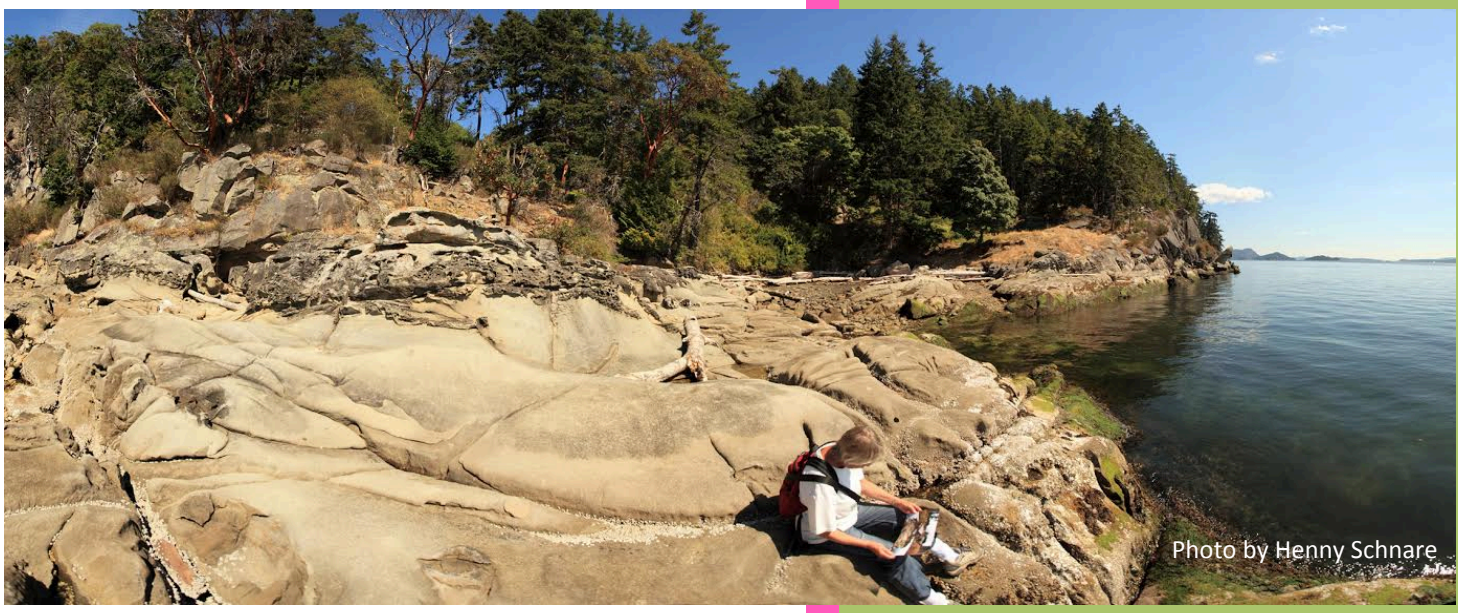
2012

Galiano Learning Centre Baseline Report



Prepared by:

Keith Erickson & Andrew Simon on behalf of the Galiano Conservancy Association

September 2012

Introduction

District Lot 57 (the Land) is a 76 hectare parcel that was acquired for conservation and as a site for the Galiano Learning Centre.

The Galiano Conservancy purchased DL57 in February 2012 from William (Bill) and Lennis Campbell. The parcel of waterfront land had remained subdivided since its original Crown Grant and was zoned for rural residential and agricultural use. Mr. Campbell had owned the Land since 1958, and had used it accordingly for residential, agricultural and forestry activities. The acquisition was accomplished with matching funds from the Natural Areas Conservation Program (NACP), administered by the Nature Conservancy of Canada (NCC) on behalf of Environment Canada. It fulfilled many ecological criteria but also provides a home for the Galiano Restorative Learning Cente. The purchase of the Land was assisted by a loan from the Vancity Resilient Capital program together with a substantial bequest from the Betty Kleiman Estate and many individuals who donated funds, guaranteed the loan and committed to servicing the loan payments. No mortgage has been registered on the Land to secure funds for its acquisition and the Land has not been used as collateral for any loans. A mortgage in favour of NCC is registered on the land title to secure the natural amenities secured through the NACP funding.

In accordance with the Kleiman Estate Bequest a covenant will be established to protect the marine / terrestrial interface for the enjoyment of kayakers. The covenant will restrict use of the shoreline forest ecosystem to protect sightlines from the water from visual impacts such as structures, tree cutting and vegetation clearing. Uses that do not require or create visual impacts such as trails, educational activities, research, landing and launching of kayaks etc. will be permitted within the covenant area.

Contact Information

Landowner

Galiano Conservancy Association

Covenantee

N/A

Surveyors

Keith Erickson

Andrew Simon

Dates

The land was surveyed through the months of July and August 2012

Acknowledgements

Table of Contents

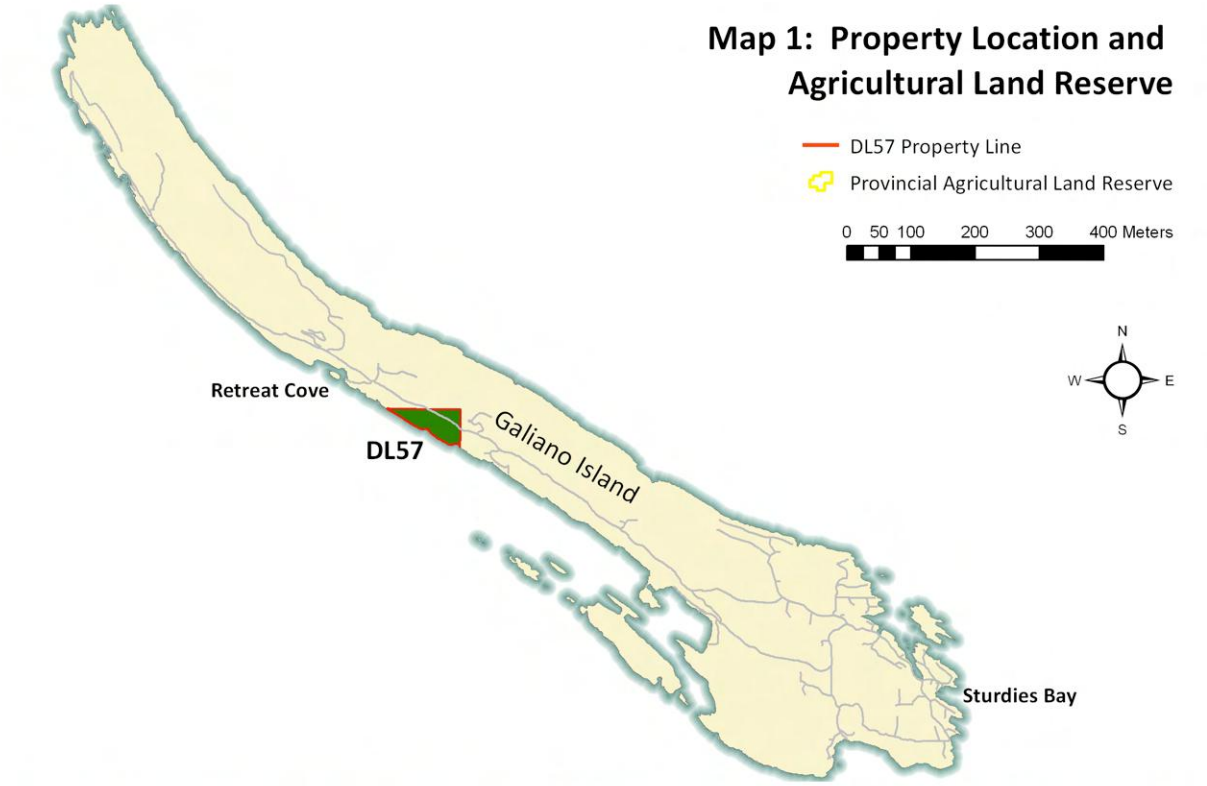
List of Maps

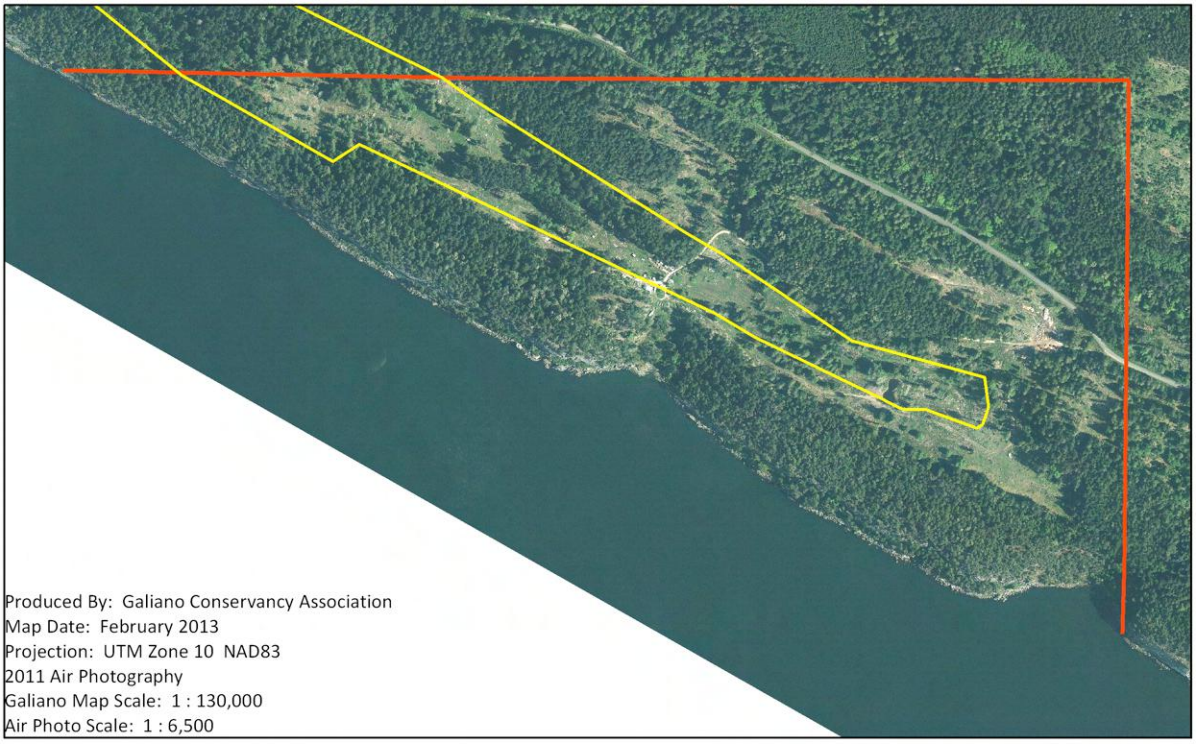
Property Location and Details

Detailed Property Information

Registered Owner in Fee Simple: Galiano Conservancy Association

Legal Description:	District Lot 57, Galiano Island, Cowichan District
Legal Notations:	Title may be affected by the Agricultural Land Commission Act: See Agricultural Land Reserve Plan No. 4, July 11, 1974
PID:	002-025-175
Mortgage:	CA2394335, 2012-02-15, The Nature Conservancy of Canada
Zoning:	The property is split zoned: Rural (60.25 hectares) and Agriculture (15.85 hectares). Galiano Island Official Community Plan and Land use Bylaw documents can be found at: http://www.islandstrust.bc.ca/ltc/gl/. A portion (approximately 13.06 hectares) of the property is designated as Agricultural Land Reserve (ALR) under the Agricultural Land Commission Act. See Map 1 for ALR boundaries.
Surface Area:	76.1 hectares (188 acres)
Elevation:	0m to 168m
Property Position:	Waterfront
Directions to Property:	The Land is located at 10825 Porlier Pass Road roughly in the middle of Galiano Island. From the ferry terminal, follow Sturdies Bay Road to the intersection ('Triangle') with Porlier Pass Road. Veer to the right onto Porlier Pass and follow for roughly 10.5 kilometers to the main access driveway on the left about 400 meters beyond the intersection with McClure Road. See Map 1 for the Location of DL57 on Galiano Island.


Map 1: Property Location and Agricultural Land Reserve
DL57 Property Line
Provincial Agricultural Land Reserve
0 50 100 200 300 400 Meters
N
W
E
S
Retreat Cove
DL57
Galiano Island
Sturdies Bay


Produced By: Galiano Conservancy Association
Map Date: February 2013
Projection: UTM Zone 10 NAD83
2011 Air Photography
Galiano Map Scale: 1 : 130,000
Air Photo Scale: 1 : 6,500

Description of the Management Organization

The Galiano Conservancy Association

The Galiano Conservancy was founded in 1989 as one of BC's first community-based land trusts. The organization is dedicated to the promotion of a human community that recognizes its role in a balanced natural system. Its mandate is to preserve, protect and enhance the quality of the human and natural environment in our region.

The Galiano Conservancy has successfully protected important ecological communities on Galiano Island through direct land purchase and cooperative partnerships. It has conducted extensive long-term biological monitoring and award-winning ecological restoration programs and has established its own native plant nursery. The Galiano Conservancy has sustained a dedicated staff and offered ongoing education programs for local and regional communities. It has hosted local environmental workshops and conferences, and maintains a provincially recognized conservation-based library, resource centre and GIS mapping facility.

The Galiano Conservancy has developed long-standing partnerships with a wide variety of conservation, environmental and educational organizations, several of which will provide key contributions to this plan.

As a requirement of the NACP grant, the management plan must be reviewed and revised (if necessary) at least every five years or as otherwise agreed to by the Galiano Conservancy Association and NCC.

In accordance with the Kleiman Estate Bequest a covenant will be established to protect the marine / terrestrial interface for the enjoyment of kayakers. The covenant will restrict use of the shoreline forest ecosystem to protect sightlines from the water from visual impacts such as structures, tree cutting and vegetation clearing. Uses that do not require or create visual impacts such as trails, educational activities, research, landing and launching of kayaks etc. will be permitted within the covenant area.

Ecological Designation

Ecoprovince: Georgia Depression - Southern Gulf Islands

Biogeoclimatic Unit: CDFmm

Land Use

Development Status:

The property is currently developed for small-scale forestry and agriculture as well as for spartan residential use with no power or functioning water systems. There are a number of 'rough built' structures, some with walls, most with plastic or tarped roofs and ranging in size from less than 10m2 up to approximately 100m2. None of the buildings have permanent foundations or footings. One public road (Porlier Pass) bisects the property. Two maintained driveways currently run through the property in addition to many rough logging and skid roads of varying degrees of naturalization. There is a very steep, rough road branching off of one of the driveways that accesses the foreshore of the property.

History of Land Use: Cultural History and Significance

First Nations use and history of the Land has not been documented or recounted. The Land lies within the traditional territories of the Hul'qumi'num Treaty Group (Chemainus, Cowichan Tribes, Halalt, Lake Cowichan, Lyackson and Penelakut), the Hwlitsum Nation, and Tsawwassen First Nation. Upon completion of the acquisition, a blessing ceremony performed by Penelakut Tribe elder, Thyus (Florence James) was conducted on the Land.

Since European settlement of the region, the Land has had an extensive history of ownership and use. Land clearing for farming and forestry is evident in aerial photography dating back to 1932. Residential use, food gardens, livestock grazing, subsistence fishing and hunting have been documented on the Land and associated waters back to the 1920's. These uses continued on the land right up to the acquisition by the Galiano Conservancy Association, with an increase in intensity of small-scale forest harvesting and milling occurring over the past two decades.

Name	Tenure	Date
G. Dishaw	Preemption	?
Joseph Ganner	Preemption	6 March 1888
W. W. Beall	Preemption	25 February 1889
J. W. Walker	Preemption	9 May 1892
John W. Walker	Crown Grant	27 Nov. 1896
John Shaw	Fee Simple	6 January 1897
Edith Elizabeth Scholefield	Fee Simple	26 January 1932
Francis Austin Graham	Fee Simple	6 January 1948
The Olympia Co-operative Association, (Galiano Co-operative Association)	Fee Simple	6 January 1948
William Alexander Campbell	Fee Simple	14 March 1958
William Alexander Campbell and Lennis Shirley Campbell	Fee Simple	10 August 2007
Galiano Conservancy Association	Fee Simple	15 February 2012

Table 1. Comprehensive list of ownership since the first preemption of the Land.

Management

The Management Plan for DL57 has been developed by a planning committee consisting of members of the Galiano Conservancy Association (Board of Directors and staff), faculty from the University of Victoria School of Environmental Studies and members of the Public (See *The Management Plan*, 2013). The planning committee completed an open planning process that included two public open houses for the Galiano Community and an Extraordinary General Meeting for the Galiano Conservancy Association membership.The Nature Conservancy of Canada (Tim Ennis, West Coast Program Manager, BC Region) was consulted throughout the planning process to ensure that the Management Plan was consistent with the Galiano Conservancy Association's proposal for acquisition funding through the NACP. The Islands Trust Fund and the owners of Retreat Cove Farms, as adjacent landowners were also directly informed and consulted throughout the process. Kate Emmings, Ecosystem Protection Specialist for the Islands Trust Fund, was also consulted with respect to how the management of DL57 ties into Islands Trust Fund Regional Conservation Plan goals and objectives. Kris Nichols, Island Planner for The Islands Trust was consulted regarding the general content of the plan to ensure familiarity with the Galiano Conservancy Association's goals and objectives in preparation for the initiation of a local rezoning process, required in order to accommodate the desired changes in use for the property. Expert advice regarding the agricultural capability of the land was provided by Gary Runka (P.Ag.). Herb Hammond (R.P.F.) provided expert advice regarding ecosystem-based planning and sustainable forest-based activities. Ecological analysis and planning was conducted by Keith Erickson (R.P.Bio.) (Galiano Conservancy Association) in consultation with a variety of local and provincial experts. The Management Plan was also informed

through direct consultation with leaders and participants of groups that have past experience with the Galiano Conservancy Association's nature based education programs.

Management Philosophy [1]

What is best for the ecosystems of the land should figure highly in any decisions. The land should be regarded as a community to which we belong that both sustains us and is sustained by us; to be honored, loved and respected. Activities on the land should bring us closer to natural processes, to ourselves and to one another.

Management Principles [2]

1. Focus on what to protect, then on what to use.
2. Recognize the hierarchical relationship between ecosystems, cultures, and economies—that economies are part of human cultures, which are part of ecosystems. Therefore, maintaining the integrity of ecosystems provides the basis for sustainable cultures, including their economies.
3. Apply the precautionary principle to all plans and activities.
4. Protect, maintain, and, where necessary, restore ecological connectivity, and the full range of composition, structure, and function of enduring features, natural plant communities, and animal habitats and ranges.
5. Facilitate the protection and/or restoration of Indigenous land use.
6. Ensure that planning is inclusive of the range of values and interests.
7. Contribute to diverse, ecologically sustainable, local economy.
8. Practice adaptive management.

1 Based on excerpts from Aldo Leopold's 'A Sand County Almanac' and Eric Higgs', 'Nature by Design'

2 Adapted from Silva Forest Foundation - Definition and Principles of Ecosystem Based Conservation Planning

Significance

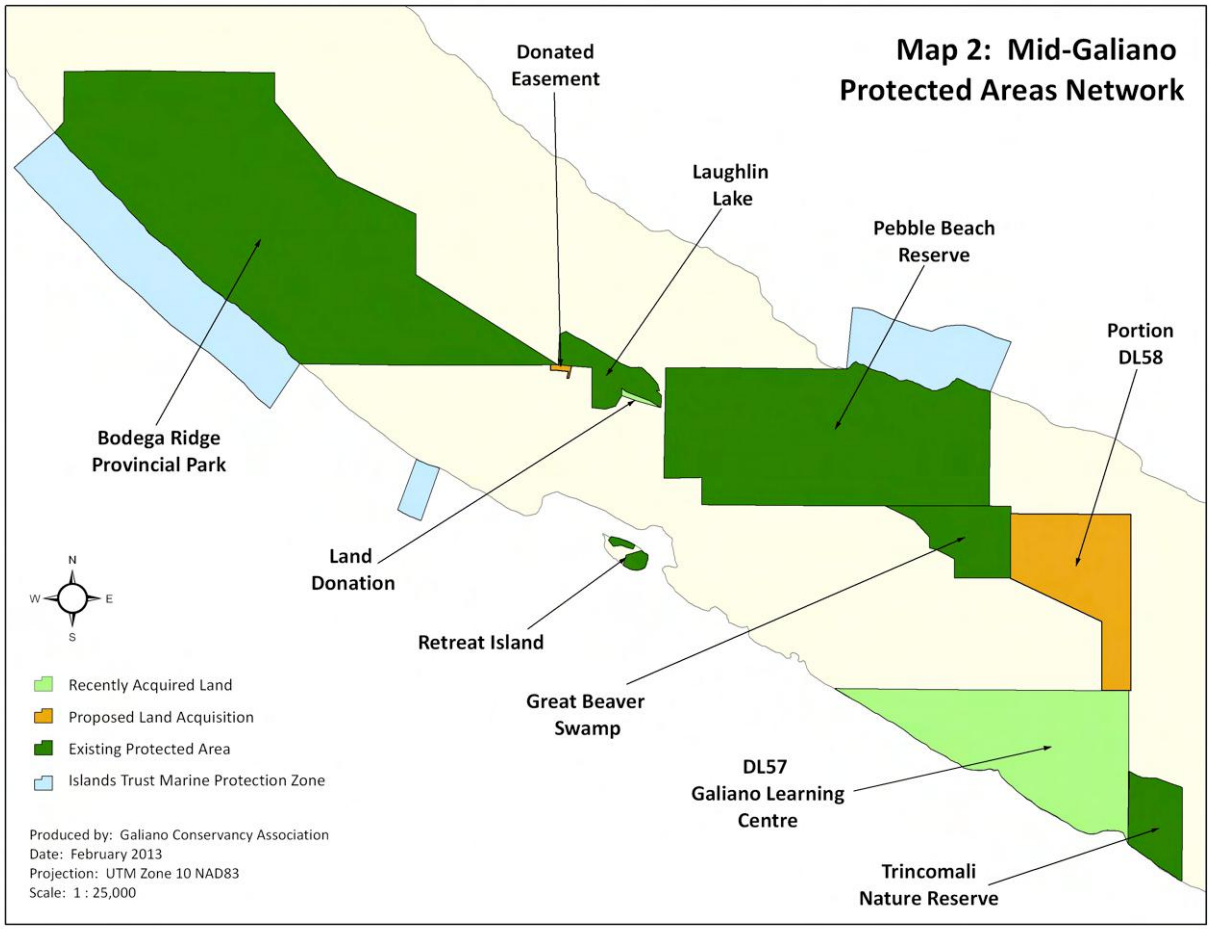
Ecological Significance

District Lot 57 lies in the heart of the endangered Coastal Douglas-fir zone (CDF), an ecological classification that has recently been ranked as imperilled both provincially and globally.

"The Coastal Douglas-fir (CDF) biogeoclimatic zone is the smallest and rarest of the 16 biogeoclimatic zones in British Columbia and is of great conservation concern (Biodiversity BC, 2008)… Ecological communities throughout the CDF are currently listed as critically imperiled in a global context and provincially, the BC CDC lists 36 ecological communities and 218 species of wildlife and plants at risk in the CDF (2010). Their at-risk status is mainly due to the limited range of the CDF, growing human populations, existing threats and past habitat loss arising from anthropogenic disturbances." *Ministry of Forests, Lands and Natural Resource Operations, Coastal Douglas-fir (CDF) Stewardship Workshops Summary (Darryn McConkey, RPBio, June 2011.*

The protection of District Lot 57 (DL57) was identified as a high priority in the Islands Trust Fund's Regional Conservation Plan (2011-2015), which was endorsed by the Islands Trust Council (December, 2010), and the protection of DL57 is consistent with the goals of NCC's Salish Sea Natural Areas Conservation Plan. The property is part of the Mid-Galiano Island Protection Network, a 500+ hectare contiguous network of conservation properties that protects a significant portion of the island's topographic variation and associated ecological diversity, and secures valuable pathways for plant and animal migration from sea level to Galiano's highest ridgeline. The network also includes marine areas adjacent to its shoreline boundaries that have been designated for protection under local land use bylaws (Map 2 shows the network). While DL57 includes tracts of healthy old growth and mature forest, wetlands and sensitive coastal bluff, it also has an extensive history of agricultural use, grazing and small-scale forestry.

The context of landscape-level connectivity within the Mid-Galiano Island Protection Network, the high conservation value of the land and the history of land-use, make DL57 ideal for learning, research and demonstration focused on ecological restoration and sustainable rural living. The Land's significance for this purpose is rooted in the close proximity of healthy, intact ecosystems to altered or damaged areas.



Significance of the Adjacent Marine Environment

Galiano Island lies within a proposed National Marine Conservation Area (NMCA) for the Southern Strait of Georgia, which will extend from the southern portion of Gabriola Island south to Haro Strait, near Victoria, with a total area of 1,400 km^2. The Canadian and BC governments have agreed to proceed with the NMCA and are currently completing a feasibility study that was launched in 2005. This area is considered significant in its capacity for marine biodiversity, and contains critical habitat for a wide variety of species, from endangered southern resident orca and rockfish populations to migrating birds and sea lions. It is home to a number of the largest species of marine invertebrates, including the Giant Pacific Octopus, the Giant Nudibranch, Giant Acorn Barnacles, and many more. This area has also been flagged as having high human impact and marine traffic, with anthropogenic threats including coastal and shoreline development, shoreline and offshore industry, heavy marine traffic and direct harvesting of marine resources. The NMCA will promote best practices for the preservation of this important marine area, from the shoreline to the seabed. The adjacent portion of the Trinco-

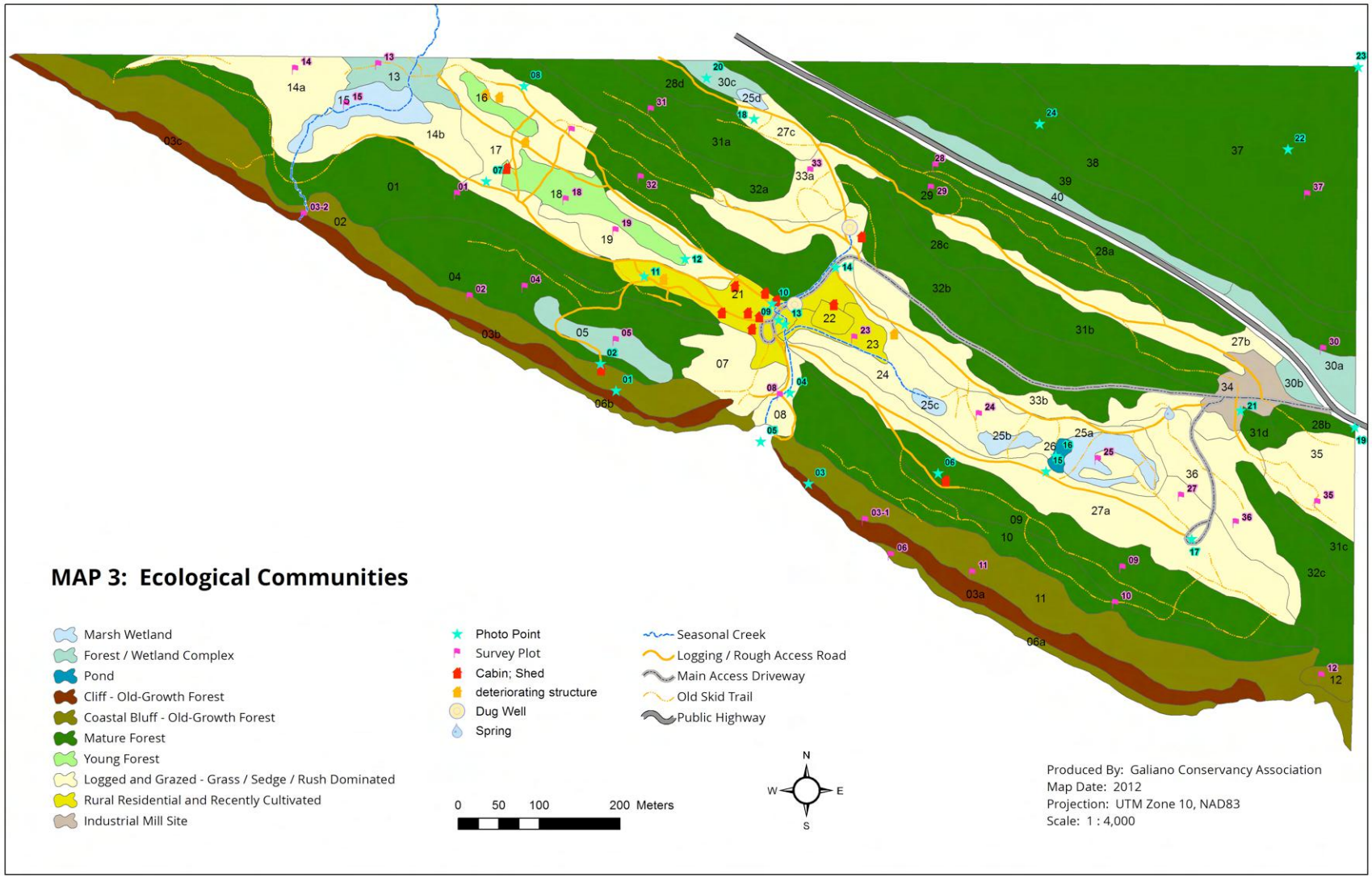
mali Channel is also designated as a Rockfish Conservation Area (RCA 17-2) by Fisheries and Oceans Canada for the protection of sensitive rockfish populations.

Current Ecological Conditions

Mapping of the property revealed 40 different ecological communities. These communities were delineated based on their position on the slope (i.e. valley vs. ridge), their history of disturbance (i.e. logged 10 years ago vs. logged 100 years ago), the steepness of the slope (i.e. cliff vs. flat) and their aspect (i.e. north vs. south). Map 3 shows these communities grouped into broad categories.

