Quadra Hill Baseline Report

January 2023

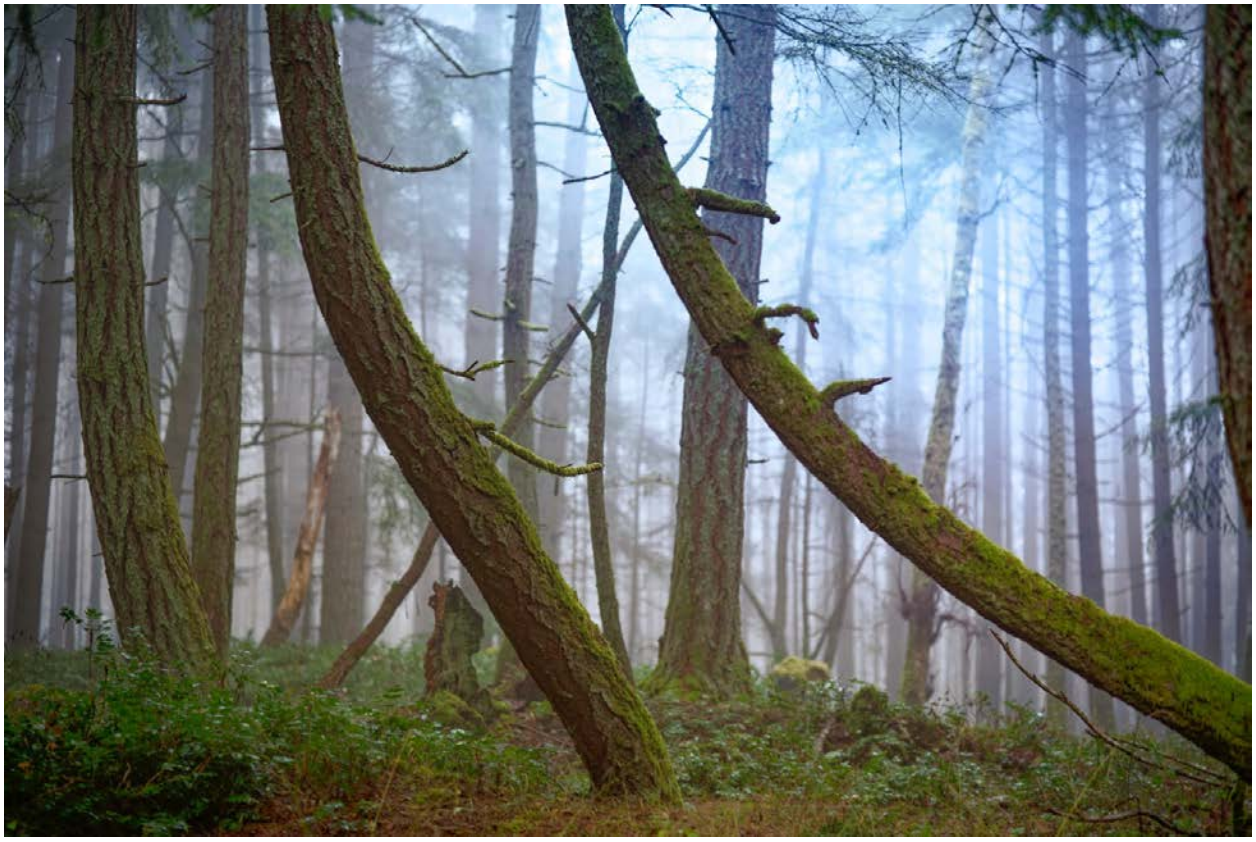

Photo credit: Jim LaBounty

Prepared by:
Adam Huggins and Michelle Thompson
on behalf of the Galiano Conservancy

Reviewed & Field Checked by:
Keith Erickson, R.P.Bio.

Financial Support:
This report was supported by an Islands Trust Conservancy Opportunity Fund grant and Environment and Climate Change Canada through the Nature Smart Climate Solutions Fund

Territorial Acknowledgement

The property described in this report (DL 58) is located within the traditional, unceded, and shared territory of the Penelakut, Hwlitsum, and other Hul'qumi'num-speaking Indigenous peoples of the Salish Sea, as well as the ceded territory of the Tsawwassen First Nation.

Table of Contents

The survey team - July 2022

Introduction

This report describes the biological and physical features and conditions of District Lot 58 (DL 58), also known as Quadra Hill, based on field surveys performed on July 6, 11, 12, 25, 26, and 27, November 29 - December 2, 2022 as well as January 10, 11, 12, and 16, 2023. The survey also incorporated information derived from pre-existing maps and inventories, baseline reports for adjacent properties, aerial photography, and LIDAR. It was prepared on behalf of the Galiano Conservancy Association, in accordance with its commitments to Environment and Climate Change Canada and the Aqueduct Foundation. The terms 'survey' and 'surveyor' used in this report are in reference to the baseline inventory survey, not a legal survey or legal land surveyor.

Survey Team

Adam Huggins - *Restoration Coordinator*
Michelle Thompson - *Conservation and Climate Coordinator*
Kendall McLaughlin - *Restoration Technician (Summer 2022)*
Sophie Dickson-Otty - *Restoration Technician (Summer 2022)*
Lily Scholz - *Intern (Summer 2022)*

Report Review & Ground Truthing

Keith Erickson - *Registered Professional Biologist*

Contact Information

Landowner / Interim Buyer

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Contact: Jennett Lee, Finance & Operations Lead
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Property Location and Details

Legal Description

District Lot 58, Galiano Island, Cowichan District, except Part 1 in Plan EPP26543
PID: 009-624-856

Civic Address

1000 Melissa Road, Galiano Island, BC, V0N 1P0

Right-of-Ways

BC Hydro and Power Authority have right-of-way along the south side of Porlier Pass Road, which follows the road as it bisects the subject property.

Undersurface rights charge in favour of HMTK in right of the province (D23415).

Latitude and Longitude

45°51’18.23”E, 54°20’33.30”N

Zoning

DL 58 is zoned Forestry 1 (F1), a classification intended for forestry-related activities (e.g., saw milling, timber production, and nursery activities). Definitions of the Islands Trust Zoning classifications can be found here.

Portions of the property are included within Development Permit Area (DPA) 4 - Elevated Groundwater Catchment Areas, DPA 5 - Sensitive Ecosystems, and DPA 7 - Steep Slopes in Galiano Island’s Official Community Plan (OCP).

While portions of two adjacent properties are included within the Provincial Agricultural Land Reserve (ALR), no ALR designation has been applied within DL 58.

Surface Area

46.77 ha (116 acres)

Elevation

57.88 - 185.77m

Directions to Property

Quadra Hill is accessed by road from the end of a gravel cul-de-sac (1000 Melissa Road) and is roughly situated in the middle of Galiano Island. From Sturdies Bay Ferry Terminal, it is about a 15-minute (14-km) drive north along Sturdies Bay Road, Porlier Pass Road, and McCoskrie Road.

Description

Galiano Island is a Southern Gulf Island located in the Strait of Georgia between Vancouver Island and the lower mainland of British Columbia, Canada. Quadra Hill (DL 58) is located mid-island on Galiano, roughly equidistant from Victoria (55 km to the south), and Vancouver (45 km to the northeast).

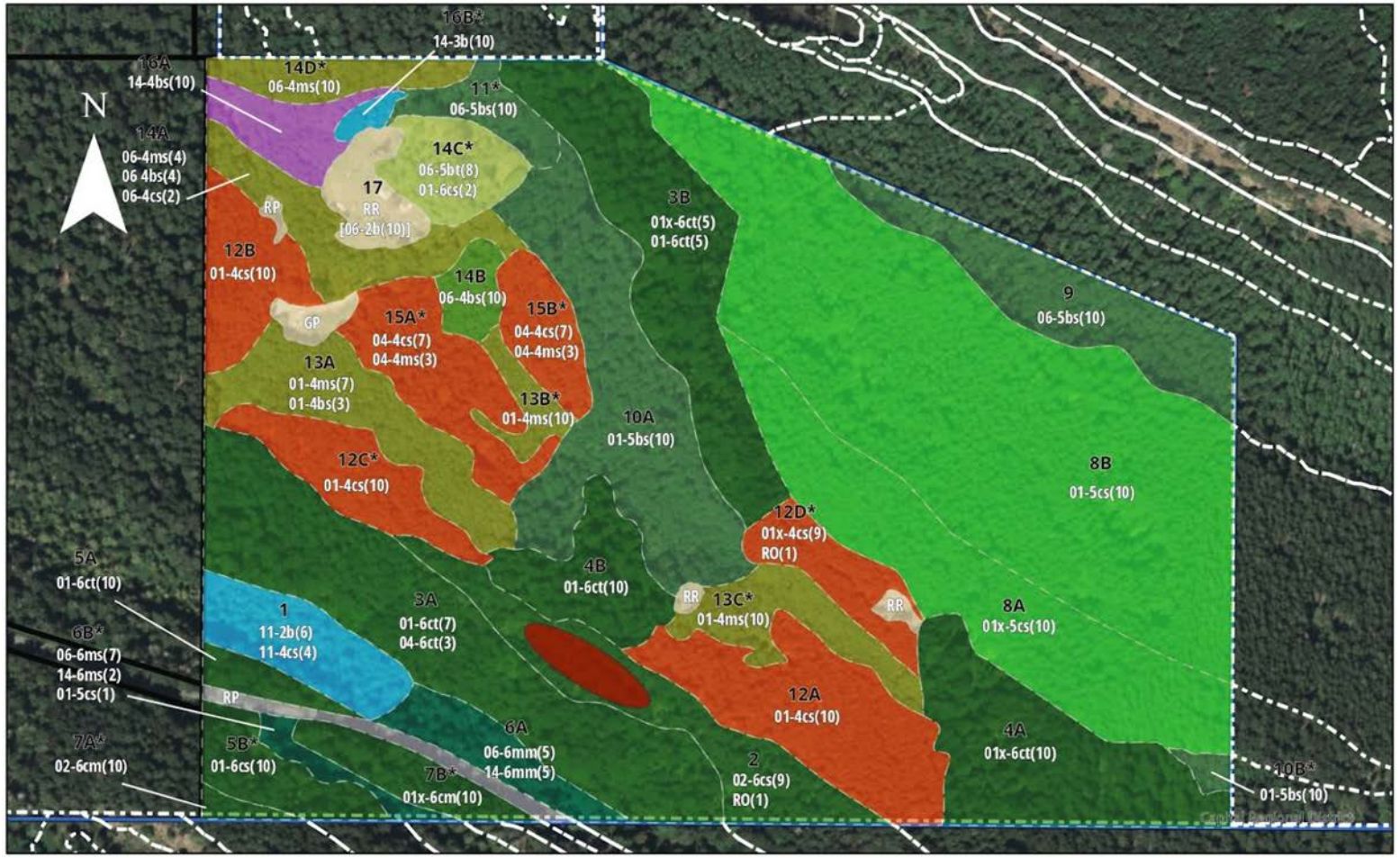
The property Quadra Hill (DL 58) consists of 46.81 ha of forest and wetland communities in the Georgia Depression ecoprovince and the Coastal Douglas-fir biogeoclimatic zone (CDFmm). Forest ecosystems range from pole/sapling and young forest to mature forest, with remnant old-growth trees scattered across the property. Wetland and disturbed wetland ecosystems occur on several level sites and depressions.

Following historical (pre-1932) harvest of the primary forest across nearly the entire property, the majority of forest stands on Quadra Hill were clear-cut in the 1940s and/or the 1990s. Regenerating broadleaf and mixed forests occur in relative topographic low areas, while dense regenerating conifer forests dominate upland sites. Scattered stands of mature forest persist. Several hectares of rich, wet forest in the northwest corner of the property were cleared by the 1960s and were used for small-scale agriculture and goat grazing in the years leading up to acquisition. In the early 1990s, a gravel pit was excavated in this area, which expanded for a couple of decades before being partially filled with concrete and levelled with soil. An unserviced cabin and garage, as well as a number of small structures, were constructed.

The baseline survey identified at least 17 ecological communities across 34 distinct polygons, corresponding to 6 BEC site series. These communities were delineated based on slope position, forest structure, forest age, vegetation composition, and soil profile. Map 1 provides an overview of patches and ecological communities for the property, as well as a breakdown of BEC ecosystem map units, which are summarized in Table 1.

Many of these ecological communities are included on the Provincial Schedule 1 (Red) and Schedule 2 (Blue) lists due to the prevalence of development and land conversion within the larger CDFmm. They are likely to support a variety of Species at Risk that have been confirmed to occur on neighbouring properties within the Mid-Island Protected Areas Network (MIPAN). A small number of individual Garry oak (*Quercus garryana*) trees occur in a suitable mature forest community on a southwest-facing ridgeline. Many Species at Risk are associated with Garry oak woodlands, and may be detected in future surveys.

Map 1: Ecological Communities of Quadra Hill



DL 58 - Ecological Communities

NAD 1983 UTM Zone 10N
Transverse Mercator
Date: January 2023
Created by: Galiano Conservancy Association

0 50 100 200 Meters

Protected Area
Property Line
Ecological Community
Garry Oaks Present
1 Ecological Community
A Ecological Subcommunity
* No Veg Plot

01 - A K S (10)
Site Series | Stage | Composition | Story | Decimal

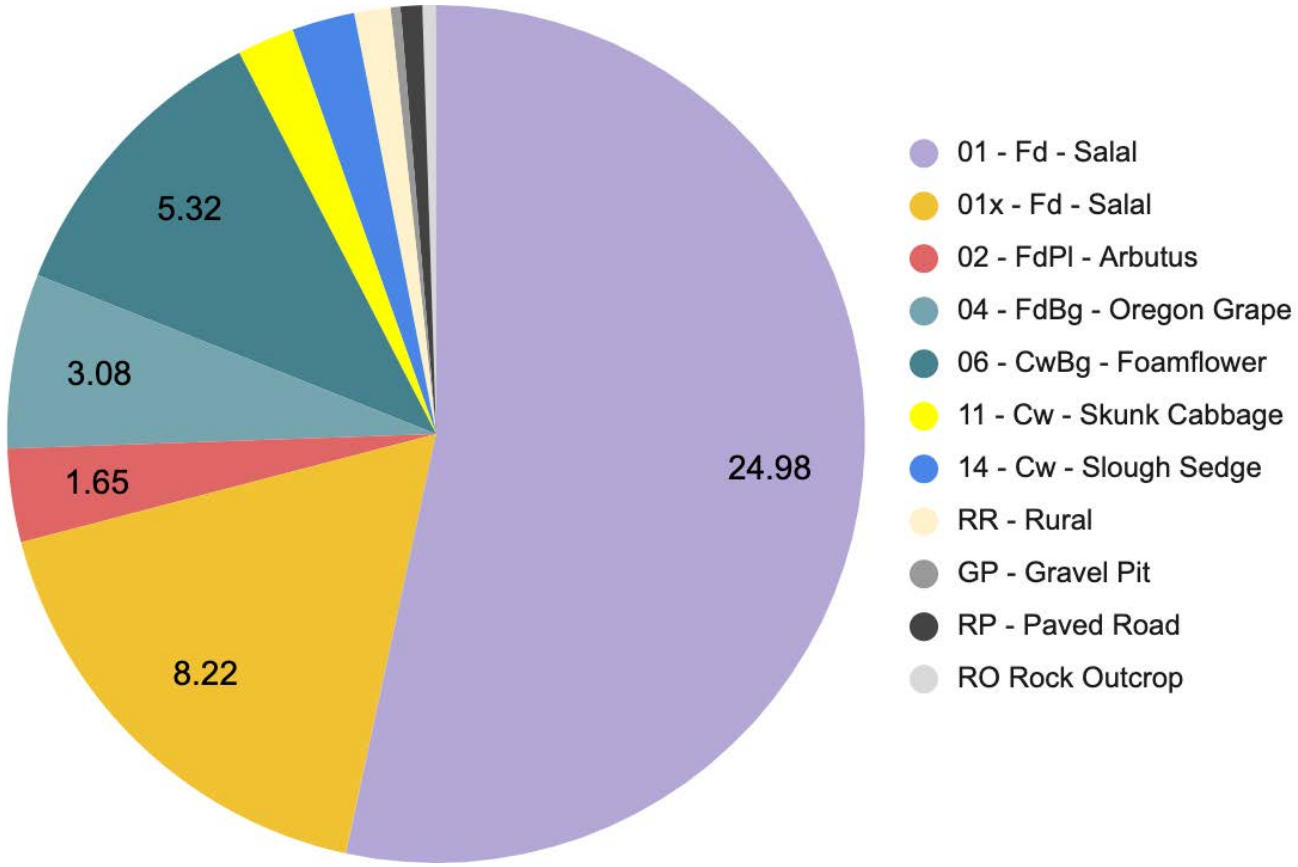
Ecological Communities
Marsh - Swamp Complex

Legend
Disturbed Swamp
Pole-sapling Broadleaf Forest
Pole-Sapling Conifer Forest
Pole-Sapling Mixed Forest
Young Broadleaf Forest
Young Conifer Forest
Mature Conifer Forest
Mature Mixed Forest
Rural Ag / Structures
Treed Pasture
Porlier Pass Road RoW

Table 1: Terrestrial Ecosystem Map Units and Modifiers

SITE CLASSIFICATION			MODIFIERS	
Code	**Site Series / Unit [colour indicates BC status]**	**Notes**	**Code**	**Structural Stage**
01	DS: Douglas-fir - Salal	Zonal ecosystem -"x" denotes dry conditions	2b	Herbaceous - Forb
02	DA: Douglas-fir - Shore pine - Arbutus	Very dry, poor soils - supports Garry Oak	3	Shrub / Herb
03	DO: Douglas-fir - Oniongrass	Very dry, rich soils - supports Garry Oak	4	Pole / Sapling Forest
04	DG: Douglas-fir - Grand fir - Oregon grape	Dry, rich soils	5	Young Forest
05	RK: Western redcedar - Douglas-fir - *Kindbergia*	Poor, fresh soils	6	Mature Forest
06	RF: Western redcedar - Grand fir - Foamflower	Rich, fresh soils	8	Old Forest
07-09	*(Floodplain Site Series)*	Do not typically occur on Galiano Island		
10	LS: Shore pine - Sphagnum	Poor, wet soils - very rare on Galiano Island	**Code**	**Composition**
11	RC: Western redcedar - Skunk cabbage	Rich, wet soils with year-round water source	c	>75% Conifer cover
12	RV: Western redcedar - Vanilla leaf	Rich, dry soils with fluctuating water table	b	>75% Broadleaf cover
13	RP: Western redcedar - Juneplum	Rich, fresh soils with fluctuating water table	m	Broadleaf + Conifer mix
14	CS: Western redcedar - Slough sedge	Rich, wet soils with fluctuating water table		
RO	Rock Outcrop	May support bryoids and wildflowers	**Code**	**Structure**
RR	Rural	Includes structures, agricultural fields, etc.	s	single-storied
RP	Road Surface	Includes dirt and paved roads	t	two-storied
GP	Gravel Pit	Partially re-filled with concrete and soil	m	multi-storied

Area (ha) by CDFmm Site Series



Connectivity

Adjacent Properties

DL 58 shares 77% of its border with protected areas within the Mid-Island Protected Areas Network (MIPAN). Consisting of 668 ha of protected land held by the Galiano Conservancy Association (GCA), the Islands Trust Conservancy (ITC), The Nature Trust of BC (TNTBC), and the Province of BC (Crown land and Provincial Park), MIPAN spans from Trincomali Channel to the Georgia Strait, and across more than 7 km, from Bodega Ridge Provincial Park in the north to the Trincomali Nature Sanctuary (ITC) in the south. DL 58 directly borders the Great Beaver Swamp Nature Reserve (GCA) to the north, Vanilla Leaf Land Nature Reserve (ITC) to the northeast and east, and the Millard Learning Centre (GCA) to the south (see Map 2).

The western property boundary is shared with the Retreat Cove Farms property, which is privately-held land that contains some of the largest contiguous patches of intact mature forest on Galiano Island. Retreat Cove Farms is owned collectively by a group of residents who live in houses along the coast and is unlikely to be developed in the immediate future due to the collective ownership model.

Other protected areas within 2 km of Quadra Hill are the Pebble Beach Reserve (GCA and Crown land), the Trincomali Nature Sanctuary, Qw'xwulwis - Cable Bay Conservation Area (TNTBC), Retreat Island Nature Sanctuary (GCA), and Laughlin Lake Nature Reserve (GCA).

Watersheds

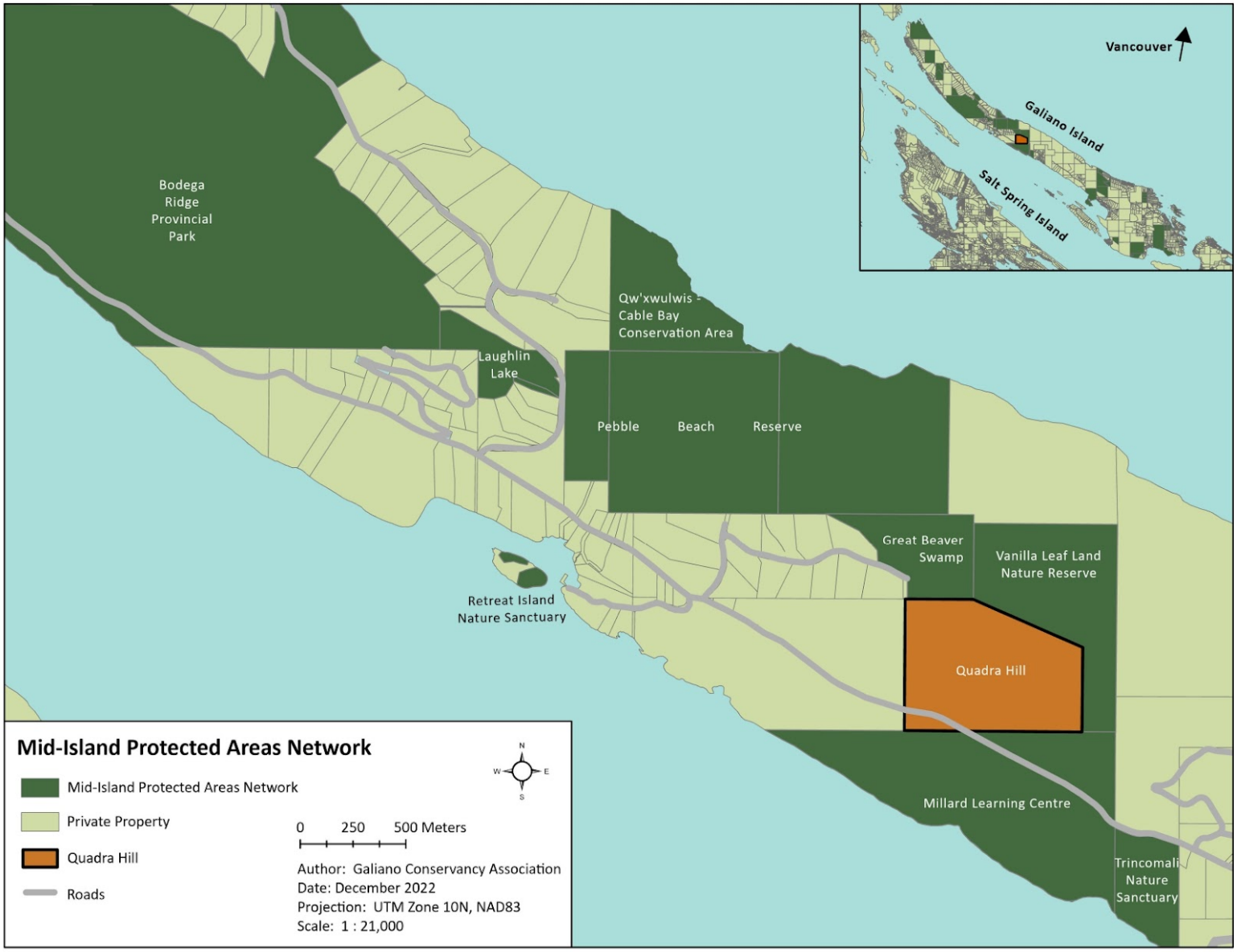
DL 58 includes land within two watersheds and three drainages (see Map 3).

Precipitation that falls south of the southernmost ridgeline enters a large watershed that drains westward through the neighbouring Retreat Cove Farms property to the Millard Learning Centre and Trincomali Channel.

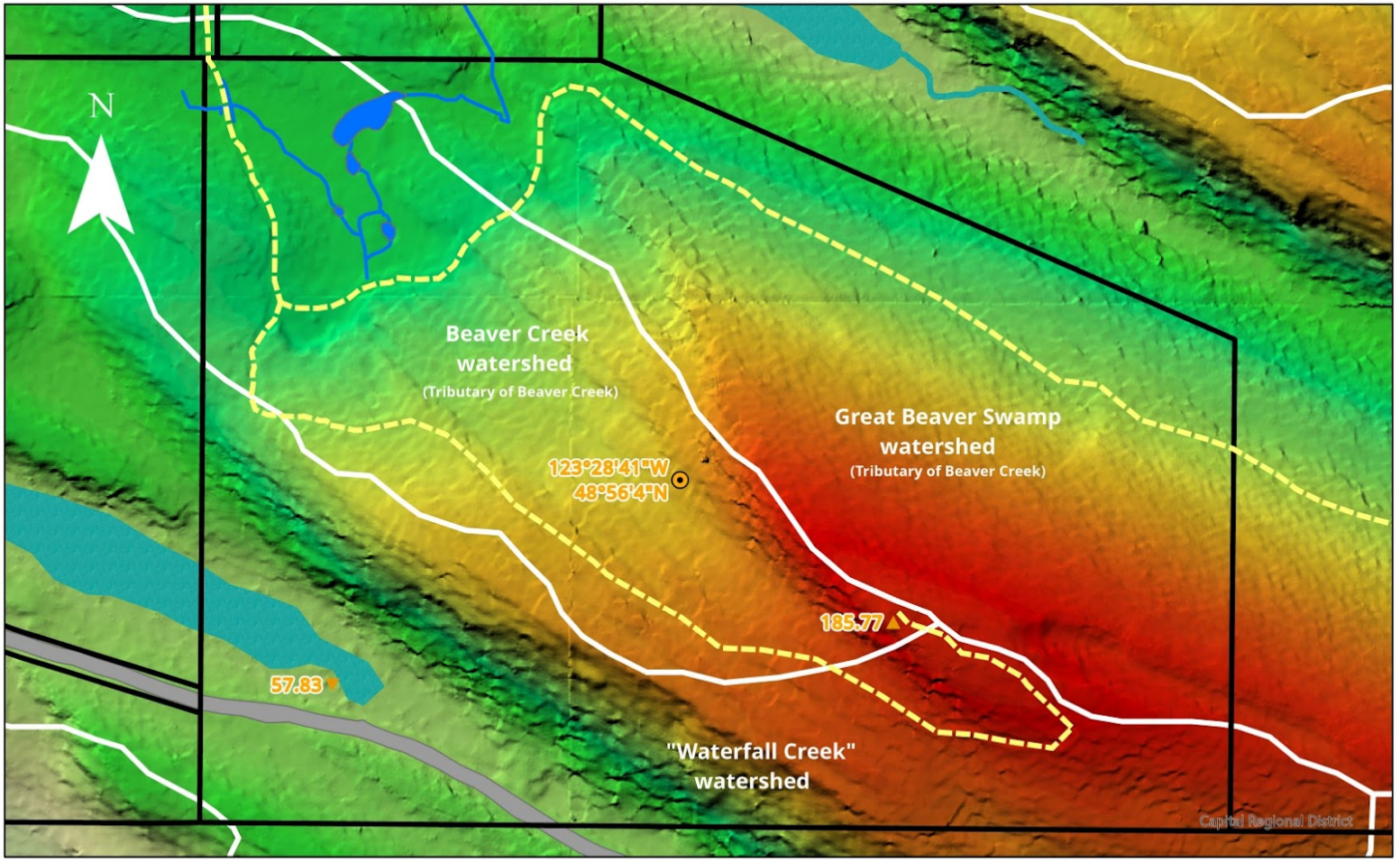
Precipitation landing north of the northernmost ridgeline drains into the Great Beaver Swamp, which eventually empties into the Strait of Georgia through Beaver Creek.

