomonitoring Station #7. Photo taken February 16th, 2015.

Figure 12. Photomonitoring station #8. Photo taken February 16th, 2015.

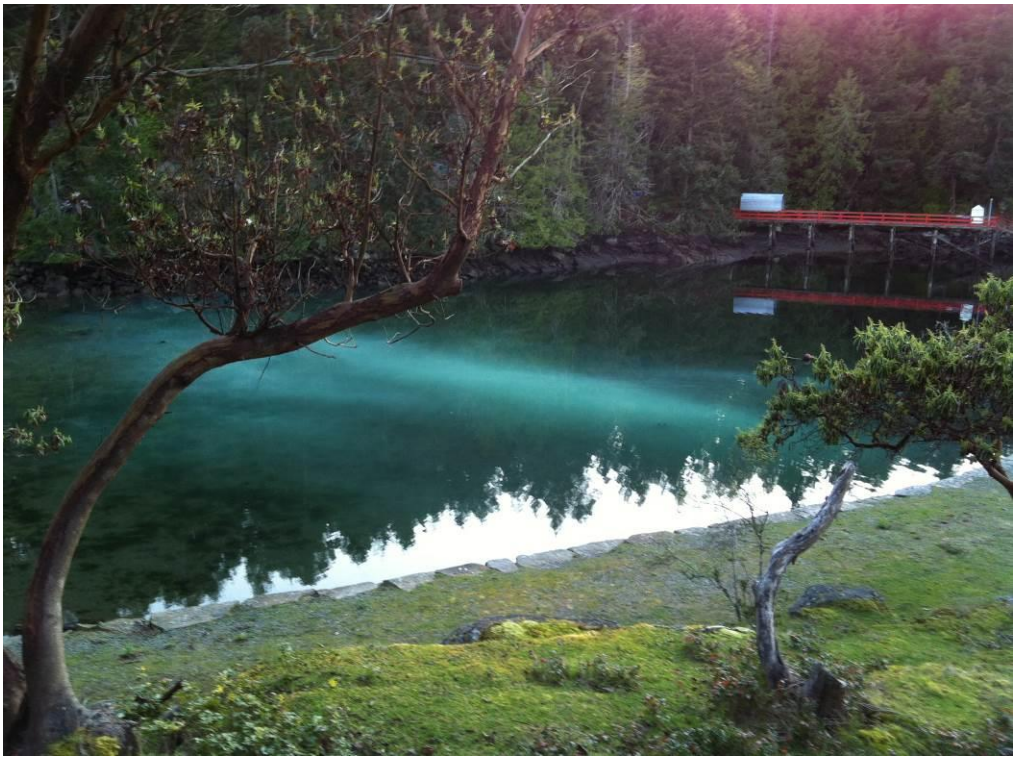

Figure 13. Herring milt observed 250m east of the Horton Bayviary Nature Reserve. Photo taken April 16th, 2014 by Jessie Sparks.