Forest and Woodland: Almost 20 hectares (ha) of old growth and mature forested coastal ridge run the length of DL57's 2km shoreline, forming a matrix of red listed ecological communities. Below the forested ridge top lies approximately 7 ha of contiguous steep southwest-facing coastal bluff including patches of red listed Garry oak communities, moss and herb dominated seepage sites, and exposed rock or cliff. A large portion of DL57 (28 ha) is characterized by 70 to 100 year old Douglas-fir and western redcedar dominated forest with scattered remnant old-growth trees and snags. Most of the moist valley bottoms and lower slopes on DL57 (22 ha) were logged over the past century and maintained through grazing as open grass, sedge and rush dominated fields. A small portion of this area (approximately 2 ha) was used for gardens and orchards.

Freshwater: There are two small seasonal creeks and a number of associated sedge and rush-dominated marsh and swamp communities in forested and cleared depression areas on DL57. One of the streams culminates in a 20 meter waterfall that cascades down a rocky bluff into the Trincomali Channel.


MAP 3: Ecological Communities
Marsh Wetland
Forest / Wetland Complex
Pond
Cliff - Old-Growth Forest
Coastal Bluff - Old-Growth Forest
Mature Forest
Young Forest
Logged and Grazed - Grass / Sedge / Rush Dominated
Rural Residential and Recently Cultivated
Industrial Mill Site
Photo Point
Survey Plot
Cabin; Shed
deteriorating structure
Dug Well
Spring
Seasonal Creek
Logging / Rough Access Road
Main Access Driveway
Old Skid Trail
Public Highway
0 50 100 200 Meters
N
W
E
S
Produced By: Galiano Conservancy Association
Map Date: 2012
Projection: UTM Zone 10, NAD83
Scale: 1 : 4,000

Disturbances

Natural Disturbances

Natural disturbance regimes on the Land are limited primarily to the gap dynamics of wind-throw and root rot caused by laminated root-rot fungus (*Phellinus wierii*). There is however some evidence of fire exhibited as scarring on Douglas-fir trees toward the northwest extent and toward the foreshore of the property. Herbivory is significant across the landscape, in some instances suppressing regeneration of trees and shrubs in logged areas.

Anthropogenic Disturbances

Historical logging, agriculture and residential use of the Land have left behind a legacy of buildings, structures, and debris. The vast majority of garbage and debris was removed from the Land by the previous owner, though the odd pile or piece remains. Large piles of off-cuts and slabs remain on the mill site near the entrance to the Land. Smaller piles of rotting logs and slash are scattered throughout recently harvested areas. Most of the remaining buildings were constructed as temporary or movable structures and do not have solid foundations. Several of these pose serious safety hazards and must be de-constructed and removed, while others are structurally sound and may provide ongoing covered and/or enclosed storage facilities. Map 6 shows the locations of existing structures and building.

A herd of twelve sheep (*Ovis aries*) roam feral on the Land. Alongside the blacktail (*Odocoileus hemionus columbianus*) deer, these sheep are a significant cause of herbivory, the evidence of which has been observed across the landscape. Disturbance by sheep, however, appears largely confined to logged and farmed areas, where the herd is wont to graze. The herd is aging and unhealthy, and is likely beset by parasites; its numbers had already been seen to be in decline by late 2012.

Climate

Annual Weather Patterns and Seasonality [3]

The rainshadow effect of the Olympic and Vancouver Island mountains along with the moderating effects of the ocean are the dominant influences on the climate of Galiano Island. Kerr (1951) describes the Island as having a "Transitional, Cool Mediterranean Climate." Galiano

[3] *From Pebble Beach Reserve Management Plan, Erickson, 1998*

exhibits a pattern of warm dry summers and mild wet winters with an average of approximately 1,900 to 2,000 hours of sunshine (Ronneseth and Barr, 1982) and 254 frost free days (Agriculture Canada, 1989) per annum. The average annual rainfall recorded at the North Galiano Atmospheric Environment Service station is 920 mm (from 1977 to 1988). Annual rainfall ranges from 597.3 mm to 1152.6 mm (Harrison, 1994). Over 75% of the total annual precipitation falls during the winter months (November through February), with less than 10% falling as snow.

The months of January and February produce the coldest mean temperatures of 4° to 5° Celsius, while July and August are the warmest months with mean temperatures of 17° to 19° Celsius. The combined effects of low precipitation, warm temperatures, and high number of sunshine hours often result in an annual moisture deficit on Galiano Island from mid-June to early October (Harrison, 1994). This deficit can often reach drought conditions in areas of recent clearcuts, and can result in an extreme forest fire hazard.

Weather during the Study Period

All data for this survey was collected during the dry mid-late summer months, from July to early September, 2012.

Landscape and Physical Features

Soils and Geology [4]

Galiano Island lies within the Nanaimo Basin, a large depression at the southern end of the Georgia Strait. Clark (1977) describes Galiano Island as structurally simple; it is part of the Northeastern edge of the Trincomali Anticline. The Islands strata form a simple homocline that dips northeast into the Georgia Basin. Eleven Sedimentary rock formations dominate the Basin stratigraphy, termed the Nanaimo group. Three of the Nanaimo group's sedimentary clastic rock formations form the bedrock of Galiano Island (Muller and Jeletzky, 1970). These formations date to the Upper Cretaceous (65-100 million years ago) and, along with Tertiary sediments, form the fill of the Georgia Basin (Mustard, 1993).

The Gabriola formation is the name of the surface layer of the Nanaimo group. This stratigraphic layer is over 500m deep and occupies 75% of Galiano Island, including the study area (Harrison, 1994). Provenance for Gabriola sandstone particles points to the Coast Range mountains as well as the Eastern Cordillera via a Fraser River scale fluvial system (Mustard,

[4] Sources: *Restoration Plan for District Lot 63 of the Pebble Beach Nature Reserve, Galiano Island* (Gaylor, Scholz, Erickson, 2002); & the Soil Report prepared by Gary Runka

1993). The Gabriola formation is over 90% arkosic arenite sandstone ranging in texture from medium to coarse grained. This young sandstone is hard and has a relative resistance to weathering. Thin layers of shale stone co-form the Gabriola formation. Galiano Island's valleys have been carved out of these softer, more erosive sedimentary layers (Green et al., 1989).

Landform expression on Galiano Island is a result of late Cretaceous and subsequent Tertiary differential uplift of Vancouver Island and the concurrent depression of the Georgia Basin (Muller and Jeletzky,1970). These historic shifts gave Galiano Island its backbone, the vertebrae being ridges and cuestas running northwest-southeast paralleling the Georgia Strait. The linear relief pattern of Galiano Island is repeatedly bisected by fractures and faults (Carter, 1977). These weaknesses have been exploited by moving water, as over time v-shaped valleys have been carved allowing the islands streams out to the ocean. Carter (1977) postulates the fractures are the tail end of faults originating on Vancouver and Saltspring Islands.

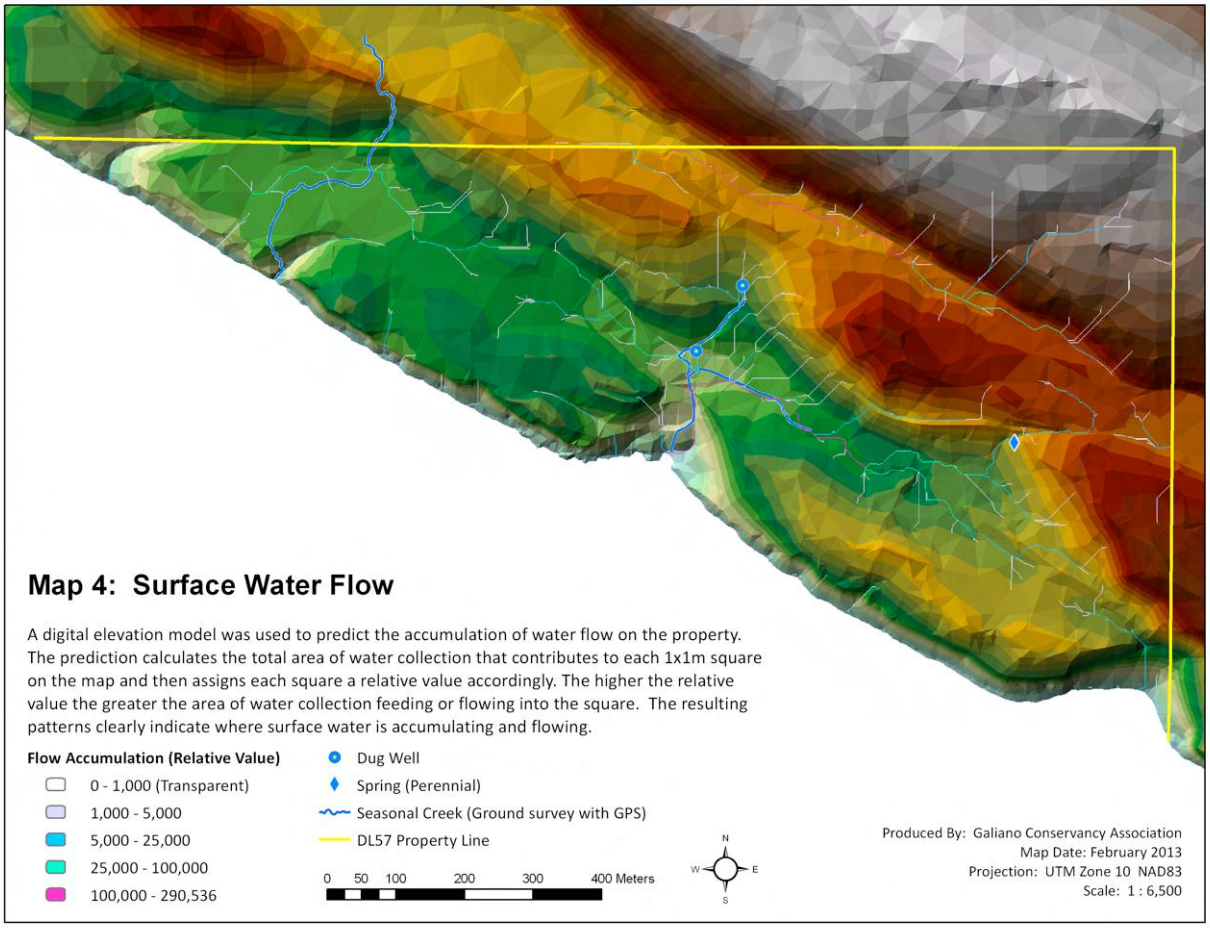
Three successive glacial events have altered the surface expression within the Nanaimo Basin, the most recent, the Fraser glaciation, occurred between 10 and 15,000 years ago (Halstead, 1967). Glaciers advanced on the region, first from Vancouver Island via the Cowichan Ice tongue, and second, from the Georgia strait lobe (ibid.). Glacial forces scraped the island landforms leaving a more subdued terrain. The legacy of glaciation endowed Galiano Island with a thin (<1 m deep) mantle of drift. The force of the glacial ice mechanically weathered the bedrock and deposited a cemented horizon of sand, silt and rock. On top of the weathered horizon was deposited a layer of unsorted gravelly, sandy, loamy till generated from glacial outwashing (Henderson, 1998). The weight of the ice depressed the land 75-90m relative to the ocean (Eis and Craigdallie, 1980). Depressed land and encroaching seas indicate that all low land in the Georgia Basin was submerged, following glacial retreat. Marine deposits found on the valley floors of the island confirm this aspect of the Island's history. Isostatic rebound following the Fraser Glaciation continues to this day (Halstead, 1967).

Soil surveys conducted by Gary Runka on the Land revealed three forms of soils present across the landscape: Brigantine, Tolmie and Qualicum. The dominant soils observed within the ALR are Brigantine and Tolmie. According to SGIBC (1989) Brigantine soils are imperfectly drained soils containing between 30 and 100 cm of loamy sand to sandy loam of marine or fluvial origin, which overly deep (>100 cm), silty clay loam to silty clay marine deposits that are usually stone free. Tolmie soils are poorly drained soils developed over deep (>100 cm) silt loams to silty clay loam deposits that are usually stone free (SGIBC 1989). Qualicum soils, contrastingly, are rapidly to moderately well-drained soils developed on deep (>150 cm) deposits of gravelly sandy loam to gravelly sand textured, glaciofluvial, fluvial or marine deposits (SGIBC 1989).

These soils occur in a complex, with Brigantine mapped as dominant and Tolmie as the sub-dominant component. It may well be that, within the DL-57 part of the map ecological community, Tolmie is dominant. Qualicum-like soils encountered on the cedar stump slope between the campsite and the pond are well drained. This is the only isolated area of such soil encountered during field observations.

Hydrology

The highly variable topography of the Land and the presence of bedrock fractures create complex patterns of sub-soil and surface water flow. The land exhibits a diverse mosaic of moist soils, dry soils, wetlands, springs and streams. Natural hydrological patterns have been highly disturbed over the past century through road building, ditching, vegetation removal and soil compaction. Map 4 shows an approximation of current significant surface water flow accumulations. Water movement on DL-57 is complex and will highly impact land use options. With complex moisture shedding/moisture receiving landscapes underlain by bedded, sedimentary rocks containing faults and fractures, it is critical that an understanding of hydrology on the subject property be a basis for management planning.



Key Species

Rare Species and Communities

The property provides habitat for several species at risk including the Olive-sided Flycatcher (*Contopus cooperi*; Blue listed), Barn Swallow (*Hirundo rustica*, Blue listed), Band-tailed Pigeon (*Columba fasciata*, Blue-listed), the Common Nighthawk (*Chordeiles minor*; Yellow listed), Peregrine Falcon (*Falco peregrinus*; Red listed), Double-crested Cormorant (*Phalacrocorax auritus*; Blue listed) Pelagic Cormorant (*Phalacrocorax pelagicus*; Yellow listed), red legged frog (*Rana aurora*; Blue listed), and Pacific sideband snail (*Monadenia fidelis*; Blue listed).

Exotic Species

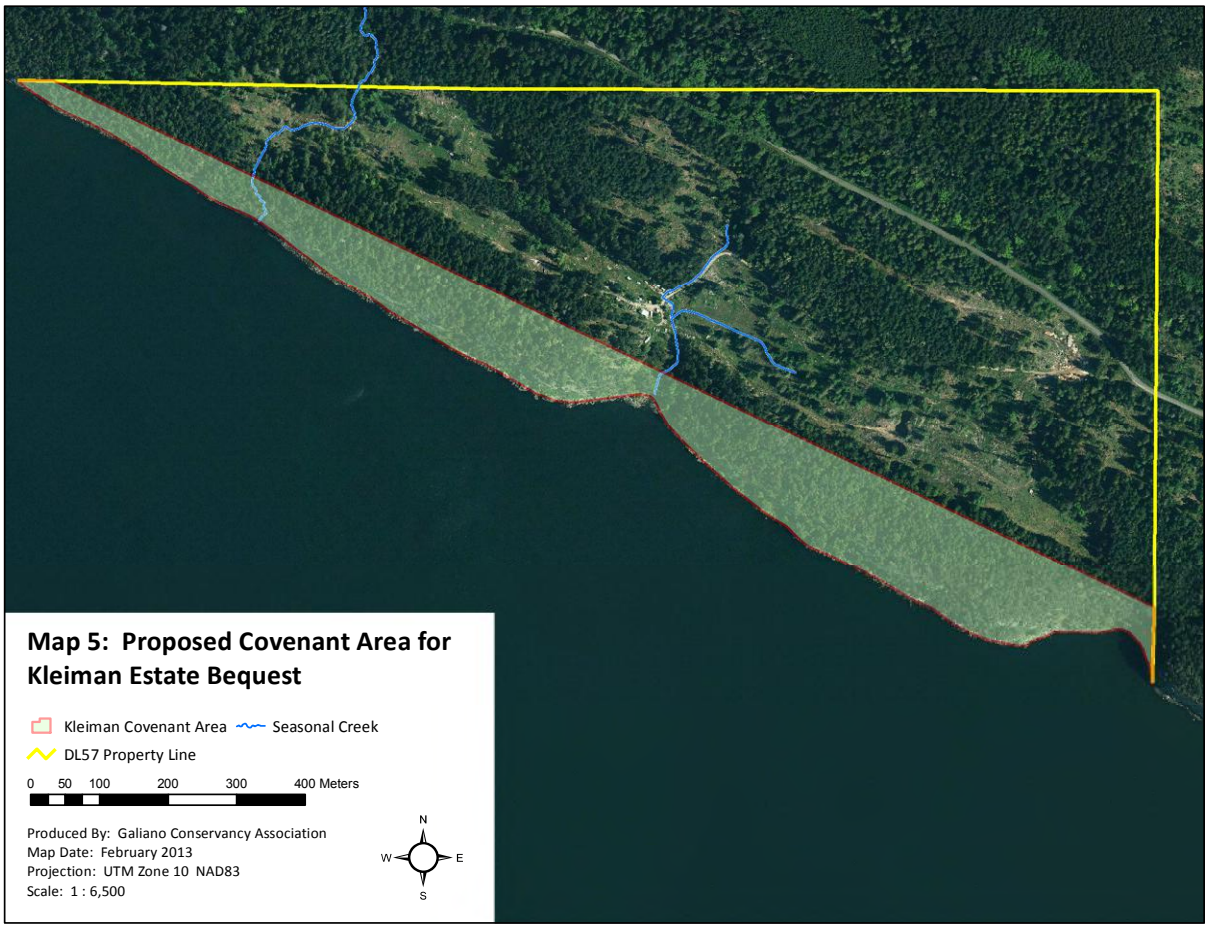
No less than 85 species of exotic plants have been documented to date on the property. Of those species, Scotch broom (*Cytisus scoparius*), holly (*Ilex aquifolium*), and Periwinkle (*Vinca major*) perhaps present the greatest cause for concern. See Appendix B for exotic species inventory; Appendix A for comprehensive species checklists of the flora and fauna documented on the Land.

Conservation Priorities

Maintain and restore the integrity of terrestrial, freshwater and marine ecosystems.

Objectives:

1. Create a protected ecosystem network that includes all endangered, threatened or at-risk ecological communities, is representative of more common ecosystems and contributes to wildlife corridors outward from the property.
2. Help to heal damaged or impacted areas through ongoing ecological restoration programs.
3. Protect and manage endangered, threatened or at-risk species and their habitat.
4. Maintain and restore hydrologic processes.
5. Control wildfire and manage fire risk with consideration of traditional disturbance regimes.
6. Control or eliminate, if possible, introduced and invasive plant and animal species and when necessary, manage native species, such as Columbia black-tailed deer (*Odocoileus hemionus columbianus*), to achieve long-term viability of ecological restoration programs.
7. Implement a collaborative stewardship outreach program with adjacent landowners and neighbours.
8. Explore opportunities to provide protection of the marine waters adjacent to the Land.



Procedures

Number and Locations of Ecological Communities

A total of 40 different ecological communities were identified on the property. Each of these ecological communities are described below and are spatially represented on the map titled 'Ecological Communities: DL57, Galiano Island' included as part of this document.

Number and Location of Sites

A total of 30 site plots were inventoried as part of this report. Data for each plot is described below. Plots are shown on the map titled 'Ecological Communities: DL57, Galiano Island' included as part of this document.

Photographs

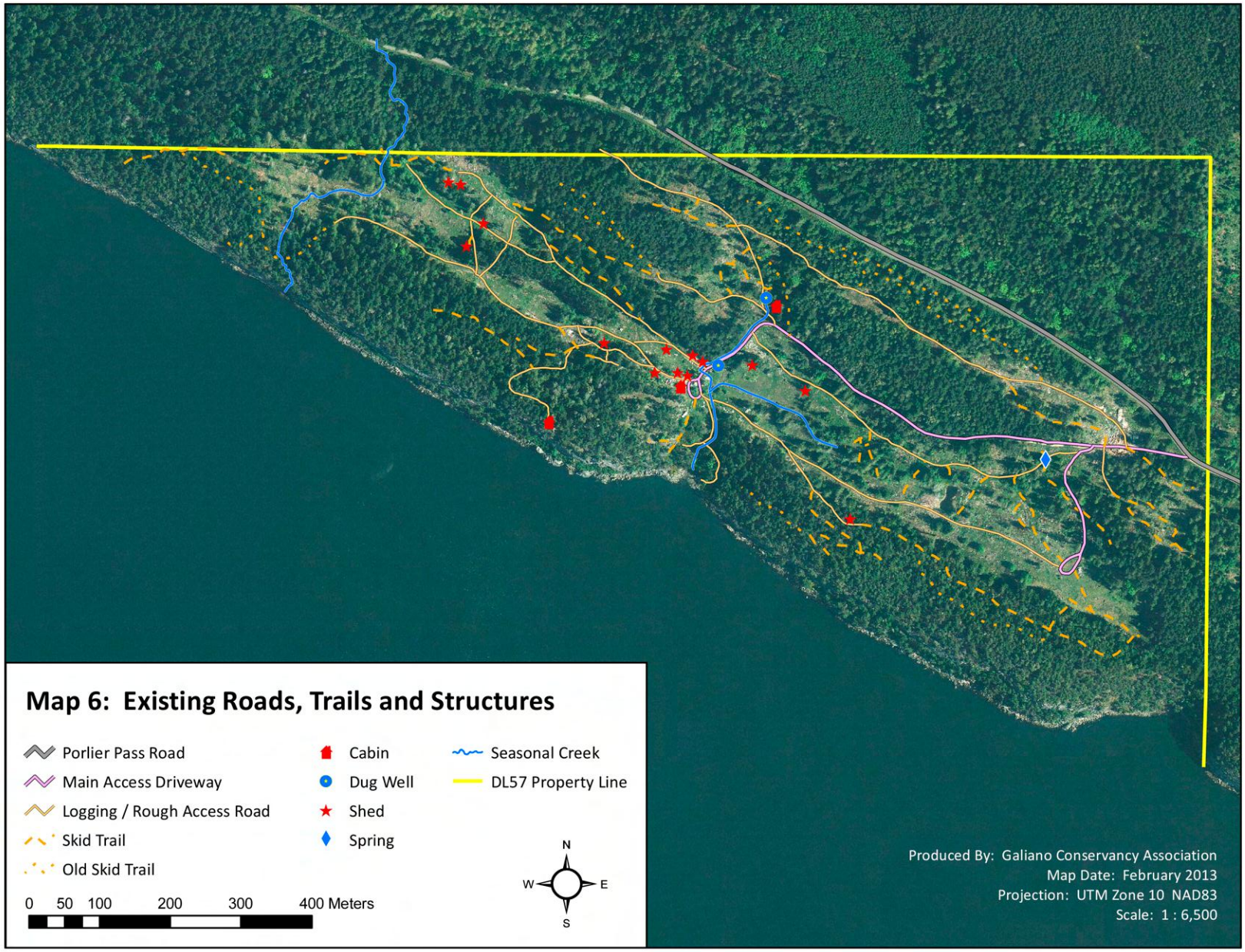
Representative photographs of each plot location, ecological community and of several anthropogenic structures and developments have also been included throughout the document. Photopoints documenting these features are geo-referenced in Map 7 along with the number and location of sites.

Type of Marker

30” rebar stakes with blue flagging tape wrapped around the top (sticking out of ground roughly 18”).

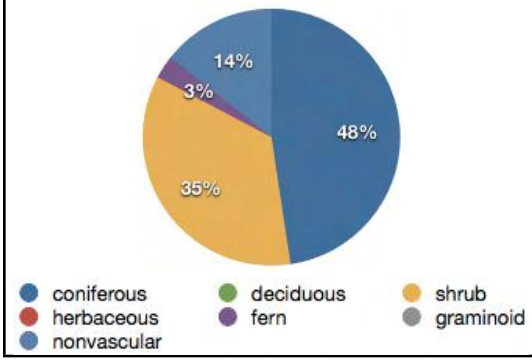
Equipment

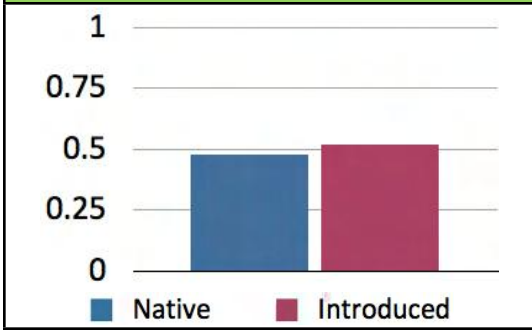
Clinometer, compass, Trible Pathfinder XC GPS, Canon SX20 IS camera, tripod, 30” rebar stakes, flagging tape, 30m tape, Land Management Handbooks 25 (2nd edition) and 28, Plants of Coastal British Columbia (Pojar, McKinnon), hand lens, increment borer, dbh tape, field maps.

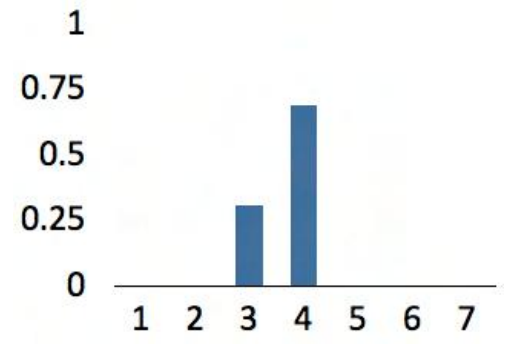

Map 6: Existing Roads, Trails and Structures
Porlier Pass Road
Main Access Driveway
Logging / Rough Access Road
Skid Trail
Old Skid Trail
Cabin
Dug Well
Shed
Spring
Seasonal Creek
DL57 Property Line
0 50 100 200 300 400 Meters
N
W
E
S
Produced By: Galiano Conservancy Association
Map Date: February 2013
Projection: UTM Zone 10 NAD83
Scale: 1 : 6,500

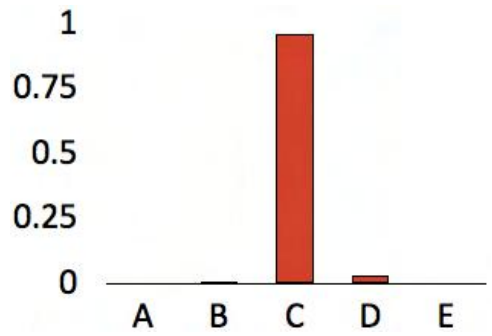
Notes on Ecological Statistics

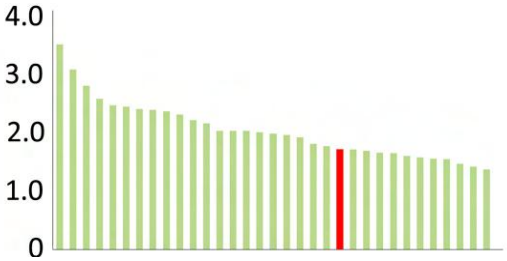
For descriptive purposes, six metrics have been included in the following ecological community accounts, based on statistical analysis of baseline data. These are tabulated below with notes on the evaluative methodologies.

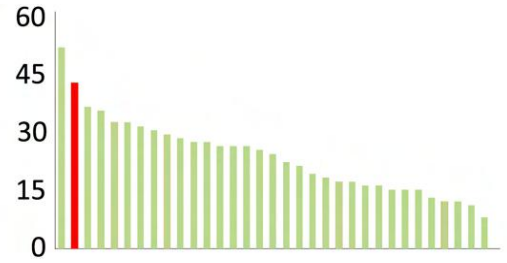
Plant Composition	
	This metric provides a summary of plot composition for the following vegetation groups: coniferous, deciduous, shrub, herbaceous, fern, graminoid, and nonvascular. Plant composition for a site is calculated by considering plant cover for each vegetative type proportional to the total estimated plant cover recorded for the plot.

Native / Introduced	
	This compositional metric summarizes the relative abundances of native to exotic species for a plot. The index is calculated, as above, by considering the plant cover for exotic and native plants proportional to the total estimated plant cover recorded for the plot, where 1 = 100% of plant cover.

Plant Composition by Moisture Regime	
	This metric uses data from the Biogeoclimatic Ecosystem Classification Database estimating the average soil moisture regime associated with a given plant. A subset of plants observed having known indicator values were included in this analysis (see Appendix C). This metric may be considered complementary to visual evaluations of soil moisture regime for each site, though slight discrepancies do arise. It is calculated by obtaining proportional abundances of plant cover falling within each moisture regime class, where: 1 = xeric, 2 = subxeric, 3 = submesic, 4 = mesic, 5 = subhygric, 6 = hygric, 7 = subhydric; and where 1 on the *y* axis = 100% of plant cover.

Plant Composition by Nutrient Regime	
	This metric uses data from the Biogeoclimatic Ecosystem Classification Database estimating the average soil nutrient regime associated with a given plant. A subset of plants observed having known indicator values were included in this analysis (see Appendix C). This metric may be considered complementary to visual evaluations of soil nutrient regime for each site, though slight discrepancies do arise. It is calculated by obtaining proportional abundances of plant cover falling within each nutrient regime class, where: A = very poor, B = poor, C = medium, D = rich, E = very rich; and 1 = 100% of plant cover.

Biodiversity Index	
 ***H'*** = 1.72 ***J'*** = 0.69	This metric uses the Shannon-Weiner biodiversity index (*H'*) which integrates species richness with a consideration for relative evenness in the proportional abundances for each species. The value for *H'* rarely exceeds 4.0 for ecological data (May 1975). Pielou's Evenness index (*J'*) ranges from 0–1; the closer the value is to 1, the more even the community. In the graph, the plot datum is shown alongside data representing all other plots for comparison, with the plot in question shown in red.

Species Richness	
 Richness (# of species) = 42	This metric represents species richness, or total species counted, for each site. For comparison the plot datum is shown alongside data representing all other plots surveyed, with the plot in question shown in red.

Limitations

The methodologies used in the acquisition and analysis of field data admit numerous sources of uncertainty. Some margin of error should be accounted for in the matter of species identification as well as in the estimation of percent cover within plots. Plant indicator values published in the Biogeoclimatic Ecosystem Classification Database should likewise be regarded with skepticism, insofar as the values taken represent the average autecology of species exhibiting a range in levels of ecological tolerance. The methods applied to acquire BEC data have their own limitations, which are not considered here.