Precipitation that lands between the two central ridges of the property drains to the northwest, where it briefly passes through the northeastern corner of the Retreat Cove Farms property before traversing a series of private residential lots and Melissa Road on its way to join Beaver Creek, which empties into the Strait of Georgia. Some of this drainage is currently being diverted down an old logging road and is draining directly into the eastern end of the Great Beaver Swamp. Flow splitting occurs within a highly disturbed wetland, and the exact boundary has not been determined.

Map 2: Location of Quadra Hill relative to the Mid-Island Protected Areas Network



Map 3: Quadra Hill Watersheds and Elevation



DL 58 - Elevation & Watersheds

NAD 1983 UTM Zone 10N
Transverse Mercator
Date: December 2022
Created by: Galiano Conservancy Association

0 50 100 200 Meters

Legend

- Property Lines
- Dug Ponds
- Ditches
- Primary Access Roads
- Streams & Wetlands
- Public Road
- Highest Point (m)
- Lowest Point (m)
- Centre Point
- Watershed Boundary

Elevation (m)
255
0

Significance of Land

Ecological Significance

The Quadra Hill property is located within Priority Place 10 - Southwestern British Columbia (BC), and within a priority area for the Pacific Birds Habitat Joint Venture. The Islands Trust Conservancy's "Regional Conservation Plan" for 2018 - 2027 ranked the need for forest protection on Galiano Island as a high priority, and identified the Quadra Hill property as having high value for protection.[1] Quadra Hill is located in the Coastal Douglas-Fir moist maritime biogeoclimatic zone (CDF), which has been identified as imperilled both provincially and globally. CDF ecosystems were some of the first forests logged and cleared and have been threatened by the logging industry ever since. CDF ecosystems support a high diversity of species and are an essential part of BC's biodiversity.

Forested ecosystems in coastal BC are among the most carbon-dense ecosystems in Canada. Forests within the Islands Trust area of the CDFmm have been shown to sequester more carbon per hectare than anywhere else is BC, most likely due to "the high density of maturing forests, which store and take in more carbon to support their growth".[2] Preliminary modelling suggests that the Quadra Hill property currently stores over 40,000 tons of CO^2e in above-ground, living biomass alone.[3]

Rare Species and Communities

The property includes habitat that has the potential to support the western screech-owl kennicottii subspecies (*Megascops kennicottii kennicottii*; COSEWIC - Threatened; SARA - Threatened; Blue-listed). [4]

Great blue heron (*Ardea herodias fannini*; COSEWIC - Special Concern; SARA - Special Concern; Blue-listed), blue dasher (*Pachydiplax longipennis*; SARA - Special Concern; Blue-listed), olive-sided flycatcher (*Contopus cooperi*; COSEWIC - Special Concern; SARA - Threatened; Yellow-listed), northern red-legged frog (*Rana Aurora*; COSEWIC - Special Concern; SARA - Special Concern; Blue-listed), band-tailed pigeon (*Patagioenas fasciata*; COSEWIC - Special Concern; SARA - Special Concern; Blue-listed), and western pondhawk (*Erythemis collocata*; SARA - Special Concern; Blue-listed) are species at risk that were observed during baseline surveys for the adjacent parcel, Lot 1 DL 58 (Vanilla Leaf Land Nature Reserve), created through subdivision in 2013.[5] Most, if not all, of these species are likely present at the Quadra Hill property, and should be targeted for future surveys.

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[1] Islands Trust Conservancy. (2018). Regional Conservation Plan 2018 - 2027. https://islandstrust.bc.ca/document/itc-regional-conservation-plan-2018-2027-2/
[2] Schuster, R. (2014). Carbon and Biodiversity mapping and assessment for the Islands Trust Area. https://islandstrust.bc.ca/wp-content/uploads/2020/11/carbonassessment.pdf.
[3] Brinkman, R.S. (22 Jan, 2022). Personal communication.
[4] Verbenkov, M. (2011). Species at risk status report: Galiano Island. Galiano Island, British Columbia: Galiano Conservancy Association. SAR_Local_Galiano_Status_Report_March_2011.pdf.
[5] Islands Trust Fund. (2013). District Lot 58 Nature Reserve Galiano Island Management Plan.

No bird surveys were conducted during this baseline report. However, it is likely that barn swallows (*Hirundo rustica*; COSEWIC - Special Concern; SARA - Threatened; Yellow-listed) and common nighthawks (*Chordeiles minor*; COSEWIC - Special Concern; SARA - Threatened; Blue-listed) are seasonally present on the property. These species have been observed on iNaturalist in nearby areas.

This property includes habitat for a culturally and environmentally significant tree species. Known in Hul'qumi'num language as X'pey, or 'tree of life', western redcedar (*Thuja plicata*) has cultural, spiritual, and economic significance to coastal First Nations people, but is widely considered to be under threat from anthropogenic climate change and land alteration in this region.[6] This property also includes a small, shallow-soil Garry oak (*Quercus garryana*) woodland, which is a highly endangered ecosystem that supports one of the highest plant diversity of terrestrial ecosystems in coastal BC.[7]

This survey identified sites that currently support or have the potential to support Provincially Red-listed ecological communities, including: Douglas-fir - Shore pine - Arbutus (CDFmm/02), Douglas-fir - Grand fir - Oregon grape (CDFmm/04), Western redcedar - Grand fir - Foamflower (CDFmm/06), and Western redcedar - Slough sedge (CDFmm/14).

Additionally, the Western redcedar - Skunk Cabbage (CDFmm/11) site series is present (Plot 13) and is Provincially Blue-listed.

Introduced Species

Scotch broom (*Cytisus scoparius*), cutleaf blackberry (*Rubus laciniatus*), English holly (*Ilex aquifolium*), Himalayan blackberry (*Rubus armeniacus*) and teasel (*Dipsacus fullonum*) were identified on the property during the survey (see Map 10). A variety of other common introduced grasses and forbs occur on the property, especially on disturbed or open sites. Fruit trees, a walnut tree, and several giant sequoias are well-established on or near the cultivated field. Several (exact number unknown) feral goats abandoned by the previous tenant are still present on the property.

[6] Wilson, S.J., Hebda R.J. (2008). Mitigating and adapting to climate change through the conservation of nature. The Land Trust Alliance of BC. https://ltabc.ca/wp-content/uploads/2012/02/LTA_ClimateChangePrint.pdf.
Zahn, M. J., Palmer M.I., Turner, N.J. (2018). "Everything we do, it's cedar": First Nation and Ecologically-based forester land management philosophies in coastal British Columbia. *Journal of Ethnobiology.*

[7] Fairbarns, M. (2020). Garry Oak Ecosystems. In Klinkenberg, Brian (Ed.). 2020. Biodiversity of British Columbia. Vancouver, British Columbia: Lab for Advanced Spatial Analysis, Department of Geography, University of British Columbia. https://ibis.geog.ubc.ca/biodiversity/eflora/E-FloraBCGarryOakEcosystems.html.

Carbon Stored in Living Biomass

2022 Results

The total tonnage of carbon dioxide equivalents (tCO2e) was estimated for the entire property, using publicly-available data and polygons from the Provincial Vegetative Resources Inventory (VRI). Growth and yield projections were performed using the Table Interpolation Program for Stand Yields (TIPSY) to provide estimates of tCO2e for the property in 2032, 2042, and 2052. Projections assume ecological restoration for the disturbed agricultural areas on the property. All modelling was performed by Robert Seaton of Brinkman Group in January 2022. Table 2 and Map 4 summarize the results.

The Quadra Hill property was estimated to hold over 40,000 tons of CO2e in 2022, and projected to sequester about 8,000 additional tons over the ensuing 30 years.

Table 2: Standing Carbon on Quadra Hill, per Seaton (2022)

Map Unit	Ecological Communities	Attributes		Density	Estimated CO2e by year			
Map 4	included in area	Model Tree	Area (ha)	tCO2e/ha	2022	*2032*	*2042*	*2052*
1	14D	Douglas-fir	0.3	956	291	345	395	440
2	1, 2, 3A, 4B, 5A, 6A-B, 7B	Douglas-fir	9.77	1473	14390	14390	14390	14390
3	9	Red Alder	1.62	818	1323	1323	1323	1323
4	5B, 7A	Douglas-fir	0.42	886	373	443	507	564
5	3B, 8A-B	Douglas-fir	3.82	1331	5080	5080	5080	5080
6	8A-B	Douglas-fir	11.24	1029	11566	13280	14829	16275
7	2, 4A	Douglas-fir	2.6	930	2416	2769	3098	3391
8	10A, 11, 12A-D, 13A-C, 14A-B, 14D, 15A-B, 16A-B	Red Alder	14.02	445	6237	6984	7499	7880
9	14A, 14C, 16A-B, 17	Red Alder	3.02	0	0	78	222	341
		Total	46.81	**Total**	41676	44692	47343	49684

2014 Results

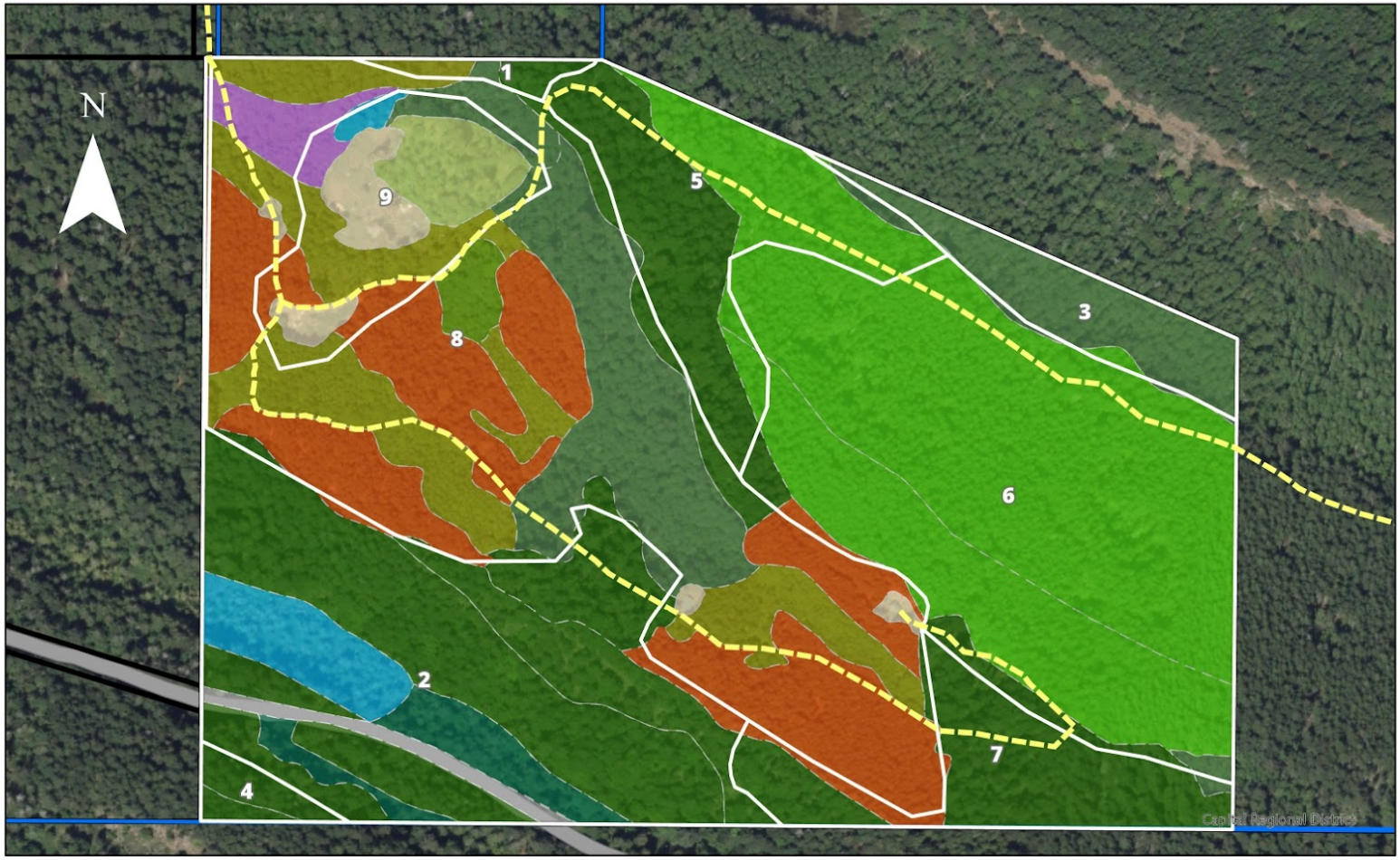
In 2014, Richard Schuster published a carbon assessment for the Islands Trust Area,[8] based on polygons from the Islands Trust TEM[9] and a prior 2012 assessment by Brad Seely. Table 3 and Map 5 summarize the results of this study as they pertain to the Quadra Hill property. It is notable that these values are significantly lower than those produced by Robert Seaton using standard methodologies for 2022, which was attributed by Robert Seaton to improved methodology and remote sensing data.

Table 3: Standing Carbon on Quadra Hill in 2014, per Schuster (2014)

Map Unit	Ecological Communities	Attributes		Density	Estimated tCO2e
Map 5	included in area	TEM Units	Area (ha)	tCO2e/ha	2014
1	3B, 8A-B	01-DS	14.03	261.58	3,669.97
2	1, 6A	06-RF	1.63	438.61	714.93
3	5B, 7A	01-DS	0.54	661.94	357.45
4	5A, 6A, 7B	01-DS	1.61	564.30	908.52
5	2, 3A	01-DS/02-DA	5.26	470.43	2,474.48
6	3A	01-DS	0.11	1,186.53	130.52
7	4A	01-DS	2.43	488.62	1,187.35
8	4B, 10A, 12C, 13A-B, 14B, 15A-B	01-DS	10.06	337.26	3,392.84
9	12A, 12D, 13C	01-DS/02-DA	4.51	183.99	829.81
10	9, 11,12B, 14A, 14C-D, 16A-B, 17	01-DS/06-RF	6.59	270.38	1,781.80
		Total	46.77	**Total**	15,447.66

[8] Schuster, R. (2014). *Carbon and Biodiversity Mapping and Assessment for the Islands Trust Area.* Islands Trust.
[9] Madrone Environmental Services. (2008). *Terrestrial ecosystem mapping of the Coastal Douglas-fir Biogeoclimatic zone.* Islands Trust.

Map 4: Map Units used to Estimate Standing Carbon by Seaton (2022)



DL 58 - Carbon Mapping (2022)

NAD 1983 UTM Zone 10N
Transverse Mercator
Date: January 2023
Created by: Galiano Conservancy Association

0 50 100 200 Meters

Legend

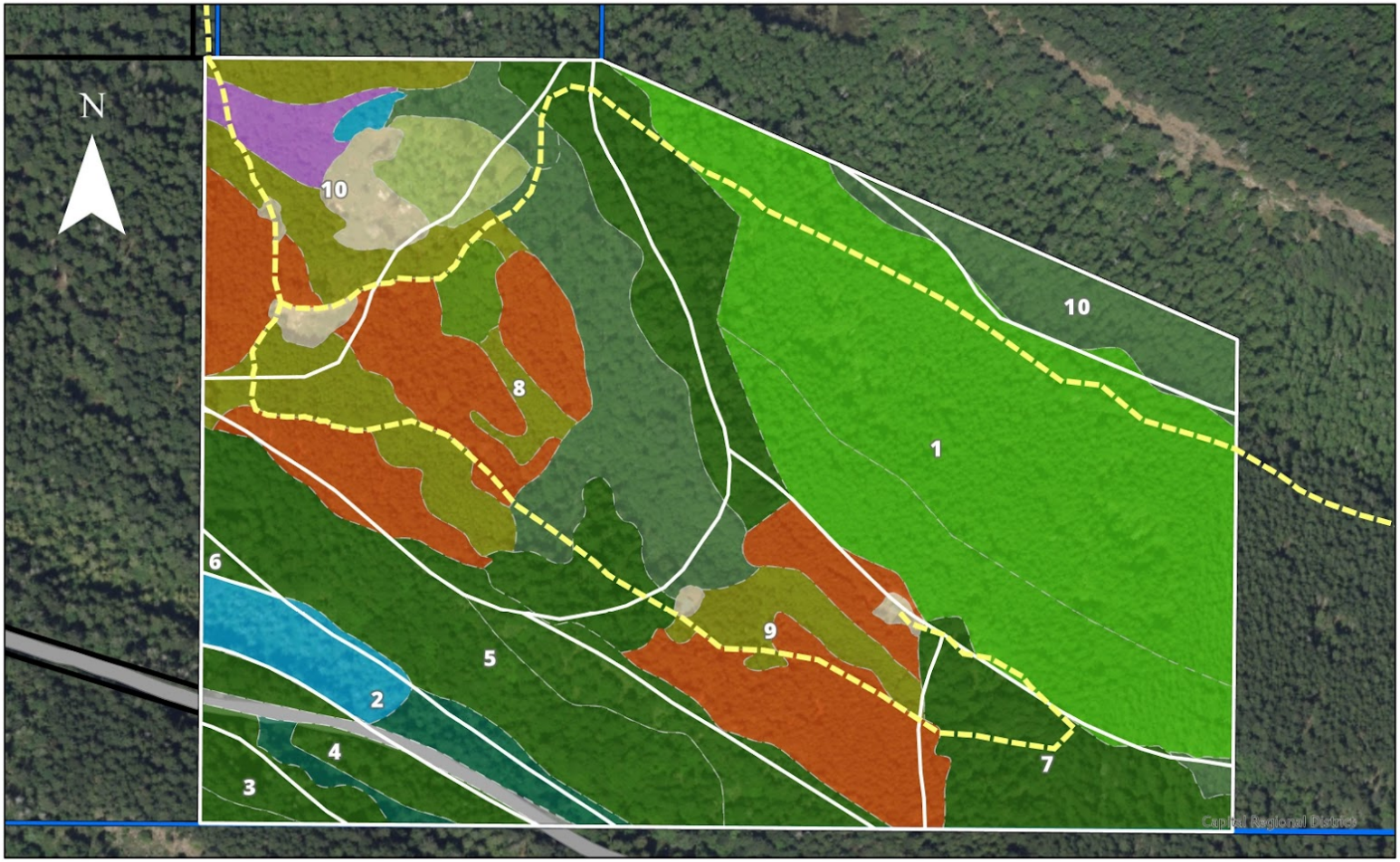
- Carbon Map Units
- Protected Areas
- Property Lines
- Primary Access Roads
- Public Road

Ecological Communities

Stage and Composition

- Marsh - Swamp Complex
- Disturbed Swamp
- Pole-sapling Broadleaf Forest
- Pole-Sapling Conifer Forest
- Pole-Sapling Mixed Forest
- Young Broadleaf Forest
- Young Conifer Forest
- Mature Conifer Forest
- Mature Mixed Forest
- Rural Ag / Structures
- Treed Pasture
- Porlier Pass Road RoW

Map 5: Map Units used to Estimate Standing Carbon by Schuster (2014)



DL 58 - Carbon Mapping (2014)

NAD 1983 UTM Zone 10N
Transverse Mercator
Date: January 2023
Created by: Galiano Conservancy Association

0 50 100 200 Meters

Legend

- Carbon Map Units
- Protected Areas
- Property Lines
- Primary Access Roads
- Public Road

Ecological Communities

Stage and Composition

- Marsh - Swamp Complex
- Disturbed Swamp
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- Young Broadleaf Forest
- Young Conifer Forest
- Mature Conifer Forest
- Mature Mixed Forest
- Rural Ag / Structures
- Treed Pasture
- Porlier Pass Road RoW

Physical Features

Topography

The Quadra Hill property consists of two semi-parallel northwest-to-southeast oriented ridgelines, which nearly converge at "Quadra Hill" in the southeast quadrant of the property. The northwest section of the property drains the area between the two ridges and is relatively level, with some undulating topography. Areas to the north and south of the two ridges slope downwards in opposite directions and ultimately drain into the Strait of Georgia and Trincomali Channel, respectively. See Map 3 for topography.

Soils and Geology

Galiano Island is composed of the fractured and faulted Cretaceous-era sedimentary rocks of the Trincomali anticline. Parallel northwest-to-southeast ridgelines formed by tectonic thrusting and glacial scour characterize the island as a whole, including the Quadra Hill property. The following soil types are recorded for the Quadra Hill property (see Map 10):

Brigantine
Brigantine soils with relatively high coarse fragment content occur in a narrow depressional band just north of Porlier Pass Road in the southwest corner of the property. They are "imperfectly drained soils that have between 30 and 100 cm of a loamy sand to sandy loam of marine or fluvial origin overlying deep (>100 cm), silty clay loam to silty clay marine deposits that are usually stone-free."[10] The surface organic layer (Ah horizon) ranges between 10-25 cm. Poorly-drained Parksville soils can occur in complex with Brigantine soils.

Saturna
Saturna soils underlie most of the gentle to moderately-sloping terrain on the property. They are "well-drained soils that have developed on shallow deposits of channery, sandy loam to channery, loamy sand textured, colluvial and glacial drift materials over sandstone bedrock within 100 cm of the surface."[11] Over large areas of the property, the Saturna soils are less than 50 cm deep. Coarse fragment content is high in Saturna soils, especially as slope increases. The surface organic layer (Ah horizon) is typically 10 cm or less. On steep sites, Saturna soils co-occur with rock outcrops.

Trincomali
Imperfectly drained Trincomali soils are found in the northeastern corner of the property in the Great Beaver Swamp drainage. They are "moderately well-drained soils that have developed on shallow (30-100 cm) deposits of gravelly sandy loam to gravelly loamy sand

[10] P., V. V. L. J., Kenney, E. A., & Green, A. J. (1989). *Soils of the Gulf Islands of British Columbia: Soils of Galiano, Valdes, Thetis, Kuper, and lesser islands* (Vol. 3, Ser. 43). Agriculture Canada, Research Branch.
[11] Ibid.

textured, marine, fluvial, or glaciofluvial materials (15-50% gravels) over gravelly sandy loam to gravelly loam textured, compact, unweathered till within 100 cm of the surface."[12] They resemble Saturna soils with a higher proportion of gravel; the main difference is the restricting layer is compacted till as opposed to sandstone bedrock, with resulting poorer drainage. The surface organic layer (Ah horizon) is typically 10 cm or less.

Wetlands

A disturbed swamp is situated in the northwest corner of the property. This forested wetland was initially cleared prior to the 1950s, and sections of it have since been repeatedly disturbed and cleared for various purposes, including a clear-cut between 1987 and 1996 across most of the area. An agricultural field and small homestead with numerous storage sheds and goats paddocks has been established in the centre of the disturbed area, with some older western redcedar (*Thuja plicata*) trees persisting in the clearings. Notable are a handful of mature pacific willow (*Salix lucida*), cascara (*Frangula purshiana*), black cottonwood (*Populus balsamifera sp. trichocarpa*), and western clematis (*Clematis ligusticifolia*) individuals located in and around the disturbed swamp (see Map 10).

Three ponds have been excavated since 1993 in the agricultural field, with old roads and drainage ditches connecting them to one another. A disturbed marsh dominated by slough sedge (*Carex obnupta*) and small, stunted red alder (*Alnus rubra*) trees receives drainage from these upslope ponds and ditches. It appears that a bulldozer or tractor was used to flatten and drain this marsh area, creating a bifurcation in the watershed that directs some of the outflow underneath the main access road to the northwest, and the rest of the outflow down an old logging road and into the Great Beaver Swamp towards the northeast.

A relatively intact marsh-swamp complex occurs north of Porlier Pass Road in the southwest corner of the property. Forest stands to the north and east of this wetland were cleared between 1930 and 1952, and some disturbance related to the construction of Porlier Pass Road is presumed. Standing water is present year-round, with small-headed bulrush (*Scirpus microcarpus*) forming the dominant cover in inundated areas, along with patches of skunk cabbage (*Lysichiton americanus*) and slough sedge (*Carex obnupta*). Western redcedar (*Thuja plicata*) and salal (*Gaultheria shallon*) occur on slightly elevated areas. Only a small portion of this wetland occurs on the Quadra Hill property. The rest of the wetland occurs on the Retreat Cove Farms Property, where it has been included within the Provincial Agricultural Land Reserve (ALR).

A narrow slough sedge (*Carex obnupta*) swamp forest is located in the southwest corner of the property, just south of Porlier Pass Road. It is continuous with a similar ecosystem on the Millard Learning Centre property to the south, and drains north across Porlier Pass Road into the marsh-swamp complex.

[12] Ibid.

Land Use

Property History

The pre-contact history of Quadra Hill is unknown. The land lies within the ceded traditional territory of the Tsawwassen First Nation, and within the shared, asserted, unceded and traditional territories of the Penelakut, Hwlitsum, Lelum Sar Augh Ta Naogh, and other Coast Salish Peoples who hold traditional rights and responsibilities in and around Galiano Island. Certainly, the land now included within the Quadra Hill property would have been used for hunting and the harvest of valued plant and wildlife resources.