Descriptions of the Ecological Communities

Ecological Community 1

Description

Ecological Community 1 consists in a northeast-facing, moderately sloped, maturing (60–100-year-old) Douglas-fir (*Pseudotsuga menziesii*)/western redcedar (*Thuja plicata*) dominated forest. Large diameter, old-growth western redcedar and Douglas-fir are scattered throughout. The understory is dominated by salal (*Gaultheria shallon*), sword fern (*Polystichum munitum*) and Oregon beaked moss (*Kindbergia oregana*). Included in this ecological community are a number of older, large diameter trees and snags. Older stumps are scattered throughout. A couple of small, logged patches poke up into the stand from the road at the base of the slope. The road and agricultural clearing at the base of the slope allow extra light into this ecological community which results in robust understory growth. The western portion of the ecological community broadens out into more of a northwest aspect and has a higher density of veteran, large-diameter trees. The ecological community includes portions of several roads and a disturbed "storage" area at the eastern end. The rough age of Douglas-fir trees in the main canopy is 90 years old (cored).

Ecological Community 1, Site 1 **Date Surveyed:** 7 August, 2012

Location

Location	References	Bearing	Description
N 5420023 E 464791	Ref. 1	12.5m @ 198°	1m diametre cedar snag with a gaping fire wound; downslope from site 1
	Ref. 2	15m @ 243°	1.5m diametre old-growth cedar, leaning; downslope; hollowed-out by fire

Site Description

The site is located about 20 metres uphill from the road, near a recently logged small patch, and is centered in a patch of stair-step moss (*Hylocomium splendens*) in the middle of the slope. Having a mixed Douglas-fir/Western redcedar canopy and an understory of salal and sword fern, it is a representative sample of Ecological Community 1.

Site ID:	01-1	Aspect:	30°	Exposure:	N/A
		Mesoslope Position:	MD	Slope:	20%

Surface Substrate:					
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***
0	0	2	5	93	0

Structural Stage:	6/Cm	SMR:	2-3	SNR:	C	Crown Closure:	75%

Percent Cover				Site Series:	CDF/01
A	B	C	D		
90%	60%	10%	25%		
Succession:	N/A				

Restoration Recommendations: N/A

Riparian Features: N/A

Disturbances

Anthropogenic: Logged selectively over the past 60 years or so. Road and agricultural field to the North.

Natural: Deer-browsed salal.

Vegetation

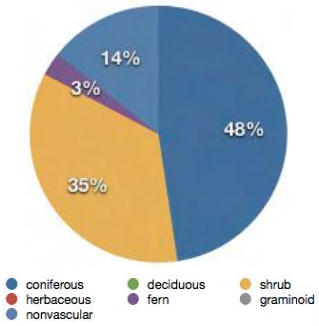
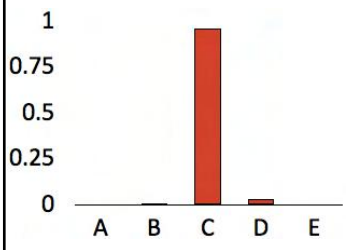
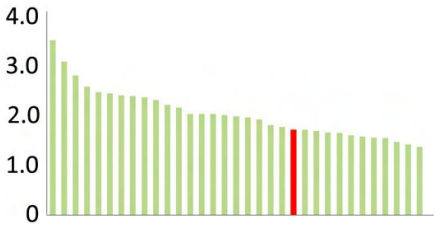
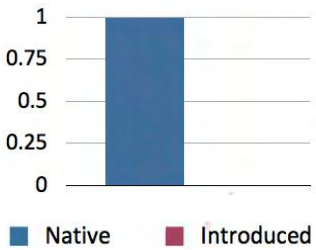
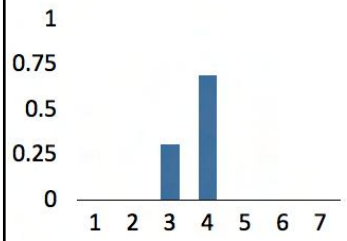
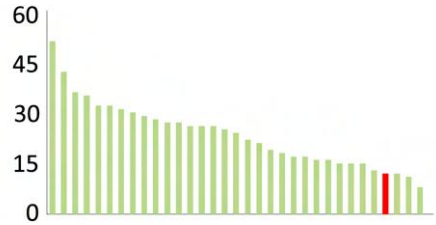
Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Berberis nervosa (dull Oregon grape)					5			5	4
Gaultheria shallon (salal)					55			8	5
Hylocomium splendens (stair-step moss)							7	3	3
Isothecium sp.							5	5	3
Kindbergia oregana (Oregon beaked moss)							13	8	3
Lonicera hispidula (hairy honeysuckle)					T			2	
Polystichum munitum (western sword fern)						5		5	3
Pseudotsuga menziesii (Douglas-fir)		35	5	1				7	3
Rosa gymnocarpa (baldhip rose)					T			2	

Thuja plicata (western redcedar)		10	30	2				7	2
Trientalis latifolia (western starflower)						T		2	4
Vaccinium ovatum (evergreen huckleberry)					1			2	3

Wildlife

Species	Life Stage	Evidence
Blacktailed deer (*Odocoileus hemionus columbianus*)	N/A	S, F
Woodpecker	N/A	F

Metrics

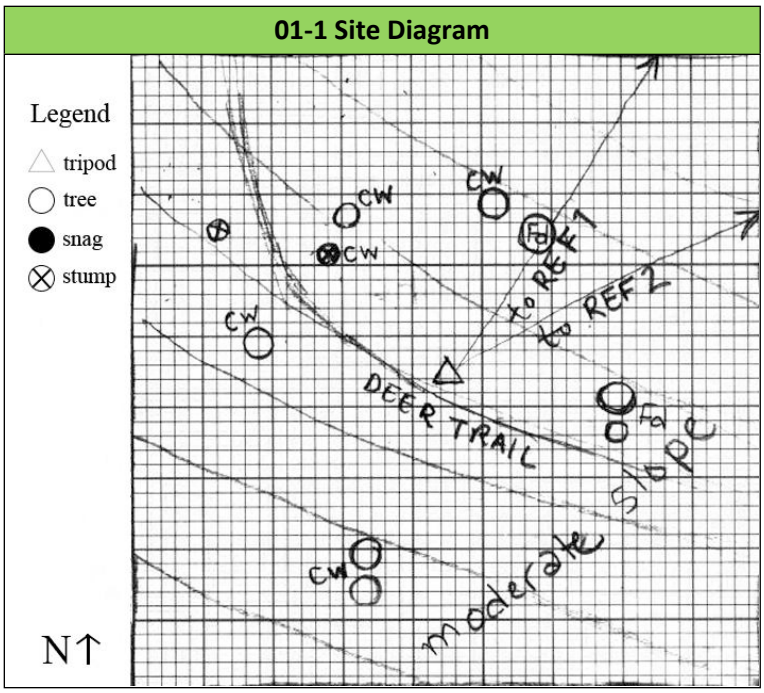
Plant Composition	Nutrient/moisture regime	Biodiversity
	 Nutrient regime (poor→rich)	 ***H'*** = 1.72 ***J'*** = 0.69
	 Moisture regime (xeric→hydric)	 Richness (# of species) = 12

Metrics for Site 01-1 describe the site's open forested character, with a canopy dominated by coniferous trees (*Thuja, Pseudotsuga*) and an understory composed of shrubs, bryophytes and ferns (in rank order of abundance). Plant composition is reflective of a moderately rich, mesic-submesic community, with the majority of plant cover (69%) indicating a mesic moisture regime, and 96% of plant cover associated with a moderate soil nutrient regime. Of the 33 sites surveyed the site places in the lower quartile, ranking 30th for richness with only 12 species observed. When evenness in the proportional abundances of species is considered, however, site diversity is augmented to the rank of 22nd. The site is one of nine sites surveyed where only native flora were recorded, of which it ranks 3rd most diverse on the Shannon index and 7th in richness.

Photographs

01-1 Photographs

01-1 Site Diagram



Ecological Community 2

Description

Ecological Community 2 consists in an old-growth Douglas-fir/arbutus stand, including a southwest-facing upper slope and ridgeline with very dry/poor soils. The ecological community has a woodland character with a moss-dominated understory (*Dicranum scoparium, Racomitrium sp., Isothecium sp. etc.*) and a variety of exotic and native grasses. There are a few scattered patches of pale, dense Douglas-fir saplings throughout the ecological community. Salal and dull Oregon grape (*Berberis nervosa*) are also sparsely scattered throughout with the odd dense patch. Observations of the occasional individual or small patch of stumps indicate that sections of the ecological community were selectively logged in the past. Most stumps are along the inland boundary of the ecological community adjacent to Ecological Communities 1 and 4. A skid road was punched in to the ecological community at the western end and is surrounded by dense regenerating Douglas-fir poles.

Ecological Community 2, Site 1 **Date Surveyed:** 8 August, 2012

Location

Location	References	Bearing	Description
N 5419900 E 464809	Ref. 1	15m @ 24°	0.8m diametre Douglas-fir snag near cliff edge
	Ref. 2	14m @ 327°	0.6m diametre Douglas-fir stump, nursing 2 Douglas-fir saplings along with salal

Site Description

Located near the border of Ecological Community 4, on the upper bench of a series of bedrock benches above the cliff (Ecological Community 3b), the site is characteristic of Ecological Community 2 and includes relatively flat "bench" areas as well as small, exposed bedrock, 'bluff' areas. The site also includes a patch of dense Douglas-fir regeneration.

Site ID:	02-1	**Aspect:**	200°	**Exposure:**	N/A
		Mesoslope Position:	UP/CR	**Slope:**	10-50%
Surface Substrate:					
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***
10%	5%	1%	5%	79%	0

Structural Stage:	6/Mm	**SMR:**	0-1	**SNR:**	A-B	**Crown Closure:**	40%
Percent Cover				**Site Series:**		CDF/02	
A	B	C	D				
Succession:	Dense patch of Douglas-fir growing in close proximity to stumps, indicating natural regeneration after selective logging. Arbutus appear to be suffering from a pathogen (black branches) and exhibits significant die-back.						

Restoration Recommendations: Control Scotch broom

Riparian Features: N/A

Disturbances

Anthropogenic: Logging road just outside and upslope of the site. A few older stumps around the site indicate selective logging in the past.

Natural: Natural windfall

Vegetation

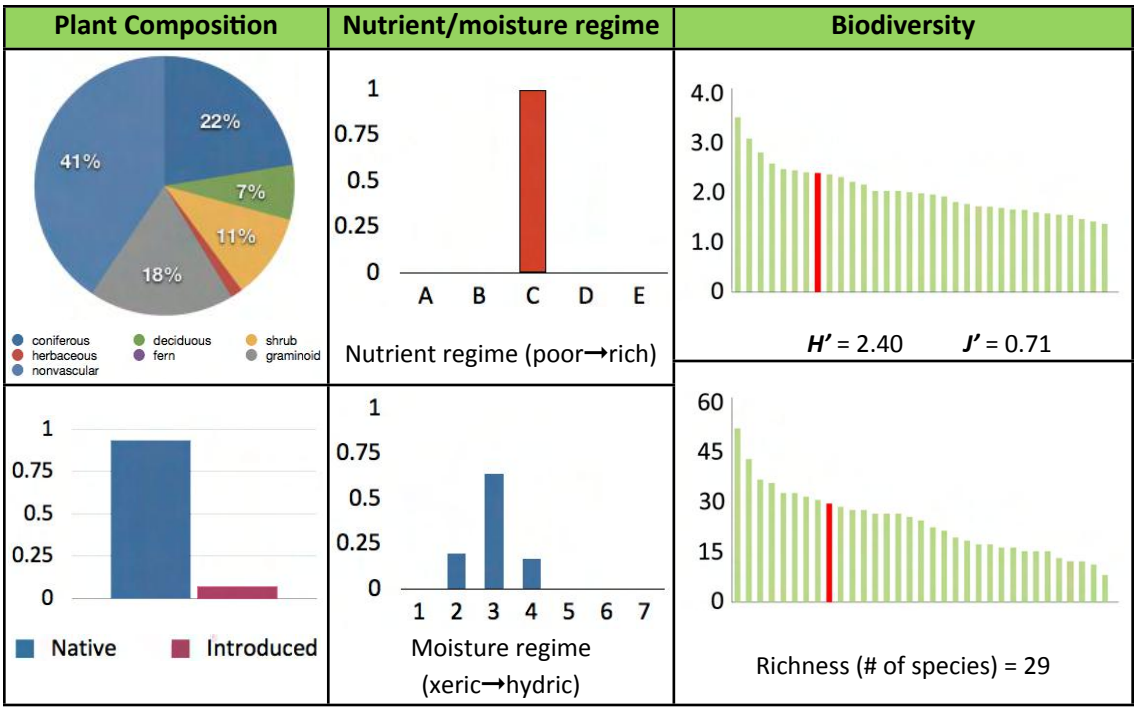
Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Aira caryophyllea (silver hairgrass)						10		5	3
Arbutus menziesii (arbutus)			10					2	1
Berberis nervosa (dull Oregon grape)					2			2	3
Bromus sp.						3		5	3
Cladina portentosa (coastal reindeer lichen)							2	2	3
Dicranum scoparium (broom moss)							45	8	3
Elymus glaucus (blue wild rye)						3		5	3
Festuca sp.						10		5	3
Gaultheria shallon (salal)					10			5	3
Goodyera pubescens (rattlesnake plantain)						1		4	4
grass sp.1						2		5	3
grass sp.2						1		5	3
Grimmia sp.							T	3	3
Grindelia stricta (Oregon gumweed)						T		2	3

Hylocomium splendens (stair-step moss)							5	3	3
Isothecium sp.							5	5	3
Kindbergia oregana (Oregon beaked moss)							5	5	3
Lonicera hispidula (hairy honeysuckle)					5			7	3
Luzula campestris (many-flowered woodrush)						T		5	3
Madia sativa						T		2	3
Piperia transversa (transverse rein orchid)						1		4	4
Polytrichum juniperinum (juniper haircap moss)							3	5	3
Pseudotsuga menziesii (Douglas-fir)		30		5	T		T	7	2
Racomitrium sp.							T	3	3
Rhytidiadelphus triquetrus (electrified cat's tail)							2	5	3
Rosa gymnocarpa (baldhip rose)					T			1	2
Salix scouleriana (Scouler's willow)				1				1	2
Sedum spathulifolium (broad-leaved stonecrop)						T		2	3
Selaginella wallacei (Wallace's selaginella)							T	3	3

Wildlife

Species	Life Stage	Evidence
Alligator lizard (*Elgaria coerulea principis*)	A	V
Blacktailed deer (*Odocoileus hemionus columbianus*)	N/A	S, T
Red squirrel (*Tamiasciurus douglasii)*	N/A	F
Turkey vulture (*Cathartes aura*)	A	V

Metrics

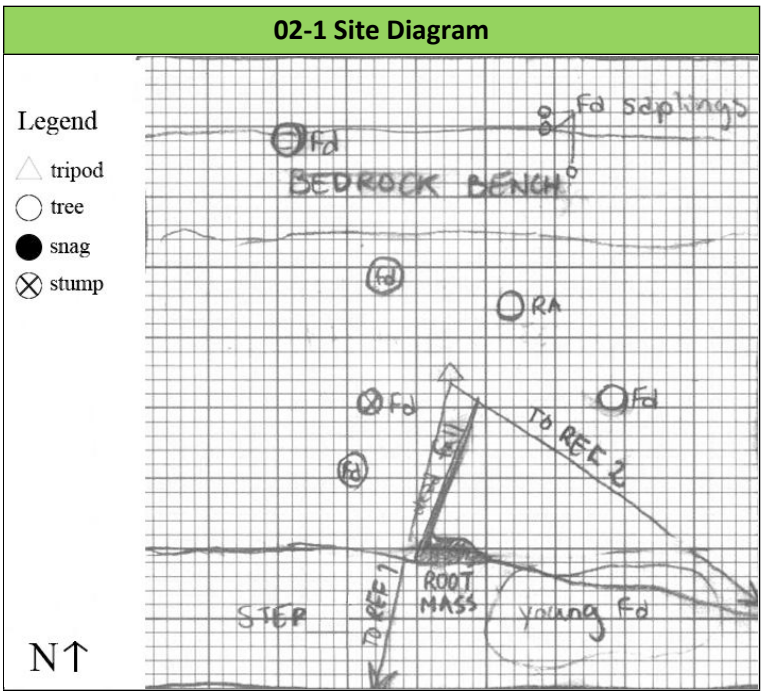


Metrics for Site 02-1 describe the site's open woodland character, with a mixed canopy of coniferous (*Pseudotsuga*) and deciduous trees (*Arbutus*), and an understory composed of bryophytes, graminoids, shrubs and forbs (in rank order of abundance). Plant composition is reflective of a moderately rich, subxeric-mesic community, with the majority of plant cover (64%) indicative of a submesic moisture regime, and 99.5% of plant cover associated with a moderate soil nutrient regime. Of the 33 sites surveyed the site ranks 9th in species richness, with 29 species observed. When evenness in the proportional abundances of species is considered, however, site diversity is augmented to the rank of 8th. The majority of flora observed are native, with 7% of the overall plant cover classified as exotic.

Photographs

02-1 Photographs

02-1 Site Diagram



Ecological Community 2 Photographs

PP01. East face of the cabin on the cliff edge, overlooking the Trincomali channel

PP02. Nearby shed, west of the cabin

Ecological Community 3

Description

The Ecological Community includes 3a, 3b and 3c, areas along the shoreline that are divided by the seasonal creeks at the cove and the waterfall.

These ecological communities encompass southwest-facing, steep sloped bluffs and cliffs, with thin, flat, deeper-soiled benches dominated by moss and lichen which are intermittent throughout. The benches provide habitat for a diverse range of shrubs, grasses and trees. Scotch broom (*Cytisus scoparius*) is the dominant shrub, along with the regular occurrence of hairy honeysuckle (*Lonicera hispidula*). Dull Oregon grape, evergreen huckleberry (*Vaccinium ovatum*) and oceanspray (*Holodiscus discolor*) are also relatively common. Grasses are mostly exotic, including sweet vernal grass, silver hairgrass (*Aira caryophyllea*), California brome (*Bromus carinatus*) and foxtail fescue (*Vulpia myuros*), but also include patches of the native blue wild rye (*Elymus glaucus*) and western fescue (*Festuca occidentalis*). Scattered trees include Douglas-fir, arbutus (*Arbutus menziesii*), and Garry oak (*Quercus garryana*). A number of small benches exhibit Garry oak associated wildflower communities including common camas (*Camassia quamash*) and meadow death camas (*Toxicoscordion venenosum*). Several small, seasonal seepages are found throughout this ecological community which support a diversity of species suited to the seasonal increase in moisture. A seasonal creek emerges as a waterfall in Ecological Community 3b and supports a variety of seepage species, such as great camas (*Camassia leichtlinii*), grassland saxifrage (*Micranthes integrifolia*), and mosses of the genus *Scleropodium*. Other seepage related species include Menzies' larkspur (*Delphinium menziesii*), goldenback fern (*Pityrogramma triangularis*), and spring-gold (*Lomatium utriculatum*).

Ecological Community 3, Site 1 **Date Surveyed:** 20 August, 2012

Location

Location	References	Bearing	Description
N 5419620 E 465296	Ref. 1	7.8m @ 100°	Douglas-fir snag (0.4m diametre) on cliff edge
	Ref. 2	8.8m @ 287°	Garry oak, stunted and snagged (0.2m diametre) near cliff edge

Site Description

Site 03-1 is located in Ecological Community 3a, just southeast from the cove, at the top of a vertical cliff where it transitions to a more bedrock/bench bluff character with scattered old-growth Douglas-fir, arbutus and Garry oak. The site does not include the seepage.

Site ID:	03-1	**Aspect:**		215°		**Exposure:**		Sun, wind, salt-spray (minor)			
		Mesoslope Position:		MD		**Slope:**		75-100%			
Surface Substrate:											
Bedrock	***Boulder***	***Exp. Minerals***		***Wood Decay***		***Organic***		***Water***			
45%	30%	1%		2%		47%		0			
Structural Stage:	3b	**SMR:**	0-1	**SNR:**	A	**Crown Closure:**		15%			
Percent Cover						**Site Series:**		CDF/02(50%)/00(50%)			
A	B	C	D								
15%	30%	40%	30%								
Succession:	N/A										

Restoration Recommendations: N/A

Riparian Features: N/A

Disturbances

Anthropogenic: Scotch broom dominance is affecting soil chemistry and site conditions. Exotic grasses are dominant. Grazing by livestock.

Natural: Grazing noted in some accessible 'bluff' areas.

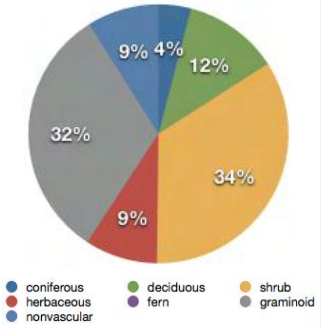
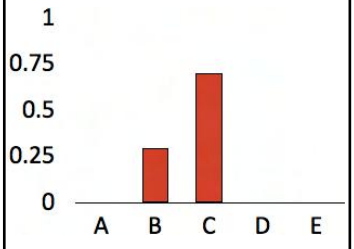
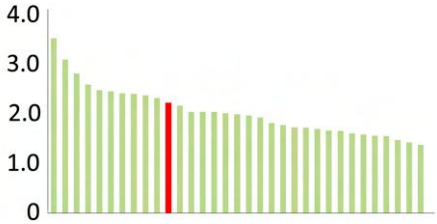
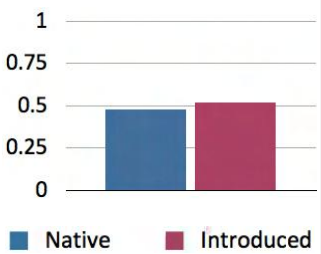
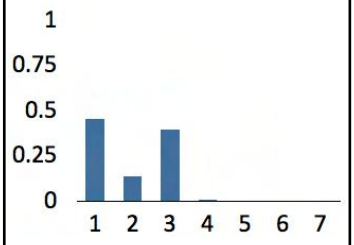
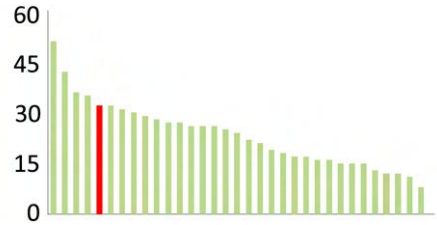
Vegetation

Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Achillea millefolium (yarrow)						1		4	3
Aira caryophyllea (silver hairgrass)						2		5	3
Anthoxanthum odoratum (sweet vernal grass)						10			3
Arbutus menziesii (arbutus)		5		5				4	1
Berberis aquifolium (tall Oregon grape)					3			4	3
Bromus sp.						2		6	3
Cladina portentosa (coastal reindeer lichen)							T	5	3
Cytisus scoparius (Scotch broom)					40			8	3
Dicranum sp.							5	5	3
Elymus glaucus (blue wild rye)						1		5	3
Eriophyllum lanatum var. leucophyllum (Oregon sunshine)						T		2	3
Evernia prunastri (oakmoss lichen)							T	5	3
Festuca sp.						25		8	3
grass sp.1						T		2	3
grass sp.2						T		2	3
Grimmia sp.							5	5	3
Grindelia stricta (Oregon gumweed)						T		1	3
Hedwigia stellata							T	5	3
Holodiscus discolor (ocean spray)					T			2	1
Lonicera hispidula (hairy honeysuckle)					T			4	3
Luzula sp.						T		2	3
Olsynium douglasii (satin-flower) (fruit?)							T	3	3
Parmelia sulcata							T	5	3
Paxistima myrsinites (falsebox)					T			2	2
Polytrichum juniperinum (juniper haircap moss)							1	5	3
Polytrichum piliferum (awned haircap moss)							T	5	3
Pseudotsuga menziesii (Douglas-fir)		5					T	4	2
Quercus garryana (Garry oak)				5				2	1
Racomitrium heterostichum							T	5	3
Rosa gymnocarpa (baldhip rose)					T			2	2
Sedum spathulifolium (broad-leaved stonecrop)						T		5	3
Selaginella wallacei (Wallace's selaginella)							10	5	3

Wildlife

Species	Life Stage	Evidence
Bald eagle (*Haliaeetus leucocephalus*)	A	V
Blacktailed deer (*Odocoileus hemionus columbianus*)	N/A	S
Pacific loon (*Gavia pacifica*)	N/A	H
Raven (*Corvus corax*)	A	V
Red squirrel (*Tamiasciurus douglasii)*	N/A	F
Turkey vulture (*Cathartes aura*)	A	V

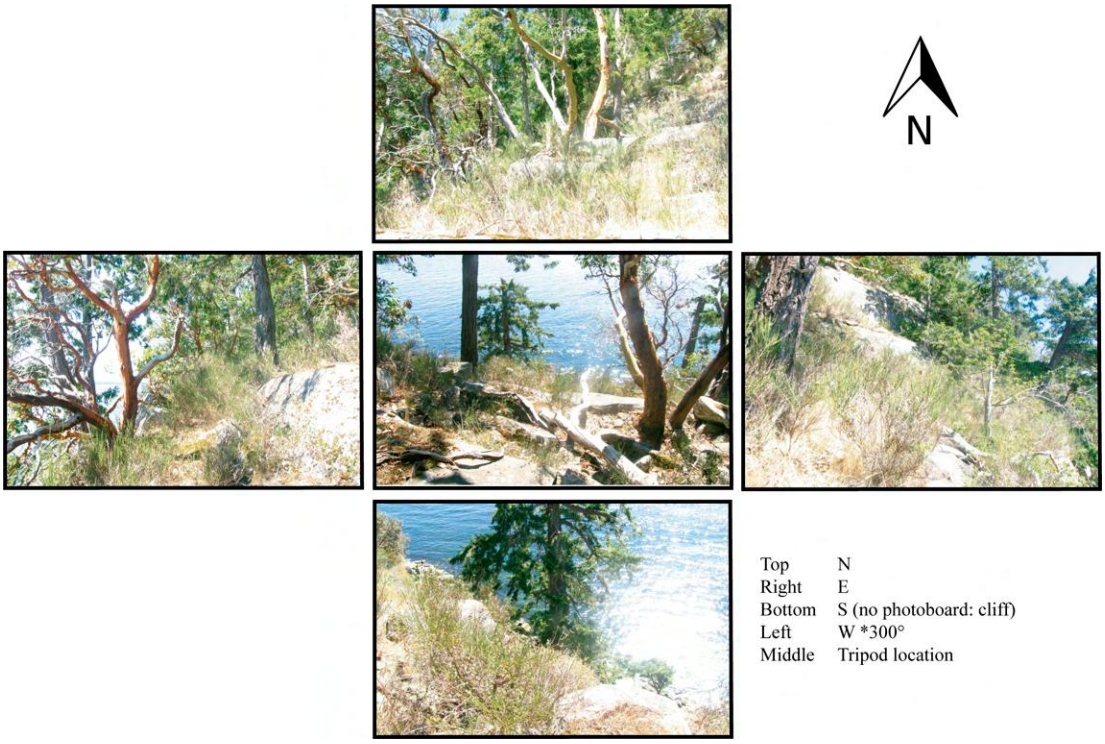
Metrics

Plant Composition	Nutrient/moisture regime	Plant Biodiversity
	 Nutrient regime (poor→rich)	 ***H'*** = 2.23 ***J'*** = 0.64
	 Moisture regime (xeric→hydric)	 Richness (# of species) = 32

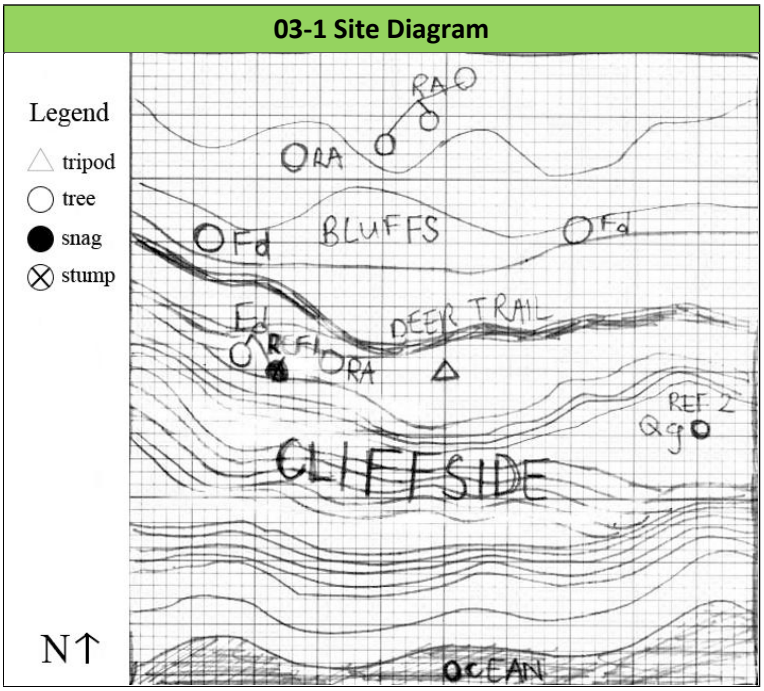
Metrics for Site 03-1 describe the site's exposed rupestral character, with a sparse canopy of deciduous (*Arbutus, Quercus*) and coniferous trees (*Pseudotsuga*), and an understory composed primarily of shrubs and graminoids, with forbs and bryophytes distributed throughout (following rank order of abundance). Plant composition is reflective of a poor to moderately rich, xeric-submesic community, with the majority of plant indicators split between xeric (46%) and submesic (40%) moisture regimes, and 70% of the plant cover associated with a moderate soil nutrient regime. According to these indices, Site 03-1 is both the driest and poorest site evaluated, with 46% of plant cover associated with a xeric soil moisture regime and 30% associated with a poor soil nutrient regime. Of the 33 sites surveyed the site places in the upper quartile, ranking 5th in species richness with 32 species observed. When evenness in the proportional abundances of species is considered, however, site diversity falls to the rank of 11th. The flora observed are split between native and introduced species, with a slight majority introduced.