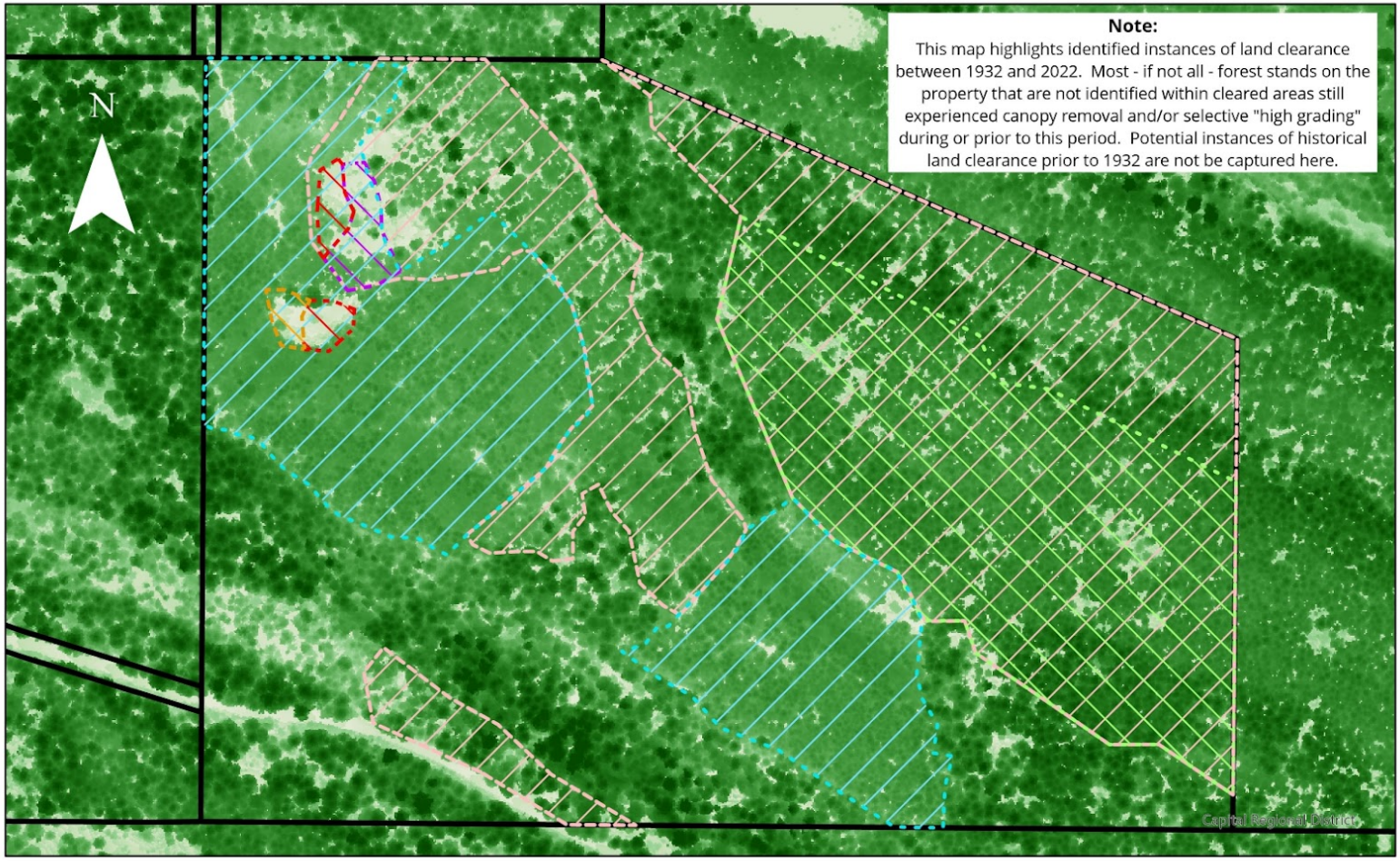
Following European settlement, the property experienced a number of forest extraction events. Remnants of skid trails and logging roads remain throughout the property. Historical aerial imagery (see Appendix) reveals that at least six extraction events have occurred on the property since the 1930s, including clear-cuts dated to between 1932 - 1950, 1950 - 1962, 1962 - 1987, 1987 - 1996, 1996 - 1998, and 2002 - 2011. Map 6 summarizes this analysis and displays LIDAR-derived tree heights for the property, highlighting remnant mature forest areas where trees are taller and less closely spaced. According to MacMilan Bloedel's own geospatial data, land cleared between 1932 and 1950 on the Quadra Hill property was cut in 1946 (western half of property) and 1948 (eastern half of property). Sections of the property not subject to clear-cut logging since 1932 nevertheless experienced intensive selective logging prior to and after 1932, as evidenced by presence of stumps, altered stand canopy composition, and the unmarketable features that characterize remnant individual old-growth trees.

In 1993 MacMillan Bloedel sold DL 58 to Dr. James Cupples, Dr. Frances Jang and Dr. D.H. Erwin Inc.[13] In 2013 DL 58 was divided, and a 100-acre section was acquired by the Trust Fund Board using Section 99 of the Land Title Act. This section (Lot 1) is now the Vanilla Leaf Land Nature Reserve.[14]

Up until 2022, large areas of the property were used for goat grazing, and the northwest corner was used for small-scale agriculture. Evidence of recent firewood harvest and collection occurs sporadically across the property. Several (exact number unknown) feral goats abandoned by the previous tenant are still present on the property.

[13] Islands Trust Fund. (2013). Vanilla Leaf Land Nature Reserve (DL 58) Galiano Island Management Plan. https://islandstrust.bc.ca/document/vanilla-leaf-management-plan/
[14] Islands Trust Fund. (2013). Vanilla Leaf Land Nature Reserve (DL 58) Galiano Island Management Plan. https://islandstrust.bc.ca/document/vanilla-leaf-management-plan/

Map 6: Tree Height and Estimated Dates of Historical Land Clearances of Quadra Hill Post-1932



DL 58 - Tree Height & Logging

NAD 1983 UTM Zone 10N
Transverse Mercator
Date: January 2023
Created by: Galiano Conservancy Association

0 50 100 200 Meters

Legend

Tree Elevations
2019 (m)
60
0

Property Lines

Historical Logging
Year Cleared (Est.)
1932-1950
1950-1962
1962-1987
1987-1996
1996-1998
2002-2011

Buildings and Structures

A number of structures were constructed on the Quadra Hill property after the 1993 sale. Two sturdy buildings are located on Quadra Hill itself. A 280 ft^2 one-room wood frame cabin occupies a clearing at the very top of Quadra Hill. A detached 900 ft^2 garage is located about halfway up the access road that serves the cabin. Both buildings pre-date the zoning bylaw that prohibits residential use and enclosed accessory buildings, rendering both structures "legal non-conforming". There is also a woodshed, pit toilet, and two small (25 ft^2) storage sheds located next to the cabin at the top of Quadra Hill.

A variety of other ramshackle structures have been erected within the agricultural area. These include a dwelling, several storage sheds, an outhouse, a hot tub, and cold frames. Most of these unpermitted structures are in a state of disrepair and present a hazard. Map 8 provides an overview of human infrastructure in this high-intensity use area.

A small farm stand is located on an unusual vegetated boulder mound on the side of Porlier Pass Rd. This mound blocks a natural drainage and is of undetermined provenance.

Roads, Utilities and Trails

Porlier Pass Road is an asphalt two lane highway with gravel shoulders and overhead utility lines that cuts across the southeast corner of the property. Several old logging roads provide access to different sections of the property. Some remain in use, accessed via 1000 Melissa Road, while others have become overgrown. Some are currently acting as ditches and diverting surface water, while others can be used as footpaths. It is likely that not all former road surfaces have been mapped. Map 7 provides an overview of the human infrastructure on Quadra Hill.

A gravel pit that has been partially filled with concrete and fill is located at the junction of the two most active access roads on the property.

Galiano Association for Internet Access (GAIA), a local internet non-profit, has established internet infrastructure near the cabin at the high point of the property, including three receivers, wiring, a solar panel, and a generator.

Threats

Key threats include the risk of human-ignited wildfire where fuels are abundant, trespassing from adjacent trails and roads (for the purpose of hunting or vandalism), population expansion of introduced species, and continued herbivory by feral goats. Threats to the property through trespass are somewhat limited due to the protected status of neighbouring properties to the north, east, and south. Logging or development in the extensive mature forests on the Retreat Cove Farm property to the west is unlikely due to their unique cooperative ownership model.
If not protected, the property would certainly experience further logging and development.

Photo 1 - Detached Garage (unserviced)

Photo 2 - Cabin (one-room; unserviced)

Photo 3 - Woodshed

Photo 4 - Dwelling, outbuildings, and fences

Photo 5 - Gravel pit

Photo 6 - Farm stand

Photo 7 - Tent Platform

Photo 8 - Debris near tent platform

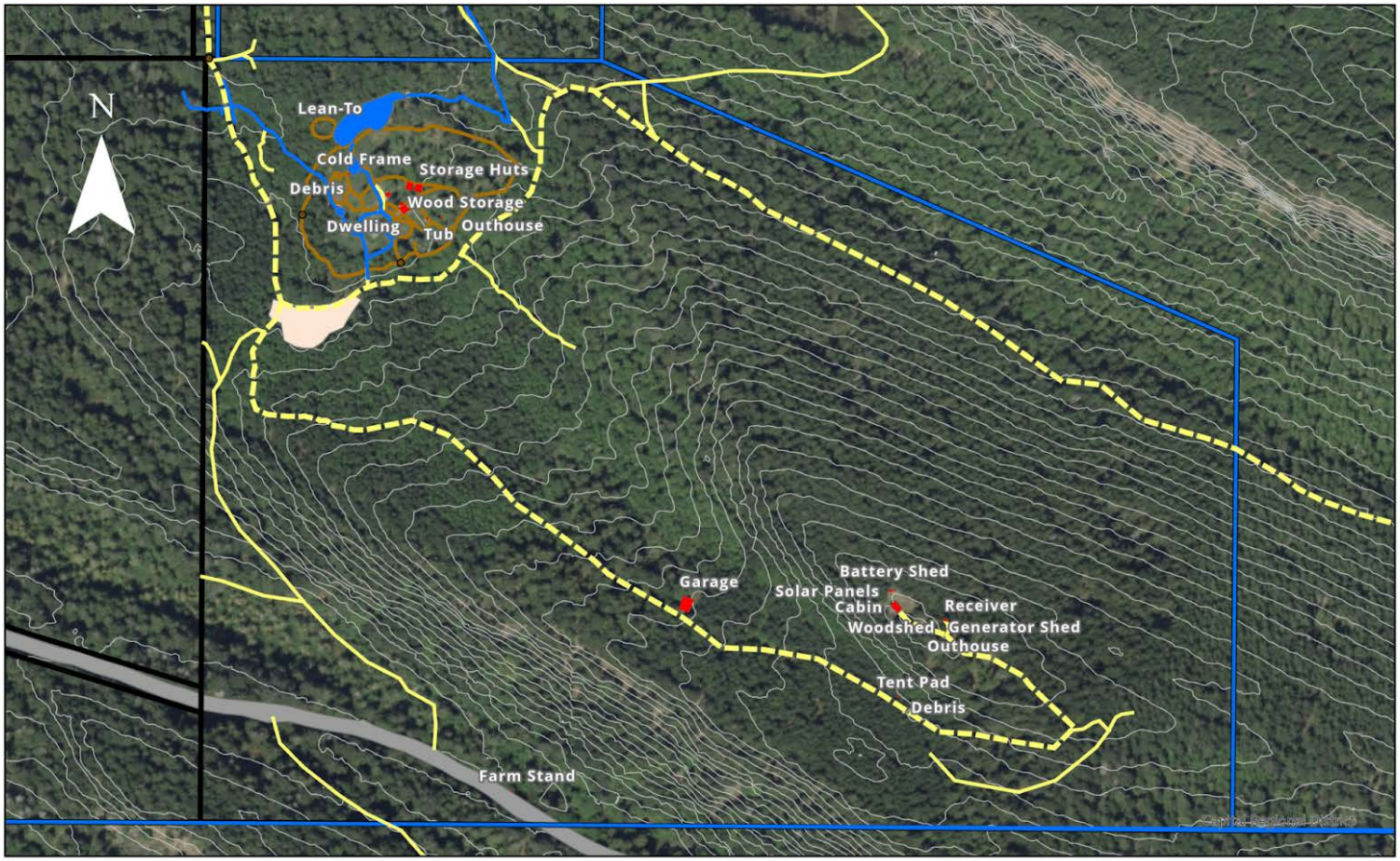
Photo 9 - Cabin outhouse

Photo 10 - Generator shed (GAIA)

Photo 11 - Solar Panel and battery shed (GAIA)

Photo 12 - Receivers (GAIA)

Map 7: Human Infrastructure found on Quadra Hill



DL 58 - Human Infrastructure

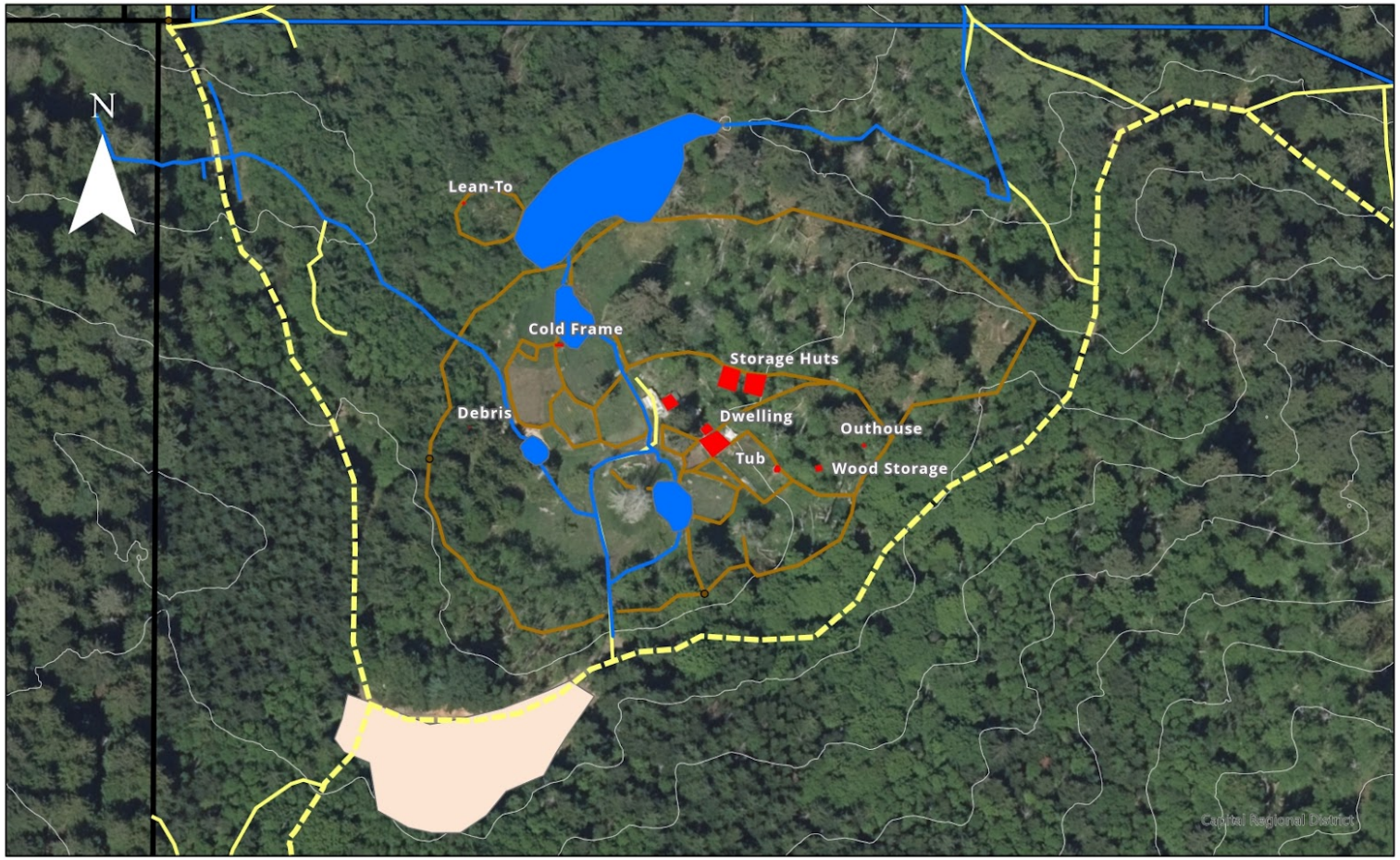
NAD 1983 UTM Zone 10N
Transverse Mercator
Date: December 2022
Created by: Galiano Conservancy Association

0 50 100 200 Meters

Legend

Protected Areas	Structures	Logging Roads
Property Lines	Dug Ponds	Gates
Contours (5m)	Ditches	Fence
Gravel Pit	Primary Access Roads	Public Road

Map 8: Human Infrastructure found on Quadra Hill - Close-up of Agricultural Area



DL 58 - Human Infrastructure

High Intensity Use Area

NAD 1983 UTM Zone 10N
Transverse Mercator
Date: December 2022
Created by: Galiano Conservancy Association

0 12.5 25 50 Meters

Legend

- Protected Areas
- Property Lines
- Contours (5m)
- Gravel Pit
- Structures
- Dug Ponds
- Ditches
- Primary Access Roads
- Logging Roads
- Gates
- Fence
- Public Road

Disturbance

Natural Disturbances

Natural disturbances are largely limited to small gap-forming disturbances caused by wind throw combined with disease like laminated root rot. Deer browsing is also evident across the property.

Douglas-fir (*Pseudotsuga menziesii*) trees across the property display fire scars. On the younger trees, these most likely resulted through the burning of slash, a common activity following clear-cut logging. Charcoal was detected near the surface in soil pits in some of these younger stands. On the scattered old-growth trees, these scars may be evidence of fires that ignited in pre-settlement times but spared mature trees. The mean fire return interval (MFRI) for this region is estimated to be on the order of 100-300 years, but was augmented by frequent low-intensity fires ignited by Coast Salish people prior to European settlement.[15]

Over a century of fire suppression and industrial forestry has created conditions conducive to massive, stand-replacing fires across Galiano Island, including on the Quadra Hill property. In pole/sapling stands especially, copious quantities of ground and ladder fuels are present below a dense, single-age canopy of highly flammable coniferous trees.

Anthropogenic Disturbance

Historic anthropogenic disturbances are summarized in the 'Land Use' section, above.

Climate

Annual Weather Patterns and Seasonality

Galiano Island has a mediterranean-type climate with mild rainy winters and very dry summers. The average annual precipitation on Galiano is 404.8 m per year, with the wettest months being November, December, January and February.[16] The months of January and February produce the coldest mean temperatures of 4°C to 5°C, while July and August are the warmest months with mean temperatures of 17°C to 19°C.[17]

Climate Change

The Islands Trust declared a "Climate Change Emergency" on March 13, 2019.[18] Galiano Island is already experiencing the effects of climate change: between 2021-2022, Galiano

[15] Derr, K.M. (2014). Anthropogenic Fire and Landscape Management on Valdes Island, Southwestern BC. *Canadian Journal of Archaeology*. 38: 250-279.
[16] Environment Canada (2022). Southern Gulf Islands Historic Data. Retrieved on Dec 9, 2022. *https://weather.gc.ca/city/pages/bc-93_metric_e.html*
[17] IBID
[18] See https://islandstrust.bc.ca/document/letter-climate-change-emergency-declaration/

has experienced atmospheric rivers, a heat wave, and reduced precipitation causing drought. The Intergovernmental Panel on Climate Change Global Climate (IPCC) 2018 report predicts that there will be more intense, more frequent and longer lasting heat waves and increased intensity of precipitation events in the future.[19] These changing conditions will have many unpredictable effects on the landscape. Potential impacts include: drought stressed ecosystems, over-saturated ecosystems, wind storms, snow storms, heat waves, and possibly forest fires.

Weather during the Study Period

Data was collected during July of 2022 during the dry mid-summer conditions. Follow-up surveys were completed during November and December 2022 with snow covering the ground. Final surveys were conducted in January of 2023 once the snow had melted.

Ecological Communities

Field Surveys

The baseline survey identified 17 ecological communities across 34 distinct polygons, corresponding to 6 BEC site series. These communities were delineated based on slope position, forest structure, forest age, vegetation composition, and soil profile. Map 1 provides an overview of ecological communities for the property, as well a breakdown of BEC terrestrial ecosystem map units, which are summarized in Table 1. Map 9 relates polygons to ecological communities. The following pages include detailed descriptions of each of these communities.

Terrestrial ecosystem mapping performed by Madrone Environmental Services on behalf of the Islands Trust Conservancy, the Province of British Columbia and Parks Canada in 2008 (see Map 10) only identified three BEC Site Series (01, 02, and 06) within the property boundary. Field assessments of soils and vegetation revealed some survey plots to be drier, wetter, or richer, especially on sites with a history of forestry, drainage, or disturbance. Sites that support or have the potential to support site series 04, 11, and 14 were identified and have been mapped, even where vegetation has been disturbed and the full complement of expected species is not present.

Within the imperilled Coastal Douglas-fir biogeoclimatic zone (CDFmm), virtually any site that is significantly richer, drier, or wetter than the zonal Douglas-fir - Salal forest ecosystem is considered by the Province of BC to be a Schedule 1 (Red-list) or Schedule 2 (Blue-list) ecosystem. Many of these ecological communities on the Quadra Hill property have experienced significant anthropogenic disturbance over the past century, and the vegetation on these sites is a response to this history. Remnant mature trees, stumps, soil characteristics, and other physical features provide clues as to the kinds of native ecosystems these sites have the potential to support.

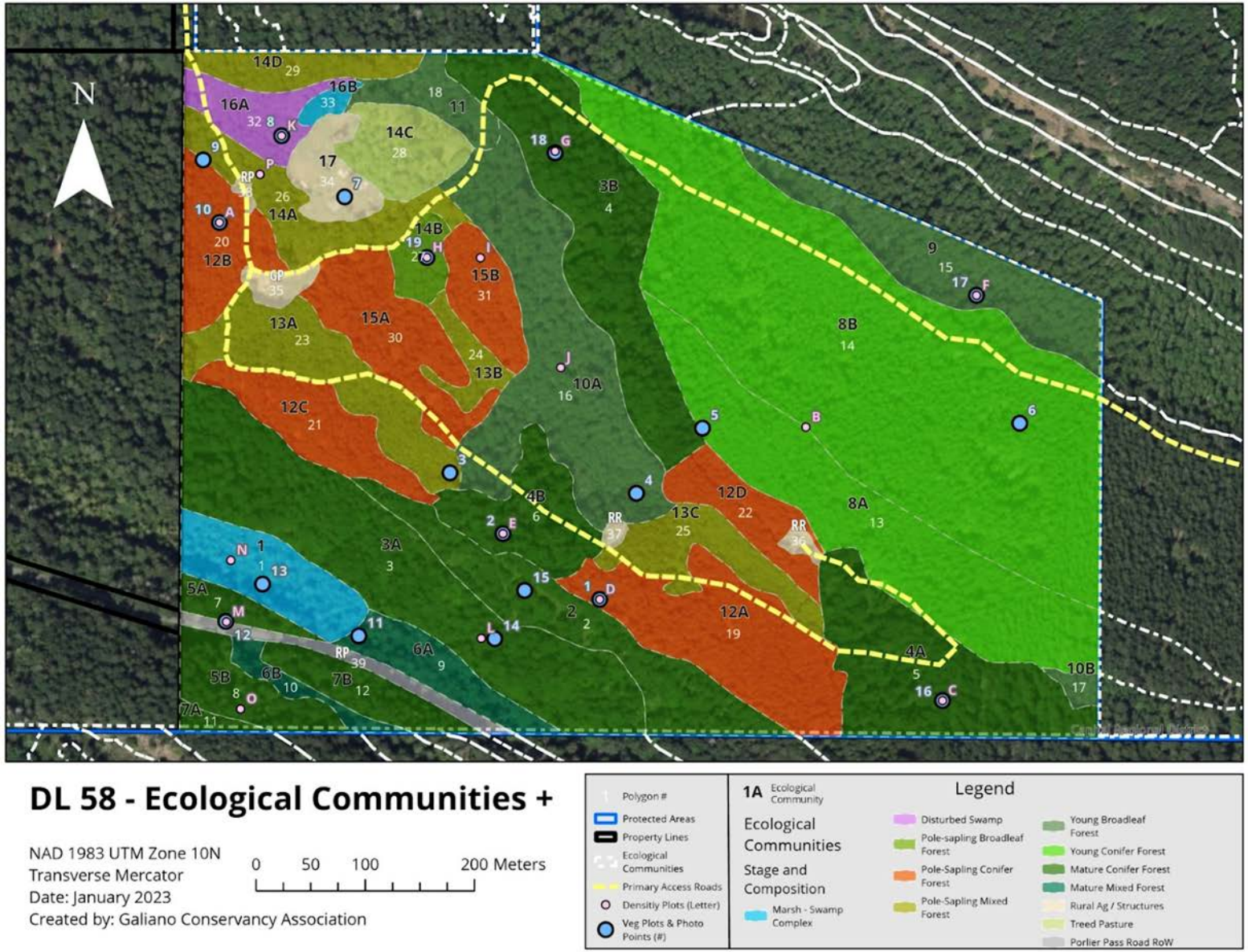
[19] IPCC. (2018). Global Warming of 1.5°*C* Retrieved on Dec 16, 2022 from https://www.ipcc.ch/sr15/

Natural processes of succession are visible across the property, but in some cases appear to have been hindered, suspended, or reversed by ongoing human activities or other factors (e.g. herbivory). Ecological restoration can be an effective response to circumstances where soils, hydrology, or other site conditions have been modified beyond the point at which natural recovery processes function efficiently.

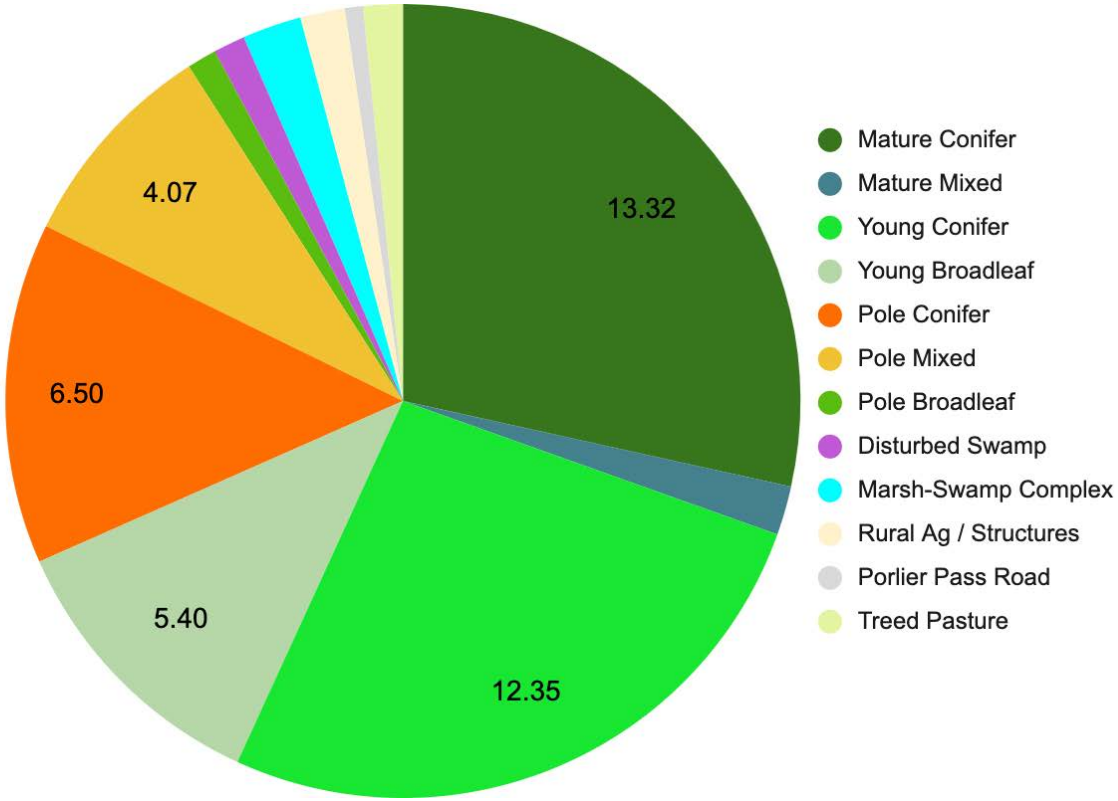
Below is the template for plot-based ecological community descriptions. Values derived from remote sensing are noted; all other values are derived from field measurements.

Ecological Community (EC#) - Description			**Plot(s)** - Veg & Density plots described			
Repeat Photograph			**Description** Brief description of ecological community; relevant observations and notes			
Site Series - BEC Unit: Primary (Secondary)			**Polygon** - Polygon that plot is within			
Attribute	Range	Notes	Layer	Species	%	Total
Slope		Incline over 5m in % (DEM)	**A**	Tree Layer		
Aspect		Orientation in °	**B**	Shrub Layer		
Structure		Community structure	**C**	Herb / Graminoid Layer		
Age		Estimated stand age	**D**	Moss Layer		
Elevation		Altitude from sea level (DEM)				
Position		Mesoslope position				
Organic layer		Depth of L,F,H, and Ah horizon				
Soil texture		Description of particle size				
SMR		Soil Moisture Regime (1-7)				
SNR		Soil Nutrient Regime (P-M-R)				
Density		Density of stems / stumps				
Notes: Additional notes, observations, or measurements			**Cored Trees:** (All cored trees are Douglas-firs) Tree #: Diameter at Breast Height (cm); Estimated Age (yrs)			

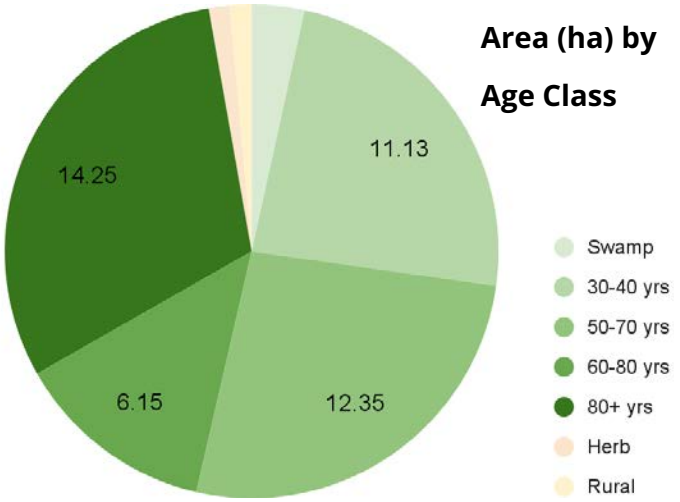
Map 9: Ecological Communities of Quadra Hill with associated Plots and Polygons

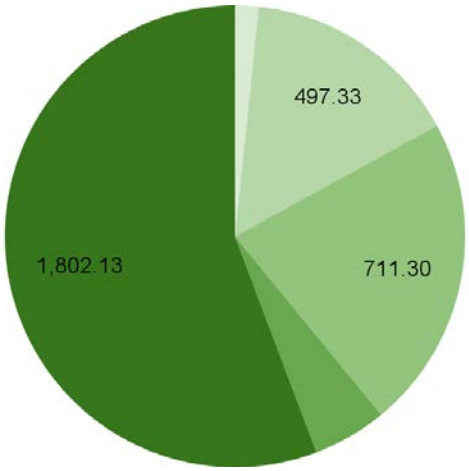


Area (ha) by Stage & Composition



Area (ha) by Age Class





Basal Area (m^2) by by Age Class (Estimate)

Community Descriptions

Ecological Community #1 - Complex Swamp and Marsh Wetland

Complex wetland composed of marsh patches and swamp patches, located on Brigantine soils in a narrow, gently-sloping valley depression in the southwest corner of the property. Marsh patches occur across low lying areas and are dominated by small-headed bulrush and skunk cabbage, with occasional clumps of slough sedge and tall mannagrass. Swamp patches occur on subtle topographic prominences and are dominated by western redcedar and salal, with occasional salmonberry individuals. Red alder and Douglas-fir are also occasional on higher ground. Soils are very rich, wet, and of unknown depth, keying to CDFmm 11 - Cw - Skunk Cabbage. Standing water is present year-round, although levels may fluctuate between wet and dry seasons. No signs of land clearance were detected, but logging may have occurred prior to 1932. An old, overgrown logging road runs along the north side of the wetland, and may have crossed through the eastern edge at one time.

This ecological community is only found in polygon 1.

EC 11 - Cw Swamp and Marsh Complex | **Plots -** 13 (Vegetation) ; N (Density)

Description

Complex wetland composed of marsh patches and swamp patches. Marsh patches occur across low lying areas and are dominated by small-headed bulrush and skunk cabbage, with occasional clumps of slough sedge and tall mannagrass. Swamp patches occur on subtle topographic prominences and are dominated by western redcedar and salal, with occasional salmonberry individuals. Red alder and Douglas-fir are also occasional on higher ground. Standing water is present year-round, although levels may fluctuate between wet and dry seasons. No signs of land clearance were detected, but logging may have occurred prior to 1932.

Site Series - 11: Cw - Skunk Cabbage

Attribute	Range	Notes
Slope	2%	Nearly level
Aspect	298°	West
Structure	2b / 4cs	Graminoid-dominant herb
Age	-	Trees are all stunted
Elevation	58 m	2019 DEM used
Position	DP / L	Depression / Level
Organic layer	40+ cm	L, F, H, and Ah horizons
Soil texture	o	Organic
SMR	7	Wet
SNR	VR	Very Rich
Stem density	500-700	100, 314 m^2 plots; 7, 15 stems
Stump density	-	No stumps detected in plot

Notes:
Part of a narrow wetland and rich forest complex on poorly drained Brigantine soils. Western redcedar trees are of unknown age, but are likely stunted by hydrology. It is located south (downslope) of EC 3A; north (downslope) of EC 5A; and west (downslope) of EC 6A. It continues to the west onto the Retreat Cove Farms property.

Polygon - 1

Layer	Species	%	Total
A	*Thuja plicata*	2	
	Alnus rubra	<1	
	Pseudotsuga menziesii	<1	**3**
B	*Gaultheria shallon*	<1	
	Rubus spectabilis	<1	**1**
C	*Scirpus microcarpus*	75	
	Lysichiton americanus	20	
	Carex obnupta	5	
	Glyceria elata	1	
	Oenanthe sarmentosa	1	
	Athyrium filix-femina	<1	
	Polystichum munitum	<1	
	Digitalis purpurea	<1	**100**

Cored Trees:
-

Plot 13 - July 25, 2022
Code: QH_B_P13
Azimuth: 303° NW
Lens Height: 1.50 m
Camera: Canon Powershot SX20 IS

Soil Pit 13
SMR: 7
SNR: VR
Organic Layer: 40+ cm
Soil Texture: Organic

Ecological Community #2 - Mature Ridgeline Douglas-fir and Arbutus Forest with Garry Oak Trees

Very dry mature forest of well-spaced Douglas-fir trees, located along a south-facing ridgecrest in the centre of the property. Occasional large arbutus trees and Garry oak trees are scattered in exposed areas; grand fir and bigleaf maple are also present. Trees are assumed to be 100 years or older. Soils are very shallow, sandy, extremely dry, and of moderate fertility, keying to CDFmm 02 - FdPl - Arbutus. Bedrock outcrops are frequent, with very steep slopes and cliffs occurring immediately beneath the crest. Trees are well-spaced, with a density of around 500 stems/ha. The open canopy and southerly aspect result in the most diverse understory vegetation community on the property, supporting a variety of native and introduced wildflowers and grasses - notable among which are Harford's oniongrass and royal rein orchid. Follow-up surveys should be performed between April and June to detect additional species. Small numbers of Scotch broom seedlings were detected, warranting ongoing management. Since 1932, there have been no documented clear-cuts, although some trees were harvested previously.

This ecological community is only found in polygon 2.

EC 13 - Mature Rock-outcrop Fd Forest | **Plots** - 15 (Vegetation)

Description

Very dry mature rideline and upper slope forest of well-spaced Douglas-fir trees, with occasional large arbutus trees scattered throughout. Several Garry oak trees occur in canopy gaps; grand fir and bigleaf maple are also present. Bedrock outcrops are frequent, and the slope beneath the crest is steep and south-facing. The open canopy and southerly aspect result in the most diverse understory vegetation community on the property, supporting a variety of native and introduced wildflowers and grasses, notable among which are Harford's oniongrass and royal rein orchid. Occasional Douglas-fir stumps present. Dull Oregon grape is the dominant understory.

Site Series - 02: FdPl - Arbutus | **Polygon** - 2

Attribute	Range	Notes
Slope	65%	Very steep
Aspect	222°	Southwest
Structure	6Cs	Mature, coniferous, single-story
Age	100+	Based on Plot 14
Elevation	131 m	2019 DEM used
Position	UP / CR	Upper-slope / Crest
Organic layer	3 cm	L, F, H, & Ah horizons
Soil texture	s	Sand
SMR	0-1	Very Dry
SNR	M	Medium
Stem density	500/ha	100 m^2 plot, 5 stems
Stump density	-	No stumps detected in plot

Layer	Species	%	Total
A	*Pseudotsuga menziesii*	35	
	Arbutus menziesii	<1	
	Other - see data sheets	<1	**35**
B	*Berberis nervosa*	15	
	Lonicera hispidula	1	
	Cytisus scoparius	<1	**16**
C	*Bromus sterilis*	10	
	Vulpia myuros	2	
	Bromus vulgaris	1	
	Festuca occidentalis	1	
	Melica harfordii	1	
	Piperia transversa	<1	
	Other - see data sheets	<1	**15**
D	*Rhytidiadelphus triquetrus*	5	**5**

Notes:
Other species detected include *Digitalis purpurea, Polystichum munitum, Pentagramma triangularis, Sedum spathulifolium, Hieracium albiflorum, Collomia heterophylla, Polypodium glycyrrhiza,* and more. This stand is located north (upslope) of EC 3A; east of EC 12C; and south (downslope) of EC 4B and 12A. It continues to the south onto DL 57 (see EC 38*).

Cored Trees:
-

Plot 15 - July 26, 2022
Code: QH_B_P15
Azimuth: 241° SW
Lens Height: 1.03 m
Camera: Canon Powershot SX20 IS

Soil Pit 15
SMR: 0-1
SNR: M
Organic Layer: 3 cm
Soil Texture: Sand

Ecological Community #3 - Zonal Steep-Slope Mature Douglas-fir and Western Redcedar Forests

Mature forests of Douglas-fir and western redcedar extending down steep, rocky south- and west-facing slopes along the two major ridgelines that cut across the property. Arbutus and bigleaf maple trees are occasional. Soils are sandy, dry to very dry, and of moderate to rich fertility, keying to CDFmm 01 - Fd: Salal and approaching CDFmm 04 - FdBg: Oregon Grape in richer areas. Large boulders are common resulting in pockets of very coarse soils. Trees are well-spaced, with a density of around 500 stems/ha. In some areas, a secondary canopy of coniferous trees in the pole stage is developing. Most Douglas-fir trees and all western redcedar trees are of pole, young, or mature age; a small number of remnant old-growth Douglas-fir trees are scattered throughout. Most of the original canopy was harvested prior to the first aerial photographs in 1932. Since 1932, there have been no documented clear-cuts.

There are two polygons that include this ecological community: 3 and 4.

EC 3A - Mature Steep South-slope CwFd Forest | **Plots -** 14 (Vegetation) ; L (Density)

Description

Steep south to southwest-facing mature coniferous forest. Old-growth trees are sporadic. Western redcedar and Douglas-fir dominate the canopy layer, with scattered large arbutus and bigleaf maple trees. A sparse sub-canopy of pole western redcedar is developing. Understory includes dull Oregon grape and sword fern, with little to no moss layer. Forest extends from xeric upper slopes down to mesic lower slopes. Large boulders and exposed bedrock are frequent. Canopy closure here is nearly complete, as opposed to the more open canopy of 3B, possibly as a result of reduced historical logging due to inaccessibility.

Site Series - 01: Fd - Salal / 04 (Toe Slope) | **Polygon** - 3

Attribute	Range	Notes	Layer	Species	%	Total
Slope	76%	Very steep	**A**	*Thuja plicata*	50	
Aspect	170°	South		*Pseudotsuga menziesii*	40	
Structure	6Ct	Mature, coniferous, two-story		*Acer macrophyllum*	5	
Age	100+	Selectively logged		*Arbutus menziesii*	3	**98**
Elevation	81 m	2019 DEM used	**B**	*Berberis nervosa*	10	
Position	MD / LW	Mid-slope / Lower-slope		*Holodiscus discolor*	1	
Organic layer	10 cm	L, F, H, & Ah horizons		*Gaultheria shallon*	1	
Soil texture	s	Sandy		*Rubus spectabilis*	<1	**12**
SMR	1-2	Very Dry - Moderately Dry	**C**	*Polystichum munitum*	15	
SNR	M-R	Medium - Rich		*Achlys triphylla*	<1	**15**
Stem density	380-550	314, 400 m^2 plots; 12, 22 stems	**D**	*Kindbergia oregana*	<1	
Stump density	-	No stumps detected in plot		*Kindbergia praelonga*	<1	**1**

Notes:
Some variation is present from eastern property line to western property line, where an old logging road provides better access and stumps are more frequent. Stand has not been clear-cut in the period after 1932. It is located north (upslope) of EC 1 and 6A; and south (downslope) of EC 2 and 12C. It continues to the south onto DL 57 (see EC 39*) and to the west onto the Retreat Cove Farms property.

Cored Trees:
Tree #11: 87 cm, >100 yrs

Plot 14 - July 26, 2022
Code: QH_B_P14
Azimuth: 280° W
Lens Height: 1.00 m
Camera: Canon Powershot SX20 IS

Soil Pit 14
SMR: 1-2
SNR: M-R
Organic Layer: 10 cm
Soil Texture: Sand

EC 3B - Mature Steep Shoulder-slope FdCw Forest

Plots - 18 (Vegetation) ; G (Density)

Description

Thin strip of mature forest extending across much of the property along a down-sloping ridgeline. Mixed canopy of Douglas-fir and western redcedar, with pole, young, mature, and old-growth individuals. Variable slope, aspect, and understory vegetation depending upon position along the ridge. Shallow, rocky soils overlying bedrock, with large boulders scattered throughout. Canopy is more open compared to 3A, with a more developed moss layer. Primary harvesting occurred prior to 1932, and the stand has not been cleared since. Younger forests on either side of this ridgeline experienced clear-cutting between 1946 and 1948, with some incursions along the edges.

Site Series - 01(x): Fd - Salal

Attribute	Range	Notes
Slope	32%	Moderately steep (Variable)
Aspect	320°	Northwest (Variable)
Structure	6Ct	Mature, coniferous, two-story
Age	65+	Selectively logged
Elevation	95 m	2019 DEM used
Position	UP / CR	Upper-slope / Crest
Organic layer	2 cm	L, F, H, & Ah horizons
Soil texture	sk	Sand with cobbles
SMR	0-1	Very Dry
SNR	M	Medium
Stem density	500/ha	707 m^2 plot, 26 stems
Stump density	100/ha	100 m^2 plot, 1 stump

Notes:
Soils appear to be very dry, but vegetation and the presence of a spring exposed by a nearby logging road suggest that groundwater may be accessible in some areas. This polygon is located west of EC 8; east (upslope) of EC 10A and 11; and north of EC 12D. It continues to the north onto Lot 1, DL 58.

Polygon - 4

Layer	Species	%	Total
A	*Pseudotsuga menziesii*	35	
	Tsuga heterophylla	10	**45**
B	*Berberis nervosa*	20	
	Vaccinium ovatum	13	
	Lonicera hispidula	2	
	Rosa gymnocarpa	<1	
	Symphoricarpos albus	<1	**35**
C	*Polystichum munitum*	1	
	Bromus vulgaris	<1	
	Galium triflorum	<1	
	Melica subulata	<1	
	Other - see data sheets	<1	**2**
D	*Kindbergia oregana*	48	
	Kindbergia praelonga	2	**50**

Cored Trees:
Tree #13: 60.9 cm, 65 yrs

Plot 18 - July 27, 2022
Code: QH_B_P18
Azimuth: 305° NW
Lens Height: 1.25 m
Camera: Canon Powershot SX20 IS

Soil Pit 18
SMR: 0-1
SNR: M
Organic Layer: 2 cm
Soil Texture: Sand

Ecological Community #4 - Zonal Upper-Slope Mature Douglas-fir and Western Redcedar Forests

Mature forests of Douglas-fir and western redcedar trees - many of which are greater than 100 years old - located on moderate slopes near ridgeline in the centre of the property. No deciduous trees are present. Soils are sandy, dry, and of moderate fertility, keying to CDFmm 01 - Fd: Salal. Trees are well-spaced, with a density of around 350 stems/ha. The low density of large Douglas-fir stumps implies an original stand density of approximately 50 stems/ha. In some areas, a secondary canopy of coniferous trees in the pole stage is developing. Most Douglas-fir trees and all western redcedar trees are of pole, young, or mature age; a small number of remnant old-growth Douglas-fir trees are scattered throughout. Most of the original canopy was harvested prior to the first aerial photographs in 1932. Since 1932, there have been no documented clear-cuts, although some evidence of firewood collection is present. Douglas-fir dominant stands have a more developed understory than western redcedar dominant stands.

There are two polygons that include this ecological community: 5 and 6.

EC 4A - Mature South-slope Fd Forest	**Plots** - 16 (Vegetation) ; C (Density)

Description

Mature forest dominated by Douglas-fir trees. Western redcedar trees have formed a sparse sub-canopy, occurring in several clumps and as scattered individuals throughout the stand. A small handful of remnant old-growth Douglas-fir trees are present. Salal dominates the shrub layer to 0.5m; the ground is covered by Oregon beaked moss. Several other common shrubs and trees are occasional, including baldhip rose, dull Oregon grape, and western hemlock. The southerly aspect and upper-slope position result in very dry zonal conditions. Primary harvesting occurred prior to 1932, and the stand has not been cleared since.

Site Series - 01x: Fd - Salal			**Polygon** - 5			
Attribute	Range	Notes	Layer	Species	%	Total
Slope	25%	Moderately steep	**A**	*Pseudotsuga menziesii*	70	
Aspect	198°	South		*Thuja plicata*	5	
Structure	6Ct	Mature, coniferous, two-story		*Tsuga heterophylla*	<1	**75**
Age	115+	Selectively logged	**B**	*Gaultheria shallon*	92	
Elevation	164 m	2019 DEM used		*Berberis nervosa*	2	
Position	MD / UP	Mid-slope / Upper-slope		*Rosa gymnocarpa*	1	
Organic layer	5 cm	L, F, H, & Ah horizons		*Lonicera hispidula*	<1	**95**
Soil texture	s	Sand	**C**	*Festuca subulata*	<1	
SMR	1-2	Very Dry - Moderately Dry		*Polystichum munitum*	<1	**<1**
SNR	M	Medium	**D**	*Kindbergia oregana*	60	**60**
Stem density	360/ha	1256 m^2 plot, 45 stems				
Stump density	50/ha	400 m^2 plot, 2 stumps				

Notes:
An old logging road provides access through this area, and there is evidence of firewood harvesting and caching. A young Douglas-fir stand with tall trees in a small ridgeline depression divides this forest from the north-facing forest to the north. It is located south (downslope) of EC 8A; east of EC 12A, 12B, and 13C; and west of EC 10B. It continues to the south onto DL 57 (see EC 37*) and east onto Lot 1, DL 58.

Cored Trees:
Tree #12: 56.8 cm, >115 yrs

Plot 16 - July 26, 2022
Code: QH_B_P16
Azimuth: 126° SE
Lens Height: 1.32 m
Camera: Canon Powershot SX20 IS

Soil Pit 16
SMR: 1-2
SNR: M
Organic Layer: 5 cm
Soil Texture: Sand

EC 4B - Mature Ridgeline CwFd Forest | **Plots** - 2 (Vegetation) ; E (Density)

Description

Mature stand of western redcedar and Douglas-fir trees on ridgeline backslope. A small handful of remnant old-growth Douglas-fir trees are present. The western redcedar trees that currently dominate the canopy were previously suppressed understory trees that were released after primary harvesting. Significant canopy gaps are present, but forest understory is very underdeveloped. There is a notable lack of shrub and moss cover, likely due to goat browsing and western redcedar allelopathy. Pockets of low herbaceous growth have become established in canopy gaps. Slope position and aspect result in moderately dry zonal conditions.

Site Series - 01: Fd - Salal

Attribute	Range	Notes
Slope	20%	Moderately steep
Aspect	291°	West
Structure	6Ct	Mature, coniferous, two-story
Age	60+	Selectively logged
Elevation	140 m	2019 DEM used
Position	MD / UP	Mid-slope / Upper-slope
Organic layer	5 cm	L, F, H, & Ah horizons
Soil texture	sk	Sand with cobbles
SMR	2-3	Moderately Dry
SNR	M	Medium
Stem density	200-350	314, 400 m^2 plots; 11, 8 stems
Stump density	50/ha	400 m^2 plot, 2 stumps

Notes:
Fire scars are present on older trees. *Tree #2* is one of the younger trees, and is not representative. This stand shows greater signs of disturbance than EC 2A, with a highly reduced understory and moss layer. It is located south (upslope) of EC 10A; north (upslope) of EC 2; east (upslope) of EC 12C and 13A; and west (downslope) of EC 12A and 13C.

Polygon - 5

Layer	Species	%	Total
A	*Thuja plicata*	30	
	Pseudotsuga menziesii	20	**50**
B	*Gaultheria shallon*	5	
	Ilex aquifolium	<1	
	Lonicera hispidula	<1	
	Rubus leucodermis	<1	
	Rubus ursinus	<1	**5**
C	*Galium triflorum*	5	
	Bromus vulgaris	2	
	Osmorhiza berteroi	<1	
	Polystichum munitum	<1	
	Urtica dioica	<1	
	Other - see data sheets	<1	**7**
D	*Kindbergia oregana*	1	**1**

Cored Trees:
Tree #2: 51.7 cm, 57 yrs

Plot 2 - July 6, 2022
Code: QH_B_P02
Azimuth: 340° NW
Lens Height: 1.50 m
Camera: Canon Powershot SX20 IS

Soil Pit 2
SMR: 2-3
SNR: M
Organic Layer: 5 cm
Soil Texture: Sand

Ecological Community #5 - Zonal North Lower-Slope Mature Douglas-fir and Western Redcedar Forests

Mature forests of Douglas-fir and western redcedar trees - many of which are greater than 100 years old - located on moderate north-facing slopes in the southwest corner of the property. Soils are sandy, moderately dry, and of moderate fertility, keying to CDFmm 01 - Fd: Salal. Trees are well-spaced, with a density of between 350 and 550 stems/ha. In some areas, a secondary canopy of coniferous trees in the pole stage is developing. Most Douglas-fir trees and all western redcedar trees are of pole, young, or mature age; a small number of remnant old-growth Douglas-fir trees are scattered throughout. Most of the original canopy was harvested prior to the first aerial photographs in 1932. Since 1932, there have been no documented clear-cuts. Douglas-fir dominant stands have a more developed understory than western redcedar dominant stands. Differences between EC 5 and EC 4 are subtle, and include aspect (north vs. south / west facing), location (south vs. north of Quadra Hill ridgeline), moisture regime (moderately dry vs. dry to very dry), and land-use history.

There are two polygons that include this ecological community: 7 and 8.

EC 5A - Mature North Toe-slope FdCw Forest | **Plots -** 12 (Vegetation) ; M (Density)

Description

Mature Douglas-fir and western redcedar forest with scattered old-growth Douglas-fir individuals. Drier and most Douglas-fir dominant towards Porlier Pass Road, trending towards western redcedar downslope near adjacent swamp-marsh complex of EC 1. Understory is dominated by thick hip-high salal, with occasional oceanspray and baldhip rose individuals. Understory is more developed and Douglas-fir is more dominant in the canopy than in EC 5B. Most of the original canopy was harvested prior to the first aerial photographs in 1932. Since 1932, there have been no documented clear-cuts.

Site Series - 01: Fd - Salal

Attribute	Range	Notes
Slope	16%	Moderate slope
Aspect	40°	Northeast
Structure	6Ct	Mature, coniferous, two-story
Age	150+	Selectively logged
Elevation	63 m	2019 DEM used
Position	LW / TO	Lower-slope / Toe-slope
Organic layer	2 cm	L, F, H, & Ah horizons
Soil texture	sp	Sandy with pebbles
SMR	2	Moderately Dry
SNR	M	Medium
Stem density	350/ha	314 m^2 plot, 11 stems
Stump density	100/ha	100 m^2 plot, 1 stump

Notes:
Small remnant mature forest patch wedged between Porlier Pass Road and a wetland area. It is located north (downslope) and across Porlier Pass Road of EC 5B, EC 6B, and EC 7B; west of EC 6A; and south (upslope) of EC 1. It continues to the west onto the Retreat Cove Farms property.

Polygon - 7

Layer	Species	%	Total
A	*Pseudotsuga menziesii*	45	
	Thuja plicata	20	
	Acer macrophyllum	<1	**65**
B	*Gaultheria shallon*	90	
	Holodiscus discolor	<1	
	Rosa gymnocarpa	<1	
	Rubus ursinus	<1	**90**
C	*Polystichum munitum*	3	
	Pteridium aquilinum	<1	**3**
D	*Kindbergia spp.*	<1	
	Rhytidiadelphus spp.	<1	**1**

Cored Trees:
Tree #10: 77 cm DBH, >150 yrs

Plot 12 - July 25, 2022
Code: QH_B_P12
Azimuth: 324° NW
Lens Height: 1.25m
Camera: Canon Powershot SX20 IS

Soil Pit 12
SMR: 2
SNR: M
Organic Layer: 2 cm
Soil Texture: Sand

EC 5B - Mature North-slope CwFd Forest	**Plot -** O (Density)
	**Description** Mature mixed Douglas-fir and western redcedar forest with remnant old-growth Douglas-fir individuals. Most stumps are Douglas-fir, but canopy is primarily composed of western redcedar trees that were released from the sub-canopy following primary harvest of Douglas-fir in the early 20th century. Understory is underdeveloped except in canopy gaps, likely due to the dense shade and surface root systems of the western redcedar trees, and to sheep browsing prior to 2020. This small polygon is a continuation of EC 28d* that was mapped in the DL 57 Baseline Survey[20] one decade previously. It is located south (upslope) of EC 6B and north (downslope) of EC 7A, and across Porlier Pass Road from EC 5A.
Site Series - 01: Fd - Salal	**Polygon** - 8

[20] See Erickson, K., & Simon, A. (2012) Galiano Learning Centre Baseline Report. GCA.

Ecological Community #6 - Western Redcedar and Red Alder Rich Forest and Swamp

Mature forests of western redcedar and red alder trees located in narrow, gently-sloping depressional drainages in the southwest corner of the property. Gradient between lowland and toe-slope areas is very slight, with occasional mature and old-growth Douglas-fir individuals located on upland sites. Soils are fine, seasonally wet, and of high fertility, keying to CDFmm 06 - CwBg: Foamflower on toe-slopes and CDFmm 14 - Cw: Slough Sedge in depressions. Canopy is multi-storied and open, with wetter micro-sites unsuitable to tree growth. Ponding occurs in the wet season, but groundwater levels drop precipitously in the dry season. Slough sedge, lady fern, and giant horsetail are dominant in depressions, while sword fern and salal are present on mounds. Hydrology may be altered by nearby roads.

There are two polygons that include this ecological community: 9 and 10.

EC 6A - CwDrFd Swamp	**Plots -** 11 (Vegetation)

Description

Open, mixed-canopy forest of young and mature western redcedar and red alder trees. Young and mature Douglas-fir trees are established on several patches of high ground. Saplings grow in canopy gaps. Large, healthy sword ferns and salal grow on hummocks, while water fills depressions. Both skunk cabbage and slough sedge present in low areas, accompanied by dense cover of lady fern and giant horsetail. Bigleaf maple and salmonberry are occasional. Several old-growth individual Douglas-firs remain on toe-slopes, but much of the area was cleared between the 1930s and 1950s.