Photographs

03-1 Photographs



03-1 Site Diagram



Ecological Community 3, Site 2 **Date Surveyed:** 23 August, 2012

Location

Location	References	Bearing	Description
N 5419982 E 464582	Ref. 1	5.1m @ 137°	Distinctly prominent and 'fulsome' Douglas-fir snag (0.7m diametre), near an ephemeral creek, where it drops over the cliff-side
	Ref. 2	11.3m @ 271°	Arbutus snag (0.5m diametre), broken roughly at mid-point (the dead-fall lies nearby, crossing the creek)

Site Description

Site 03-2 is located in Ecological Community 3b, at the top of the waterfall on the edge of the stream bank. The site includes the steep waterfall/seepage area down the cliff and a portion of the shallower sloped area as the ridge begins to crest. The plot is on the boundary of Ecological Community 3b and 2 and includes a portion of the drier cliff and ridge areas as well as the stream/seepage.

Site ID:	03-2		**Aspect:**		220°		**Exposure:**		Sun, wind, salt-spray		
			Mesoslope Position:		UP		**Slope:**		40-140%		
Surface Substrate:											
Bedrock	***Boulder***		***Exp. Minerals***		***Wood Decay***		***Organic***		***Water***		
25%	6%		1%		3%		65%		0		
Structural Stage:	7/Mm	**SMR:**	0-1*	**SNR:**	A*		**Crown Closure:**		40%		
Percent Cover							**Site Series:**		CDF/02*		
A	B		C		D						
4%	49%		69%		15%						
Succes-sion:	N/A										

* *The moisture and nutrient regime of the seasonal bed and banks are moister and richer. The moisture regime in the seepage is highly fluctuating with running water and saturation over winter and into early summer and very dry and exposed in late summer to early fall. Vegetation communities reflect the moisture character with the presence of several species that would not occur otherwise.*

Restoration Recommendations: N/A

Riparian Features:

***Class*:** High bench
***Centreline Bearing*:** 225˚
***Bankfull Width*:** 55 cm
***Bankfull Depth*:** 20 cm
***Wetted Width*:** 0
***Wetted Depth*:** 0
***Bank Slopes*:** 20-35%
***Stream Gradient*:** 25-125%
***Bed Characteristics*:** Bedrock
***Flow Characteristics*:** Pool/glide/waterfall (seasonal)
***Aquatic Vegetation*:** see vegetation list below
***Modifications*:** N/A
***Fish/Wildlife Use*:** fall/winter/early spring water source; potential to meet some insect and amphibian life stage requirements.

Disturbances

Anthropogenic: N/A

Natural: Wind-throw and broken tops noted, as well as deer browse.

Vegetation

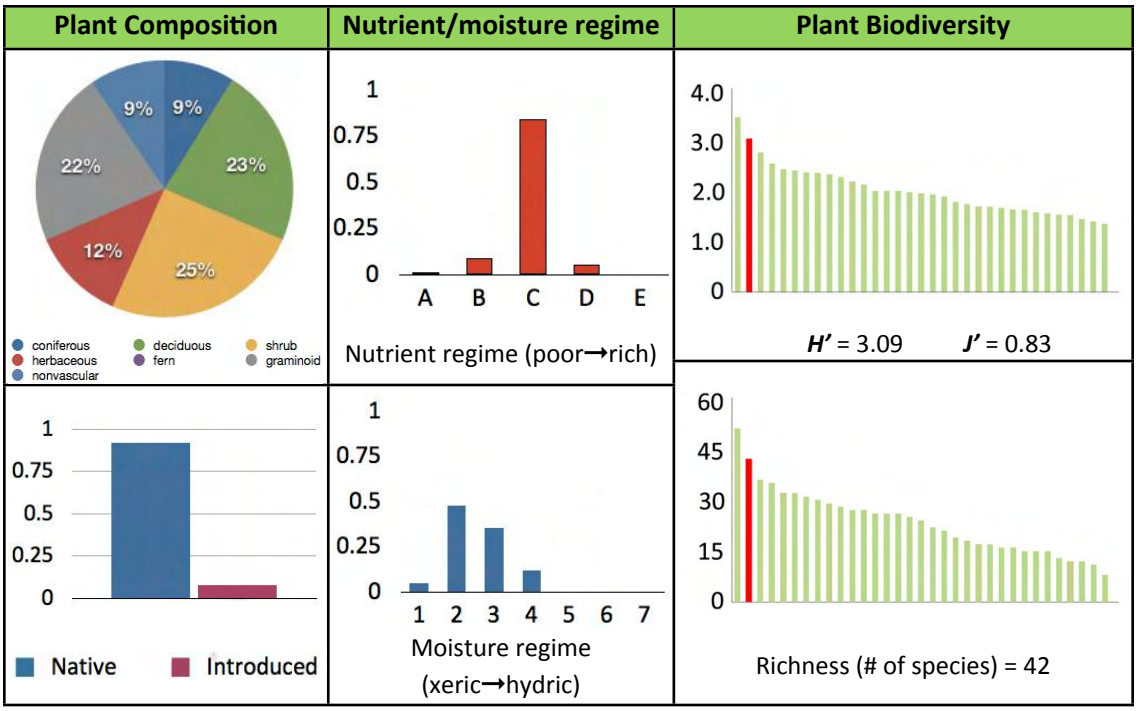
Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Achillea millefolium (yarrow)						T		4	3
Amelanchier florida (Saskatoon berry)				3	T			4	2
Arbutus menziesii (arbutus)		10	10	5				4	2
Berberis aquifolium (tall Oregon grape)					15			5	1
Berberis nervosa (dull Oregon grape)					5			5	3
Bromus hordeaceus (soft brome)						1		4	3
Camassia leichtlinii (great camas)						T		3	3
Castilleja hispida (harsh paintbrush)						T		5	3
Castilleja miniata (common red paintbrush)						T		5	3
Cerastium arvense (field chickweed)						10		5	4
Circaea alpina (enchanter's-nightshade)						T		2	3
Cladina portentosa (coastal reindeer lichen)							1	5	3
Cynosorus echinatus (hedgehog dogtail)						T		3	3

Dactylis glomerata (orchard grass)						1		5	3
Dicranum sp.							3	5	3
Elymus glaucus (blue wild rye)						15		5	3
Erythranthe guttata (yellow monkey-flower)						T		5	3
Festuca sp.						T		3	3
Galium aparine (cleavers)						T		4	3
grass sp.1						3		5	3
grass sp.2						2		5	3
Hieracium sp.						T		4	3
Holcus lanatus (common velvet-grass)						5		5	3
Holodiscus discolor (ocean spray)				10				4	3
Isothecium sp.							8	5	3
Kindbergia oregana (Oregon beaked moss)							1	5	3
Lonicera hispidula (hairy honeysuckle)					5			8	2
Lychnis coronaria (rose campion)						2		5	4
Madia sativa (Chilean tarweed)					2			4	3
Micranthes integrifolia (grassland saxifrage)						1		5	4
moss sp.1							T	5	3
Paxistima myrsinites (falsebox)					T			2	2
Pseudotsuga menziesii (Douglas-fir)		10	2	2	T			4	3
Quercus garryana (Garry oak)			8					4	3
Rosa gymnocarpa (baldhip rose)					1			4	2
Rubus ursinus (trailing blackberry)					2			4	3
Sanicula crassicaulus (Pacific sanicle)						T		4	3
Scleropodium sp.							3	5	3
Sedum spathulifolium (broad-leaved stonecrop)						2		5	3
Selaginella wallacei (Wallace's selaginella)							1	5	3
Symphoricarpos albus (common snowberry)					2			4	2
Vulpia sp. (fescue)						8		5	3

Wildlife

Species	Life Stage	Evidence
Blacktailed deer (*Odocoileus hemionus columbianus*)	N/A	F
Woodpecker	N/A	F
Turkey vulture (*Cathartes aura*)	A	V

Metrics



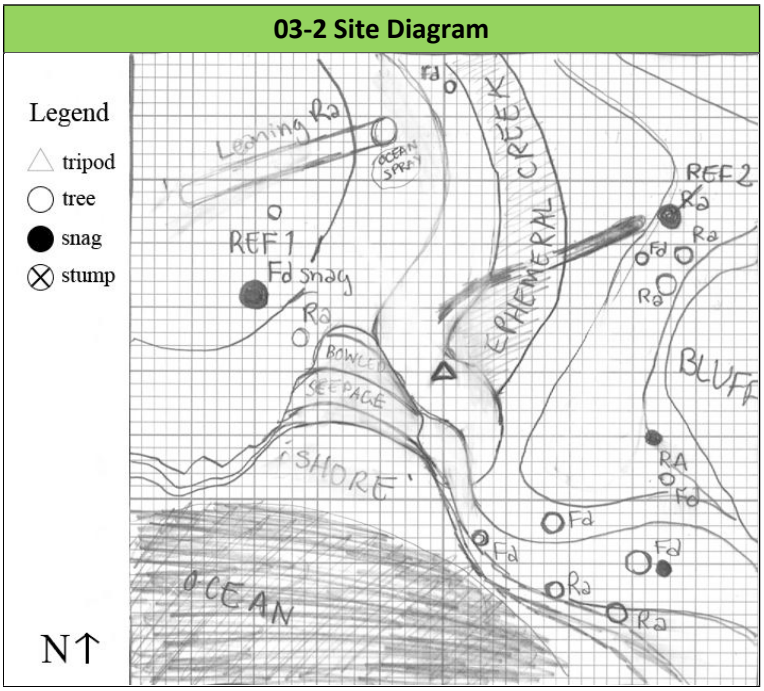
Metrics for Site 03-2 describe the site's exposed, riparian, cliff-side character, with a relatively sparse canopy of deciduous (*Arbutus, Quercus*) and coniferous trees (*Pseudotsuga*), and an understory composed of shrubs, graminoids, forbs and bryophytes (in rank order of abundance). Plant composition is reflective of poor to rich, xeric-mesic communities, with the majority of plant indicators distributed among subxeric (48%) and submesic (35%) moisture regimes, and 84% of the plant cover associated with a moderate soil nutrient regime. Of the 33 sites surveyed the site places in the upper quartile, ranking 2nd in species richness with 42 species observed. When evenness in the proportional abundances of species is considered, site diversity retains the rank of 2nd among the plots surveyed. The majority of flora observed comprise in native species, with 8% of plant cover classified as exotic.

Photographs

03-2 Photographs

Top N
Right E
Bottom S *258° (no photoboard: cliff)
Left W
Middle Tripod location

03-2 Site Diagram



Ecological Community 3a photographs

PP03. Turkey vultures perched in a snag on south-facing oceanfront cliffside.

Ecological Community 4

Description

Ecological Community 4 includes a forest canopy dominated by mature Douglas-fir, with scattered arbutus on shallow-soiled, bedrock ridgelines, and patches of western redcedar in micro-depressions of deeper soil between ridgelines. There are several dry, east-west running bedrock ridgelines with slightly moister micro-depression areas between them. The bedrock ridgelines are moss-dominated (esp. *Hylocomium splendens*), while the depressions are covered in dense salal and scattered dull Oregon grape (*Berberis nervosa*). The average diameter Douglas-fir in the main canopy is 115-years-old (cored).

Ecological Community 4, Site 1 **Date Surveyed:** 7 August, 2012

Location

Location	References	Bearing	Description
N 5419908 E 464874	Ref. 1	3.7m @ 106°	1.2m diametre Douglas-fir stump on ridge, nursing salal
	Ref. 2	15m @ 238°	0.6m diametre Douglas-fir snag, with some cavities

Site Description

Located on the ridgeline closest to the ocean, the site is representative of Ecological Community 4, including both the ridgeline and micro-depression areas.

Site ID:	04-1	**Aspect:**	185°	**Exposure:**	N/A		
		Mesoslope Position:	CR	**Slope:**	10-15%		
Surface Substrate:							
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***		
5	5	2	3	85	0		
Structural Stage:	6/Cm	**SMR:**	0-2	**SNR:**	A-C	**Crown Closure:**	55%
Percent Cover				**Site Series:**	CDF/02(25%) 01(75%)		
A	B	C	D				
60%	70%	5%	50%				
Succession:	N/A						

Restoration Recommendations: N/A

Riparian Features: N/A

Disturbances

Anthropogenic: Selective logging occurred approximately 65 years ago.

Natural: Deer-browsed salal.

Vegetation

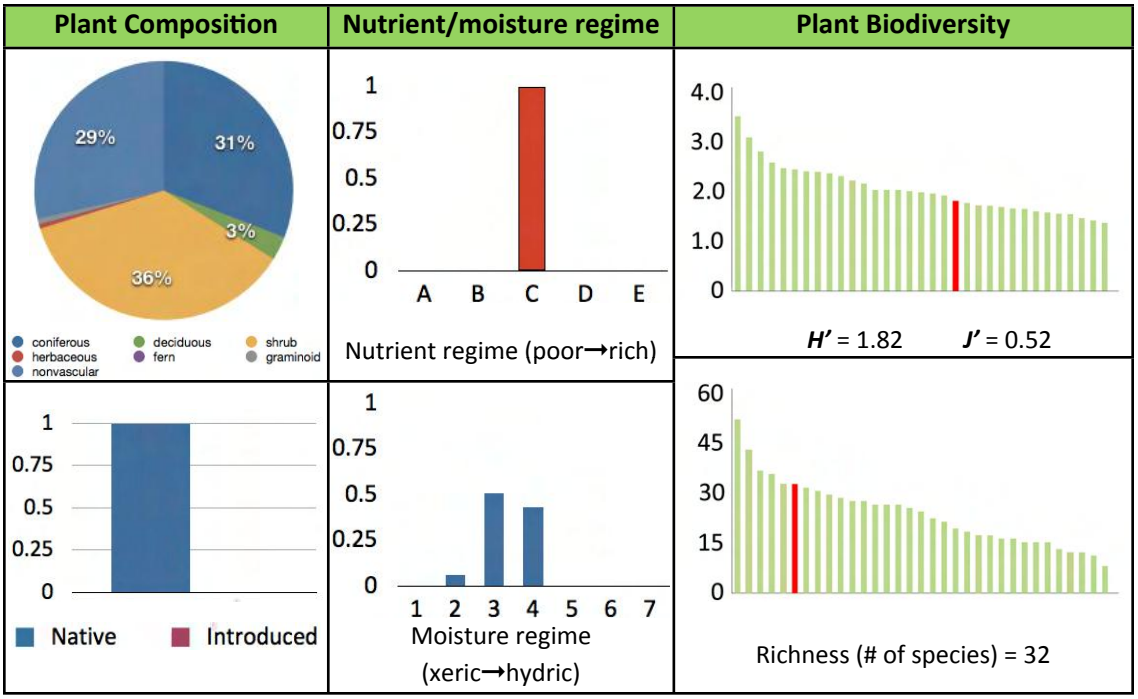
Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Arbutus menziesii (arbutus)			5						
Berberis nervosa (dull Oregon grape)					8			5	4
Bromus sp.						1		5	3
Corallorhiza maculata (western coralroot orchid)						T		2	2
Dicranum scoparium (broom moss)							1	5	4
Elymus glaucus (blue wild rye)						T		2	3
Evernia prunastri (oakmoss lichen)							T	2	4
Gaultheria shallon (salal)					50			8	4
Goodyera pubescens (rattlesnake plantain)						T		2	4
Holodiscus discolor (ocean spray)				1				2	4
Hylocomium splendens (stair-step moss)							15		4
Hypogymnia sp.							T	2	4
Isothecium sp.							1	5	4
Kindbergia oregana (Oregon beaked moss)							30		4
Lonicera ciliosa (orange honeysuckle)				T				2	2
Lonicera hispidula (hairy honeysuckle)					1			4	4
Parmelia sulcata							T	2	4
Peltigera sp.							T	2	4
Piperia sp. (rein orchid)						T		1	4
Polypodium glycyrrhiza (licorice fern)						T		1	2
Polystichum munitum (western sword fern)						T		2	3
Prunus emarginata (bitter cherry)				T				1	4
Pseudotsuga menziesii (Douglas-fir)		40	1	10					
Rhytidiadelphus triquetrus (electrified cat's tail)							1	5	4
Rosa gymnocarpa (baldhip rose)					1			5	3
Sedum spathulifolium (broad-leaved stonecrop)						T		5	3
Selaginella wallacei (Wallace's selaginella)							T	2	4
Thuja plicata (western redcedar)				1					

Trientalis latifolia (western starflower)						T		2	3
Usnea sp.							T	2	4
Vicia sp. (vetch)						T		2	3
Vulpia sp. (fescue)						T		2	3

Wildlife

Species	Life Stage	Evidence
Blacktailed deer (*Odocoileus hemionus columbianus*)	N/A	S, F
Woodpecker	N/A	F

Metrics

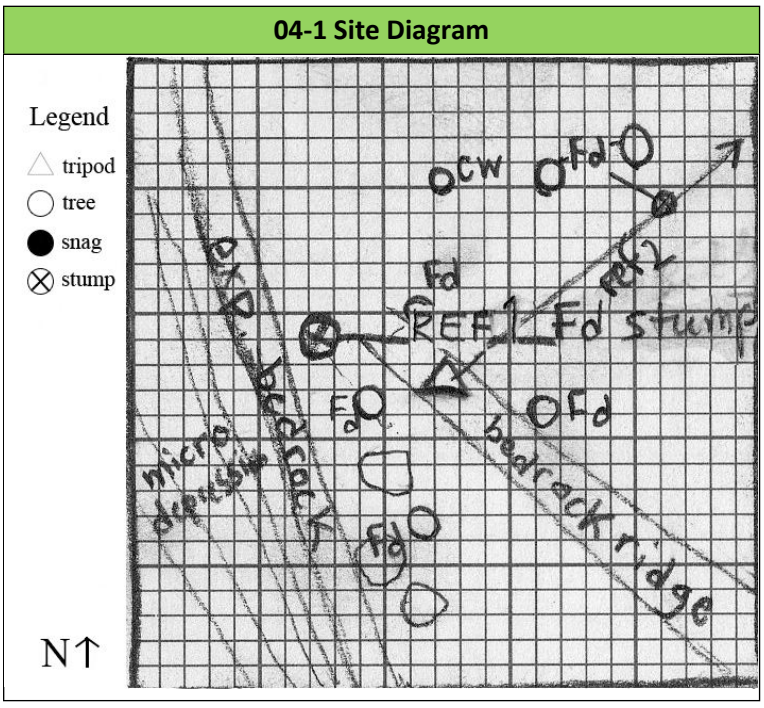


Metrics for Site 04-1 describe the site's exposed woodland character, with a canopy dominated by coniferous trees (*Pseudotsuga*) alongside scattered deciduous trees (*Arbutus*) and an understory composed mainly of shrubs and bryophytes, with trace coverage of forbs, graminoids and ferns (following rank order of abundance). Plant composition is indicative of a moderately rich, subxeric-mesic community, with the majority of plants split between submesic (51%) and mesic (43%) moisture regimes. Within the subset of plants considered in this analysis, 99.7% of the flora is associated with a moderate soil nutrient regime. Of the 33 sites surveyed the site places in the upper quartile, ranking 6th in species richness with 32 species observed. When evenness in the proportional abundances of species is considered, however, site diversity diminishes to the rank of 20th. The site is one of nine sites surveyed where only native flora were recorded, of which it ranks 2nd most diverse on the Shannon index and 1st in richness.

Photographs

04-1 Photographs

04-1 Site Diagram



Ecological Community 5

Description

Ecological Community 5 delineates a small depression/draw along the ridge, with a western redcedar/quaking aspen (*Populus tremuloides* var. *vancouveriana*) dominated canopy and an understory characterized by a mosaic of dense patches of salal and slough sedge (*Carex obnupta*), as well as relatively barren areas with heavily browsed cedar and cottonwood regeneration. Areas characterized by slough sedge appear to have a fluctuating water table and may get inundated over the winter. This is a maturing stand with some stumps, indicating selective logging in the past.

Ecological Community 5, Site 1 **Date Surveyed:** 7 August, 2012

Location

Location	References	Bearing	Description
N 5419842 E 464987	Ref. 1	8.5m @ 346°	0.7m diametre cedar with snagged top; nearby fallen cottonwood
	Ref. 2	8.8m @ 182°	0.4m diametre cottonwood snag on the edge of flooded area; salal and slough sedge nearby

Site Description

Located near the "cliff-house site," the site is a wet, micro-depression site which is seasonally inundated with water. This micro-depression is thin and east-west running. It is dominated by cottonwood and sedge, with Douglas-fir and salal on either side.

Site ID:	05-1			**Aspect:**	level	**Exposure:**	N/A				
				Mesoslope Position:	DP	**Slope:**	1%				
Surface Substrate:											
Bedrock	***Boulder***		***Exp. Minerals***		***Wood Decay***	***Organic***	***Water***				
0	0		2%		10%	88%	0				
Structural Stage:	6/Mm	**SMR:**	7	**SNR:**	E	**Crown Closure:**	25%				
Percent Cover						**Site Series:**	CDF/14				
A	B	C	D								

25%	40%	30%	20%		
Succession:	Extensive active regeneration will ensure that species remain within stand, though cedar cover may increase in near future as trees mature. Site is completely dry in August but will become saturated and possibly submerged in winter.				

Restoration Recommendations: N/A

Riparian Features: N/A

Disturbances

Anthropogenic: Evidence of older selective logging around site, though no stumps are on site or immediately adjacent. There are roads near site to the south and west.

Natural: Extensive natural wind-throw: mostly aspen. Extensive deer browse on aspen saplings.

Vegetation

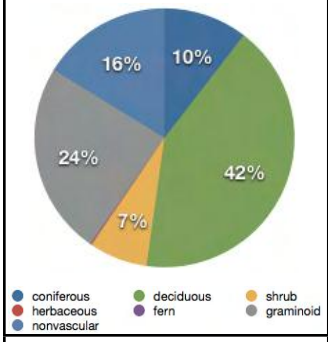
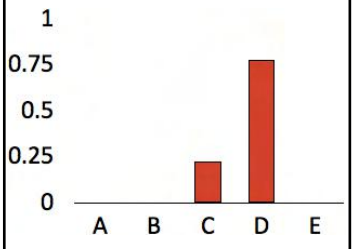
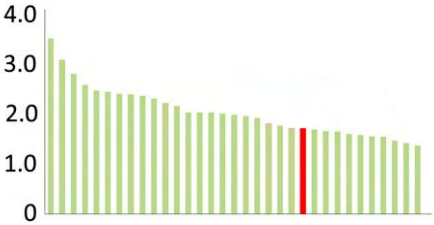
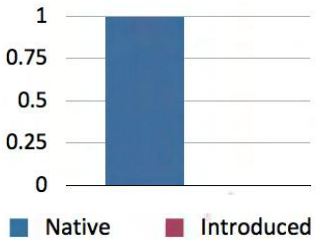
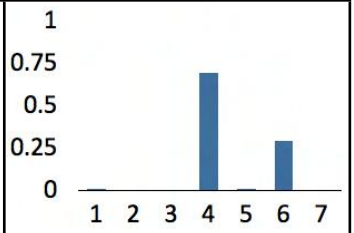
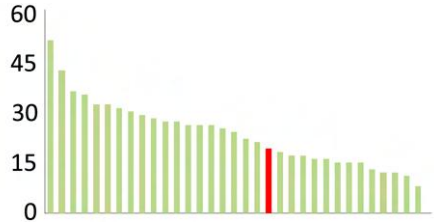
Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Alnus rubra (red alder)			1					2	2
Amelanchier florida (Saskatoon berry)				1				1	3
Carex obnupta (slough sedge)						30		9	4
Evernia prunastri (oakmoss lichen)							T	2	4
Galium sp.						T		2	4
Gaultheria shallon (salal)					8			5	4
grass sp.						T		2	4
Isothecium sp.							2	5	4
Kindbergia oregana (Oregon beaked moss)							15	5	4
Kindbergia praelonga (common feather moss)							1	5	4
moss sp.							T	2	3
Neckera douglasii (Douglas' neckera moss)							1	5	4
Polystichum munitum (western sword fern)						T		2	4
Populus tremuloides var. *vancouveriana* (hybrid cottonwood)		20		20	10		T	9	3
Platismatia glauca							T	5	4
Rhytidiadelphus loreus (lanky moss)							1	5	4
Rhytidiadelphus triquetrus (electrified cat's tail)							T	5	3

Spiraea douglasii (hardhack)				1	T			2	4
Thuja plicata (western redcedar)			10	1	2			5	3

Wildlife

Species	Life Stage	Evidence
Blacktailed deer (*Odocoileus hemionus columbianus*)	N/A	S, F
Woodpecker	N/A	F
Raven (*Corvus corax*)	N/A	H
Sparrow	N/A	H

Metrics

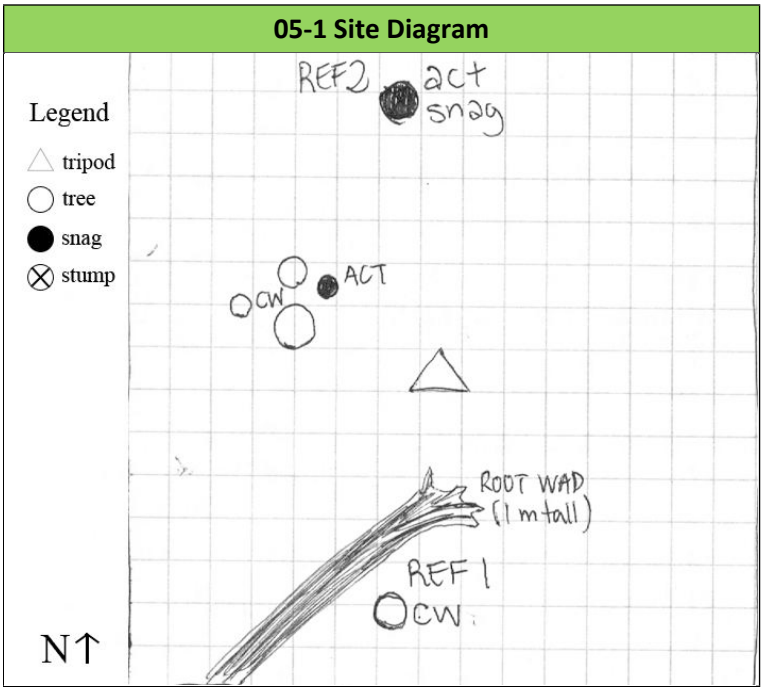
Plant Composition	Nutrient/moisture regime	Plant Biodiversity
	 Nutrient regime (poor→rich)	 ***H'*** = 1.72 ***J'*** = 0.58
	 Moisture regime (xeric→hydric)	 Richness (# of species) = 19

Metrics for Site 05-1 describe the site character of an ephemeral sylvan pool, with a canopy largely comprised of deciduous quaking aspen (*P. tremuloides* var. *vancouveriana*), alongside coniferous trees (*Pseudotsuga*) and an understory composed of graminoids, bryophytes, shrubs and ferns (following rank order of abundance). Plant composition is indicative of overall rich, mesic and hygric communities, with the majority of plant indicators punctuating mesic (69%) and hygric (29%) moisture regimes, and 78% of plant cover associated with a rich soil nutrient regime. Of the 33 sites surveyed the site ranks 20th in species richness, with 19 species observed. When evenness in the proportional abundances of species is considered, site diversity diminishes to the rank of 23rd. The site is one of nine sites surveyed where only native flora were recorded, of which it ranks 4th most diverse on the Shannon index and 2nd in richness.

Photographs

05-1 Photographs

05-1 Site Diagram



Ecological Community 6

Description

Ecological Community 6 encompasses the lower slope and toe of shoreline cliff along the high-tide line. The ecological community is broken due to sections where cliff descends directly into water. It is characterized by dense and robust shrub communities dominated by oceanspray and occasional patches of Scotch broom. Scattered old-growth Douglas-fir, Garry oak and arbutus occur throughout with the odd bigleaf maple (*Acer macrophyllum*) in moister seepage areas. Surface material is dominated by boulders and some exposed bedrock. Vigour of shrubs indicates that these sites are generally moisture-receiving (seepage at base of cliff) and are not subject to regular browse by deer or sheep by virtue of their cloistered setting. This ecological community also includes several isolated herb/moss-dominated micro-sites occurring on the northeast-facing shallow slopes of large boulders along the shoreline. Dominant vegetation in the moist seepages of the cove include Pacific ninebark (*Physocarpus capilatus*), willow (*Salix* sp.) with the odd bigleaf maple and oceanspray.

Ecological Community 6, Site 1 **Date Surveyed:** 20 August, 2012

Location

Location	References	Bearing	Description
N 5419576 E 465328	Ref. 1	1m @ 19°	1.2m diametre Douglas-fir, double-stemmed, growing on shoreline
	Ref. 2	none	none

Site Description

Located half way along the shoreline between the cove and the eastern boundary of the property, the site is representative of a larger, dense patch of Douglas-fir, arbutus, Garry oak and oceanspray at the toe of the shoreline cliff.

Site ID:	06-1	**Aspect:**	200°	**Exposure:**	Sun, wind, salt-spray, high-tide
		Mesoslope Position:	TO/LW	**Slope:**	75%

Surface Substrate:					
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***
10%	20%	10%	5%	55%	0

Structural Stage:	7/Mm	**SMR:**	1	**SNR:**	C	**Crown Closure:**	60%

Percent Cover					
A	B	C	D	**Site Series:**	CDF/02
70%	80%	35%	5%		
Succession:	N/A				

Restoration Recommendations: N/A

Riparian Features: N/A

Disturbances

Anthropogenic: N/A

Natural: Occasional rock-fall and broken tops from cliff and ridge above. All Douglas-firs are wind damaged. There is also erosion from winter high-tides along shoreline edge in exposed areas.