Site Series - 06 (Upland) / 14 (Lowland)			**Polygon -** 9			
Attribute	Range	Notes	Layer	Species	%	Total
Slope	8%	Gentle slope	**A**	*Alnus rubra*	15	
Aspect	320°	Northwest		*Thuja plicata*	15	**30**
Structure	6Mm	Mature, mixed, multi-story	**B**	*Gaultheria shallon*	8	
Age	72-90	Last cleared 1932-1950		*Vaccinium parvifolium*	1	
Elevation	59 m	2019 DEM used		Other - see data sheets	<1	**10**
Position	DP / TO	Depression / Toe-slope	**C**	*Polystichum munitum*	40	
Organic layer	35 cm	L, F, H, & Ah horizons		*Equisetum telmateia*	30	
Soil texture	cs	Clay and sand		*Athyrium filix-femina*	10	
SMR	7f	Wet; Fluctuating		*Lysichiton americanus*	5	
SNR	R-VR	Rich - Very Rich		*Urtica dioica*	3	
Stem density	900/ha	100 m^2 plot, 9 stems		*Carex obnupta*	1	
Stump density	-	No stumps detected in plot		*Glyceria elata*	1	
				Carex leptopoda	1	
				Other - see data sheets	4	**95**

Notes:
Transitional rich forest and swamp on poorly drained Brigantine soils. It is located east (upslope) of EC 1 and south (downslope) of EC 3A. Porlier Pass Road and "rock plug" with farmstand upslope are likely modifying the hydrology. No stumps were detected in this plot, but large stumps are located just outside of the plot. Toe-slopes are characterized by large boulders, with rich colluvial soils.

Cored Trees:
-

Plot 11 - July 25, 2022
Code: QH_B_P11
Azimuth: 330° NW
Lens Height: 1.35 m
Camera: Canon Powershot SX20 IS

Soil Pit 11
SMR: 7f
SNR: R-VR
Organic Layer: 35 cm
Soil Texture: Clay, Sand

EC 6B - CwDrFd Swamp	**No Plots**
	**Description** Mature, open canopy western redcedar and red alder forest with occasional remnant old-growth Douglas-fir individuals. Bigleaf maple and grand fir are occasional in open canopy areas. Sword fern and salal dominate understory on toe slopes, while slough sedge covers seasonally-inundated depressions. A skid road runs parallel to the low-lying areas and eventually meets Porlier Pass Road in a small disturbed clearing with compacted soils and non-native grass cover. This narrow polygon is a continuation of EC 30c* that was mapped in the DL 57 Baseline Survey[21] one decade previously, and is located across Porlier Pass Road from EC 6A. It is located south (downslope) of EC 7B and north (downslope) of EC 5B.
Site Series - 06 (Upland) / 14 (Lowland)	**Polygon** - 10

[21] See Erickson, K., & Simon, A. (2012) Galiano Learning Centre Baseline Report. GCA.

Ecological Community #7 - Dry Zonal Ridgecrest Mature Douglas-fir and Western Redcedar Forests

Mature forests of Douglas-fir and western redcedar trees - many of which are greater than 80 years old - straddling narrow ridgelines with very coarse soils in the southwest corner of the property. Soils are extremely dry and of low fertility, corresponding to CDFmm 02 - FdPl: Arbutus and very dry CDFmm 01 - Fd: Salal. Trees are dense and limited by shallow soils and dry conditions. Pole, young, and mature trees grow together, forming a dense canopy and resulting in a very sparse understory. Most of the original canopy was harvested prior to the first aerial photographs in 1932. Since 1932, there have been no documented clear-cuts.

There are two polygons that include this ecological community: 11 and 12.

EC 7A - Mature Ridgeline Fd Forest	**No Plots**

Description

Mature ridgeline Douglas-fir forest on the south side of Porlier Pass Road. Canopy is primarily Douglas-fir of varying ages, with occasional western redcedar Understory is sparse, and tree spacing is very tight. High mortality of western redcedar trees in the understory, resulting in snags and deadwood. This small polygon is a continuation of EC 31a* that was mapped in the DL 57 Baseline Survey[22] one decade previously. It is located along the northern crest and upper slope of an east-west ridgeline, just south (upslope) of EC 5B.

Site Series - 02: FdPl - Arbutus	**Polygon** - 11

EC 7B - Mature Ridgeline CwFd Forest	**No Plots**

Description

Mature western redcedar and Douglas-fir forest perched across a narrow, rocky, descending ridgeline on the south side of Porlier Pass Road. Most stumps are Douglas-fir; the canopy is Douglas-fir dominant on south ridge crest and western redcedar dominant on north ridge crest. Old-growth Douglas-fir individuals are occasional. The north slope is influenced by clearing along Porlier Pass Road, resulting in a robust shrub community including dull Oregon grape, salal, sword fern, and oceanspray. Lots of woody debris on the ground. This narrow polygon is a continuation of both EC 29 and 28A* that were mapped in the DL 57 Baseline Survey[23] one decade previously. It is located south (upslope) of EC 6A and north (upslope) of EC 6B.

Site Series - 01x: Fd - Salal	**Polygon** - 12

[22] Ibid.
[23] Ibid.

Ecological Community #8 - Zonal North-Slope Young Douglas-fir Forests

Young monocultural forests of Douglas-fir trees that are around 60 years old on a moderately steep north-facing slope that occupies nearly the entire northeast quadrant of the property. No deciduous trees are present. The forest extends from the crest of Quadra Hill down to a narrow bench where an access road cuts across the toe-slope, inhabiting nearly the full range of mesoslope positions. Soils are sandy, dry, and are of above average fertility for zonal forests, keying to CDFmm 01 - Fd: Salal. Coarse fragment content is high, with cobble-sized rocks encountered in both soil pits. Forest density is variable, ranging from 400 stems/ha in the driest areas to 1000 stems/ha in more mesic areas. Understory is a mosaic, alternating between dense knee-high patches of salal and dull Oregon grape and sparse patches of moss and shade-tolerant grasses. There is a notable lack of coarse woody debris in the understory compared to surrounding forests. Several large canopy gaps are present, resulting in thick chest-high salal growth. A depression at ridgeline on Quadra Hill has created local conditions supporting relatively taller trees. Clear-cut logging occurred in 1948, followed by a brushing around 1960.

There are two polygons that include this ecological community: 13 and 14.

EC 8A - Young Upper North-slope Fd Forest | **Plots** - 5 (Vegetation) ; B (Density)

Description

Well-spaced young Douglas-fir stand covering the upper half of a large north-facing slope on very dry soils. Stem density is roughly half that of lower-slope areas. Small patches of oniongrass and moss alternate with patches of low-growing salal and dull Oregon grape; groundcover is primarily Oregon beaked moss. Baldhip rose is occasional. Understory is less robust than lower-slope areas. There is a notable lack of coarse woody debris on the ground. A small cabin with outbuildings occupies a clearing bordering the highest point in this polygon, at the top of Quadra Hill.

Site Series - 01x: Fd - Salal

Attribute	Range	Notes
Slope	25%	Moderately steep
Aspect	6°	North
Structure	5Cs	Young, coniferous, single-story
Age	60-72	Last cleared 1950-1962
Elevation	167 m	2019 DEM used
Position	UP / CR	Upper-slope / Crest
Organic layer	10 cm	L, F, H, & Ah horizons
Soil texture	sk	Sand with cobbles
SMR	1-2	Very dry - Moderately Dry
SNR	M	Medium
Stem density	425-650	314, 400 m^2 plots; 20, 17 stems
Stump density	100/ha	400 m^2 plot, 4 stumps

Notes:
An even-aged forest of Douglas-fir trees that covers most of the eastern half of the property. It is located east of EC 3B; south (upslope) of EC 8B; north (downslope) of EC 10B and 12D; and north (upslope) of EC 4A. It continues to the east onto Lot 1, DL 58.

Polygon - 13

Layer	Species	%	Total
A	*Pseudotsuga menziesii*	65	**65**
B	*Mahonia nervosa*	15	
	Gaultheria shallon	15	
	Rosa gymnocarpa	1	
	Lonicera hispidula	<1	**30**
C	*Melica subulata*	1	
	Festuca occidentalis	<1	
	Festuca subulata	<1	
	Moehringia macrophylla	<1	
	Other - see data sheets	<1	**1**
D	*Kindbergia oregana*	80	
	Hylocomium splendens	15	
	Rhytidiadelphus triquetrus	1	
	Other - see data sheets	<1	**95**

Cored Trees:
Tree #5A: 47.1 cm, 60 yrs
Tree #5B: 55.9 cm, 60 years

Plot 5 - July 11, 2022
Code: QH_B_P05
Azimuth: 18° N
Lens Height: 1.18 m
Camera: Canon Powershot SX20 IS

Soil Pit 5
SMR: 1-2
SNR: M
Organic Layer: 10 cm
Soil Texture: Sand

EC 8B - Young Lower North-slope Fd Forest | **Plots** - 6 (Vegetation) ; B (Density)

Description

Tightly-spaced middle-aged Douglas-fir stand covering the lower half of a large north-facing slope on dry soils. Thick shrub layer of salal and dull Oregon grape over a healthy moss layer of Oregon beaked moss and step moss. Baldhip rose and tall oceanspray shrubs are occasional; oceanspray architecture indicates heavy browsing pressure. Stem density is roughly twice that of upslope areas. Understory is more robust than upslope areas, with dense hip-high shrub growth and higher cover of mosses. An access road runs along the northern edge of this polygon.

Site Series - 01: Fd - Salal

Attribute	Range	Notes
Slope	55%	Steep
Aspect	16°	North
Structure	5Cs	Young, coniferous, single-story
Age	60-72	Last cleared 1950-1962
Elevation	127 m	2019 DEM used
Position	MD/ LW	Mid-slope / Lower-slope
Organic layer	9 cm	L, F, H, & Ah horizons
Soil texture	sk	Sand with cobbles, very rocky
SMR	2-3	Moderately Dry
SNR	M	Medium
Stem density	650-1000	100, 314 m^2 plots; 10, 20 stems
Stump density	-	No stumps detected in plot

Notes:
An even-aged forest of Douglas-fir trees that covers most of the eastern half of the property. It is located east of EC 3B; south (upslope) of EC 9; and north (downslope) of EC 8A. It continues to the north and east onto Lot 1, DL 58.

Polygon - 14

Layer	Species	%	Total
A	*Pseudotsuga menziesii*	60	**60**
B	*Holodiscus discolor*	5	
	Gaultheria shallon	60	
	Mahonia nervosa	25	
	Rosa gymnocarpa	1	**90**
C	*Polystichum munitum*	<1	
	Goodyera oblongifolia	<1	
	Festuca subulata	<1	**<1**
D	*Hylocomium splendens*	30	
	Kindbergia oregana	30	
	Leucolepis menziesii	5	
	Rhytidiadelphus loreus	5	
	Rhytidiadelphus triquetrus	2	
	Other - see data sheets	<1	**75**

Cored Trees:
Tree #6: 28 cm, 45 yrs
Tree #7: 42.5 cm, 55-60 yrs
Tree #16: 52.4 cm, 55 yrs

Plot 6 - July 11, 2022
Code: QH_B_P06
Azimuth: 32° N
Lens Height: 0.8 m
Camera: Canon Powershot SX20 IS

Soil Pit 6
SMR: 2-3
SNR: M
Organic Layer: 9 cm
Soil Texture: Sand

Ecological Community #9 - Zonal North-Slope Young Red Alder Forest

Young forest of red alder trees that are mostly over 70 years old, located on imperfectly-drained Trincomali soils on a moisture-receiving bench in the northeast corner of the property. Many canopy trees are dead or dying. Conifer recruitment is sparse and includes Douglas-fir, western redcedar, and western hemlock saplings. Soils are a fine silty sand above a coarse gravel over compacted till, resulting in moist winter conditions and very dry summer conditions, keying to 06 - CwBg - Foamflower. Forest density is low and variable, ranging from 100 to 300 living stems/ha. The open canopy results in a dense herbaceous understory composed of stinging nettle, vanilla leaf, and sword fern. Groundcover is a rich moss layer of electrified cat's tail moss, Menzies' tree moss, and badge moss. This forest is located on imperfectly-drained Trincomali soils, which are poorly-drained compared to adjacent Saturna soils. Clear-cut logging occurred in 1948, and regeneration has been limited to deciduous species post-logging.

This ecological community is only found in polygon 15.

EC 9 - Young Bench North-slope Dr Forest | **Plots** - 17 (Vegetation) ; F (Density)

Description

Young red alder forest occupying a mid-slope bench below a young Douglas-fir forest and above steeper slope descending into a riparian red alder forest. Older trees are dying and creating canopy gaps that support a dense herbaceous understory, but little conifer regeneration is evident. The stand location on imperfectly drained Trincomali soils (coarse, gravelly soils over compact, unweathered glacial till) may be resulting in poor drainage patterns. Vegetation and logging history are similar to EC 10A, but canopy appears more open and less robust, and soils are Trincomali. Relative lack of stumps may be the result of bulldozing following clear-cutting.

Site Series - 06: CwBg - Foamflower | **Polygon** - 15

Attribute	Range	Notes
Slope	12%	Moderate slope
Aspect	10°	North
Structure	5Bs	Young, broadleaf, single-story
Age	72-90	Last cleared 1932-1950
Elevation	97 m	2019 DEM used
Position	MD	Mid-slope / Bench
Organic layer	3 cm	L, F, H, & Ah horizons
Soil texture	s$\underline{g}$	Sandy silt over gravel
SMR	3-5	Moderately Dry - Slightly Dry
SNR	M-R	Medium - Rich
Stem density	110-300	100, 314 m^2 plots; 3, 8 stems
Stump density	100/ha	100 m^2 plot, 1 stump

Layer	Species	%	Total
A	*Alnus rubra*	45	**45**
B	*Rubus leucodermis*	1	
	Rubus ursinus	<1	
	Vaccinium parvifolium	<1	**1**
C	*Urtica dioica*	50	
	Achlys triphylla	15	
	Polystichum munitum	5	
	Stellaria crispa	3	
	Carex leptopoda	3	
	Festuca subulata	1	
	Other - see data sheets	3	**80**
D	*Rhytidiadelphus triquetrus*	40	
	Leucolepis acanthoneuron	30	
	Plagiomnium insigne	25	**95**

Notes:
This particular stand occupies a mid-slope bench between upper and lower slopes which have a shared history of clear-cut logging but have taken separate trajectories. It is located north (downslope) of EC 8B, and continues to the north and east onto Lot 1, DL 58.

Cored Trees:
-

Plot 17 - July 27, 2022
Code: QH_B_P17
Azimuth: 299° W
Lens Height: 1.25 m
Camera: Canon Powershot SX20 IS

Soil Pit 17
SMR: 3-5
SNR: M-R
Organic Layer: 3 cm
Soil Texture: Sand

Ecological Community #10 - Mid-Slope Young Red Alder Forest

Young forests of red alder trees that are mostly over 70 years old, located on concave middle slopes with distinct soils. Remnant old-growth Douglas-fir trees form sparse clusters in several areas. Pole / sapling and young conifers - including western redcedar, grand fir, and western hemlock - are occasional in the subcanopy. Bigleaf maple and Scouler's willow are also present. Soils are sandy with silt present, moderately dry, and are of above average fertility for zonal forests, corresponding to CDFmm 01 - Fd: Salal. Forest density is variable, ranging from 400 to 900 stems/ha. Significant quantities of coarse woody debris are present on the ground. Understory is dominated by stinging nettle and associated herbaceous species on upper-mid slopes, trending towards sword fern on lower-mid slopes ; groundcover includes badge moss and electrified cat's tail moss. Clear-cut logging occurred in 1946, followed by a noticeable lack of conifer regeneration.

There are two polygons that include this ecological community: 16 and 17.

EC 10A - Young Mid-slope Dr Forest | **Plots** - 4 (Vegetation) ; J (Density)

Description

Young red alder stands located on moderate soils in topographic draws. Well-developed herbaceous understory dominated by stinging nettle. Large quantities of coarse woody debris on the ground. Other trees are occasional, including bigleaf maple, Douglas-fir, western redcedar, Scouler's willow, western hemlock, and grand fir. Large western redcedar stumps are present; several old-growth Douglas-fir individuals are also present. Herbaceous vegetation and concave topography suggest elevated soil moisture and nutrient levels relative to surrounding low ridges. Vegetation and logging history are similar to EC 9, but canopy appears healthier and more robust, and soils are Saturna.

Site Series - 01: Fd - Salal | **Polygon** - 16

Attribute	Range	Notes
Slope	20%	Moderately steep
Aspect	316°	Northwest
Structure	5Bs	Young, broadleaf, single-story
Age	72-90	Last cleared 1946 (1932-1950)
Elevation	139 m	2019 DEM used
Position	MD	Mid-slope
Organic layer	5 cm	L, F, H, & Ah horizons
Soil texture	sk	Sand with cobbles & silt
SMR	2	Moderately Dry
SNR	M	Medium
Stem density	400-900	100, 314m^2 plots; 9, 13 stems
Stump density	-	No stumps detected in plot

Layer	Species	%	Total
A	*Alnus rubra*	75	
	Thuja plicata	<1	**75**
B	*Gaultheria shallon*	<1	
	Rubus ursinus	<1	**<1**
C	*Urtica dioica*	45	
	Galium aparine	15	
	Nemophila parviflora	5	
	Achlys triphylla	3	
	Stellaria crispa	3	
	Other - see data sheets	5	**55**
D	*Plagiomnium insigne*	35	
	Rhytidiadelphus triquetrus	25	
	Kindbergia oregana	5	
	Other - see data sheets	1	**60**

Notes:
This community straddles two parallel minor drainages, and appears to be the result of slightly elevated soil moisture and nutrient levels and clear-cut logging in the 1940s. It is located south (upslope) of EC 11; east (downslope) of EC 13A and 15B; north (downslope) of EC 4B and 13C; and west (downslope) of EC 3B and 12D.

Cored Trees:
-

Plot 4 - July 11, 2022
Code: QH_B_P04
Azimuth: 330° NW
Lens Height: 1.42 m
Camera: Canon Powershot SX20 IS

Soil Pit 4
SMR: 2
SNR: M
Organic Layer: 5 cm
Soil Texture: Sand

EC 10B - Young South-slope Dr Forest	**No Plots**

Description

Young and pole-sapling red alder forest on a minor topographic bench, surrounded by coniferous forest. Douglas-fir trees are occasional. Open canopy, with a few western redcedar stumps and an understory of dull Oregon grape, foxglove, and grasses. Groundcover is evenly split between moss, grass, and leaf litter. The Vanilla Leaf Trail is located just across the property line on Lot 1, DL 58. This stand is likely the result of unusual soil conditions and disturbance. It is located east of EC 4A and south (downslope) of EC 8A. It continues east onto Lot 1, DL 58.

Site Series - 01: Fd - Salal	**Polygon** - 17

Ecological Community #11 - Rich Lower-Slope Young Red Alder Forest

Young forest of red alder trees that are mostly over 70 years old, located in a moisture-receiving drainage at the northern edge of the property. Pole / sapling and young western redcedar trees occur in several clusters. Soils are disturbed with a high winter water table, corresponding to CDFmm 06 - CwBg: Foamflower. Moderate quantities of coarse woody debris are present on the ground. Understory is dominated by sword fern; groundcover includes grass and moss. Several old skid roads cut down the centre of two perpendicular drainages that converge and then descend across the northern property line. A logging road channels and conveys runoff and water from the marsh in EC 17B down to the Great Beaver Swamp through this drainage. Clear-cut logging occurred in 1946, followed by a noticeable lack of conifer regeneration.

This ecological community is only found in polygon 18.

EC 11 - Young Lower-slope Dr Forest	**No Plots**

Description

Young red alder forest, with clumps of western redcedar trees in wet areas. Sword fern dominates the understory. Most stumps are western redcedar. Logging roads seasonally channel water down towards the Great Beaver Swamp; soil compaction is present around roadways. This area has been highly disturbed by logging, and roads are likely altering hydrology, resulting in drier soil conditions. It is located north (downslope) of EC 10A; west (downslope) of EC 3B; and east (downslope) of EC 14C. It continues north onto the Great Beaver Swamp property.

Site Series - 06: CwBg - Foamflower	**Polygon** - 18

Ecological Community #12 - Zonal Upper-slope Pole-sapling Douglas-fir Monocultures

Dense stands of Douglas-fir trees that are between 25 and 35 years old, located along ridgeline and on relative topographic prominences between the two central ridgelines that cut across the property. Occasional deciduous trees - including bigleaf maple, Scouler's willow, and bitter cherry - are scattered throughout, but here present are being overtaken by conifers; understory is minimal. Soils are generally sandy, dry, and of moderate fertility, keying to CDFmm 01 - Fd: Salal. Stand density is over 800 stems/ha, with active self-thinning evident from copious coarse and fine woody debris on the ground. Fire scars on trees likely indicate the use of fire to clear slash piles after logging. High density of western redcedar stumps in plots indicate that current stands are third-growth, following the removal of the original Douglas-fir canopy and subsequent clear-cutting of the regenerating secondary western redcedar canopy between 1987 and 1996.

There are four polygons that include this ecological community: 19, 20, 21, and 22.

EC 12A - Pole-sapling Upper Backslope Fd Forest | **Plots** - 1 (Vegetation); D (Density)

Description

Dense pole-sapling Douglas-fir forest that is less than 30 years old, near ridgeline. Self-thinning actively taking place, with large amounts of coarse and fine woody debris covering the forest floor. Occasional individual deciduous trees remain, with others shaded out and standing dead. Stand density is very high, with minimal diversity in the shrub and herb layers. Stand density is slightly higher and average DBH slightly lower than similar stands lower on the property. Moss layer is also reduced, with the exception of a handful of canopy small gaps that may be a result of root rot.

Site Series - 01: Fd - Salal | **Polygon** - 19

Attribute	Range	Notes
Slope	20%	Moderately steep
Aspect	298°	Northwest
Structure	4Cs	Pole, coniferous, single-story
Age	26-35	Last cleared 1987-1996
Elevation	149 m	2019 DEM used
Position	MD / UP	Mid-slope / Upper-slope
Organic layer	7 cm	L, F, H, & Ah horizons
Soil texture	sp	Sand with pebbles
SMR	2-3	Moderately Dry
SNR	M	Medium
Stem density	1170/ha	314 m^2 plot, 37 stems
Stump density	600/ha	100 m^2 plot, 6 stumps

Layer	Species	%	Total
A	*Pseudotsuga menziesii*	60	
	Acer macrophyllum	15	**75**
B	*Lonicera hispidula*	<1	**<1**
C	*Epipactis helleborine*	<1	
	Melica subulata	<1	
	Prunus emarginata	<1	
	Polystichum munitum	<1	**<1**
D	*Kindbergia oregana*	10	**10**

Notes:
Fire scars present on many trees, possibly from fires used to clear slash following logging. No surviving mature trees in the canopy. Large quantities of woody debris and ladder fuels present, resulting in a significant fire risk. Terrain is undulating, with irregular mounds and depressions throughout. It is located north (upslope) of EC 2, east (upslope) of EC 4B, west of EC 4A, and south (upslope) of EC 13C.

Cored Trees:
Tree #1: 32.8 cm; 27 yrs

Plot 1 - July 6, 2022
Code: QH_B_P01
Azimuth: 316° NW
Lens Height: 1.44 m
Camera: Canon Powershot SX20 IS

Soil Pit 1
SMR: 2-3
SNR: M
Organic Layer: 7 cm
Soil Texture: Sand

EC 12B - Pole-sapling Low-crest Fd Forest	**Plots -** 10 (Vegetation) ; A (Density)

Description

Pole-sapling Douglas-fir forest on a gentle rise in the landscape. Large number of stumps of different sizes indicate that this area has been logged at least twice. Less wood on the ground and higher moss layer than in similar ridgeline backslope stands on the property, possibly due to firewood collection. This polygon is located near the gravel pit and a large landing along the main access road to the property, and likely experienced heavy human use and grazing by goats in recent years. It borders a rare mature forest with similar soils and landscape position on the adjacent property, providing an example of what it looked like prior to the most recent round of logging.

Site Series - 01: Fd - Salal			**Polygon** - 20			
Attribute	Range	Notes	Layer	Species	%	Total
Slope	6%	Gentle slope	**A**	*Pseudotsuga menziesii*	85	**85**
Aspect	119°	Southeast	**B**	*Berberis nervosa*	1	
Structure	4Cs	Pole, coniferous, single-story		*Gaultheria shallon*	<1	**1**
Age	26-35	Last cleared 1987-1996	**C**	*Polystichum munitum*	1	
Elevation	95 m	2019 DEM used		*Galium triflorum*	<1	
Position	UP / CR	Upper-slope / Crest		*Rubus ursinus*	<1	**1**
Organic layer	15 cm	L, F, H, & Ah horizons	**D**	*Kindbergia oregana*	55	
Soil texture	sp	Sand with pebbles		*Hylocomium splendens*	5	**60**
SMR	2-3	Moderately Dry				
SNR	M	Medium				
Stem density	800/ha	314 m^2 plot, 25 stems				
Stump density	1000/ha	100 m^2 plot, 10 stumps				

Notes:
This area appears to have been repeatedly logged. Charcoal found in soil pit, and burn marks present on many Fd stumps. It is located south and west (upslope) of EC 14A and north (upslope) of EC 13A. It is bordered to the west by mature zonal forest on similar soils on the Retreat Cove Farms property.

Cored Trees:
Tree #9: 28 cm, 33 yrs
Tree #15: 29.1 cm, 40-50 yrs

Plot 10 - July 12, 2022
Code: QH_B_P10
Azimuth: 345° NW
Lens Height: 1.40m
Camera: Canon Powershot SX20 IS

Soil Pit 10
SMR: 2-3
SNR: M
Organic Layer: 15 cm
Soil Texture: Sand

EC 12C - Pole-sapling Lower Backslope Fd Forest	**No Plots**

Description

Dense pole-sapling Douglas-fir forest that is less than 30 years old, near ridgeline, with occasional western redcedar trees. Self-thinning actively taking place, with large amounts of coarse and fine woody debris covering the forest floor. Large Douglas-fir and western redcedar stumps are present. Understory includes sparse moss on deadwood, dull Oregon grape, salal, and sword fern. There is some evidence of pole tree harvest for firewood use. Soil is sandy with cobbles. Similar to EC 12A, but lower down on the slope, with potentially slightly richer and moister soil conditions. It is located north (upslope) of EC 2 and 3A; east and south (upslope) of EC 13A; and west (downslope) of EC 4B.

Site Series - 01: Fd - Salal	**Polygon** - 21

EC 12D - Pole-sapling Steep-slope Fd Forest	**No Plots**

Description

Dense pole-sapling Douglas-fir forest that is less than 30 years old, descending from ridgecrest down a steep slope, with occasional western redcedar trees. Self-thinning actively taking place, with large amounts of coarse and fine woody debris covering the forest floor. Douglas-fir stumps are present. Understory is sparse, with occasional dull Oregon grape and moss growing on deadwood. Soils are shallow and coarse, with several areas of exposed bedrock with oceanspray and salal. Includes the cabin clearing at the top of Quadra Hill. It is located north (upslope) of EC 13C; east (upslope) of EC 10A; east of EC 3B; west (upslope) of EC 4A; and south (upslope) of EC 8A.

Site Series - 01x: Fd - Salal	**Polygon** - 22

Ecological Community #13 - Zonal Mid-slope Mixed Pole-sapling Red Alder and Douglas-fir Forests

Dense stands of Douglas-fir and red alder trees that are between 25 and 35 years old, located on concave upper and middle slopes between minor ridges in the centre of the property . Understory is thicker in canopy gaps and more spare in dense patches, consisting of herbaceous species such as stinging nettle. Soils are generally sandy, moderately dry, and of moderate fertility, keying to CDFmm 01 - Fd: Salal. Stand density is over 700 stems/ha, with some self-thinning evident. Western redcedar stumps in plots indicate that current stands are third-growth, following the removal of the original Douglas-fir canopy and subsequent clear-cutting of the regenerating secondary western redcedar canopy between 1987 and 1996. This community occupies the same topographic positions as EC 10, but on relatively poorer soils with a more recent history of clear-cut logging.

There are three polygons that include this ecological community: 23, 24, and 25.

EC 13A - Pole-sapling Mid-slope DrFd Forest | **Plots** - 3 (Vegetation)

Description

Pole-sapling mixed red alder and Douglas-fir stand located in a narrow, minor topographic draw. Bigleaf maple is occasional. Well-developed herbaceous understory and moss layers occur in canopy gaps and clusters of red alder trees. Western redcedar stumps are present. Stands alternate between clumps that are dominated by red alder and clumps that have more Douglas-fir interspersed. Shrub layer is mostly lacking. Two minor ridges to the east and west are of similar age, but are conifer dominant and exhibit minimal understory development. Similar to EC 14B, but with poorer soils; similar to EC 14C, but occupying a mid-slope (as opposed to upper-slope) position.

Site Series - 01: Fd - Salal | **Polygon** - 23

Attribute	Range	Notes
Slope	15%	Moderate slope
Aspect	328°	Northwest
Structure	4Ms/4Bs	Pole, mixed, single-story
Age	26-35	Last cleared 1987-1996
Elevation	130 m	2019 DEM used
Position	MD / UP	Mid-slope / Upper-slope
Organic layer	5 cm	L, F, H, & Ah horizons
Soil texture	sk	Sand with cobbles
SMR	2	Moderately Dry
SNR	M	Medium
Stem density	725/ha	400 m^2 plot, 29 stems
Stump density	125/ha	400 m^2 plot, 5 stumps

Layer	Species	%	Total
A	*Alnus rubra*	30	
	Pseudotsuga menziesii	15	
	Acer macrophyllum	5	
	Tsuga heterophylla	<1	**50**
B	*Rubus spp.* (several)	<1	
	Other - see data sheets	<1	**<1**
C	*Stellaria crispa*	50	
	Urtica dioica	30	
	Poa annua	15	
	Carex leptopoda	10	
	Other - see data sheets	<1	**100**
D	*Plagiomnium insigne*	25	
	Rhytidiadelphus triquetrus	5	
	Kindbergia oregana	<1	**30**

Notes:
Soil is light and fluffy, appearing poorer than other concave sites on the property. Alder trees present are not particularly impressive, leaving several large canopy gaps in stand. It is located north (downslope) of EC 12C; west (downslope) of EC 4B and 10A; and south (downslope) of EC 15A.

Cored Trees:
Tree #3: 17.9 cm, 24 yrs

Plot 3 - July 6, 2022
Code: QH_B_P03
Azimuth: 318° NW
Lens Height: 1.24 m
Camera: Canon Powershot SX20 IS

Soil Pit 3
SMR: 2
SNR: M
Organic Layer: 0.4 cm
Soil Texture: Sand

EC 13B - Pole-sapling Mid-slope DrBg Forest	**No Plots**

Description

Pole-sapling mixed red alder and grand fir stand located in a narrow, minor topographic draw between two conifer-dominated ridges. Large western redcedar stumps are present. Understory is dominated by sword ferns and stinging nettle, with a robust moss layer. Alders are concentrated near the lowest areas, where an old skid road runs directly uphill through this stand. Very similar to EC 13C, but with richer soil conditions. It is located south (upslope) of EC 14B; east (downslope) of EC 15A; west (downslope) of EC 15B; and north (downslope) of EC 10A.

Site Series - 04: FdBg - Oregon Grape	**Polygon** - 24

EC 13C - Pole-sapling Upper-slope DrFd Forest	**No Plots**

Description

Pole-sapling mixed red alder and conifer stand located in a narrow, minor topographic draw between two conifer-dominated slopes. Red alder is clearly dominant in low areas, with Douglas-fir and western redcedar secondary along the edges. Large western redcedar stumps are present. Stinging nettle is the dominant understory vegetation, with a well-developed moss layer. Similar to EC 13A, but located on an upper slope with greater segregation between red alder and conifers; similar to EC 13B, but located upslope on poorer soils. It is located east (upslope) of EC 10A; north (downslope) of EC 12A; west (downslope) of EC 4A; and south (downslope) of EC 12D.

Site Series - 01: Fd - Salal	**Polygon** - 25

Ecological Community #14 - Rich Lower-slope Mixed Transitional Forests

Highly disturbed and very uneven 30-40 year-old stands of western redcedar, red alder, and occasional Douglas-fir trees located on lower and toe-slopes in a ring around the drainage basin that receives moisture from the area located between the two central ridges that cut across the property. Some stands are mixed, while others are primarily red alder or western redcedar; some are still in the pole-sapling stage, while others have matured to a young forest structure. Notable occasional tree species include black cottonwood, cascara, grand fir, bigleaf maple, bitter cherry, Scouler's willow, and Pacific willow. Understory is either rich (sword ferns, moss, herbaceous plants), suppressed (under a dense western redcedar canopy), or grazed down by goats (pasture). Soils are sandy with silt, moderately dry to fresh, and of medium to rich fertility, keying to CDFmm 06 - CwBg: Foamflower. Management of these areas appears to have been intense but highly variable, and as a result forest composition is patchy, with a variety of distinct assemblages. Most of this area was logged between 1987 and 1996, and there is evidence ongoing of firewood collection and goat grazing.

There are four polygons that include this ecological community: 26, 27, 28, and 29.

EC 14A - Transitional Toe-slope CwDr Forest | **Plots -** 9 (Vegetation) ; P (Density)

Description

Transitional forest between disturbed wetlands and coniferous uplands around the cultivated field. Includes one very large cascara individual, gregarious western clematis vines, and several healthy giant sequoia trees that were planted by previous owners. Evidence of high human use and impact. Western redcedar stumps are present. Complex stand, with sections that are red alder dominant, western redcedar dominant, and mixed. Sword fern is dominant in the understory in mixed and broadleaf patches; understory vegetation is limited under western redcedar patches. Stinging nettle and grasses are common throughout. Blue plastic netting indicates prior planting activity.

Site Series - 06: CwBg - Foamflower | **Polygon** - 26

Attribute	Range	Notes
Slope	12%	Moderate slope
Aspect	350°	Northwest
Structure	4Ms	Pole, mixed, single-story
Age	26-35	Last cleared 1987-1996
Elevation	85 m	2019 DEM used
Position	LW / TO	Lower-slope / Toe-Slope
Organic layer	7.5 cm	L, F, H, & Ah horizons
Soil texture	ps	Sand with pebbles
SMR	4-5	Moderately Dry - Slightly Dry
SNR	M-R	Medium - Rich
Stem density	1200-1330	100, 314 m^2 plots; 12, 42 stems
Stump density	100/ha	100 m^2 plot, 1 stump

Layer	Species	%	Total
A	*Alnus rubra*	20	
	Prunus emarginata	20	
	Pseudotsuga menziesii	10	
	Abies grandis	<1	
	Thuja plicata	<1	**50**
B	*Gaultheria shallon*	1	**1**
C	*Polystichum munitum*	40	
	Urtica dioica	30	
	Carex leptopoda	5	
	Other - see data sheets	5	**80**
D	*Kindbergia oregana*	4	
	Hylocomium splendens	2	
	Plagiomnium insigne	2	
	Other - see data sheets	1	**10**

Notes:
Charcoal was detected in the soil pit. Stand composition is likely determined more by disturbance history than by soil or slope characteristics. It is located north (downslope) of EC 12B, 15A, and 15B and the gravel pit; south and west (upslope) of EC 17; and south (upslope) of EC 14C and 16A. It continues west onto the Retreat Cove Farms property.

Cored Trees:
Tree #8: 19.1 cm, 32 yrs

Plot 9 - July 12, 2022
Code: QH_B_P09
Azimuth: 319° NW
Lens Height: 1.10 m
Camera: Canon Powershot SX20 IS

Soil Pit 9
SMR: 4-5
SNR: M-R
Organic Layer: 7.5 cm
Soil Texture: Sand

EC 15B - Transitional Toe-slope MbDr Forest | **Plots** - 19 (Vegetation) ; H (Density)

Description

Unusual stand of broadleaf trees dominated by bigleaf maple, with occasional red alder, grand fir, and bitter cherry. It is located on a concave slope between two minor ridges that are dominated by grand fir and Douglas-fir. Evidence of high human use and impact, including grazing and firewood collection. Very large western redcedar stumps are present in the understory, indicating a productive site. Understory is very underdeveloped, likely due to both goat grazing and dense bigleaf maple canopy. Electrified cat's tail moss is the most prominent groundcover.

Site Series - 06: CwBg - Foamflower | **Polygon** - 27

Attribute	Range	Notes
Slope	23%	Moderate slope
Aspect	306°	Northwest
Structure	4Bs	Young, broadleaf, single-story
Age	27-35	Last cleared 1987 - 1996
Elevation	95 m	2019 DEM used
Position	LW	Lower-slope / Toe-slope
Organic layer	9 cm	L, F, H, & Ah horizons
Soil texture	ss	Sandy with silt
SMR	5	Slightly dry
SNR	R	Rich
Stem density	650/ha	400 m^2 plot, 26 stems
Stump density	175/ha	400 m^2 plot, 7 stumps

Layer	Species	%	Total
A	*Acer macrophylla*	80	
	Abies grandis	5	
	Prunus emarginata	<1	**85**
B	*Rubus ursinus*	<1	**<1**
C	*Polystichum munitum*	4	
	Urtica dioica	3	
	Stellaria media	3	
C	*Digitalis purpurea*	1	
	Lapsana communis	1	
	Other - see data sheets	<1	**12**
D	*Rhytidiadelphus triquetrus*	20	
	Kindbergia oregana	10	
	Leucolepis acanthoneuron	<1	
	Plagiomnium insigne	<1	**30**

Notes:
Located just uphill from the main access road and the cultivated field and homestead. Likely heavily grazed by goats and used for firewood. Road drainage may be drying out the soil. It is located north (downslope) of EC 13B; east (downslope) of EC 15A; west (downslope) of EC 15B; and south (upslope) of EC 14A.

Cored Trees:
Tree #14: 28.2 cm DBH, 40 yrs

Plot 19 - July 27, 2022
Code: QH_B_P19
Azimuth: 292° W
Lens Height: 1.25 m
Camera: Canon Powershot SX20 IS

Soil Pit 19
SMR: 5
SNR: R
Organic Layer: 9 cm
Soil Texture: Sand, Silt

EC 14C - Goat Pasture with DrCw Canopy	**No Plots**

Description

Fenced goat pasture with partially preserved tree canopy. Young red alder trees are present throughout, with occasional young and mature western redcedar trees scattered among them. Several large old-growth Douglas-fir trees occur along a minor ridge that divides this community from EC 11. Understory is highly disturbed and primarily composed of introduced grasses from over a decade of heavy grazing. This area was clear-cut in 1946 and has likely experienced some selective harvest since then. It is located south and west (upslope) of EC 11; east (upslope) of EC 17; west, and north (downslope) of EC 10A and 14A.

Site Series - 06: CwBg - Foamflower	**Polygon** - 28

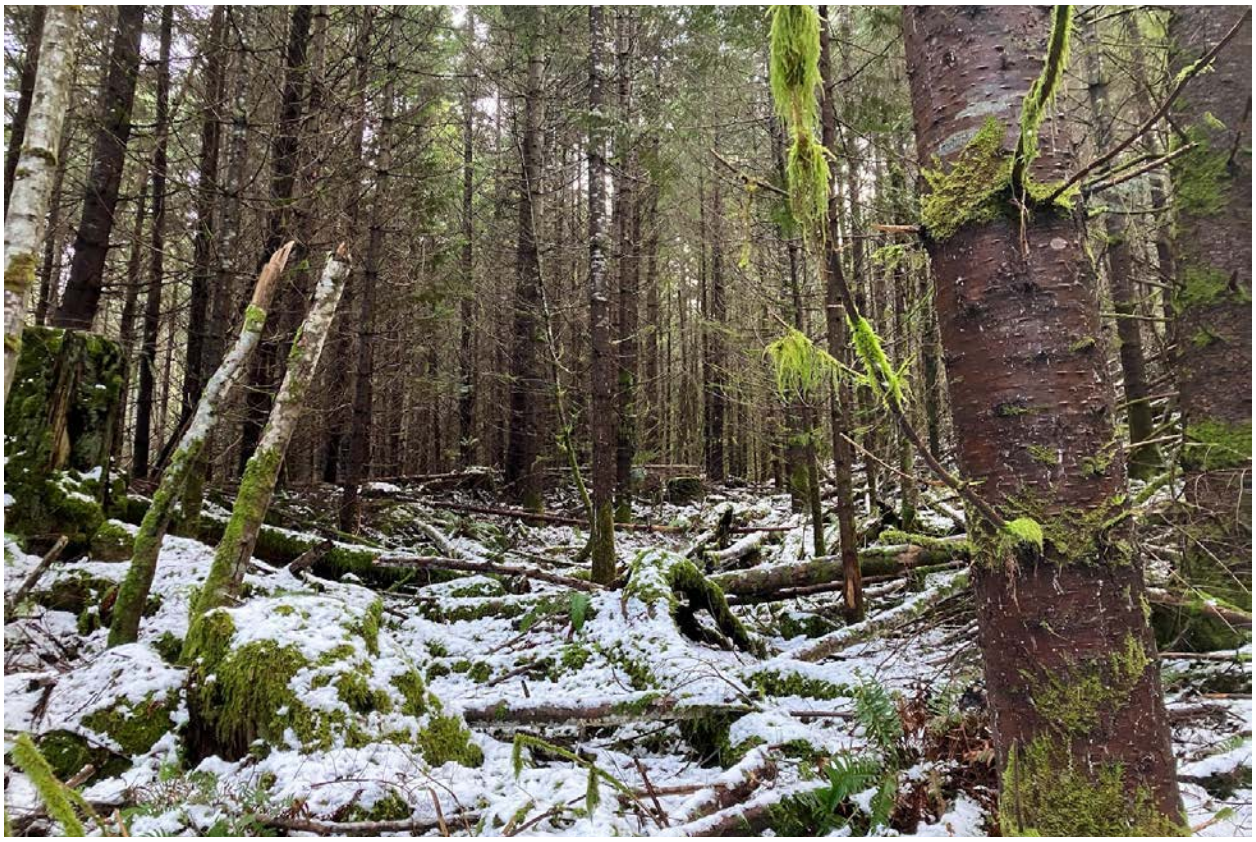
EC 14D - Pole-sapling Toe-slope CwDrFd Forest	**No Plots**

Description

Mixed pole-sapling western redcedar, red alder, and Douglas-fir forest located on a very subtle (hardly distinguishable) topographic prominence adjacent to the disturbed wetlands of EC 16A and 16B. Salal is prominent in the understory, with some sword fern and deadwood. Western redcedar stumps are common. Soils are silty. Notable trees include large black cottonwood and cascara individuals. Similar to EC 14A, but with greater percentage of Douglas-fir and poorer drainage. This narrow polygon is criss-crossed by old logging roads, and was clear-cut between 1987 and 1996. It is located north (upslope) of EC 16A and 16b; and east (upslope) of EC 11. It continues north onto the Great Beaver Swamp property.

Site Series - 06: CwBg - Foamflower	**Polygon** - 29

Ecological Community #15 - Mid-slope Douglas-fir, Grand fir, and Red Alder Forests



Dense stands of grand-fir and Douglas-fir with interspersed red alder trees, located along two minor parallel downsloping ridges in the centre of the property. Grand fir is dominant on the north ridge, and Douglas-fir is co-dominant on the south ridge. Bigleaf maple is occasional. The understory is sparse, consisting of occasional sword fern and moss on deadwood. Soils are silty sand with low coarse fragment content and a 5-10cm Ah layer, keying to 04: FdBg - Oregon Grape. Stand density is around 1000 stems/ha, but variable. This area was clear-cut between 1987 and 1996.

There are two polygons within this ecological community: 30 and 31.

EC 15A - Pole-sapling Mid-slope FdBgDr Forest	**No Plots**

Description

Dense, pole-sapling stand of grand fir, Douglas-fir, and red alder located on a minor topographic ridge in a mid-slope position. Self-thinning actively taking place, with large amounts of coarse and fine woody debris covering the forest floor. Western redcedar stumps are present, and western redcedar saplings are recruiting in canopy gaps. Understory includes occasional sword fern, with a patchy moss layer. Soils are enriched, with a 5+ cm Ah horizon. Very similar to EC 15B, but denser, with a higher percentage of Douglas-fir and fewer red alder trees. It is located south (upslope) of EC 14A; east (upslope) of EC 13A; west (upslope) of EC 13B and 14B; and north (downslope) of EC 10A.

Site Series - 04: FdBg - Oregon Grape	**Polygon** - 30

EC 15B - Pole-sapling Mid-slope BgFdDr Forest	**Plot** - I (Density)

Description

Pole-sapling stand of grand fir, red alder, and Douglas-fir located on a minor topographic ridge in a mid-slope position. Self-thinning actively taking place, with large amounts of coarse and fine woody debris covering the forest floor. Large western redcedar stumps are present. Understory includes occasional sword fern, with a patchy moss layer and lots of leaf litter Soils are enriched, with a 5-10cm Ah horizon. Very similar to EC 15A, but more open, with a higher percentage of grand fir and more red alder trees. It is located south (upslope) of EC 14A; east (upslope) of EC 12B; west (upslope) of EC 10A; and north (downslope) of EC 10A.

Site Series - 04: FdBg - Oregon Grape	**Polygon** - 31

Ecological Community #16 - Disturbed Wetland

Highly disturbed, uneven pole-sapling stand of small-diameter red alder trees in a small basin in the northwest corner of the property, draining the cultivated field and upslope areas located between the two major ridges that cut across the property. Pacific willow, western redcedar, and Douglas-fir trees are occasional throughout. Soils are seasonally saturated, fine, and of high fertility, keying to CDFmm 14 - Cw: Slough Sedge. Slough sedge is the dominant understory species, with sword fern predominating on raised mounds and high ground. Salal and salmonberry are occasional. Several roads that may have been produced by a tractor or bulldozer criss-cross the area, with introduced grasses covering compacted areas. The roads act as ditches, conveying runoff from one of the ponds in the cultivated field onto the Retreat Cove Farms property to the west. There is a subtle topographic boundary separating one subdivision of the Beaver Creek watershed from another, with water forking off to the east or to the north. Several target invasive species are present, including Himalayan blackberry and English holly.

There are two polygons that include this ecological community: 32 and 33.

EC 16A - Disturbed Swamp Wetland | **Plots -** 8 (Vegetation) ; K (Density)

Description

Flattened swampland adjacent to access roads and agricultural land. Strongly fluctuating water table indicates winter flooding and summer drought. Slough sedge is the dominant cover, with a canopy of thin, stunted alder trees and occasional larger individuals of Pacific willow, Douglas-fir, and western redcedar. Surface water flow enters the area through two ditches from dug ponds upslope, and exits via two skid roads - one under the main access road towards the property to the west, and one down an old road heading north to the Great Beaver Swamp. Partly cleared in 1946 and then completely cleared between 1987-1996.

Site Series - 14: Cw - Slough Sedge

Attribute	Range	Notes
Slope	1%	Nearly level
Aspect	330°	Northwest
Structure	4Bs	Pole, deciduous, single-story
Age	27-35	Last cleared 1987 - 1996
Elevation	81 m	2019 DEM used
Position	DP	Depression / Level
Organic layer	37 cm	L, F, H, & Ah horizons
Soil texture	cs	Clay with some sand
SMR	5f-7f	Slightly Dry - Wet; Fluctuating
SNR	R-VR	Rich - Very Rich
Stem density	2500/ha	100 m^2 plot, 25 stems
Stump density	300/ha	100 m^2 plot, 3 stumps

Notes:
This area shows signs of heavy disturbance in the past, potentially with a tractor or bulldozer. Several large spoil piles occur on the periphery. A small fenced clearing with a lean-to was created in the centre of the stand. It is located south (downslope) of EC 14D; north (downslope) of EC 14A and 17; and west (upslope) of EC 11 and 16B. It continues west onto the Retreat Cove Farms property.

Polygon - 32

Layer	Species	%	Total
A	*Salix lucida*	20	
	Alnus rubra	20	
	Pseudotsuga menziesii	<1	**40**
B	*Ilex aquifolium*	1	
	Rubus spectabilis	1	
	Other - see data sheets	<1	**2**
C	*Carex obnupta*	70	
	Polystichum munitum	40	
	Cirsium arvense	<1	
	Digitalis purpurea	<1	
	Elymus glaucus	<1	
	Holcus lanatus	<1	
	Pteridium aquilinum	<1	
D	Other - see data sheets	<1	**<1**

Cored Trees:
-

Plot 8 - July 12, 2022
Code: QH_B_P08
Azimuth: 0° N
Lens Height: 1.10 m
Camera: Canon Powershot SX20 IS

Soil Pit 8
SMR: 5-7f
SNR: R-VR
Organic Layer: 37 cm
Soil Texture: Clay, Sand

EC 16B - Disturbed Marsh	**No Plots**
	**Description** Seasonally inundated marsh located in a depression within disturbed wetland area. Stunted trees occur around the margins, including red alder, western redcedar, and Pacific willow. Slough sedge is the dominant vegetation. Some salal grows around the perimeter of the marsh. Receives runoff from a ditch that drains two of the upslope ponds in EC 17, before discharging it into EC 11. It is located south and east (downslope) of EC 16A; north (downslope) of EC 17; and west (upslope) of EC 11.
Site Series - 14: Cw - Slough Sedge	**Polygon** - 33

Ecological Community #17 - Cultivated Field

Highly disturbed field most recently used for small-scale agriculture and goat grazing, located on gently sloping land in the northwest quadrant of the property. Three semi-perennial ponds have been excavated in the area, with spoil discarded nearby in piles and ditches connecting ponds to downslope disturbed wetland areas. Fencelines and roads criss-cross the area, and a small dwelling with outbuildings has been constructed. A handful of orchard trees and western redcedars are scattered throughout the area. Vegetation consists almost entirely of introduced grasses and forbs, with a minor contingent of native wetland species establishing on pond perimeters. Soils are compacted and soil strata appear disturbed, but site conditions suggest this area used to be rich lowland forest (i.e. CDFmm 06 - CwBg: Foamflower). This area has been repeatedly cleared for various purposes since the 1940s.

This ecological community is found only in polygon 34.

EC 17 - Cultivated Field | **Plot** - 7 (Vegetation)

Description

Cleared, flattened, ditched, and drained agricultural land adjacent to access roads, dwellings, and dug ponds. Evidence of a fluctuating water table, with cover of introduced grasses and forbs firmly established. Remnant western redcedar trees are occasional across the field, alongside old fruit trees. Roads and ditches actively drain the site into EC 17A and 17B. Evidence of repeated clearing, including from 1932-1950, 1962-1987, 1987-1996, and 2002-2011 depending on area.

Site Series - CF [06: CwBg - Foamflower] | **Polygon** - 34

Attribute	Range	Notes
Slope	7%	Gentle slope
Aspect	346°	Northwest
Structure	2b	Graminoid-dominant herb
Age	-	Cleared between 1932-1950
Elevation	83 m	2019 DEM used
Position	LV	Level
Organic layer	31.5 cm	L, F, H, & Ah horizons
Soil texture	scg	Sand, clay, and gravel
SMR	6	Fresh
SNR	R-VR	Rich - Very Rich
Stem density	-	No stems detected in plot
Stump density	-	No stumps detected in plot

Layer	Species	%	Total
A	*Thuja plicata*	<1	**<1**
C	*Agrostis stolonifera*	40	
	Juncus bufonius	20	
	Lolium perenne	15	
	Agrostis capillaris	5	
	Holcus lanatus	5	
	Trifolium repens	5	
	Hypochaeris radicata	2	
	Juncus effusus	1	
	Cynosurus cristatus	1	
	Schedonorus pratensis	<1	
	Cirsium vulgare	<1	
	Ranunculus repens	<1	
	Other - see data sheets	<1	**100**

Notes:
The soil pit was excavated to 63 deep, where groundwater was evident. Upper ~ 30cm composed of organically-enriched clay, with grass roots limited to the top few cm. Lower ~30cm composed of sand, with mottles present. At 60cm, a dense layer of interlocking sand and gravel was encountered. It is located south (upslope) of EC 16A and 16B; west (downslope) of EC 14C; and north and east (downslope) of EC 14A.

Cored Trees:
-

Plot 7 - July 12, 2022
Code: QH_B_P07 (A,B,C,D)
Azimuth: 320° NW (A)
Lens Height: 1.25 m
Camera: Canon Powershot SX20 IS

Soil Pit 7
SMR: 6
SNR: R-VR
Organic Layer: 31.5 cm
Soil Texture: Sand, Clay

Appendix

Field Methods, Plot Locations, and Repeat Photography

Vegetation Plots

19 square vegetation plots were established on cardinal directions in representative ecological communities and were either 10x10m or 20x20m, depending on plant diversity. Species composition was documented, percent cover visually estimated, and soil moisture and nutrient regimes characterized from soil pits that were dug to a minimum of 30cm. 17 Douglas-fir trees were cored and assessed in the field to help estimate stand age. A permanent repeat photopoint was established at one corner of each plot and was marked with a rebar stake with blue flagging tape and an orange rebar safety cap. Locations of notable species and target introduced species were mapped when encountered.

Density Plots

16 circular density plots were established in representative stands with either a 10m, 15m or 20m radius, depending on stand density. Species and diameter at breast height (DBH) were recorded for all stems above 10cm DBH within the plot. Some density plots are coincident with vegetation plots; in density-only plots, the plot centre has been temporarily marked with orange flagging tape around a tree.

Soil Classification

Soils pits were used to aid in terrestrial ecosystem mapping, and were not assessed in detail for soil classification. Soil classifications provided in Map 10 are taken from:

> P., V. V. L. J., Kenney, E. A., & Green, A. J. (1989). *Soils of the Gulf Islands of British Columbia: Soils of Galiano, Valdes, Thetis, Kuper, and lesser islands* (Vol. 3, Ser. 43). Agriculture Canada, Research Branch.