Vegetation

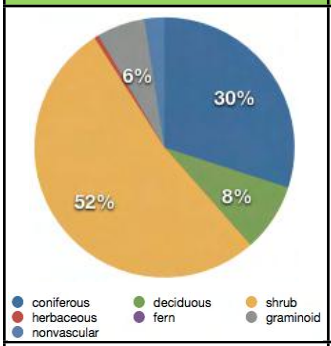
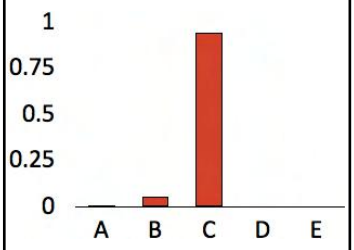
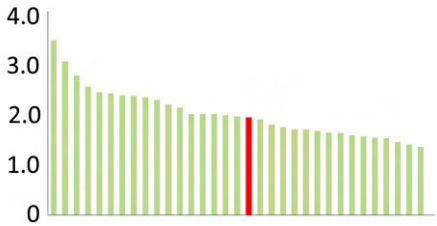
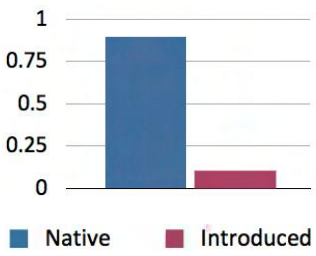
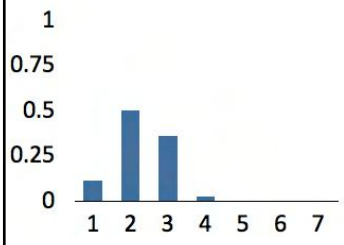
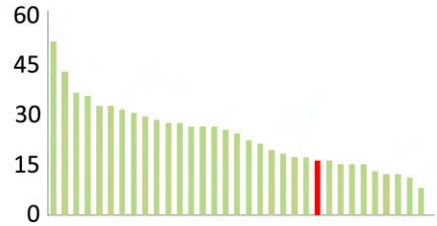
Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Arbutus menziesii (arbutus)			5	2				4	2
Berberis aquifolium (tall Oregon grape)					5			5	4
Bromus sp. 2						2		5	4
Cytisus scoparius (Scotch broom)				10	10			5	3
Elymus glaucus (blue wild rye)						5		5	4
Festuca occidentalis (western fescue)						5		5	4
Holodiscus discolor (ocean spray)				60				8	4
Isothecium sp.							3	5	3
Lonicera hispidula (hairy honeysuckle)				2	15			8	4
moss sp.							2	5	3
Pseudotsuga menziesii (Douglas-fir)		60						4	3
Quercus garryana (Garry oak)		2	8					4	3

Rosa gymnocarpa (baldhip rose)					2			2	3
Sedum spathulifolium (broad-leaved stonecrop)						1		5	4
Symphoricarpos albus (common snowberry)					1			5	4
Trientalis latifolia (western starflower)						T		2	4

Wildlife

Species	Life Stage	Evidence
Sea otter (*Enhydra lutris*)	N/A	S

Metrics

Plant Composition	Nutrient/moisture regime	Plant Biodiversity
	 Nutrient regime (poor→rich)	 ***H'*** = 1.96 ***J'*** = 0.71
	 Moisture regime (xeric→hydric)	 Richness (# of species) = 16

Metrics for Site 06-1 describe the site's exposed foreshore character, with scattered coniferous (*Pseudotsuga*) and deciduous (*Arbutus, Quercus*) trees, and an understory dominated by shrubs, with graminoids, bryophytes and forbs scattered throughout (listed in rank order of abundance). Plant composition is reflective of a moderately rich, xeric-mesic community, with the majority of plant indicators distributed among subxeric (50%) and submesic (36%) soil moisture regimes, and 94% of the plant cover associated with a moderate soil nutrient regime. Of the 33 sites surveyed the site places in the lower quartile, ranking 25th in species richness with 16 species observed. When evenness in the proportional abundances of species is considered, however, site diversity is augmented to the rank of 18th. The majority of flora observed are native, with 7% of the overall plant cover classified as exotic.

Photographs

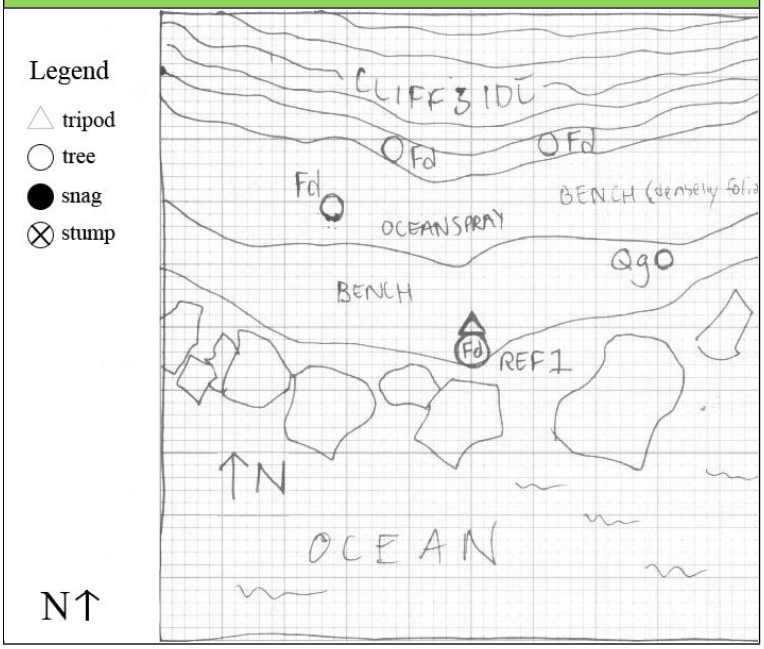
06-1 Photographs

N

Top	N
Right	E *98°
Bottom	S
Left	W *298°
Middle	Tripod location

Note: no photoboards were used at this site; camera was also at a height of 1.3 m due to difficult situation.

06-1 Site Diagram



Ecological Community 6 Photographs

PP04a. The northeast slope of a large bedrock outcrop along the shoreline in Ecological Community 6

PP04b. Dominant vegetation includes broadleaf stonecrop (*Sedum spathulifolium*), moss, and gumweed (*Grindelia integrifolia*)

Ecological Community 7

Description

Ecological Community 7 is described by a steep, exposed, south-facing bluff that has recently been selectively logged. The ecological community includes steep mid and upper slopes as well as the crest. The open, woodland-like canopy is characterized by scattered arbutus and Douglas-fir of varying ages, from sapling to old-growth. Stumps (mainly Douglas-fir and the odd arbutus) are littered throughout the area, indicating a much denser canopy prior to logging. The surface is characterized by large bedrock and boulder outcrops, mixed with exotic grass-dominated, flatter benches. Benches were used to access the site for logging by machinery. A couple of machine-created boulder piles/walls were also observed. There is less exposed bedrock on the north slope. (The ecological community also includes a small, steep, shallow-soiled, north-facing slope between the crest and the 'house' structure.) The understory is dominated by sweet vernal grass with scattered small patches of salal and dull Oregon grape. Bedrock is relatively bare with patches of Wallace's selaginella (*Selaginella wallacei*) and a species of *Isothecium*. The north aspect has larger patches of salal and a dominant moss layer comprised of electrified cat's tail and Oregon beaked moss.

Ecological Community 7, Site 1 **Date Surveyed:** 22 August, 2012

Location

Location	References	Bearing	Description
N E	Ref. 1	4.3m @ 343°	Large-diametre (1.2m) old-growth Douglas-fir stump--2.3 m tall
	Ref. 2	5.6m @ 55°	Mature Scouler's willow (2.5m tall), growing nearby an arbutus

Site Description

The site is located on the upper slope just below the crest. It is characteristic of the south slope of the ecological community and includes both bench and bedrock outcrop areas.

Site ID:	07-1	**Aspect:**	180°	**Exposure:**	Sun, wind
		Mesoslope Position:	UP/CR	**Slope:**	45%
Surface Substrate:					
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***
40%	15%	2%	3%	40%	0

Structural Stage:	6(15%)/2b(85%)	SMR:	0-1	SNR:	A	Crown Closure:	15%
Percent Cover				Site Series:		CDF/02	
A	B	C	D				
15%	7%	35%	10%				
Succession:	Naturally regenerating Douglas-fir and arbutus seedlings and saplings were plentiful in this ecological community. Due to dry and poor soil conditions, as well as exposure, the regeneration will take a long time (50-100 years) before it constitutes a sub-canopy. Grasses will remain dominant in the understory.						

Restoration Recommendations: N/A

Riparian Features: N/A

Disturbances

Anthropogenic: Selectively logged on at least two entries, one of which was within the last ten years. Evidence of intense browse by sheep.

Natural: Natural wind-throw also observed. Evidence of intense browse by deer.

Vegetation

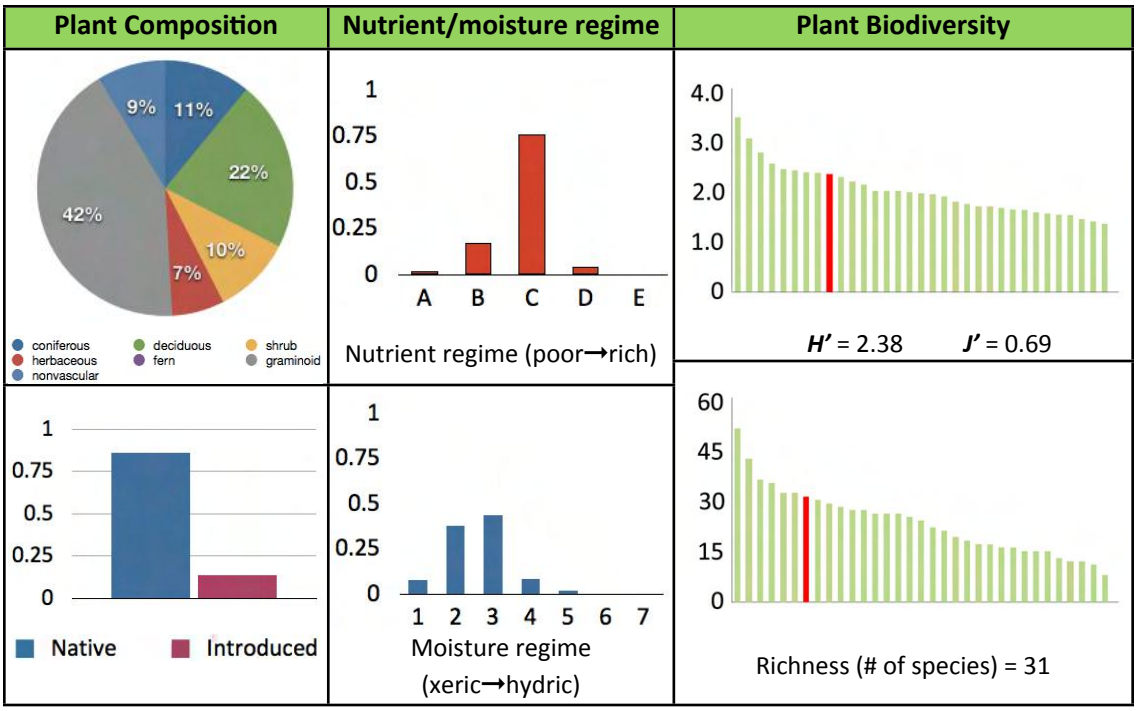
Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Anthoxanthum odoratum (sweet vernal grass)						5		5	3
Arbutus menziesii (arbutus)			10	5	T		T	4	1
Berberis aquifolium (tall Oregon grape)					1			5	2
Berberis nervosa (dull Oregon grape)					1			5	3
Bromus sp.						T		4	3
Clinopodium douglasii (yerba buena)						T		4	3
Cytisus scoparius (Scotch broom)					T			4	2
Dactylis glomerata (orchard grass)						T		4	3
Dicranum sp.							2	5	3
Digitalis purpurea (common foxglove)						1		5	3
Elymus glaucus (blue wild rye)						1		5	3
Festuca sp.						3		5	3
Gaultheria shallon (salal)					3			5	3
Hieracium sp.						T		4	3
Holcus lanatus (common velvet-grass)						1		5	3

Hypochaeris radicata (hairy cat's-ear)						T		4	3
Isothecium sp.							2	5	2
Kindbergia oregana (Oregon beaked moss)							T	5	2
Lactuca muralis (wall lettuce)						T		2	2
Lonicera hispidula (hairy honeysuckle)					3			5	3
Madia sativa (Chilean tarweed)						T		4	3
moss sp.1							T	3	3
Polytrichum juniperinum (juniper haircap moss)							3	5	3
Pseudotsuga menziesii (Douglas-fir)		5	1	2	T		T	4	3
Rosa gymnocarpa (baldhip rose)					T			4	2
Rubus leucodermis (blackcap raspberry)					T			1	1
Salix scouleriana (Scouler's willow)				2				1	2
Sedum spathulifolium (broad-leaved stonecrop)						1		5	3
Selaginella wallacei (Wallace's selaginella)							3	5	3
Thuja plicata (western redcedar)				T				1	1
Vulpia sp. (fescue)						25		6	3

Wildlife

Species	Life Stage	Evidence
Crickets (*Gryllinae*)	N/A	H
Blacktailed deer (*Odocoileus hemionus columbianus*)	N/A	S

Metrics

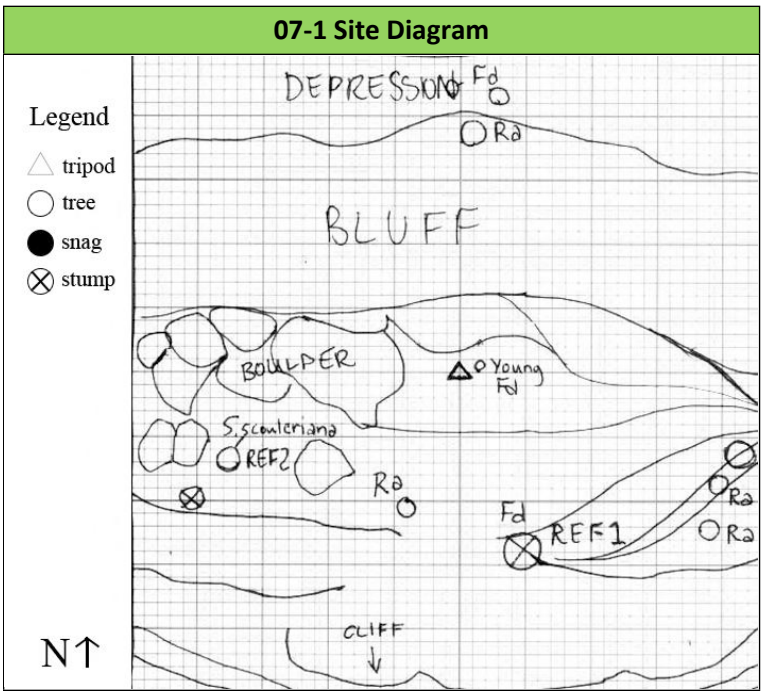


Metrics for Site 07-1 describe the site's disturbed woodland character, with scattered deciduous (*Arbutus*) and coniferous (*Pseudotsuga, Thuja*) trees, and an understory dominated by graminoids, with shrubs, bryophytes and forbs scattered throughout (listed in rank order of abundance). Plant composition reflects a broad spectrum of very poor to rich, xeric-subhygric communities, with the majority of plant indicators distributed among subxeric (38%) and submesic (44%) soil moisture regimes, and 76% of the plant cover associated with a moderate soil nutrient regime. Of the 33 sites surveyed the site places in the upper quartile, ranking 7th in species richness with 31 species observed. When evenness in the proportional abundances of species is considered, however, site diversity falls to the rank of 9th. The majority of flora observed are native, with 14% of the overall plant cover classified as exotic.

Photographs

07-1 Photographs

07-1 Site Diagram



Ecological Community 8

Description

Ecological Community 8 consists in a small, heavily disturbed, bowl-shaped area that includes a seasonal ditched stream and the access road to the cove. The ecological community includes heavily disturbed road areas dominated by exotic grasses along with sparse canopy woodland portions with a mix of scattered arbutus, regenerating Douglas-fir poles, and a small patch of mature Douglas-fir, a patch of Garry oak, as well as the odd alder and bigleaf maple. Mature Scotch broom was removed from a large portion of the ecological community in the summer of 2012. The site at present is clear of mature broom plants, except for a few patches on the steep slope near the cove. Broom regeneration will likely be prolific over the next several years and will require consistent annual removal to maintain control. Dominant vegetation on the road and disturbed areas includes exotic grasses such as common velvet grass (*Holcus lanatus*) and colonial bentgrass (*Agrostis capillaris*), as well as thistles (*Cirsium* spp.). A large portion of the ecological community has thick, continuous groundcover of European periwinkle (*Vinca* sp.). The ditch also contains exotic grasses and periwinkle in a portion but exhibits a high percentage of common rush (*Juncus effusus*) and field mint (*Mentha arvensis*) as well as horsetail (*Equisetum arvense*) in some areas. The ecological community includes a variety of site conditions ranging from very dry, rocky southwest-facing, shallow-soiled micro-ridgelines to more moderately sloped, deeper-soiled zonal areas to moisture-receiving riparian sites along the ditch and seepage areas on the very steep back around the cove. The shrub-dominated steep seepage bank is characterized by a mix of willow and Pacific ninebark, bigleaf maple and oceanspray, with periwinkle along the ground. Another invasive species of note is evergreen blackberry (*Rubus laciniatus*), with several well-established patches scattered throughout the ecological community.

Ecological Community 8, Site 1 **Date Surveyed:** 20 August, 2012

Location

The site is located between a foot and vehicle bridge, about 2 metres downhill from the ditch.

Location	References	Bearing	Description
N 5419774 E 465191	Ref. 1	15.8m @ 247°	Young western redcedar next to outhouse
	Ref. 2	8.6m @ 210°	Western post of the bridge crossing an ephemeral creek

Site Description

The site represents the heavily disturbed road/ditch area with periwinkle groundcover.

Site ID:	08-1	**Aspect:**	200°	**Exposure:**	N/A
		Mesoslope Position:	MD	**Slope:**	25%

Surface Substrate:					
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***
1%	1%	2%	1%	95%	0

Structural Stage:	4-5/Mi	**SMR:**	3	**SNR:**	C	**Crown Closure:**	8%

Percent Cover				**Site Series:**	CDF/ 01(90%)/ Ri(10%)
A	B	C	D		
3%	10%	90%	5%		
Succession:	N/A				

Restoration Recommendations:

Restoration recommendations for this ecological community include invasive exotic control, specifically for Scotch broom, periwinkle, evergreen blackberry, along with spot planting of a diversity of native trees and shrubs where invasives have been removed. Also recommended is fencing natural regeneration subject to intense deer browse. Remediation of unused roads would also improve the integrity of both the hydrology and ecology of the area.

Riparian Features:

Class: High bench
Centreline Bearing: 250˚
Bankfull Width: 1 m
Bankfull Depth: 10 cm
Wetted Width: 0
Wetted Depth: 0
Bank Slopes: 100%
Stream Gradient: 15%
Bed Characteristics: Boulder glide with silty fines where bed flattens out.

***Flow Characteristics*:** Seasonal.

***Aquatic Vegetation*:** Yellow flag iris, common rush, field mint, grasses

***Modifications*:** Ditched; small wooden bridge for vehicles at road crossing; clearing of riparian vegetation and invasive exotic species dominate the area.

***Fish/Wildlife Use*:** No fish; possible wildlife access seasonal stream for drinking in winter and shoulder seasons. Potential to meet some insect and amphibian life stage requirements.

Disturbances

Anthropogenic: A road runs through the site and the stream is ditched. Two small bridges and an outhouse have been built and periwinkle introduced. A large pile of soil from the ditch/road clearing is present, as well as an old steel cul vert lying on the edge of the road. The area has been partially logged and cleared of stumps.

Natural: N/A

Vegetation

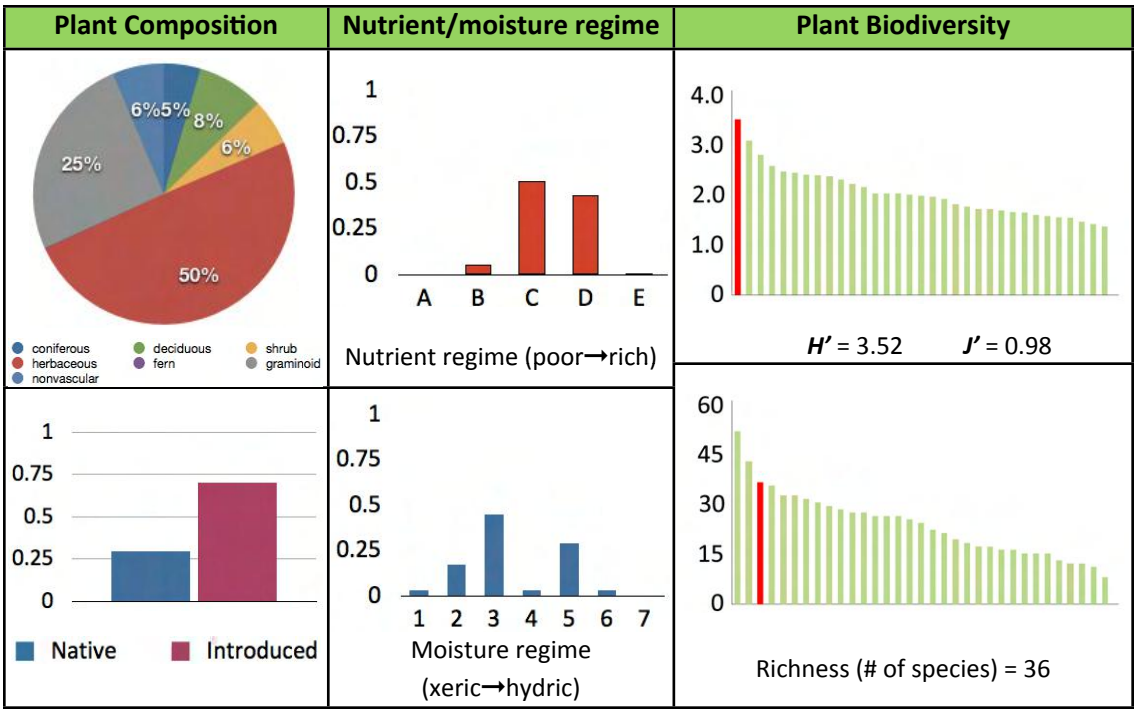
Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Agropyron sp. (crested-wheat grass)						3		5	3
Agrostis capillaris (colonial bentgrass)						15		8	3
Alnus rubra (red alder)				2				1	2
Anthoxanthum odoratum (sweet vernal grass)						2		5	3
Arbutus menziesii (arbutus)			3					2	2
Cirsium sp. (thistle)						2		4	3
Cytisus scoparius (Scotch broom)					1			4	2
Dactylis glomerata (orchard grass)						1		5	3
Equisetum arvense (common horsetail)						8		6	3
Gaultheria shallon (salal)					1			5	2
Hieracium sp.						T		4	3
Holcus lanatus (common velvet-grass)						3		8	3
Holodiscus discolor (ocean spray)				1	T			2	2
Hypochaeris radicata (hairy cat's-ear)						2		4	3
Iris pseudacorus (yellow-flag iris)						T		2	4
Isothecium sp.							3	5	2

Juncus effusus (common rush)						1		5	3
Kindbergia oregana (Oregon beaked moss)							3	5	2
Mentha arvensis (field mint)						1		3	4
Phleum pratense (Timothy)						3		5	3
Physocarpus capilatus (Pacific ninebark)				T				1	3
Polystichum munitum (western sword fern)						T		2	2
Polytrichum juniperinum (juniper haircap moss)							1	3	2
Pseudotsuga menziesii (Douglas-fir)				3	2			2	3
Ranunculus repens (creeping buttercup)						T		4	3
Rubus discolor (Himalayan blackberry)					T			5	3
Rubus laciniatus (evergreen blackberry)					1			2	3
Rubus ursinus (trailing blackberry)					2			5	3
Rumex obtusifolius (bitter dock)						T		3	4
Salix scouleriana (Scouler's willow)					T			1	2
Taraxacum sp. (Ruderalia) (dandelion)						T		4	3
Tree sp. 1 (non-native)				2				1	3
Tree sp. 2 (non-native)				2				1	3
Trifolium sp. (clover)						1		5	3
Vicia sp. (vetch)						T		2	3
Vinca sp. (periwinkle)						40		8	4

Wildlife

Species	Life Stage	Evidence
Woodpecker	N/A	F

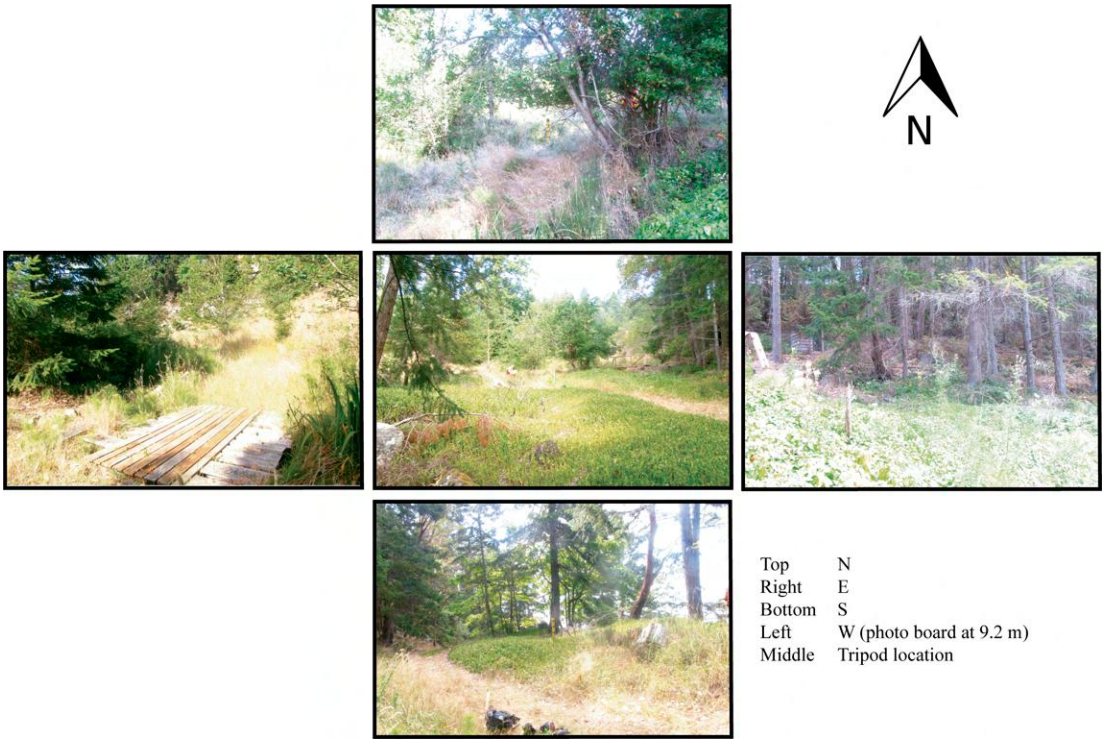
Metrics



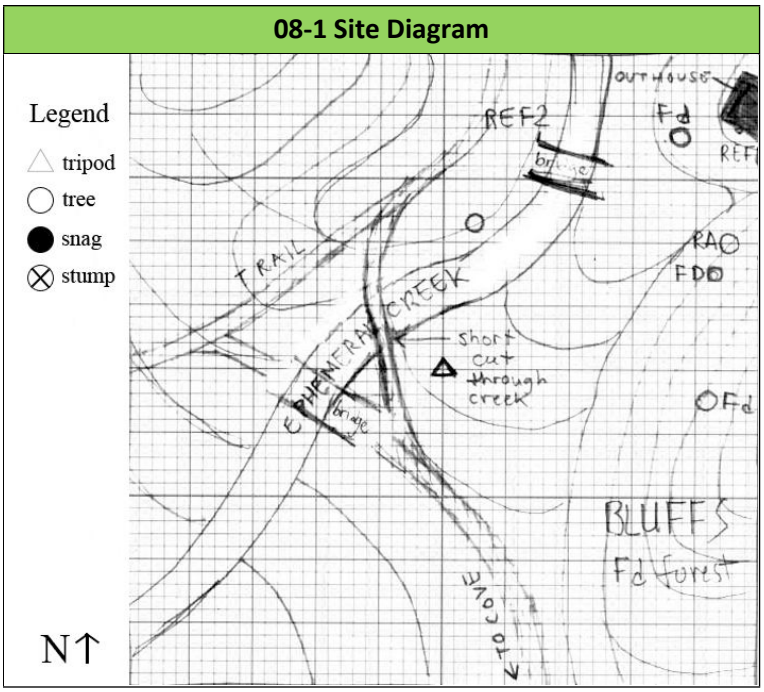
Metrics for Site 08-1 describe the site's disturbed riparian character, with sparse deciduous (*Arbutus, Alnus, Salix*) and coniferous (*Pseudotsuga*) trees distributed along an otherwise open slope dominated by forbs and graminoids, with shrubs and bryophytes scattered throughout (listed in rank order of abundance). Plant composition reflects a broad spectrum of poor to rich, subxeric-hygric communities, with a bimodal distribution of plant indicators punctuating submesic (45%) and subhygric (29%) soil moisture regimes, and 94% of the plant cover associated with moderate to rich soil nutrient regimes. Of the 33 sites surveyed the site places in the upper quartile, ranking 3rd in species richness with 36 species observed. When evenness in the proportional abundances of species is considered, the site ranks 1st in diversity. The majority of flora observed are exotic, however, with only 29% of the overall plant cover classified as native.

Photographs

08-1 Photographs



08-1 Site Diagram



Ecological Community 8 Photographs

PP5. Outhouse and bridge over the ephemeral stream which flows down into the cove

PP6. The 'bowled' seepage dropping down to the cove; Pacific ninebark the dominant shrub

Ecological Community 9

Description

Ecological Community 9 circumscribes a maturing Douglas-fir/western redcedar-dominated forest on a cool north-facing slope. The understory is dominated by salal and Oregon beaked moss, with the odd evergreen huckleberry and sword fern, as well as patches of dull Oregon grape, scattered throughout. The ecological community has been selectively logged both for Douglas-fir and western redcedar in past decades. More recently, a single-tree and small-patch selection has occurred along the northern edge, feathering in from the clearing below (Ecological Community 27a). Several patches of laminated root rot (*Phellinus weirii*) were observed throughout the ecological community. An older road runs through portions of the ecological community and a small clearing with an unfinished barn structure is located in the western portion. Several alder (*Alnus rubra*) and arbutus trees occupy the canopy gaps throughout. A couple of Pacific yew trees (*Taxus brevifolia*) were observed. The ecological community includes patches of young forest interspersed with mature and occasionally veteran trees.