Terrestrial Ecosystem Mapping

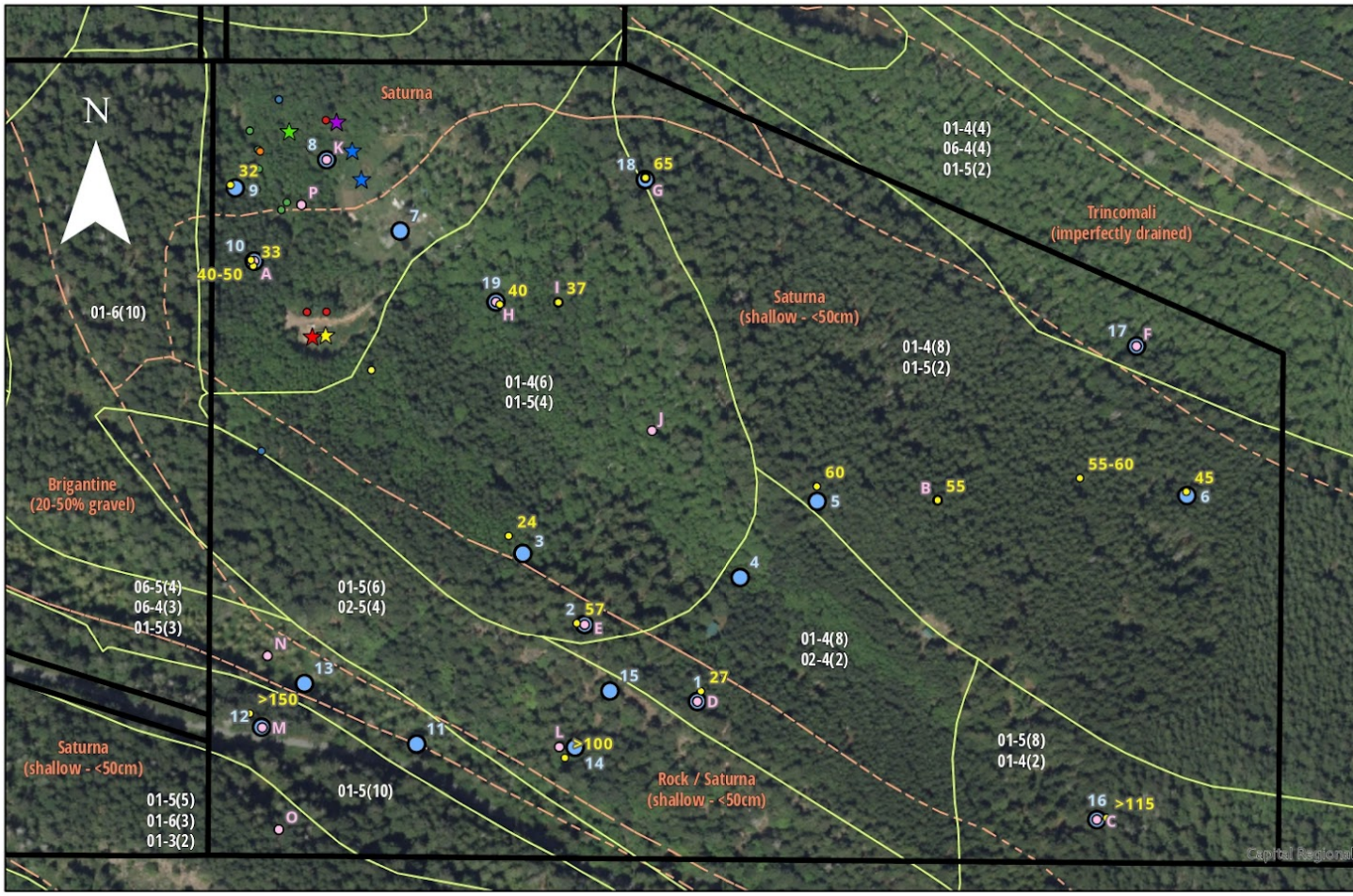
Fine-scale terrestrial ecosystem mapping based on the baseline survey is summarized in Map 1. Broad-scale terrestrial ecosystem map units provided in Map 10 are taken from:

> Madrone Environmental Services. (2008). *Terrestrial ecosystem mapping of the Coastal Douglas-fir Biogeoclimatic zone.* Islands Trust.

Equipment

Equipment included: clinometer, compass, Trimble Geoexplorer XH 6000 series, Canon Powershot SX20 IS, tripod, 30 m tape, rebar stakes, flagging tape, DBH tape, field maps, *Flora of the Pacific Northwest: An Illustrated Manual* (2nd Ed), hand lens, stereo microscope.

Map 10: Locations of Permanent Plots, Photopoints, Cored Trees, Notable Plants, and Soil / TEM polygons



DL 58 - Plots, Plants, Soils, & TEM

NAD 1983 UTM Zone 10N
Transverse Mercator
Date: December 2022
Created by: Galiano Conservancy Association

0 50 100 200 Meters

Legend

- Property Lines
- TEM Site Series (IT)
- Soils
- Veg Plots & Photo Points (#)
- Densitiy Plots (Letter)
- Cored Fd Trees (Age)

Plants of Note

Species
- Black Cottonwood
- Cascara
- Giant Sequoia
- Pacific Yew
- Ponderosa pine
- Western Clematis

Invasive Species
- Cutleaf blackberry
- English h
- Himalaya
- Scotch Br
- Teasel

Density Plots

Representative density plots were established for ecological communities on the property to allow for general estimates of above-ground biomass. Tree species recorded in plots include FD - Douglas-fir (*Pseudotsuga menziesii*), CW - western redcedar (*Thuja plicata*), DR - red alder (*Alnus rubra*), MB - bigleaf maple (*Acer macrophyllum*), BG - grand fir (*Abies grandis*), VB - bitter cherry (*Prunus emarginata*), and S - Scouler's willow (*Salix scouleriana*). The dominant species for each plot is labelled in **bold**. LIDAR was used to estimate average tree heights for each polygon.[24] Table 4 summarizes the results.

[24] Our gratitude to Avi Bryant for providing these results based on custom coding.

Table 4: Density Plots for Quadra Hill

Plot	Plot (m^2)	Polygon (ha)	Species	Individuals	Avg DBH (cm)	Avg Height (m)
A	314.2	0.91	**FD**	25	25.59	22
B	314.2	3.28	**FD**	20	32.56	30
C	1256.64	2.29	**FD**	38	53.56	33
			CW	7	33.47	
D	314.2	2.05	**FD**	33	20.27	23
			S	1 (6 stems)	17.8	
			MB	1 (2 stems)	26.85	
			VB	1	24.5	
E	314.2	1.03	**CW**	8	79.40	31
			FD	3	58.2	
F	706.86	1.68	**DR**	7	33.36	24
			FD	1	11.2	
G	706.86	2.79	**FD**	17	56.98	31
			CW	8	24.74	
			HW	1	16.1	
H	314.2	0.34	**MB**	11 (15 stems)	23.63	20
			VB	1	21.5	
			FD	4	25.98	
			BG	1	10.2	
I	314.2	0.64	**BG**	15	25.08	21
			FD	2	12.9	
			DR	14	17.86	
			MB	2	21.4	
J	314.2	3.11	**DR**	13	36.66	22
K	314.2	0.60	**DR**	14	12.14	13

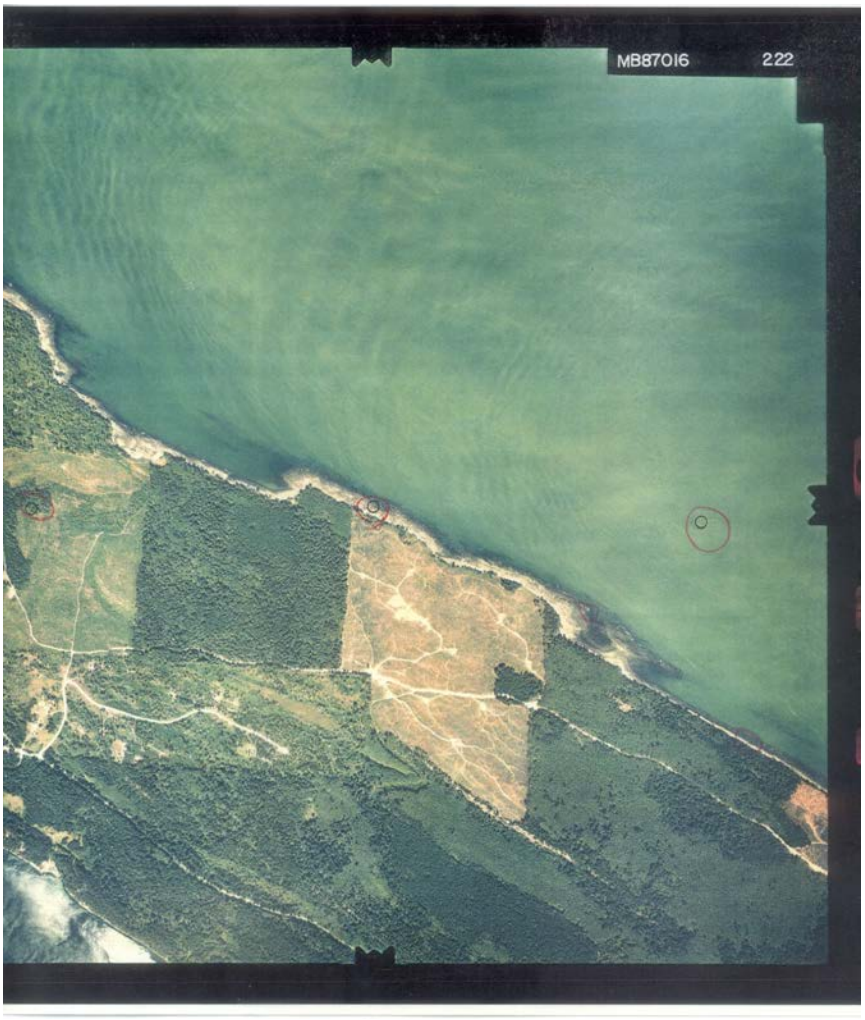
			CW	1	20.2	
			S	7	21.88	
L	314.2	3.76	**CW**	6	71.58	34
			FD	5	64.2	
			MB	1	22.1	
M	314.2	0.30	**FD**	9	37.10	36
			MB	1	39	
			CW	1	106.6	
N	314.2	1.01	**CW**	14	28.27	18
			FD	2	29.05	
O	314.2	0.71	**CW**	13	40.29	34
			FD	4	79.9	
P	314.2	1.00	**CW**	23	22.57	17
			DR	13	15.3	
			VB	3	25.97	
			FD	3	33.43	

Historical Aerial Photography

Aerial imagery from the years 1932, 1950, 1962, 1987, 1996, 1998, 2002, 2011, and 2021 were used to help produce this survey. Images were orthorectified and analyzed on ArcGIS pro.

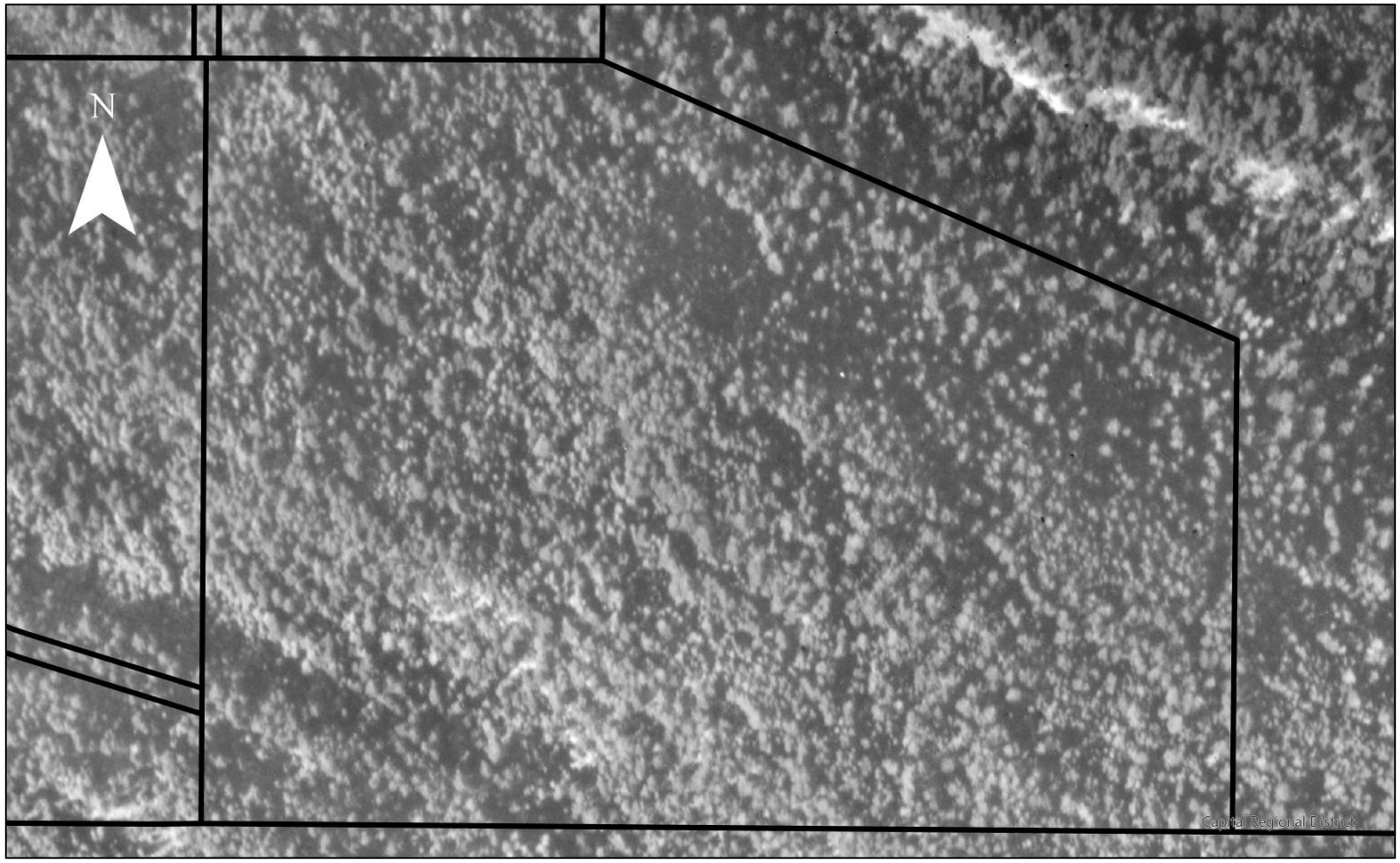
There appear to be some discrepancies in perspective that prevent perfect alignment of historical images, especially those taken prior to 1987. Painstaking effort was applied to cross-reference aerial images with LIDAR imagery and field observations to ensure that the maps in this report are as spatially accurate as possible.

Notes regarding our interpretation of the aerial photo sequence have been provided for each image in Maps 11 through 19.



Example of aerial photography from 1987

Map 11: Aerial Photograph of Quadra Hill, 1932



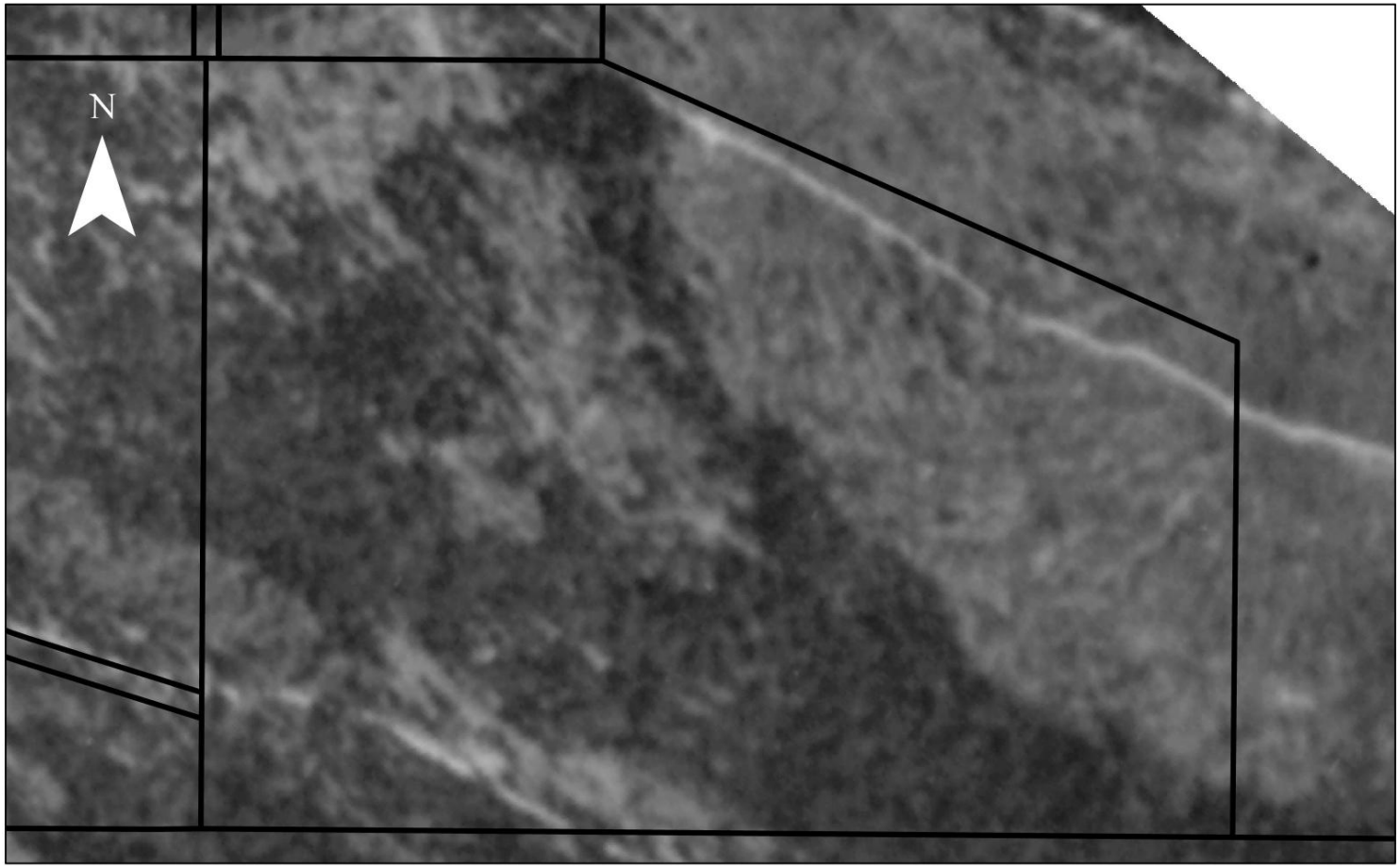
DL 58 - Aerial Imagery: 1932

NAD 1983 UTM Zone 10N
Transverse Mercator
Date: December 2022
Created by: Galiano Conservancy Association

0 50 100 200 Meters

Legend	Notes
Property Lines	Entirety of property is forested, including wetland areas. Dry, open forest is evident in the centre of the southern ridgeline, but less exposed rock is present than on the adjacent property to the northeast.

Map 12: Aerial Photograph of Quadra Hill, 1950



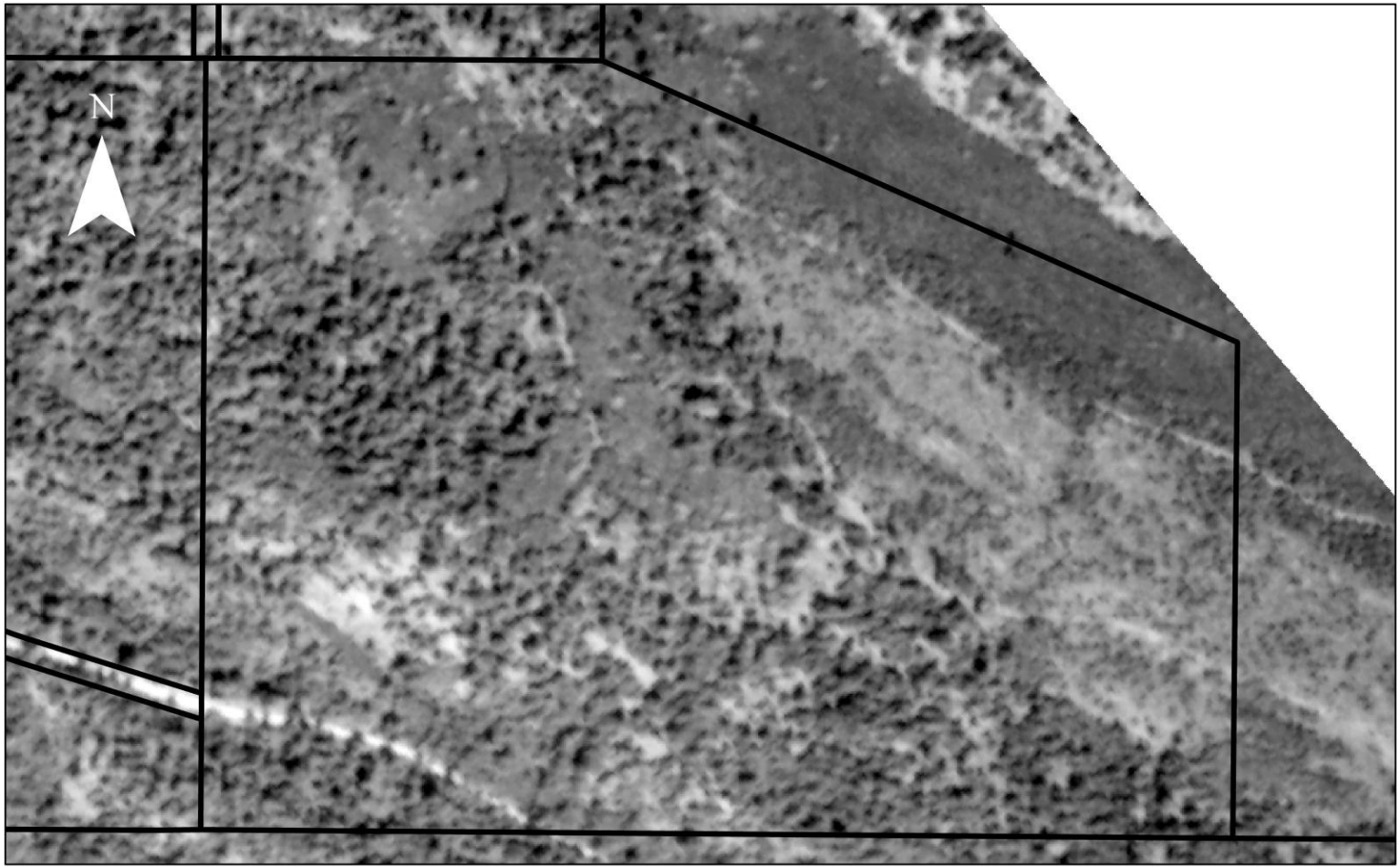
DL 58 - Aerial Imagery: 1950

NAD 1983 UTM Zone 10N
Transverse Mercator
Date: December 2022
Created by: Galiano Conservancy Association

0 50 100 200 Meters

Legend	Notes
Property Lines	Image is blurry, but at least four separate clear-cuts are visible: one in the northwest corner, one encompassing the northeast quadrant, one the centre of the property, and one along Porlier Pass Road. The "East Side Haul Road" has been established. Regeneration of younger trees is distinguishable in cleared areas, suggesting at least several years have transpired since land clearance.

Map 13: Aerial Photograph of Quadra Hill, 1962



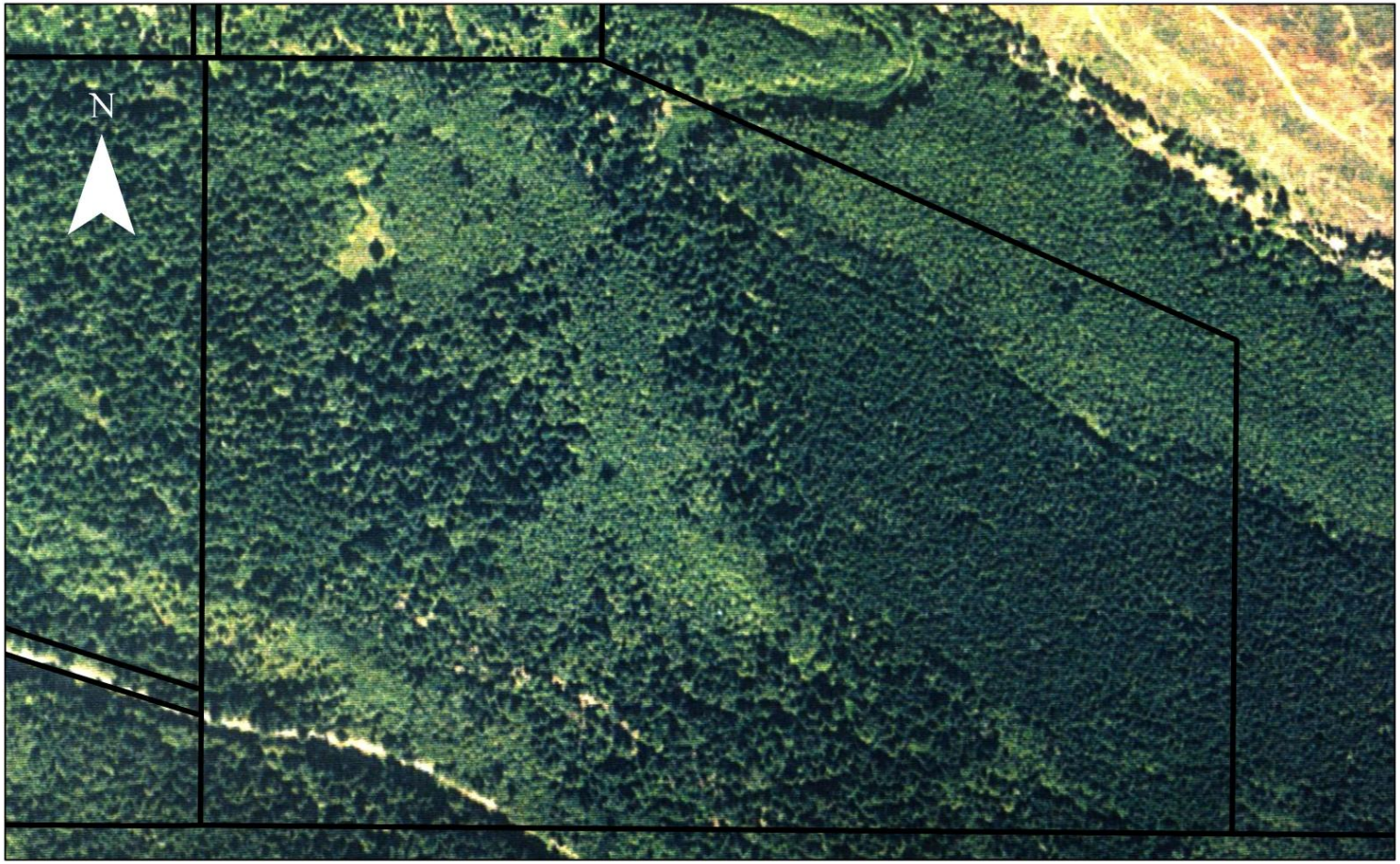
DL 58 - Aerial Imagery: 1962

NAD 1983 UTM Zone 10N
Transverse Mercator
Date: December 2022
Created by: Galiano Conservancy Association

0 50 100 200 Meters

Legend	Notes
Property Lines	Areas cleared between 1932-1950 have begun to fill in with patchy shrub and tree growth. Thick alder growth fills the Great Beaver Swamp basin. A large section of the northeast quadrant of the property south of the "East Side Haul Road" appears to have been cleared for a second time between 1950 and this image. An additional zone of apparent harvest is evident above Porlier Pass Road.

Map 14: Aerial Photograph of Quadra Hill, 1987



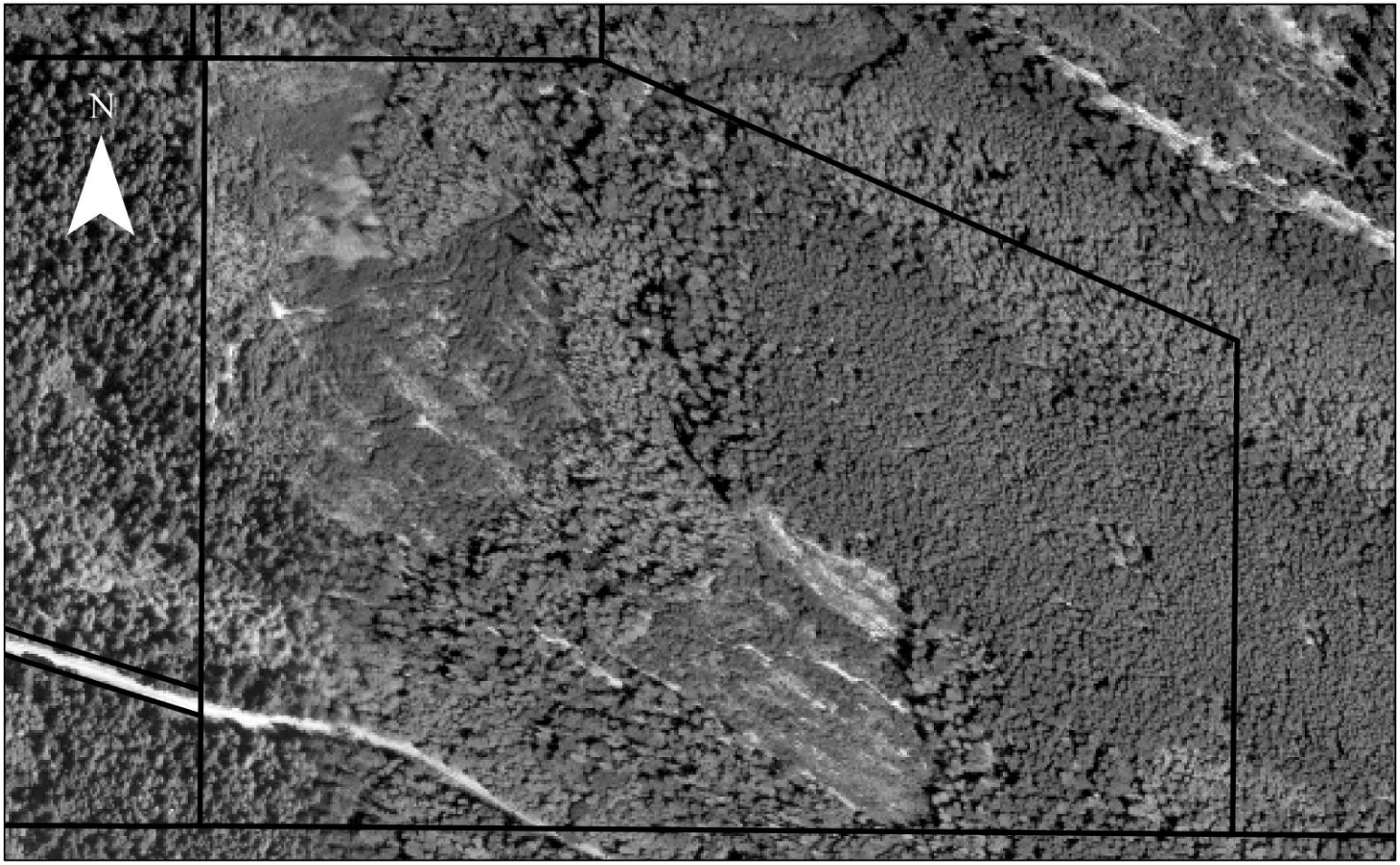
DL 58 - Aerial Imagery: 1987

NAD 1983 UTM Zone 10N
Transverse Mercator
Date: December 2022
Created by: Galiano Conservancy Association

0 50 100 200 Meters

Legend	Notes
Property Lines	Cleared areas continue to recover with a primary cover of red alder. The exception is the area cleared between 1950-1962, where a distinctive line separating Douglas-fir and red alder stands has formed along the "East Side Haul Road." Notably, a small clearing has been created in the northeast quadrant at the site of the future agricultural area.

Map 15: Aerial Photograph of Quadra Hill, 1996



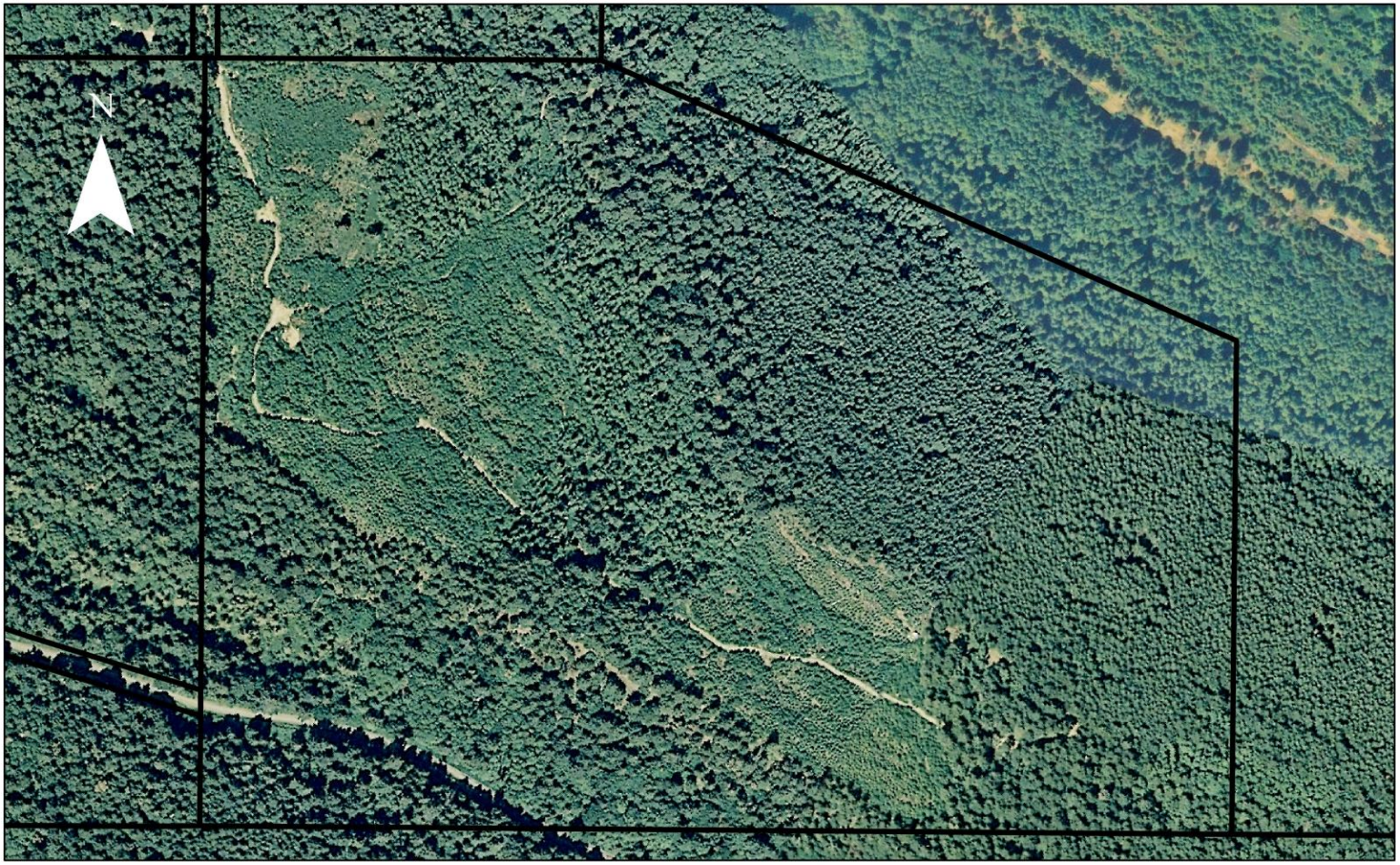
DL 58 - Aerial Imagery: 1996

NAD 1983 UTM Zone 10N
Transverse Mercator
Date: December 2022
Created by: Galiano Conservancy Association

0 50 100 200 Meters

Legend	Notes
Property Lines	Two additional clear-cuts occur between 1987 and this photograph, presumably prior to the sale of the property in 1993. Clear-cuts overlap on the margins with some areas that were cleared between 1932-1950. Shrubby regrowth has already begun, suggesting that at least several years have elapsed since the last land clearance. A small bare patch has been created in the vicinity of the gravel pit.

Map 16: Aerial Photograph of Quadra Hill, 1998



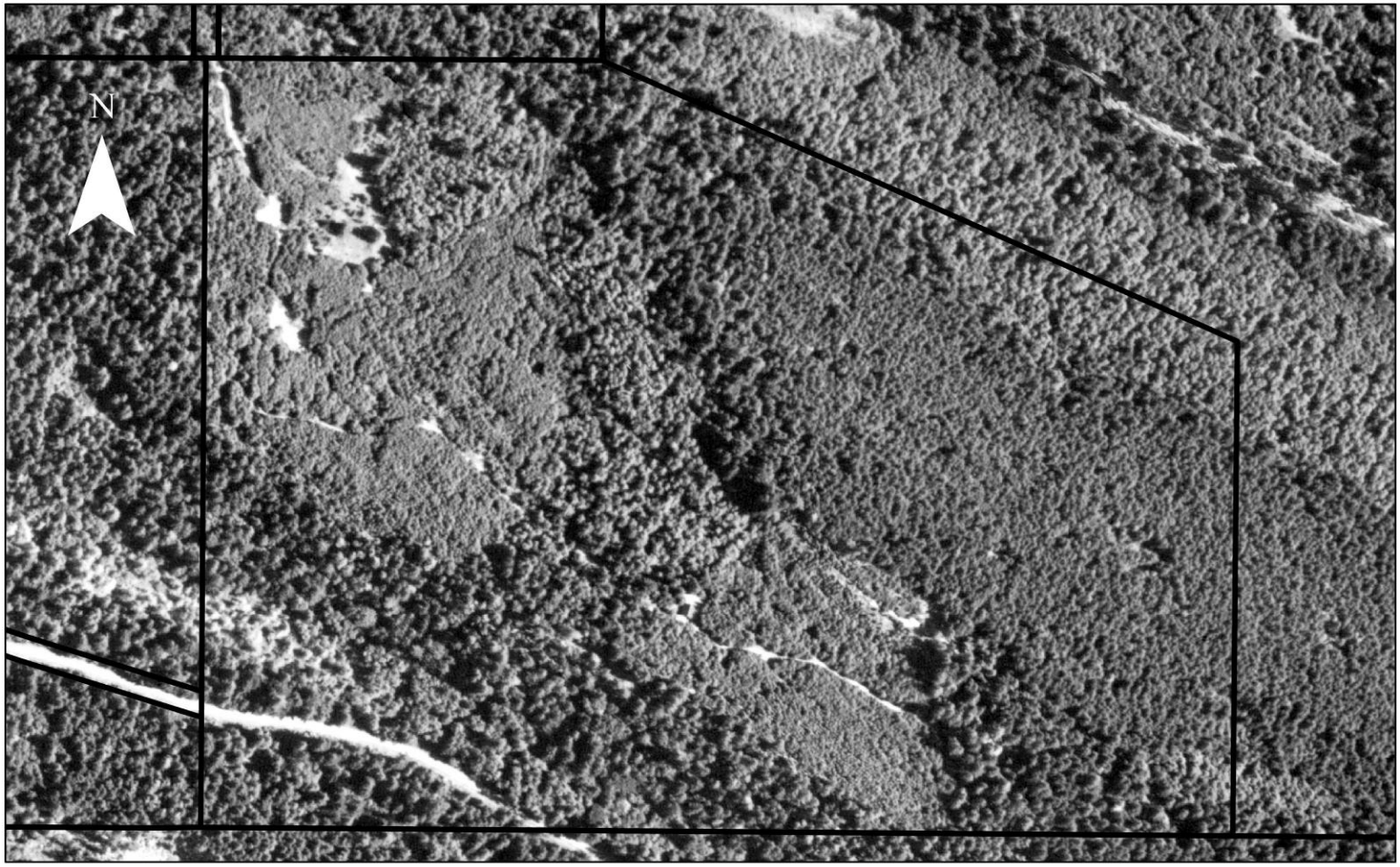
DL 58 - Aerial Imagery: 1998

NAD 1983 UTM Zone 10N
Transverse Mercator
Date: December 2022
Created by: Galiano Conservancy Association

0 50 100 200 Meters

Legend	Notes
Property Lines	Recently cut patches continue to recover. Summit road is now more visible (possibly due to road improvement), and gravel pit bare patch has expanded slightly. In addition, a small landing has been cleared (or revealed) between the property entrance gate and the gravel pit.

Map 17: Aerial Photograph of Quadra Hill, 2002



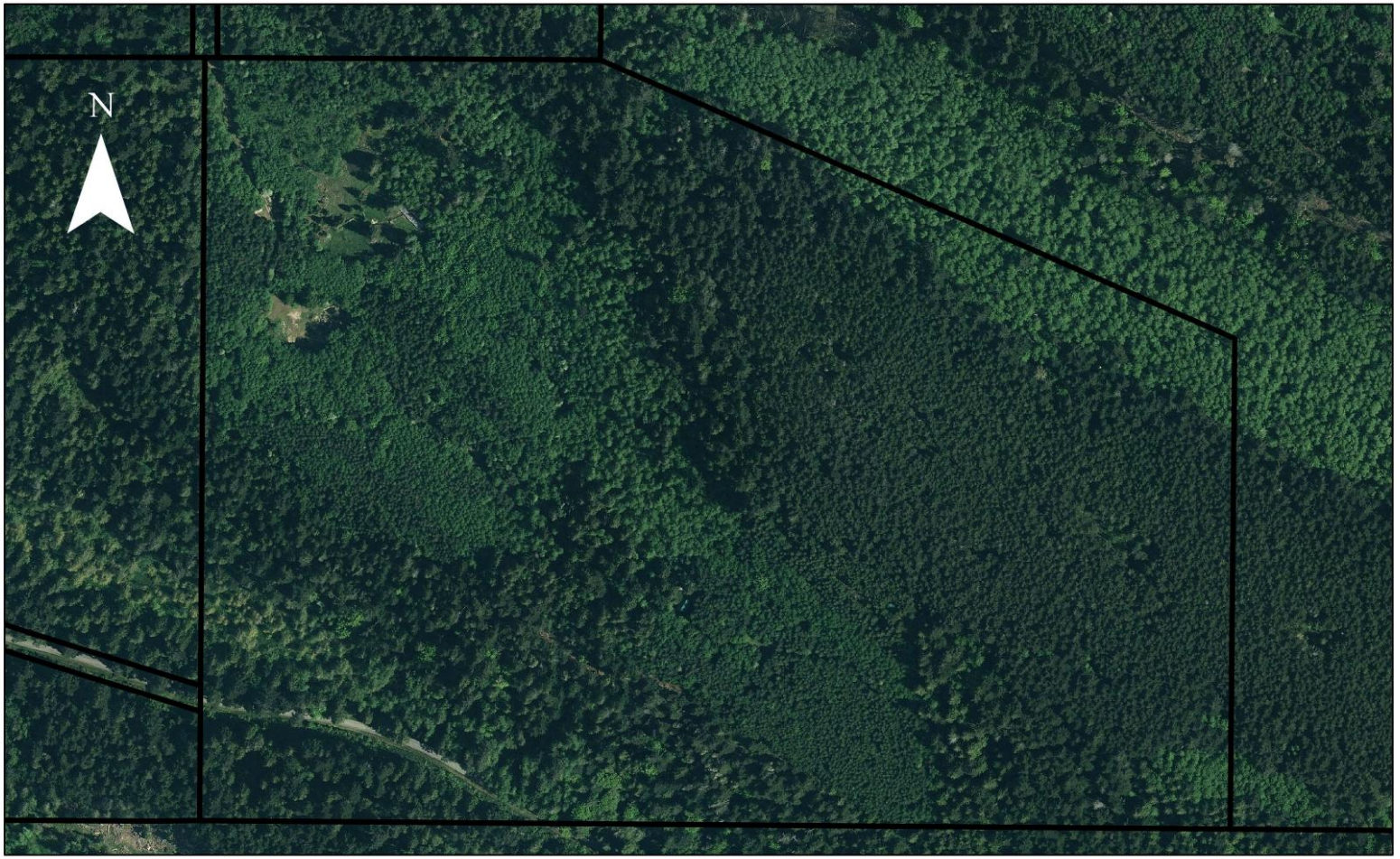
DL 58 - Aerial Imagery: 2002

NAD 1983 UTM Zone 10N
Transverse Mercator
Date: December 2022
Created by: Galiano Conservancy Association

0 50 100 200 Meters

Legend	Notes
Property Lines	The gravel pit has expanded again, and the agricultural area has been cleared for what appears to be a second time. A garage has been constructed about halfway up the summit road. It is unclear from the image whether the summit cabin has been constructed yet, or whether the site has simply been cleared.

Map 18: Aerial Photograph of Quadra Hill, 2011



DL 58 - Aerial Imagery: 2011

NAD 1983 UTM Zone 10N
Transverse Mercator
Date: December 2022
Created by: Galiano Conservancy Association

0 50 100 200 Meters

Legend	Notes
Property Lines	Cabin has now been constructed (if not prior to 2002). Gravel pit has expanded to its final footprint. The agricultural area has expanded, and livestock fences have been erected.

Map 19: Aerial Photograph of Quadra Hill, 2021

DL 58 - Aerial Imagery: 2021

NAD 1983 UTM Zone 10N
Transverse Mercator
Date: December 2022
Created by: Galiano Conservancy Association

0 50 100 200 Meters

Legend	Notes
Property Lines	Aerial photo of property just prior to acquisition by the Aqueduct Foundation. Additional land clearance and construction evident in the agricultural area. The area immediately around the summit cabin has also been cleared. Gravel pit has been partially in-filled, with evidence of vegetation establishing within its footprint.

Species Lists

Vascular Plant & Allies

Table 5 summarizes the vascular and nonvascular plants encountered during field surveys. It is not meant to be exhaustive, and more comprehensive vegetation surveys will be needed to produce a comprehensive species list. Instead, it provides an overview of species commonly (and uncommonly) encountered across the property, and their distribution across vegetation plots. Species will be added to the list over time as they are encountered.

A green box means that a species was encountered within the vegetation plot. A yellow box indicates that a species was noted in the area immediately around the vegetation plot.

Table 5: Vascular Plants Species and Allies Encountered During Baseline Survey on Quadra Hill

Name		Details		Plots Encountered																
Common	Scientific	Form	Status	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
grand fir	*Abies grandis*	Tree - Conifer	Native																			
Douglas-fir	*Pseudotsuga menziesii*	Tree - Conifer	Native																			
giant sequoia	*Sequoiadendron giganteum*	Tree - Conifer	Introduced																			
Pacific yew	*Taxus brevifolia*	Tree - Conifer	Native																			
western redcedar	*Thuja plicata*	Tree - Conifer	Native																			
western hemlock	*Tsuga heterophylla*	Tree - Conifer	Native																			
bigleaf maple	*Acer macrophyllum*	Tree - Broadleaf	Native																			
red alder	*Alnus rubra*	Tree - Broadleaf	Native																			

Name		Details		Plots Encountered																	
Common	Scientific	Form	Status	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
arbutus	*Arbutus menziesii*	Tree - Broadleaf	Native																			
cascara	*Frangula purshiana*	Tree - Broadleaf	Native																			
English holly	*Ilex aquifolium*	Tree - Broadleaf	Introduced																			
Persian walnut	*Juglans regia*	Tree - Broadleaf	Introduced																			
domestic apple	*Malus domestica*	Tree - Broadleaf	Introduced																			
black cottonwood	*Populus balsamifera ssp. trichocarpa*	Tree - Broadleaf	Native																			
bitter cherry	*Prunus emarginata*	Tree - Broadleaf	Native																			
Garry oak	*Quercus garryana*	Tree - Broadleaf	Native																			
Pacific willow	*Salix lucida*	Tree - Broadleaf	Native																			
Scouler's willow	*Salix scouleriana*	Tree - Broadleaf	Native																			
dull Oregon grape	*Berberis nervosa*	Shrub	Native																			
Scotch broom	*Cytisus scoparius*	Shrub	Introduced																			
salal	*Gaultheria shallon*	Shrub	Native																			
oceanspray	*Holodiscus discolor*	Shrub	Native																			
falsebox	*Paxistima myrsinites*	Shrub	Native																			
baldhip rose	*Rosa gymnocarpa*	Shrub	Native																			
Himalayan blackberry	*Rubus armeniacus*	Shrub	Introduced																			

Name		Details		Plots Encountered																	
Common	Scientific	Form	Status	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
cutleaf blackberry	*Rubus laciniatus*	Shrub	Introduced			■					■											
blackcap raspberry	*Rubus leucodermis*	Shrub	Native		■	■														■		
salmonberry	*Rubus spectabilis*	Shrub	Native								■			■		■	■					
snowberry	*Symphoricarpos albus*	Shrub	Native							■											■	
evergreen huckleberry	*Vaccinium ovatum*	Shrub	Native					■													■	
red huckleberry	*Vaccinium parvifolium*	Shrub	Native			■					■			■						■		
lady fern	*Athyrium filix-femina*	Fern	Native											■		■						
spreading wood fern	*Dryopteris expansa*	Fern	Native			■																
goldback fern	*Pentagramma triangularis*	Fern	Native															■				
licorice fern	*Polypodium glycyrrhiza*	Fern	Native															■				
sword fern	*Polystichum munitum*	Fern	Native	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■
bracken fern	*Pteridium aquilinum*	Fern	Native							■	■	■			■							
vanilla leaf	*Achlys triphylla*	Herb	Native		■	■	■										■			■		
woodland madia	*Anisocarpos madioides*	Herb	Native															■				
bittercress	*Cardamine spp.*	Herb	Introduced					■														

Name		Details		Plots Encountered																	
Common	Scientific	Form	Status	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
mouse-eared chickweed	*Cerastium glomeratum*	Herb	Introduced							■								■				
Canada thistle	*Cirsium arvense*	Herb	Introduced							■	■											
bull thistle	*Cirsium vulgare*	Herb	Introduced							■												■
Siberian miner's lettuce	*Claytonia sibirica*	Herb	Native			■	■															
variable collomia	*Collomia heterophylla*	Herb	Native															■				
foxglove	*Digitalis purpurea*	Herb	Introduced				■			■	■					■		■				■
teasel	*Dipsacus fullonum*	Herb	Introduced																			
broad-leaved helleborine	*Epipactis helleborine*	Herb	Introduced	■																		
cleavers	*Galium aparine*	Herb	Introduced		■	■	■	■				■						■		■	■	■
sweet-scented bedstraw	*Galium triflorum*	Herb	Native		■	■							■									
rattlesnake plantain	*Goodyera oblongifolia*	Herb	Native						■													
white-flowered hawkweed	*Hieracium albiflorum*	Herb	Native															■				
hair cat's-ear	*Hypochaeris radicata*	Herb	Native							■								■				■
nipplewort	*Lapsana communis*	Herb	Introduced				■					■										■
skunk cabbage	*Lysichiton americanus*	Herb	Native													■						
field mint	*Mentha arvensis*	Herb	Native							■				■								

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largeleaf sandwort	*Moehringia macrophylla*	Herb	Native					■														
small-leaved blinks	*Montia parviflora*	Herb	Native																			
wall lettuce	*Mycelis muralis*	Herb	Introduced		■	■												■		■		■
small-flowered nemophila	*Nemophila parviflora*	Herb	Native		■	■	■					■								■		
Pacific water parsley	*Oenanthe sarmentosa*	Herb	Native											■		■						
mountain sweet-cicely	*Osmorhiza berteroi*	Herb	Native		■	■	■															
royal rein orchid	*Piperia transversa*	Herb	Native															■				
frogleaf plantain	*Plantago major*	Herb	Introduced							■												
common knotgrass	*Polygonum aviculare*	Herb	Introduced							■												
creeping buttercup	*Ranunculus repens*	Herb	Introduced							■												
dock	*Rumex spp.*	Herb	Introduced							■												
Pacific sanicle	*Sanicula crassicaulis*	Herb	Native															■				
broadleaf stonecrop	*Sedum spathulifolium*	Herb	Native															■				
prickly sow-thistle	*Sonchus asper*	Herb	Introduced							■												
common sow-thistle	*Sonchus oleraceus*	Herb	Introduced																			■
crisp starwort	*Stellaria crispa*	Herb	Native			■	■													■		

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chickweed	*Stellaria media*	Herb	Introduced				■															■
foamflower	*Tiarella trifoliata*	Herb	Native											■								
common hedge-parsley	*Torilis arvensis*	Herb	Introduced		■			■										■				
starflower	*Trientalis latifolia*	Herb	Native					■													■	
white clover	*Trifolium repens*	Herb	Introduced							■												
wildcat clover	*Trifolium willdenovii*	Herb	Native															■				
stinging nettle	*Urtica dioica*	Herb	Native		■	■	■			■		■		■						■		■
corn speedwell	*Veronica arvensis*	Herb	Introduced															■				
common vetch	*Vicia sativa*	Herb	Introduced							■												
western clematis	*Clematis ligusticifolia*	Vine	Native									■										
hairy honeysuckle	*Lonicera hispidula*	Vine	Native	■	■			■										■	■		■	
trailing blackberry	*Rubus ursinus*	Vine	Native		■	■	■				■		■	■	■					■		■
colonial bentgrass	*Agrostis capillaris*	Grass	Introduced							■	■			■								
creeping bentgrass	*Agrostis stolonifera*	Grass	Introduced							■	■			■								
silver hairgrass	*Aira caryophyllea*	Grass	Introduced															■				
early hairgrass	*Aira praecox*	Grass	Introduced															■				
California brome	*Bromus carinatus*	Grass	Native															■				

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soft brome	*Bromus hordeaceus*	Grass	Introduced							■								■				
barren brome	*Bromus sterilis*	Grass	Introduced															■				
Columbia brome	*Bromus vulgaris*	Grass	Native		■	■												■		■	■	
crested dogtail	*Cynosurus cristatus*	Grass	Introduced							■												
blue wildrye	*Elymus glaucus*	Grass	Native			■					■									■		■
western fescue	*Festuca occidentalis*	Grass	Native					■										■				
nodding fescue	*Festuca subulata*	Grass	Native					■	■			■					■		■	■		■
tall mannagrass	*Glyceria elata*	Grass	Native											■		■						
velvet grass	*Holcus lanatus*	Grass	Introduced			■				■	■							■				
perennial ryegrass	*Lolium perenne*	Grass	Introduced							■												
Harford's oniongrass	*Melica harfordii*	Grass	Native															■				
Alaska oniongrass	*Melica subulata*	Grass	Native	■	■			■				■						■			■	
annual meadow grass	*Poa annua*	Grass	Introduced			■	■															
Kentucky bluegrass	*Poa pratensis*	Grass	Introduced			■																
Sandberg's bluegrass	*Poa secunda*	Grass	Native																			
meadow rye grass	*Schedonorus pratensis*	Grass	Introduced							■												
rattail six weeks grass	*Vulpia myuros*	Grass	Introduced															■				

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Common	Scientific	Form	Status	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
jointleaf rush	*Juncus articulatus*	Rush	Native																			
Bolander's rush	*Juncus bolanderi*	Rush	Native																			
toad rush	*Juncus bufonius*	Rush	Native																			
common rush	*Juncus effusus*	Rush	Hybrid																			
slender-footed sedge	*Carex leptopoda*	Sedge	Native																			
slough sedge	*Carex obnupta*	Sedge	Native																			
giant horsetail	*Equisetum telmateia*	Other	Native																			
small-headed bulrush	*Scirpus microcarpus*	Other	Native																			
bur reed	*Sparganium spp.*	Other	Native																			
wavy-leaved cotton moss	*Buckiella undulata*	Moss	Native																			
broom moss	*Dicranum scoparium*	Moss	Native																			
step moss	*Hylocomium splendens*	Moss	Native																			
slender mouse-tail moss	*Isothecium myosuroides*	Moss	Native																			
Oregon beaked moss	*Kindbergia oregana*	Moss	Native																			
feather moss	*Kindbergia praelonga*	Moss	Native																			
Menzies' tree moss	*Leucolepis acanthoneuron*	Moss	Native																			

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badge moss	*Plagiomnium insigne*	Moss	Native			■	■	■			■	■								■		■
lanky moss	*Rhytidiadelphus loreus*	Moss	Native						■													
electrified cat's-tail moss	*Rhytidiadelphus triquetrus*	Moss	Native			■	■	■	■			■			■			■		■		■

Wildlife

Additional surveys are required to produce this list.

Lichens & Fungi

Additional surveys are required to produce this list.