Ecological Community 9, Site 1 **Date Surveyed:** 10 August, 2012

Location

Location	References	Bearing	Description
N 5419600 E 465619	Ref. 1	18.2m @ 49°	Closely growing/attached Douglas-fir and cedar, each 0.5-0.8m diametre; nearby road
	Ref. 2	18.2m @ 126°	Triple crowned, 0.5m diametre, cedar; downslope from road

Site Description

Site ID:	09-1	**Aspect:**	15°	**Exposure:**	N/A
		Mesoslope Position:	MD	**Slope:**	25%
Surface Substrate:					
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***
0	1%	3%	12%	84%	0

Structural Stage:	6/Cm	SMR:	2	SNR:	C	Crown Closure:	75%
Percent Cover				Site Series:		CDF/01	
A	B	C	D				
75%	50%	3%	70%				
Succession:	Light from the clearing and small patch cut to the north is allowing greater coverage of understory species.						

Restoration Recommendations: N/A

Riparian Features: N/A

Disturbances

Anthropogenic: Western redcedar and Douglas-fir stumps indicate logging.

Natural: Wind-throw shows evidence of *P. weirii* root rot.

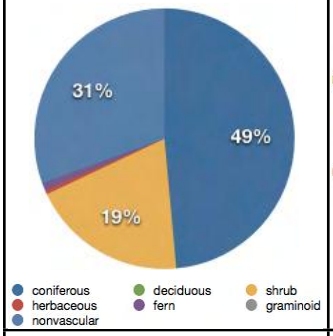
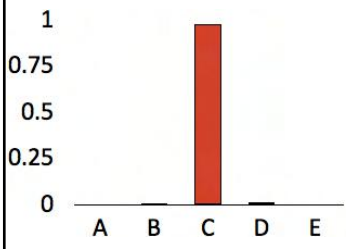
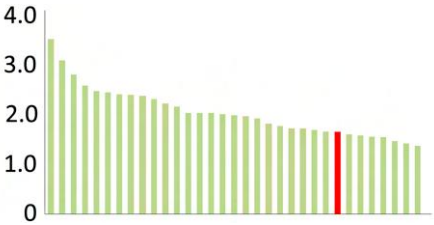
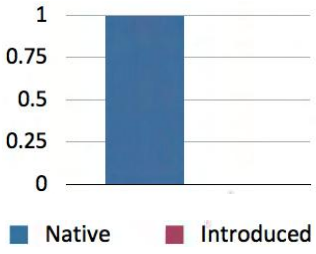
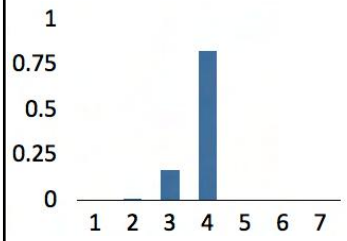
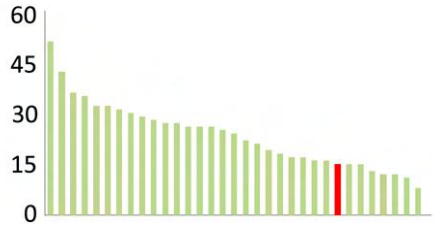
Vegetation

Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Achlys triphylla (vanilla leaf)						1		5	3
Gaultheria shallon (salal)					40			8	4
Holodiscus discolor (ocean spray)				1				1	3
Hylocomium splendens (stair-step moss)							10	5	3
Isothecium stoloniferum							5	5	3
Kindbergia oregana (Oregon beaked moss)							50	8	4
Lonicera ciliosa (orange honeysuckle)					T			1	3
Monotropa uniflora (Indian pipe)						T		3	3
moss sp.							T	3	1
Plagiothecium undulatum (wavy-leaved cotton moss)							T	3	3
Polystichum munitum (western sword fern)						2		2	2
Pseudotsuga menziesii (Douglas-fir)	25							4	3
Rhytidiadelphus loreus (lanky moss)							1	5	4
Thuja plicata (western redcedar)		40	35	5	T			7	3
Vaccinium parvifolium (red huckleberry)				1				1	4

Wildlife

Species	Life Stage	Evidence
Chickadee (*Poecile sp.*)	N/A	H
Red-breasted nuthatch (*Sitta Canadensis*)	N/A	H
Turkey vulture (*Cathartes aura*)	A	V

Metrics

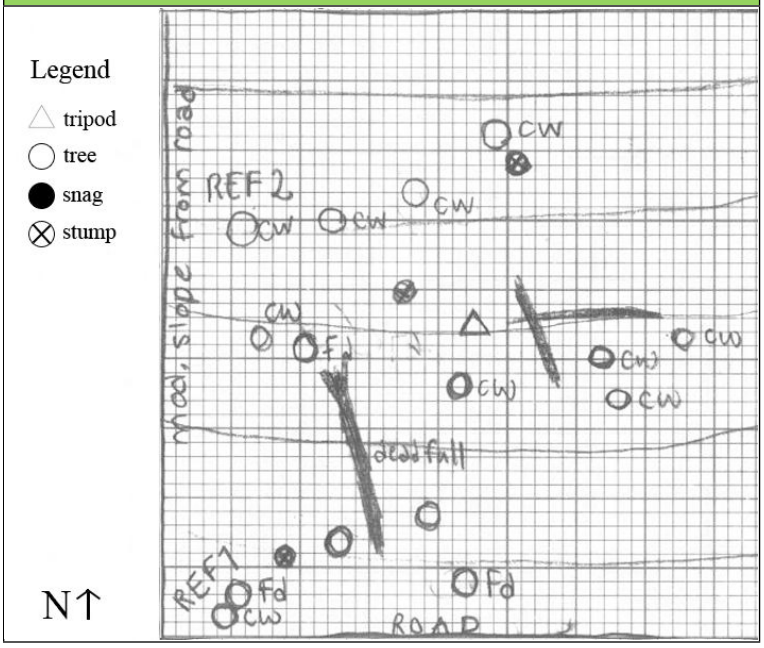
Plant Composition	Nutrient/moisture regime	Plant Biodiversity
	 Nutrient regime (poor→rich)	 ***H'*** = 1.65 ***J'*** = 0.61
	 Moisture regime (xeric→hydric)	 Richness (# of species) = 15

Metrics for Site 09-1 describe the site's open forested character, including a canopy dominated by coniferous (*Thuja, Pseudotsuga*) trees and an understory composed primarily of bryophytes and shrubs, with ferns and forbs sparsely distributed throughout (following rank order of abundance). Plant composition is reflective of a moderately rich, submesic-mesic community, with the majority of plant cover (83%) indicative of a mesic soil moisture regime, and 98% of plant cover associated with a moderate soil nutrient regime. Of the 33 sites surveyed the site places in the lower quartile, ranking 26th in species richness with 15 species observed. When evenness in the proportional abundances of species is considered, the site retains the rank of 26th in diversity. The site is one of nine sites surveyed where only native flora were recorded, of which it ranks 5th most diverse on the Shannon index and 5th in richness.

Photographs

09-1 Photographs

09-1 Site Diagram



Ecological Community 9 Photographs

PP7. A small barn lies sheltered in the western region of Ecological Community 9

PP8. Feral turkey

Ecological Community 10

Description

Ecological Community 10 encompasses a mature Douglas–fir dominated, flat ridge-top, transitioning from Douglas-fir-salal (CDFmm01) on the northeast aspect, to Douglas–fir-arbutus (CDFmm/02) on the southwest aspect. The understory is a mosaic of shrub-dominated and moss–dominated patches with salal as the dominant shrub and electrified cat's tail moss (*Rhytidiadelphus triquetrus*) as the dominant moss. Scattered stumps indicate selective logging has occurred over the years. As a result, young Douglas–fir patches are scattered throughout the ecological community.

Ecological Community 10, Site 1 **Date Surveyed:** 27 July, 2012

Location

Location	References	Bearing	Description
N 5419517 E 465605	Ref. 1	5.2m @ 150°	1m tall Douglas-fir stump; 0.5m diametre; on crest with salal growing out of the top.
	Ref. 2	15m @ 102°	1m tall Douglas-fir stump; 0.7 diametre; on crest of slope with 3 Douglas-firs and 1 arbutus seedlings growing out of the top.

Site Description

The site is situated in a Douglas-fir-dominated stand with scattered arbutus and a shrub/moss understory. It is representative of Ecological Community 10, on a mature forested crest, including portions of more open southwest-facing warm exposure and cooler northeast exposure on back of the ridge.

Site ID:	10-1	**Aspect:**	148°	**Exposure:**	N/A
		Mesoslope Position:	CR	**Slope:**	0-25%

Surface Substrate:					
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***
1%	10%	1%	15%	73%	0

Structural Stage:	6/Cm	**SMR:**	1	**SNR:**	B	**Crown Closure:**	55%

Percent Cover				Site Series:	CDF/01x/02
A	B	C	D		
45%	30%	30%	75%		
Succession:	Stand will continue to mature with suppressed Douglas-fir forming sub-canopy.				

Restoration Recommendations: N/A

Riparian Features: N/A

Disturbances

Anthropogenic: The site was selectively logged approximately 60 years ago. An old logging road is present along the northeast side of the site. Some grazing by sheep is noted.

Natural: Fire scar on an old snag is noted, as well as grazing by deer.

Vegetation

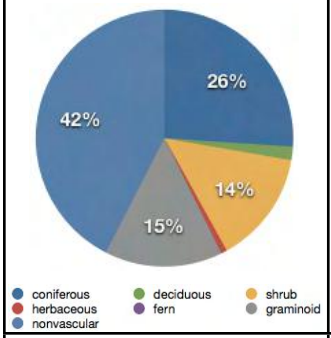
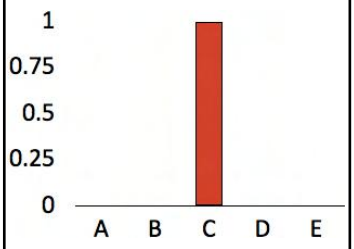
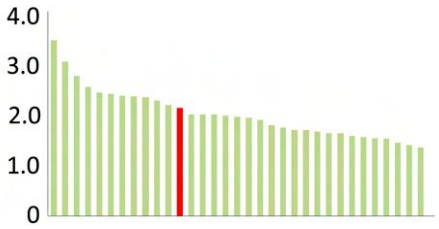
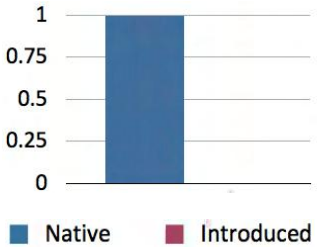
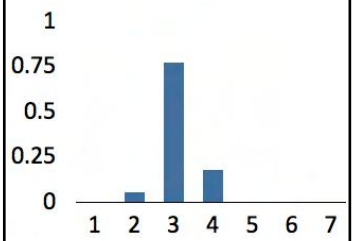
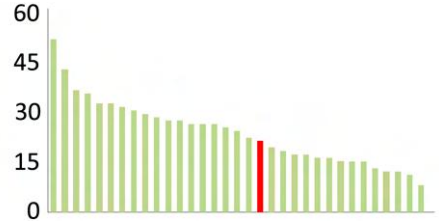
Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Arbutus menziesii (arbutus)			2	T			T	2	?
Berberis nervosa (dull Oregon grape)					7			5	3
Bromus sp.						10		4	3
Dicranum scoparium (broom moss)							8	5	3
Elymus glaucus (blue wild rye)						1		3	3
Festuca sp.						15		4	3
Galium aparine (cleavers)						T		1	3
Gaultheria shallon (salal)					15			5	3
Goodyera pubescens (rattlesnake plantain)						1		4	3
grass sp.1						T		4	3
grass sp.2						T		4	3
Hylocomium splendens (stair-step moss)							2	3	3
Isothecium sp.							5	5	3
Kindbergia oregana (Oregon beaked moss)							20	5	3
Lonicera ciliosa (orange honeysuckle)				T				4	3
Lonicera hispidula (hairy honeysuckle)					2			7	3

Piperia transversa (transverse rein orchid)							T	4	3
Pseudotsuga menziesii (Douglas-fir)		40	3	5	T		T	7	1-2
Rhytidiadelphus triquetrus (electrified cat's tail)							40	5	3
Rosa gymnocarpa (baldhip rose)					1			5	3
Vicia sp. (vetch)						T		4	3

Wildlife

Species	Life Stage	Evidence
Blacktailed deer (*Odocoileus hemionus columbianus*)	N/A	S
Pileated Woodpecker (*Dryocopus pileatus*)	N/A	V, F
Turkey vulture (*Cathartes aura*)	A	V

Metrics

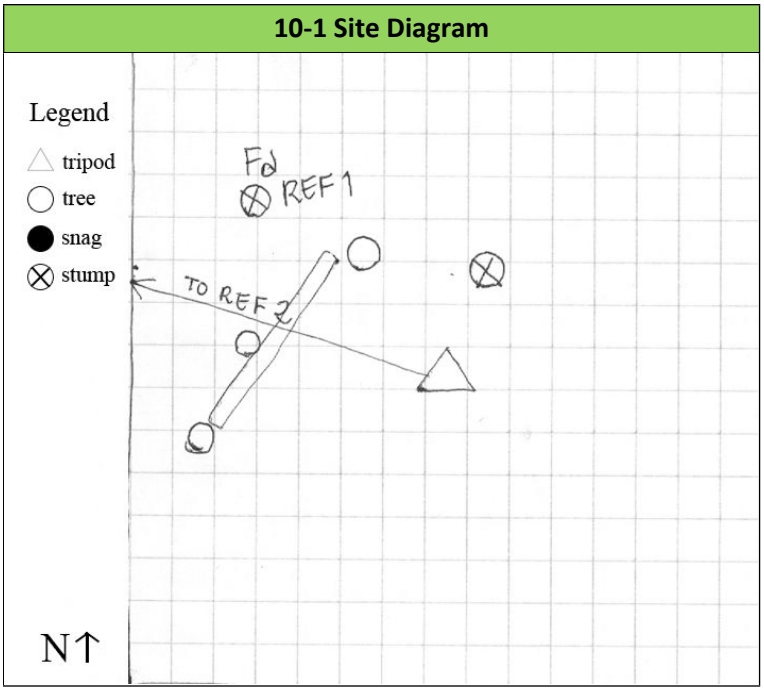
Plant Composition	Nutrient/moisture regime	Plant Biodiversity
	 Nutrient regime (poor→rich)	 ***H'*** = 2.17 ***J'*** = 0.71
	 Moisture regime (xeric→hydric)	 Richness (# of species) = 21

Metrics for Site 10-1 describe the site's open, mature forested character, including a canopy dominated by coniferous (*Pseudotsuga*) trees and an understory composed of bryophytes, graminoids and shrubs, with deciduous trees (*Arbutus*) and forbs sparsely distributed throughout (listed in rank order of abundance). Plant composition reflects a moderately rich, subxeric-mesic community, with the majority of plant cover (77%) indicative of a submesic soil moisture regime, and 100% of plant cover associated with a moderate soil nutrient regime. Of the 33 sites surveyed the site ranks 19th in species richness, with 21 species observed. When evenness in the proportional abundances of species is considered, site diversity is augmented to the rank of 12th. The vast majority of flora observed are native, with only a fraction of one percent of the overall plant cover classified as exotic.

Photographs

10-1 Photographs

10-1 Site Diagram



Ecological Community 11

Description

The ecological community includes an old growth Douglas–fir and arbutus woodland on a benched, steep boulder/bedrock slope, transitioning to an exposed ridge and cliffs overlooking the Trincomali Channel. The understory is characterized by very sparsely scattered hairy honeysuckle, salal, oceanspray, and baldhip rose (*Rosa gymnocarpa*). Herb–cover includes mostly exotic grasses, as well as Chilean tarweed (*Madia sativa*). Moss–cover here is about 30 per cent, dominated by *Dicranium scoparium* and a species of *Isothecium*. Exposed bedrock–cover is approximately 50 per cent. Soils are very thin and dry, resulting in very limited tree size.

Ecological Community 11, Site 1 **Date Surveyed:** 27 July, 2012

Location

Location	References	Bearing	Description
N 5419555 E 465429	Ref. 1	7.8m @ 106°	Large-diametre Douglas-fir stump; 1.5m tall; well decayed; slumping bark
	Ref. 2	18.8m @ 40°	Medium-diametre Douglas-fir snag, on edge of cliff, in the open; a couple of branches mid-stem with stubs above; several cavities

Site Description

The site is representative of Ecological Community 6 and is situated in a Douglas-fir-arbutus dominated mid-slope area with exposed bedrock and boulder.

Site ID:	11-1	**Aspect:**	195°	**Exposure:**	N/A
		Mesoslope Position:	MD	**Slope:**	25-35%
Surface Substrate:					
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***
30%	10%	3%	5%	52%	0

Structural Stage:	6-7/Mm	SMR:	0-1	SNR:	A	Crown Closure:	45%
Percent Cover				Site Series:		CDF/02	
A	B	C	D				
50%	6%	20%	50%				
Succession:	Stand will continue in balance.						

Restoration Recommendations: Remove Scotch broom.

Riparian Features: N/A

Disturbances

Anthropogenic: No logging is observed, but there is some grazing by sheep and deer.

Natural: A high exposure to wind and sun.

Vegetation

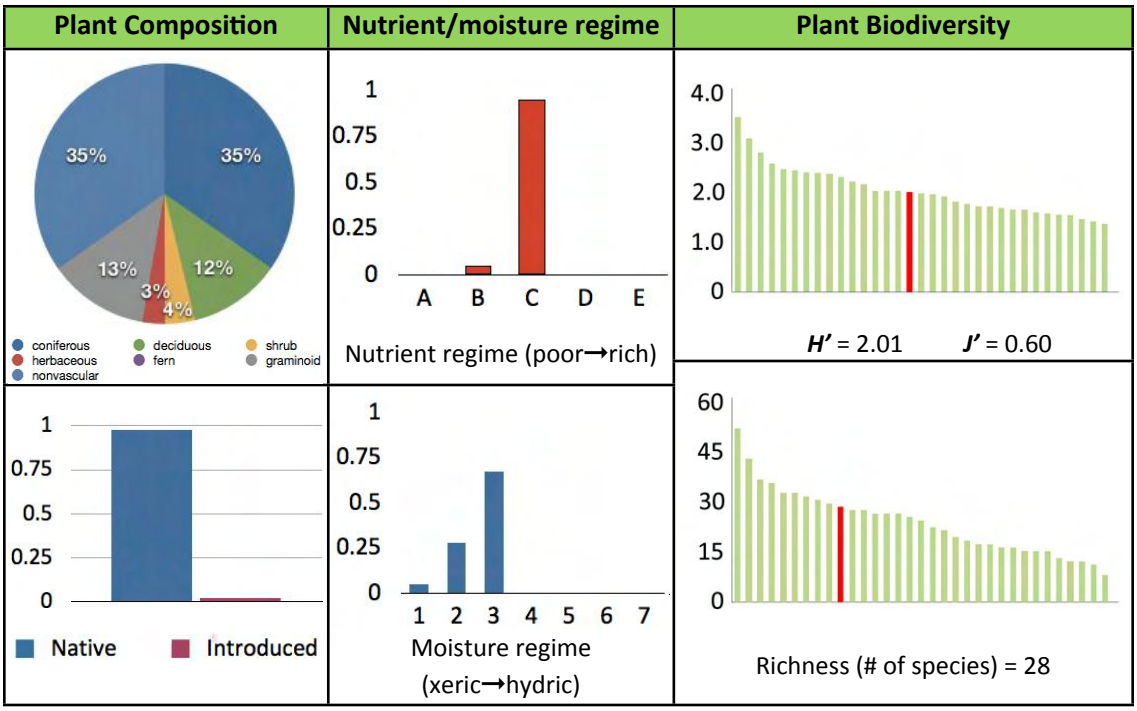
Vegetation	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Arbutus menziesii (arbutus)			10	4				7	1
Bromus sp.*1*						3		6	3
Cladina portentosa (coastal reindeer lichen)							1	5	4
Cladonia sp. (pixie-cup lichen)							1	5	3
Clinopodium douglasii (yerba buena)						T		4	3
Cynosorus echinatus (hedgehog dogtail)						T		5	3
Cytisus scoparius (Scotch broom)					1			3	3
Dicranum scoparium (broom moss)							30	6	3
Festuca sp.						2		5	3
Festuca (vulpia?)						10		5	3
Gaultheria shallon (salal)					T			2	3
Grimmia sp.							T	5	3
Hieracium albiflorum (white-flowered hawkweed)						T		4	3
Holodiscus discolor (ocean spray)					T			1	3
Kindbergia oregana (Oregon beaked moss)							8	5	3
Lactuca muralis (wall lettuce)						T		7	3
Lonicera hispidula (hairy honeysuckle)					3			6	3
Luzula campestris (many-flowered woodrush)						T		5	3

Madia sativa (Chilean tarweed)						1		4	3
moss sp.1							1	5	3
moss sp.2							T	5	3
Paxistima myrsinites (falsebox)					T			1	3
Polytrichum juniperinum (juniper haircap moss)							3	5	3
Pseudotsuga menziesii (Douglas-fir)		30	10	2	T			8	2
Rosa gymnocarpa (baldhip rose)					T			3	3
Rubus ursinus (trailing blackberry)					T			3	3
Sedum spathulifolium (broad-leaved stonecrop)						T		1	3
Selaginella wallacei (Wallace's selaginella)							2	5	3

Wildlife

Species	Life Stage	Evidence
Blacktailed deer (*Odocoileus hemionus columbianus*)	N/A	S, T
Finch (*Fringilla sp.)*	A	V
Woodpecker	N/A	F
Red squirrel (*Tamiasciurus douglasii)*	N/A	F
Wren	A	V

Metrics

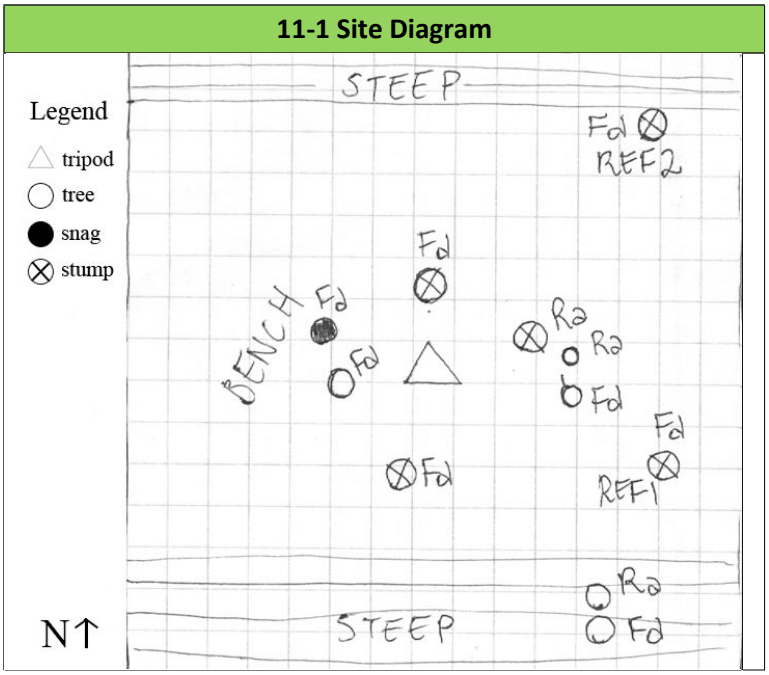


Metrics for Site 11-1 describe the site's woodland character, with a mixed canopy of coniferous (*Pseudotsuga*) and deciduous (*Arbutus*) trees, and an understory dominated by bryophytes, with graminoids, shrubs and forbs distributed throughout (listed in rank order of abundance). Plant composition reflects a moderately rich, xeric-submesic community, with the majority of plant cover (67%) indicative of a submesic soil moisture regime, and 95% of plant cover associated with a moderate soil nutrient regime. Of the 33 sites surveyed the site ranks 10th in species richness, with 28 species observed. When evenness in the proportional abundances of species is considered, site diversity is diminished to the rank of 16th. The vast majority of flora observed are native, with only 2% of overall plant cover classified as exotic.

Photographs

11-1 Photographs

11-1 Site Diagram



Ecological Community 12

Description

The ecological community encompasses an open old-growth Douglas-fir and arbutus woodland with scattered Garry oak. Included are a series of small, relatively flat, moisture-receiving benches or seepage sites separated by steep bedrock steps. As a result, the understory is characterized by patches of very dry and poor shallow-soiled sites, dominated by mosses (10% *Dicranium scoparium & Selaginella wallacei*), mixed with moister, richer and deeper-soiled, diverse grass and herb-dominated sites (90%). Within Ecological Community 12 are the richest, most ecologically diverse communities on the property. Species of note in the seepage areas include robust populations of meadow death camas and a presence of naked broomrape (*Orobanche uniflora*), and Howel's brodiaea (*Triteleia howellii*). Dominant grasses include blue wild rye (*Elymus glaucus*), orchard grass (*Dactylis glomerata*) as well as sweet vernal grass (*Anthoxanthum odoratum*).

Ecological Community 12, Site 1 **Date Surveyed:** 10 August, 2012

Location

Location	References	Bearing	Description
N 5419427 E 465861	Ref. 1	6m @ 170°	0.7m diametre Douglas-fir growing on bedrock outcrop, with distorted basal stem/roots
	Ref. 2	13.8m @ 70°	0.5m diametre Garry oak growing down slope from site

Site Description

Located along the eastern border of property in the southern corner, the site encompasses both deeper and shallow-soiled communities and is characteristic of the ecological community.

Site ID:	12-1	**Aspect:**	200°	**Exposure:**	Sun and wind
		Mesoslope Position:	MD	**Slope:**	30-70%
Surface Substrate:					
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***
10%	1%	1%	2%	86%	0

Structural Stage:	7/Cm	**SMR:**	2	**SNR:**	A-C	**Crown Closure:**	20%

Percent Cover				Site Series:	CDF/02
A	B	C	D		
20%	10%	80%	15%		
Succession:	N/A				

Restoration Recommendations:

Fire suppression has potentially increased the tree density of this site, leading to the consideration of thinning a number of young, regenerating Douglas-firs in order to maintain openness and resulting diversity in the herb layer. This ecological community is very sensitive to disturbance and should be managed accordingly. Scotch broom is also present and should be controlled.

Riparian Features: N/A

Disturbances

Anthropogenic: Some netting, fencing material, was observed at the bottom (southern boundary) of the ecological community.

Natural: Natural wind-throw and extensive broken tops. Intense browse, especially on tall Oregon grape (*Berberis aquifolium*).

Vegetation

Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Achillea millefolium (yarrow)						10		8	4
Aira caryophyllea (silver hairgrass)						2		5	3
Anthoxanthum odoratum (sweet vernal grass)						T		5	3
Arbutus menziesii (arbutus)			3					2	1
Berberis aquifolium (tall Oregon grape)					5			5	1
Bryum miniatum (red bryum)							T	5	3
Carex sp.						2		5	3
Cirsium vulgare (bull thistle)						2		5	3
Cladina portentosa (coastal reindeer lichen)						T		5	3
Cladonia chlorophaea (false-pixie cup)							T	2	3
Cladonia squamosa (dragon cladonia)							T	2	3
Clinopodium douglasii (yerba buena)						5		5	3

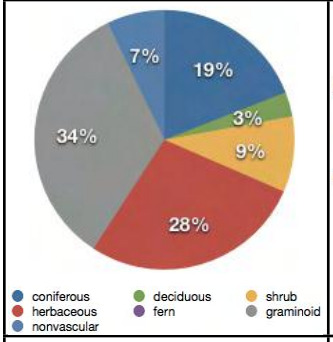
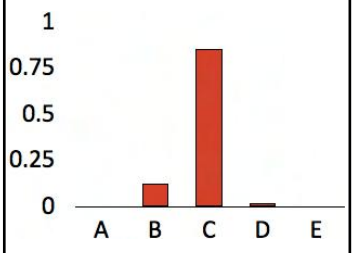
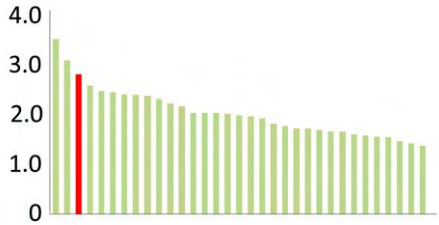
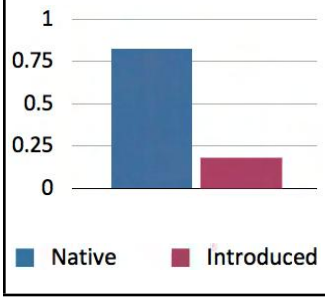
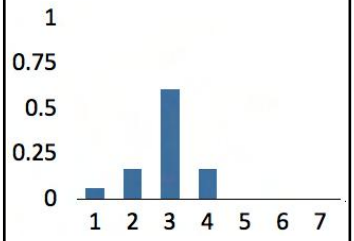
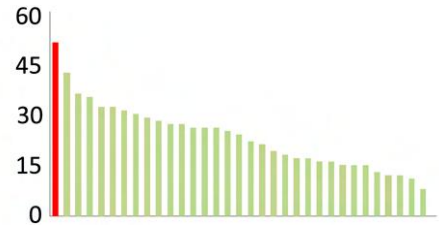
Cytisus scoparius (Scotch broom)					1			2	2
Dactylis glomerata (orchard grass)						5		2	3
Dicranum scoparium (broom moss)							8	5	3
Digitalis purpurea (common foxglove)						T		2	3
Elymus glaucus (blue wild rye)						10		5	4
Eriophyllum lanatum var. leucophyllum (Oregon sunshine)						T		2	3
Fragaria vesca (woodland strawberry)						T		2	3
Geranium molle (dovesfoot)						T		2	3
grass sp. (small)						20		5	3
Hieracium sp.						10		5	4
Holcus lanatus (common velvet-grass)					T			5	3
Holodiscus discolor (ocean spray)				T				2	
Isothecium sp.							T	5	3
Kindbergia oregana (Oregon beaked moss)							1	5	3
Lonicera ciliosa (orange honeysuckle)				T				2	
Lonicera hispidula (hairy honeysuckle)					3			5	
Madia sativa						T		2	3
Medicago lupulina (black medic)						T		2	3
Micranthes integrifolia (grassland saxifrage)						T		2	3
Myosotis sp.						T		5	3
Parmelia sulcata							T	5	3
Phleum pratense (Timothy)						5		5	3
Plantago lanceolata (ribwort)						1		2	3
Polytrichum juniperinum (juniper haircap moss)							T	5	3
Prunella vulgaris (self-heal)						T		2	3
Pseudotsuga menziesii (Douglas-fir)		15	5	5				2	2
Quercus garryana (Garry oak)			T	T				2	3
Racomitrium sp.						T		5	3
Rosa gymnocarpa (baldhip rose)					T			2	3
Rubus ursinus (trailing blackberry)					T			2	3
Sanicula crassicaulus (Pacific sanicle)						T		2	3
Sedum spathulifolium (broad-leaved stonecrop)						T		5	3
Selaginella wallacei (Wallace's selaginella)							3	5	3
Stellaria sp. (pink-flowered chickweed?)						T		2	4
Symphoricarpos albus (common snowberry)					3			5	

Taraxacum sp. (Ruderalia) (dandelion)						1		2	4
Toxicoscordion venenosum (meadow death-camas)						3		5	4
Vicia sp. (vetch)						T		2	3

Wildlife

Species	Life Stage	Evidence
Alligator lizard (*Elgaria coerulea principis*)	A	V
Blacktailed deer (*Odocoileus hemionus columbianus*)	N/A	S, F
Raven (*Corvus corax*)	N/A	H
Red squirrel (*Tamiasciurus douglasii)*	N/A	T, F

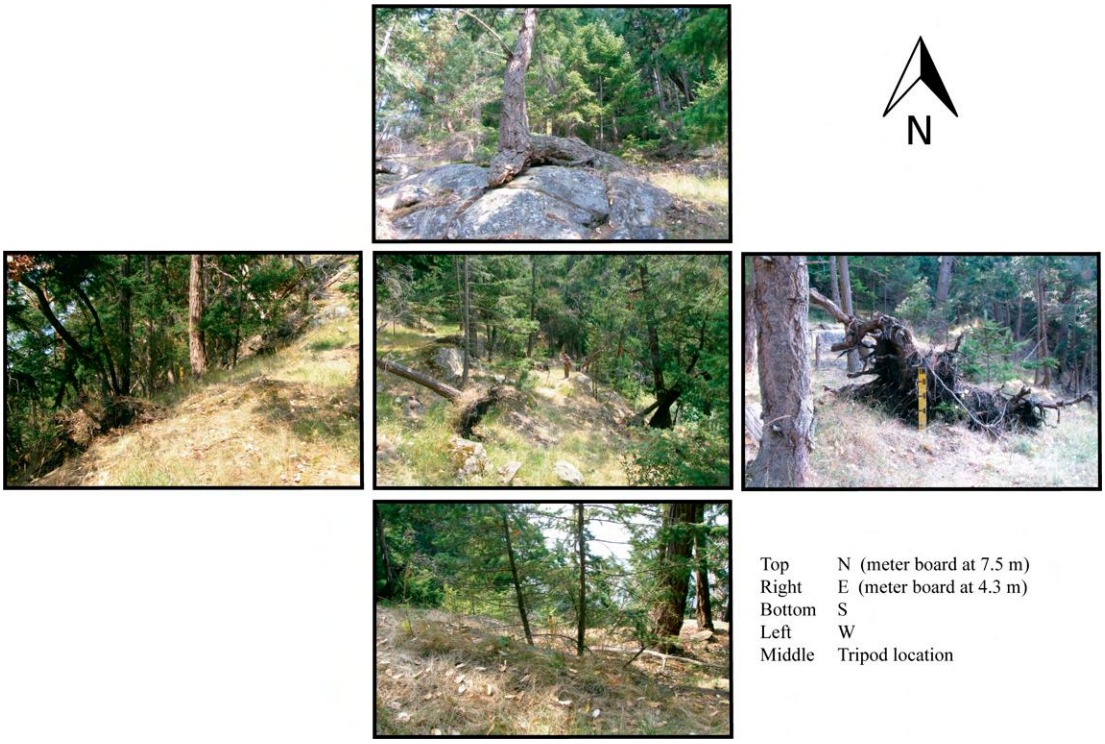
Metrics

Plant Composition	Nutrient/moisture regime	Plant Biodiversity
	 Nutrient regime (poor→rich)	 ***H'*** = 2.81 ***J'*** = 0.72
	 Moisture regime (xeric→hydric)	 Richness (# of species) = 51

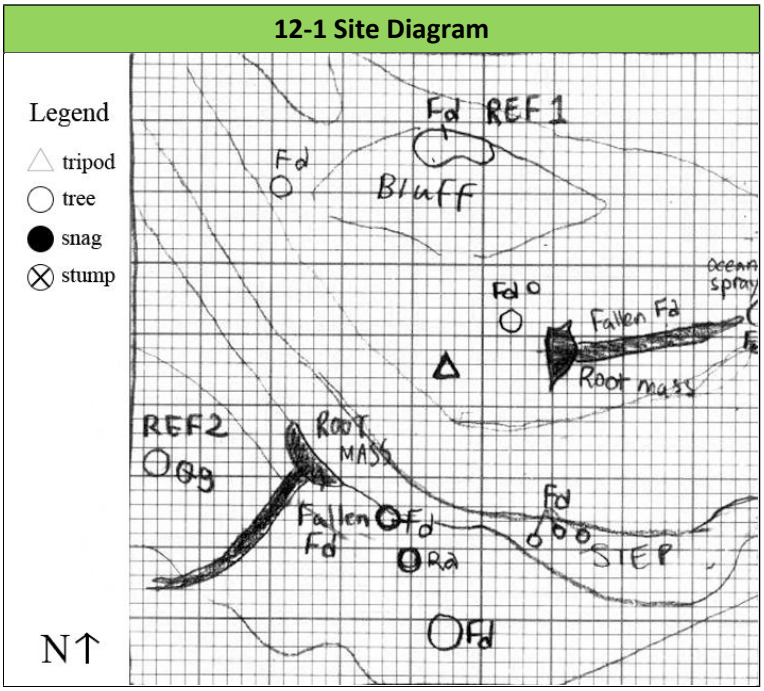
Metrics for Site 12-1 describe the site's relatively moist woodland character, with a mixed canopy of coniferous (*Pseudotsuga*) and deciduous (*Arbutus, Quercus*) trees, and an understory dominated by graminoids and forbs, with shrubs and bryophytes distributed throughout (in rank order of abundance). Plant composition reflects a moderately rich, xeric-mesic community, with the majority of plant cover (61%) indicative of a submesic soil moisture regime, and 85% of plant cover associated with a moderate soil nutrient regime. Of the 33 sites surveyed the site ranks 1st in species richness, with 51 species observed. When evenness in the proportional abundances of species is considered, site diversity is diminished to the rank of 3rd. The majority of flora observed are native, with 18% of overall plant cover classified as exotic.

Photographs

12-1 Photographs



12-1 Site Diagram



Ecological Community 13

Description

The western half of the ecological community is characterized by a patch of mature western redcedar and Douglas–fir–dominated canopy with scattered individual alders. The eastern half of the ecological community is a young Douglas–fir/western redcedar/red alder forest. The understory vegetation is similar throughout, with a patchy matrix of sword fern, bracken fern (*Pteridium aquilinum*) and salal, along with Oregon beaked moss and slender beaked moss (*Kindbergia praelonga*) representing the dominant mosses. Patches of vanilla leaf (*Achlys triphylla*) and dull Oregon grape were also observed. Between the young and mature stands lies a cleared, shallow–soiled seepage where the stream transitions into the wetland in Ecological Community 26. The seepage has been disturbed and grazed and is dominated by thistle, bracken fern, and a variety of exotic grasses. Shallow root systems were observed on several wind–thrown root wads along the boundary of the wetland and seepage area, indicative of the relatively high water table in these areas. Many of the standing trees along the wetland/seepage area are experiencing die–back and have thin crowns. The ecological community is on the lower slope and exhibits a relatively moist and rich CDFmm/05–06 site association.

Ecological Community 13, Site 1 **Date Surveyed:** 23 August, 2012

Location

Location	References	Bearing	Description
N 5420184 E 464693	Ref. 1	7.5m @ 185°	Oldgrowth western redcedar (1.3m diametre)
	Ref. 2	7.6m @ 333°	Three western redcedars growing side by side; reference: the cedar standing in the middle (0.5m diametre)

Site Description

The site is located within the mature forest stand in the western half of the ecological community. It is characteristic of the lower slope but includes a small portion where the slope transitions to the flatter, moister, wetland edge, which is subject to wind-throw.

Site ID:	13-1	**Aspect:**	190°	**Exposure:**	N/A
		Mesoslope Position:	LW	**Slope:**	10-15%

Surface Substrate:					
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***
0	0	1%	8%	91%	0

Structural Stage:	6/M	**SMR:**	4-5	**SNR:**	C-D	**Crown Closure:**	70%

Percent Cover					
A	B	C	D	**Site Series:**	CDF/05-06
70%	20%	30%	15%		
Succession:	N/A				

Restoration Recommendations: N/A

Riparian Features: N/A

Disturbances

Anthropogenic: Logging road just outside and upslope of the site. A few older stumps around the site indicate selective logging.

Natural: Wind-throw

Vegetation

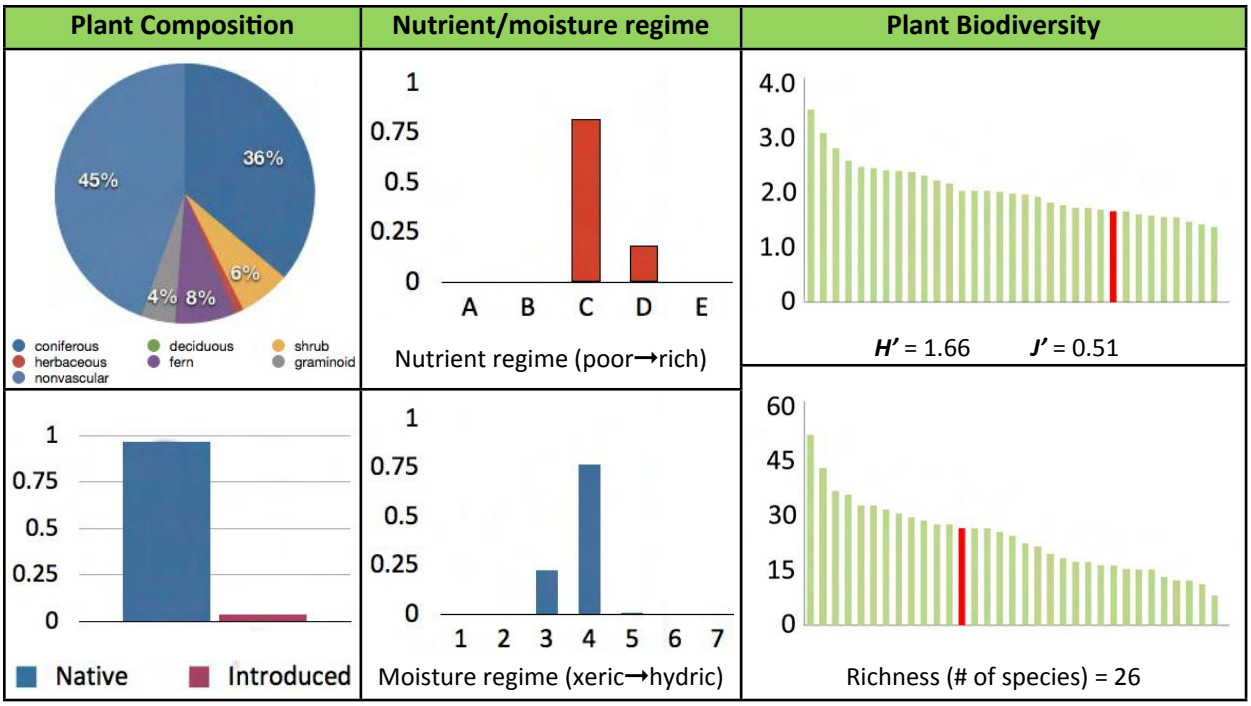
Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Achlys triphylla (vanilla leaf)						1		3	3
Alnus rubra (red alder)			T					1	1
Berberis nervosa (dull Oregon grape)					2			1	3
Carex sitchensis (Sitka sedge)						T		2	3
Carex sp.						1		4	3
Cirsium sp. (thistle)						T		2	4
Dicranum sp.							T	5	3
Elymus glaucus (blue wild rye)						1		3	3
Galium aparine (cleavers)						1		4	3
Galium sp.						T		4	3
Gaultheria shallon (salal)					15			6	3
Holcus lanatus (common velvet-grass)						7		3	3

Ilex aquifolium (holly)					T			1	3
Isothecium sp.							5	5	3
Juncus effusus (common rush)						1		2	3
Kindbergia oregana (Oregon beaked moss)							10	6	3
Kindbergia praelonga (common feather moss)							1	5	3
Lactuca muralis (wall lettuce)						T		4	3
Lonicera ciliosa (orange honeysuckle)					T			1	3
Plagiothecium undulatum (wavy-leaved cotton moss)							T	3	3
Polystichum munitum (western sword fern)						15		6	3
Pseudotsuga menziesii (Douglas-fir)		15	3					4	3
Pteridium aquilinum (bracken fern)						3		4	3
Rubus ursinus (trailing blackberry)					T			4	3
Thuja plicata (western redcedar)		55	10	T	3			7	4
Trientalis latifolia (western starflower)						T		2	3
Urtica dioica (stinging nettle)						T		4	3
Veronica beccabunga spp. *americana*						T		3	3

Wildlife

Species	Life Stage	Evidence
Blacktailed deer (*Odocoileus hemionus columbianus*)	N/A	S
Pacific chorus frog (*Pseudacris regilla*)	N/A	H
Woodpecker	N/A	F
Raven (*Corvus corax*)	N/A	H
Red squirrel (*Tamiasciurus douglasii)*	N/A	H

Metrics

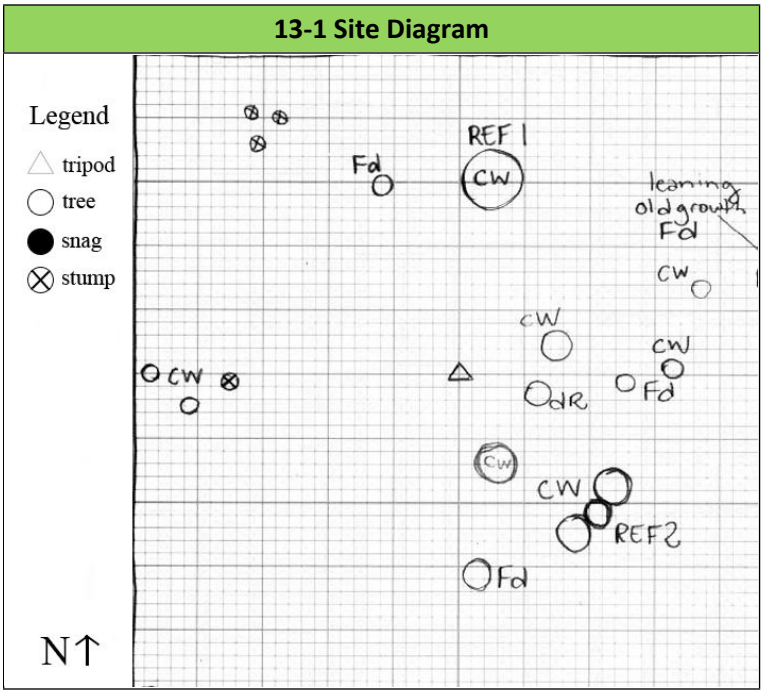


Metrics for Site 13-1 describe the site's transitional forest-wetland character, largely dominated by coniferous (*Thuja*, *Pseudotsuga*) trees, and an understory dominated by bryophytes, with ferns, shrubs, graminoids and forbs distributed throughout alongside scattered deciduous trees (*Alnus*) (listed in rank order of abundance). Plant composition reflects a moderate to rich, submesic-mesic community, with the majority of plant cover (77%) indicative of a mesic soil moisture regime, and 82% of plant cover associated with a moderate soil nutrient regime. Of the 33 sites surveyed the site ranks 14th in species richness, with 26 species observed. When evenness in the proportional abundances of species is considered, site diversity is diminished to the rank of 25th. The vast majority of flora observed are native, with 3% of overall plant cover classified as exotic.

Photographs

13-1 Photographs

13-1 Site Diagram



Ecological Community 14

Description

Ecological Community 14 encloses a relatively flat, graminoid and fern-dominated clearing with scattered, young western redcedar throughout. The ecological community includes subtle micro-topography, resulting in some small, patchy common rush- (or slough sedge) dominated depressions, in a matrix of slightly drier common velvet-grass, colonial bentgrass, sword fern, bracken fern and salal-dominated raised areas. Western redcedar leave trees are generally in poor health, most with dead tops and showing signs of stress, possibly due to the intense sun exposure in the clearing. The majority of stumps are Douglas-fir and appear to have been cut approximately 15-20 years ago (indicated by growth rings on Douglas–fir core). Tree regeneration is very sparse, with the odd Douglas-fir and western redcedar sapling observed. Regeneration has likely been inhibited by livestock grazing over the past couple of decades and may also be inhibited by fluctuating winter wet and summer dry soil moisture conditions. The western arm of this ecological community is slightly moister and richer and includes a higher density of western redcedar and Douglas-fir leave trees, along with grand fir (*Abies grandis*), red alder and a couple of large diameter Douglas-fir snags.

Ecological Community 14b includes a fringe of young/pole regenerating forest that appears to have been fenced off from grazing. The open logged area of 14b is very similar in character to 14a. The young forest fringe is a mix of Douglas-fir and western redcedar with patches of alder scattered throughout.

Ecological Community 14, Site 1 **Date Surveyed:** 23 August, 2012

Location

Location	References	Bearing	Description
N 5420178 E 464591	Ref. 1	m @ °	
	Ref. 2	m @ °	

Site Description

The site is characteristic of the more open, cleared majority of the ecological community and includes both drier and wetter micro-sites as well as a western redcedar leave tree.

Site ID:	14-1	**Aspect:**	185°	**Exposure:**	Sun
		Mesoslope Position:	LV	**Slope:**	2%

Surface Substrate:											
Bedrock	***Boulder***		***Exp. Minerals***		***Wood Decay***		***Organic***		***Water***		
0	0		0		5%		95%		0		
Structural Stage:	2b	**SMR:**	4-6	**SNR:**	C-D		**Crown Closure:**		3%		
Percent Cover						**Site Series:**	CDF/01(40%)/05-06(60%)				
A	B	C	D								
3%	15%	90%	1%								
Succession:	N/A										

Restoration Recommendations:

This graminoid-dominated ecological community is an excellent candidate for replanting with a diverse mix of conifer and broadleaf species.

Riparian Features: N/A

Disturbances

Anthropogenic: Logged 15-20 years ago. Soil disturbance from machine use appears to be extensive due to lack of regeneration and graminoid dominance. Current conditions may also be in response to livestock grazing over past several decades.

Natural: N/A

Vegetation

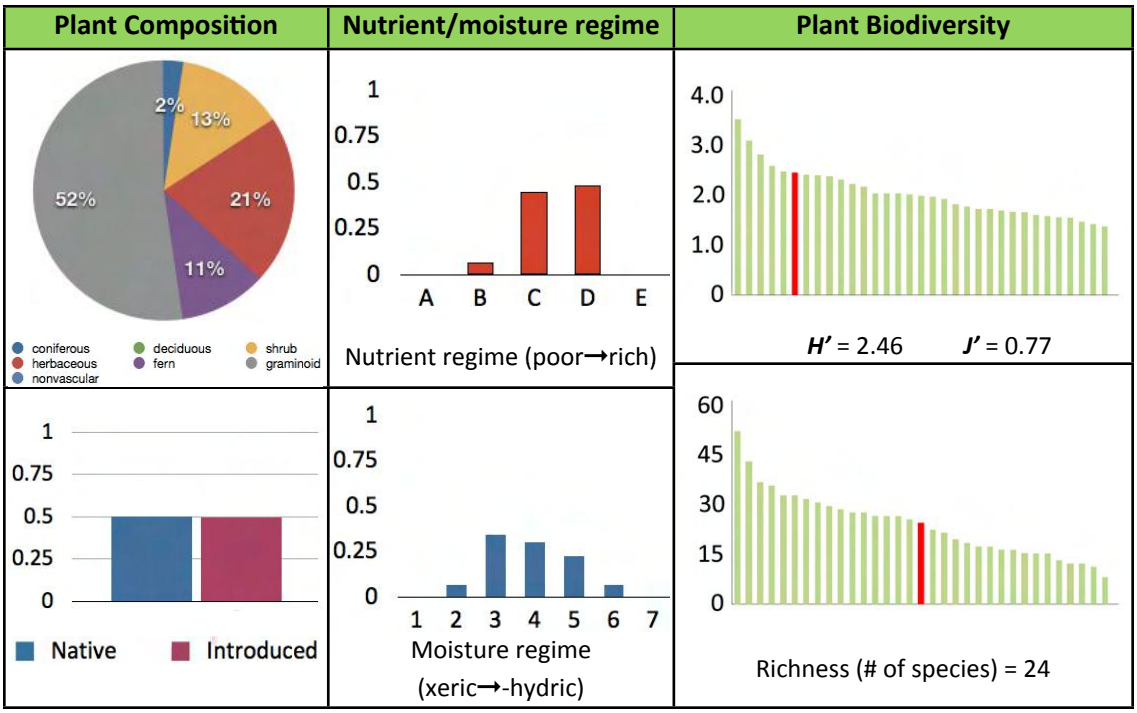
Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Agrostis capillaris (colonial bentgrass)						30		8	4
Anthoxanthum odoratum (sweet vernal grass)						5		6	4
Berberis nervosa (dull Oregon grape)					1			5	2
Bromus sp. 1 (grass sp. 1)						2		6	3
Bromus sp. 2						T		3	3
Carex obnupta (slough sedge)						5		3	3
Cirsium sp. (thistle)						10		7	3

Digitalis purpurea (common foxglove)						2		6	3
Galium sp.						10		6	3
Gaultheria shallon (salal)					15			5	2
Holcus lanatus (common velvet-grass)						10		6	3
Hypochaeris radicata (hairy cat's-ear)						5		6	3
Ilex aquifolium (holly)				1				1	4
Juncus effusus (common rush)						15		6	3
Kindbergia oregana (Oregon beaked moss)							T	5	2
moss sp.1							T	5	2
Phleum pratense (Timothy)						T		3	3
Polystichum munitum (western sword fern)						4		5	1
Pseudotsuga menziesii (Douglas-fir)				T				2	2
Pteridium aquilinum (bracken fern)						10		7	3
Rubus leucodermis (blackcap raspberry)					T			4	3
Rubus ursinus (trailing blackberry)					T			2	2
Thuja plicata (western redcedar)		3						2	1
Urtica dioica (stinging nettle)						T		4	3

Wildlife

Species	Life Stage	Evidence
Blue-eyed darner (*Rhionaeschna multicolor)*	A	V

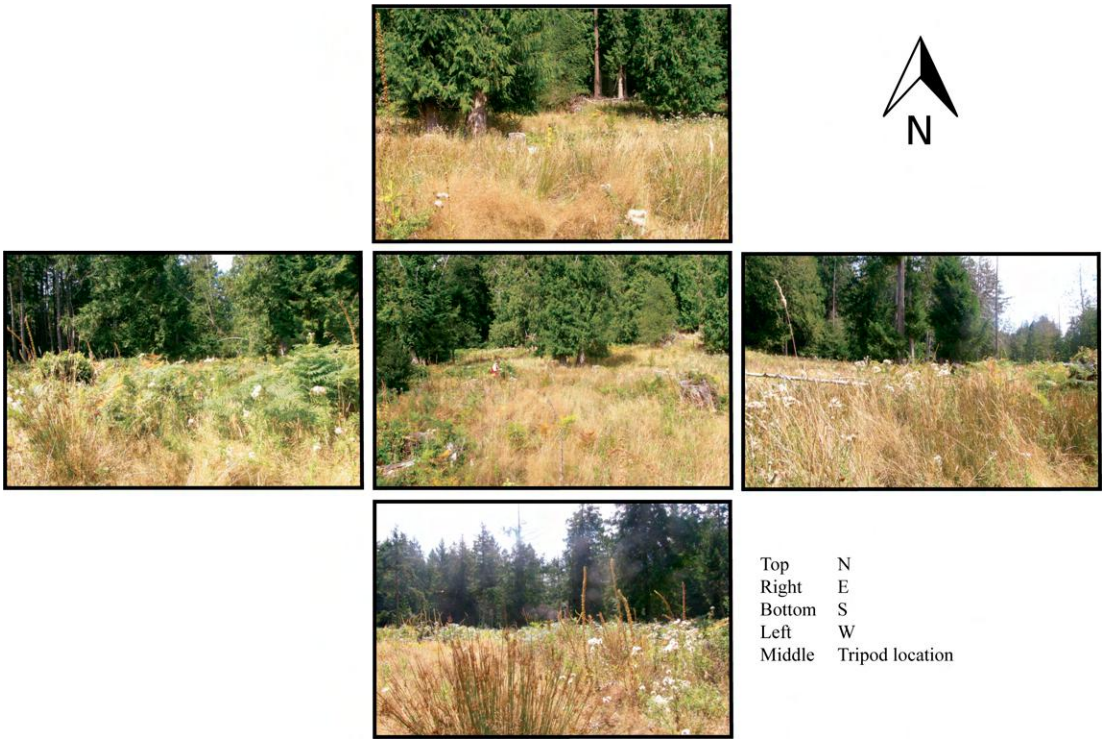
Metrics



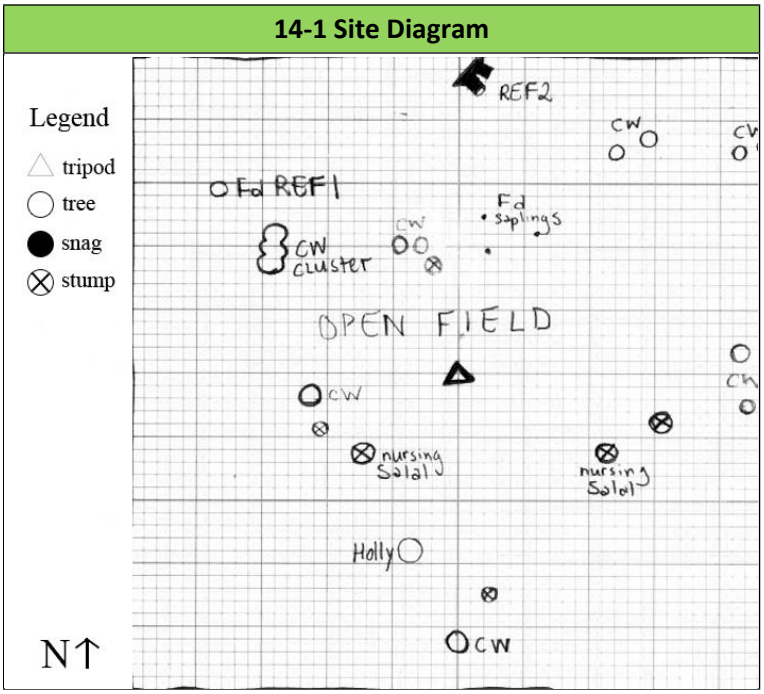
Metrics for Site 14-1 describe the site's moist, graminoid-dominated character, with scattered coniferous trees (*Thuja, Pseudotsuga*) among herbaceous, shrub, fern, and marginal bryophyte communities (listed in rank order of abundance). Plant composition reflects a broad spectrum of poor to rich, subxeric-hygric communities, with the majority (86%) of plant indicators falling across submesic-subhygric soil moisture regimes, and 92% of plant cover associated with a moderate to rich soil nutrient regime. Of the 33 sites surveyed the site ranks 17th in species richness, with 24 species observed. When evenness in the proportional abundances of species is considered, site diversity is augmented to the rank of 6th. Only about half of the flora observed are native, with 49.8% of estimated plant cover classified as exotic.

Photographs

14-1 Photographs



14-1 Site Diagram



Ecological Community 15

Description

Ecological Community 15 circumscribes a Sitka sedge (*Carex sitchensis*)-dominated wetland marsh (Wm50) with scattered patches of Bolander's rush (*Juncus bolanderi*) and common rush on slightly dryer micro–sites. The wetland has feathered margins where it transitions to young patches of western redcedar/Douglas-fir forest and logged areas with bracken fern, sword fern, salal and an exotic grass-dominated understory. Pacific water–parsley (*Oenanthe sarmentosa*) and field mint are also prominent throughout the marsh. This site is flooded for most of the year with soils remaining saturated into late August and September.

Ecological Community 15, Site 1 **Date Surveyed:** 23 August, 2012

Location

Location	References	Bearing	Description
N 5420134 E 464654	Ref. 1	25.6m @ 64°	Douglas-fir snag with double-stemmed, gnarly top (0.6m diametre)
	Ref. 2	13.5m @ 265°	Cluster of two young western redcedars; ref: that which is double-stemmed (0.3m diametre)

Site Description

Site ID:	15-1	**Aspect:**	N/A	**Exposure:**	N/A		
		Mesoslope Position:	DP	**Slope:**	0-1%		
Surface Substrate:							
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***		
0	0	0	10%	90%	0		
Structural Stage:	2b	**SMR:**	7+	**SNR:**	D-E	**Crown Closure:**	1%
Percent Cover				**Site Series:**	WM/50		
A	B	C	D				
1%	0	98%	1%				
Succession:	As Tree cover (western redcedar and red alder) will increase around the fringes of the wetland and possibly within drier raised micro-sites, however the open marsh wetland will persist as the dominant feature.						

Restoration Recommendations: N/A

Riparian Features: N/A

Disturbances

Anthropogenic: The site appears relatively undisturbed; roads and logging on the margins and in surrounding ecological communities.

Natural: N/A

Vegetation

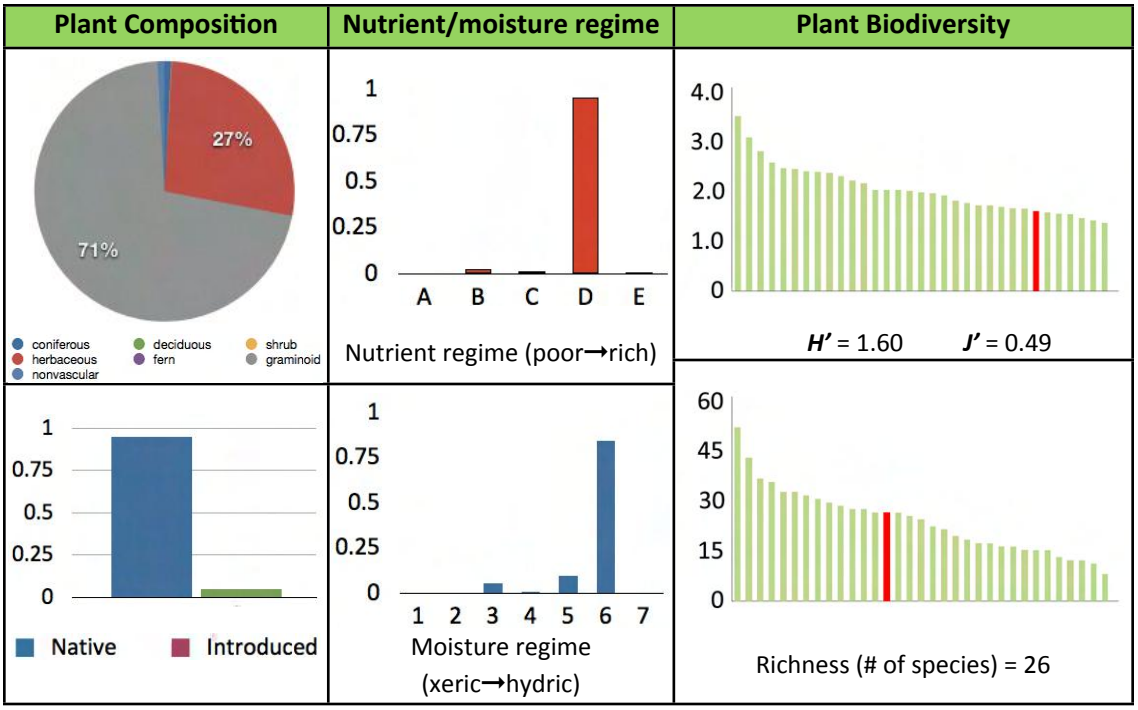
Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Anthoxanthum odoratum (sweet vernal grass)						3		5	3
Carex pallescens (pale sedge)						T		2	3
Carex sitchensis (Sitka sedge)						70		9	4
Cirsium sp. (thistle)						T		4	3
Eleocharis sp. (spike rush)						T		3	3
Galium sp.						T		5	3
Holcus lanatus (common velvet-grass)						3		4	3
Hypericum anagalloides (bog St. John's-wort)						3		5	4
Juncus bolanderi (Bolander's rush)						5		5	3
Juncus effusus (common rush)						10		6	3
Juncus mertensianus (Merten's rush)						T		3	3
Kindbergia oregana (Oregon beaked moss)							1	5	3
Kindbergia praelonga (common feather moss)							T	5	3
Lysimachia thyrsiflora (tufted loosestrife)						1		4	3
Medicago lupulina (black medic)						T		4	3
Mentha arvensis (field mint)						20		7	4
Erythranthe guttata (yellow monkey-flower)						1		5	3
Myosotis discolor (common forget-me-not)						T		4	3
Oenanthe sarmentosa (Pacific water parsley)						10		7	4
Phleum pratense (Timothy)						T		3	3
Pseudotsuga menziesii (Douglas-fir)		T						2	2
Ranunculus occidentalis (western buttercup)						T		4	3
Rubus leucodermis (blackcap raspberry)					T			2	3

Stachys mexicana (mexican hedge-nettle)						T		4	3
Stellaria calycantha (northern starwort)						T		2	3
Thuja plicata (western redcedar)		1						2	1
Vicia sp. (vetch)						T		4	3

Wildlife

Species	Life Stage	Evidence
Crickets (*Gryllinae* spp.)	N/A	H
Pacific chorus frog (*Pseudacris regilla*)	N/A	H

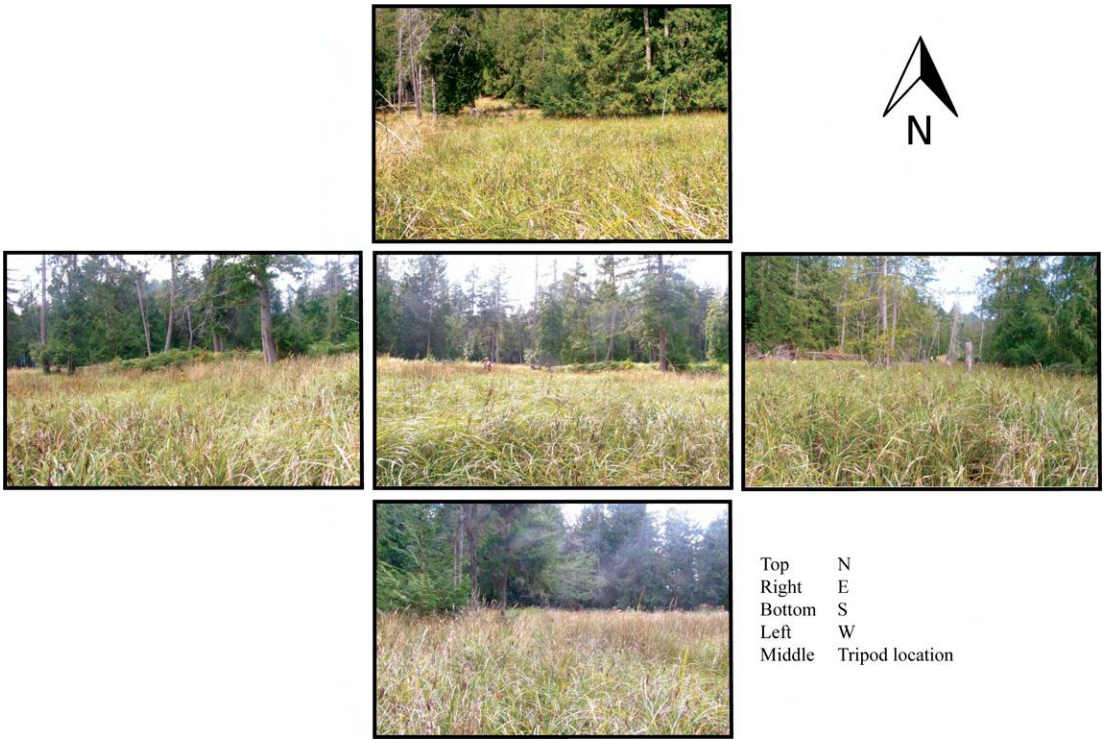
Metrics



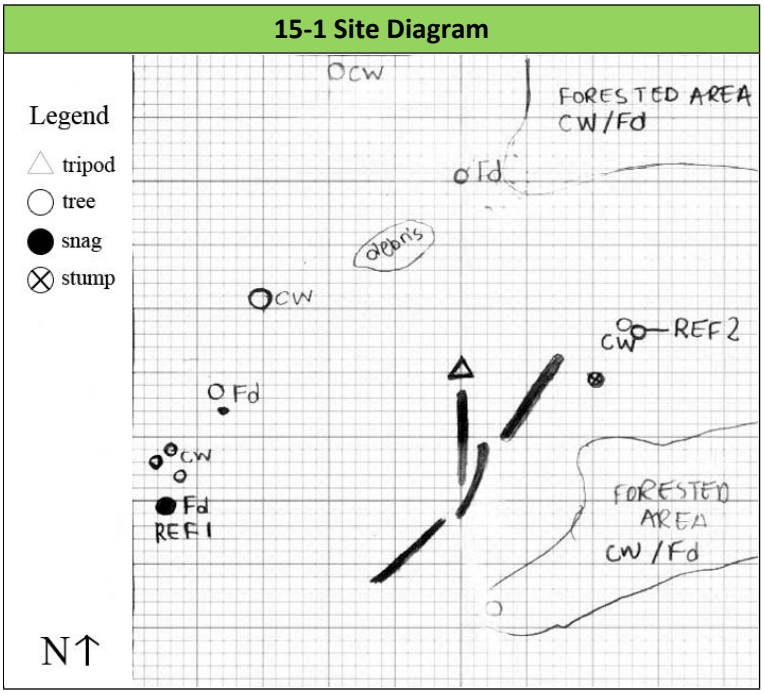
Metrics for Site 15-1 describe the site's marsh-wetland character, showing prevalence among hydrophytic graminoids and forbs, with coniferous trees (*Thuja, Pseudotsuga*), bryophytes and shrubs scattered throughout (listed in rank order of abundance). Plant composition reflects a rich, hygric community, with the majority (85%) of plant cover indicating a hygric soil moisture regime, and 96% of plant cover associated with a rich soil nutrient regime. According to this metric, Site 15-1 is the wettest site evaluated, and the third richest in terms of soil nutrient regime. Of the 33 sites surveyed the site ranks 15th in species richness, with 26 species observed. When evenness in the proportional abundances of species is considered, however, site diversity is diminished to the rank of 27th. The majority of flora observed are native, with 5% of estimated plant cover classified as exotic.

Photographs

15-1 Photographs



15-1 Site Diagram



Ecological Community 16

Description

Ecological Community 16 includes a small 20–30 metre wide strip of young western redcedar-dominated forest on a moderate southwest–facing slope between the upper chicken coop area and lower valley. Almost all of the Douglas-fir has been removed from this patch. It has high boulder cover and the dominant understory vegetation includes bracken fern, sword fern, *Isothecium* moss and common exotic grasses.

Ecological Community 17

Description

Ecological Community 17 encompasses an open clearcut area with an extensive history of grazing. Site characteristics are zonal but logging and grazing have resulted in a graminoid-dominated plant community with very little natural regeneration. Dominant vegetation includes colonial bentgrass, common velvet–grass, and thistle, with scattered patches of bracken fern and salal. The area was logged roughly 15 years ago and includes a high density of access/farm roads. Soils are generally compacted from grazing and machine/truck use. Four derelict sheds are located within the ecological community, along with a fenced chicken run and a variety of pallets and small structures. The ecological community is consists of an upper and lower plateau divided by a moderate, southwest facing, young western redcedar dominated slope (Ecological Community 16)Areas on the upper plateau appear to have been used for sheep–shearing, firewood–cutting and log–staging, and as a chicken coop/run.

Ecological Community 17, Site 1 **Date Surveyed:** 29 August, 2012

Location

Location	References	Bearing	Description
N 5420122 E 464902	Ref. 1	8.7m @ 126°	young alder (0.8 m diametre) growing amid coarse woody debris
	Ref. 2	31.2m @ 96°	small diametre (0.3m) Douglas-fir snag with snapped top, nearby a mature western redcedar with a defoliated top

Site Description

The site is located on the upper 'chicken coop' plateau and exhibits site conditions that are slightly more disturbed than is typical of the ecological community. The area shows evidence of concentrated sheep presence (for sheering?) as well as more soil compaction from vehicle use. Possibly it was used as a log staging area or firewood cutting station.

Site ID:	17-1	**Aspect:**	150°	**Exposure:**	N/A
		Mesoslope Position:	MD	**Slope:**	2%

Surface Substrate:					
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***
0	3%	1%	12%	84%	0

Structural Stage:	2b	**SMR:**	3	**SNR:**	C	**Crown Closure:**	1%

Percent Cover					
A	B	C	D	**Site Series:**	CDF/01
0	4%	95%	1%		
Succession:	N/A				

Restoration Recommendations: N/A

Riparian Features: N/A

Disturbances

Anthropogenic: Site was clearcut logged and is heavily grazed. Road and vehicle access has resulted in heavily compacted soils. Site includes a staging area or firewood station.

Natural: N/A

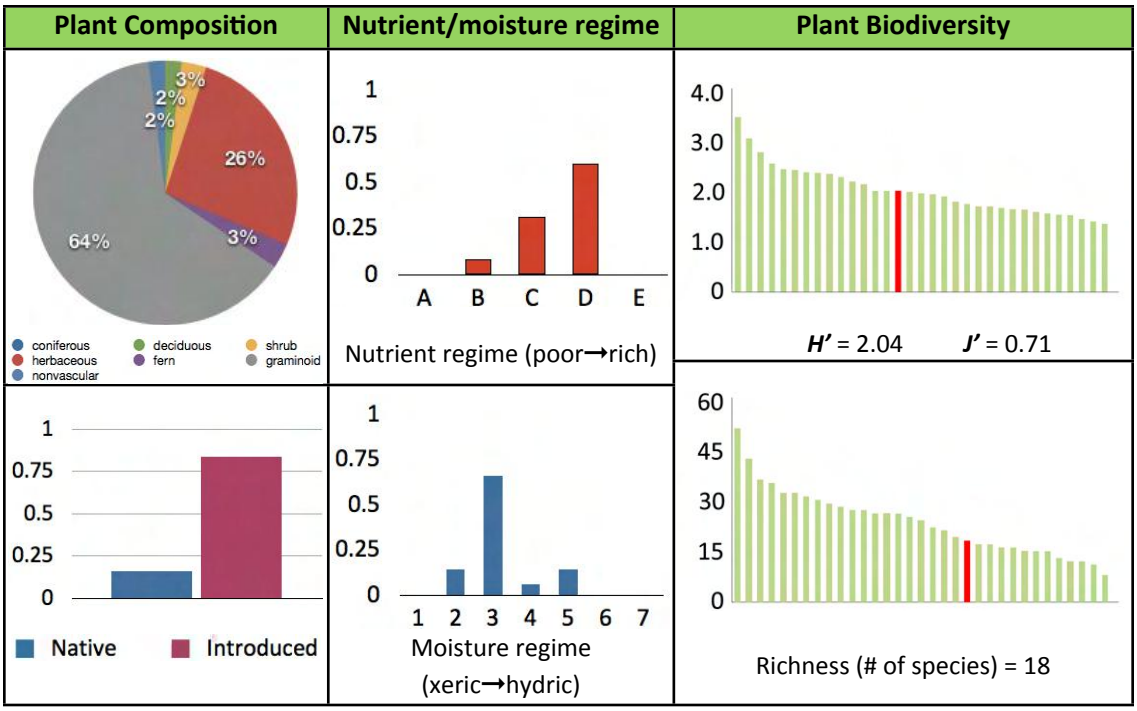
Vegetation

Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Achillea millefolium (yarrow)						1		5	3
Achlys triphylla (vanilla leaf)						1		5	3
Agrostis capillaris (colonial bentgrass)						40		8	3
Alnus rubra (red alder)				2				1	1
Anthoxanthum odoratum (sweet vernal grass)						3		5	3
Bromus sp.						2		5	3
Cirsium sp. (thistle)						15		6	4
Dactylis glomerata (orchard grass)						1		5	3
Digitalis purpurea (common foxglove)						2		4	4
Gaultheria shallon (salal)					2			5	2
Hieracium sp.						T		5	3
Holcus lanatus (common velvet-grass)						15		6	3
Hypochaeris radicata (hairy cat's-ear)						5		6	3
Juncus effusus (common rush)						1		4	3
Kindbergia oregana (Oregon beaked moss)							2	5	2
Phleum pratense (Timothy)						8		6	3
Pteridium aquilinum (bracken fern)						3		6	2
Rubus ursinus (trailing blackberry)					1			5	3
Urtica dioica (stinging nettle)						2		6	2

Wildlife

Species	Life Stage	Evidence
Blacktailed deer (*Odocoileus hemionus columbianus*)	N/A	S
Blue-eyed darner (*Rhionaeschna multicolor)*	A	V
Sheep	N/A	F

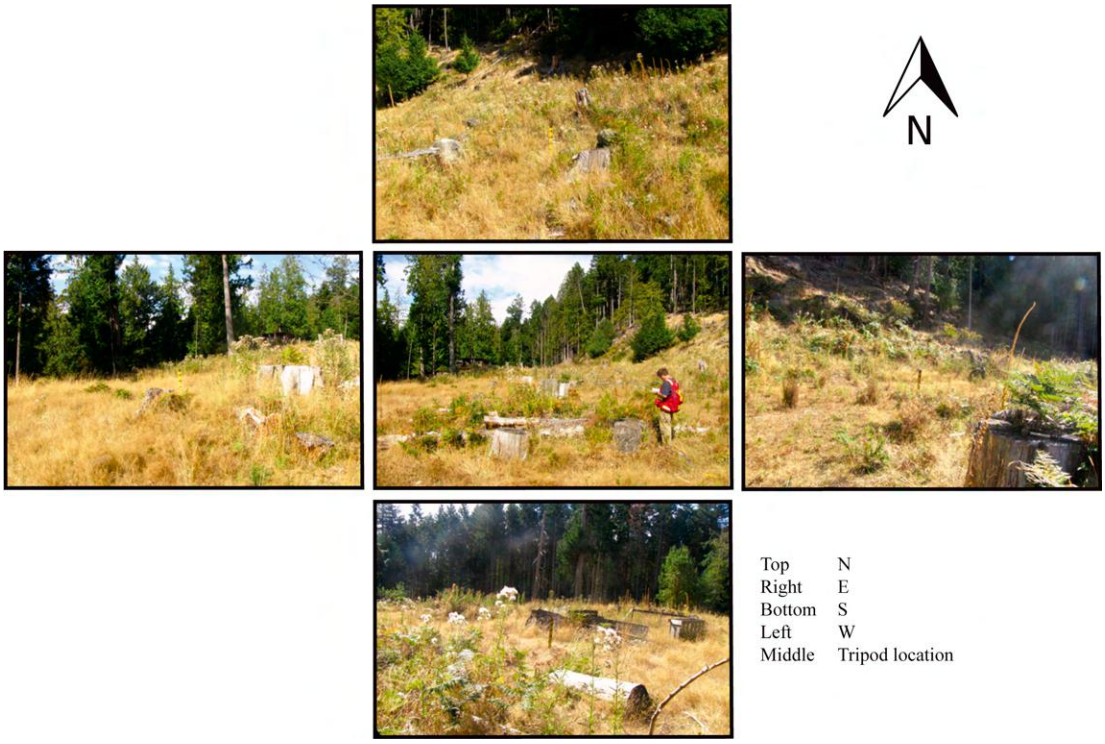
Metrics



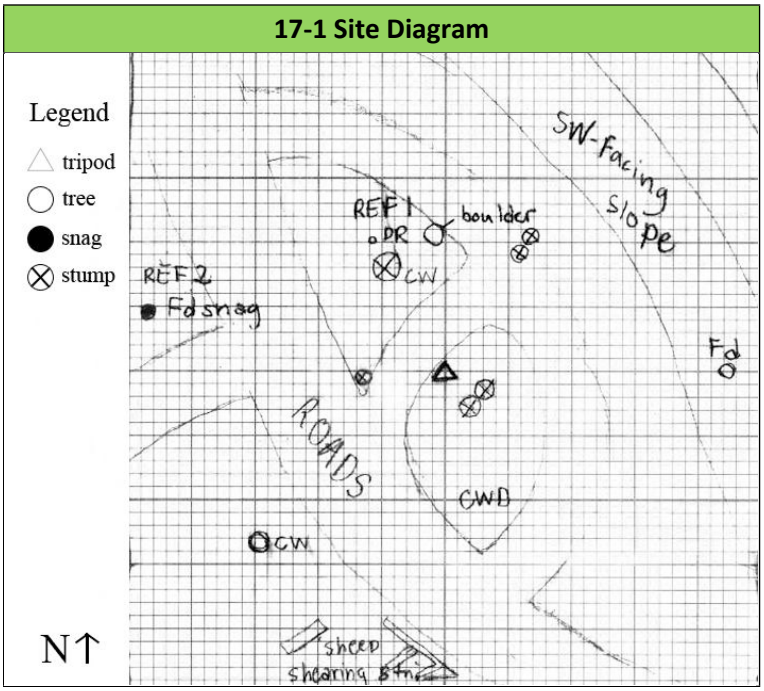
Metrics for Site 17-1 describe the site's rural character as dominated by graminoids and herbaceous plants, with shrubs, ferns, bryophytes and deciduous trees (*Alnus*) scattered throughout (listed in rank order of abundance). Plant composition reflects a moderate to rich, largely submesic community, with the majority of plant indicators (66%) suggesting a submesic soil moisture regime and 91% of plant cover associated with a moderate to rich soil nutrient regime. Of the 33 sites surveyed the site ranks 21st in species richness, with 18 species observed. When evenness in the proportional abundances of species is considered, site diversity is augmented to the rank of 15th. A great majority of the flora observed are exotic, with only 16% of estimated plant cover classified as native. Site 17-1 is among the three most compromised sites surveyed in terms of introduced species.

Photographs

17-1 Photographs



17-1 Site Diagram



Ecological Community 17 Photographs

PP9. Two structures standing at the bottom of a gradual slope (Ecological Communities 17/ 14b)

PP10. Two stables and a paddock (Ecological Community 17), upslope from the structures below

Ecological Community 17 Photographs

PP11. Seven feral sheep

Ecological Community 18

Description

The ecological community delineates an isolated stand of young, 60-year-old Douglas-fir. It has the appearance of a plantation. Trees are densely spaced, tall and skinny in form, with small crowns. Patches of alder are interspersed with the Douglas-fir, primarily along the ecological community's northern boundary, where the site transitions to moister and richer soils. The understory is dominated by exotic grasses including orchard grass and common velvet grass, with sparse patches of salal and Oregon grape, and bracken fern scattered throughout.

Ecological Community 18, Site 1 **Date Surveyed:** 8 August, 2012

Location

Location	References	Bearing	Description
N 5420016 E 464926	Ref. 1	18.2m @ 40°	0.2m diametre alder at the edge of Douglas-fir stand
	Ref. 2	30.6m @ 330°	1m diametre cedar at edge of Douglas-fir stand

Site Description:

Located towards the western end of the Ecological Community, roughly centred north to south, the site is representative of Douglas-fir dominated portion and does not include an alder patch.

Site ID:	18-1		**Aspect:**	120°	**Exposure:**	N/A	
			Mesoslope Position:	MD	**Slope:**	8%	
Surface Substrate:							
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***		
0	0	1%	6%	93%	0		
Structural Stage:	5/Cs	**SMR:**	2-3	**SNR:**	C	**Crown Closure:**	75%
Percent Cover				**Site Series:**	CDF/01		
A	B	C	D				
75%	10%	90%	20%				
Succession:	N/A						

Restoration Recommendations:

Stand could benefit from light thinning treatment of smaller diametre Douglas-fir.

Riparian Features: N/A

Disturbances

Anthropogenic: Appears to have been cleared, including stumps for agriculture, in the early to mid 1900s, then planted to Douglas-fir approximately 60 years ago. Heavy browse by sheep (evidenced by wool stuck to browsed *Berberis*).

Natural: Self-thinning and wind-throw are evident.

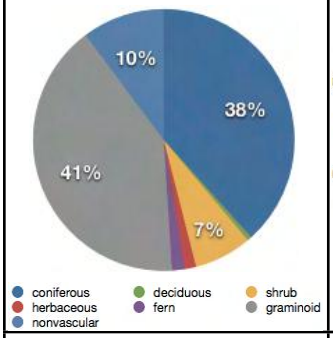
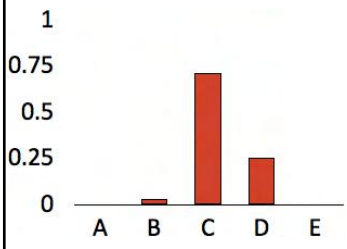
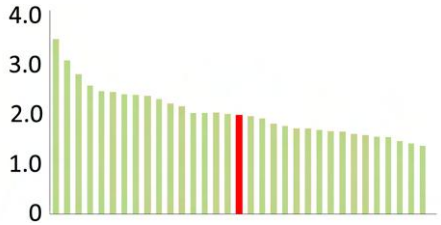
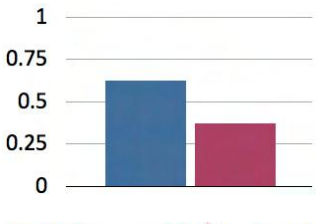
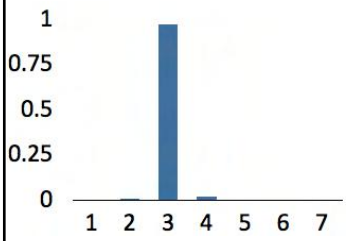
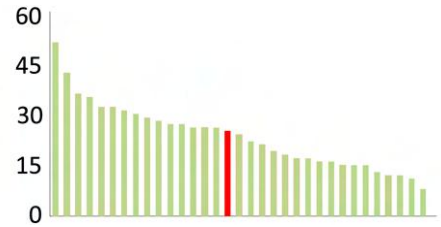
Vegetation

Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Agrostis capillaris (colonial bentgrass)						2		5	4
Alnus rubra (red alder)			1					5	2
Anthoxanthum odoratum (sweet vernal grass)						5		5	4
Arbutus menziesii (arbutus)							T	1	3
Berberis nervosa (dull Oregon grape)					10			5	1
Cirsium sp.						1		2	3
Dactylis glomerata (orchard grass)						15		8	4
Digitalis purpurea (common foxglove)						T		2	3
Galium sp.						T		2	3
Gaultheria shallon (salal)					3			5	3
grass sp.1						10		5	4
grass sp.2						3		5	4
Grindelia stricta (Oregon gumweed)						T		2	3
Hieracium sp.						1		2	3
Holcus lanatus (common velvet-grass)						40		9	4
Kindbergia oregana (Oregon beaked moss)							20	5	2
Lactuca muralis (wall lettuce)						T		2	2
Lonicera hispidula (hairy honeysuckle)					1			5	3
Phleum pratense (Timothy)						5		5	4
Polystichum munitum (western sword fern)						T		2	2
Pseudotsuga menziesii (Douglas-fir)		70	5				T	7	2
Pteridium aquilinum (bracken fern)						3		5	3
Taraxacum sp. (Ruderalia) (dandelion)						T		2	3
Trientalis latifolia (western starflower)						T		2	2
Vicia sp. (vetch)						T		2	2

Wildlife

Species	Life Stage	Evidence
Blacktailed deer (*Odocoileus hemionus columbianus*)	N/A	F
Woodpecker	N/A	F
Turkey vulture (*Cathartes aura*)	A	V

Metrics

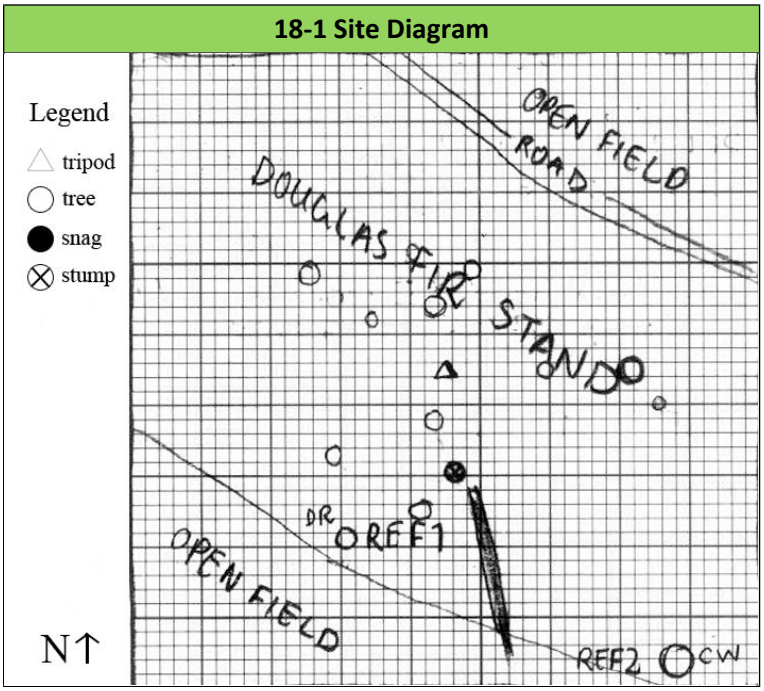
Plant Composition	Nutrient/moisture regime	Plant Biodiversity
	 Nutrient regime (poor→rich)	 ***H'*** = 1.99 ***J'*** = 0.62
	 Moisture regime (xeric→hydric)	 Richness (# of species) = 25

Metrics for Site 18-1 describe the site character of an open woodlot, with a sparse canopy comprised of coniferous trees (*Pseudotsuga*) and an understory dominated by graminoids, with shrubs, bryophytes, ferns and deciduous trees (*Alnus*) distributed throughout (listed in rank order of abundance). Plant composition reflects a moderately rich to rich, submesic community, with the majority of plant cover (97%) indicative of a submesic soil moisture regime, and 71% of plant cover associated with a moderate soil nutrient regime. Of the 33 sites surveyed the site ranks 16th in species richness, with 25 species observed. When evenness in the proportional abundances of species is considered, site diversity falls to the rank of 17th. The majority of flora observed are native, with 37% of the overall plant cover classified as exotic.

Photographs

18-1 Photographs

18-1 Site Diagram



Ecological Community 19

Description

Ecological Community 19 includes a graminoid-dominated, moisture-receiving lower slope and depression area. Soil moisture ranges generally from subhygric to subhydric, with some areas saturated and patches of standing water during winter months. The ecological community also includes slough sedge-dominated patches that become inundated with water over the winter. In addition, a strip of young red alder-dominated forest with a sword fern and slough sedge dominated understory runs along the northern boundary adjacent to Ecological Community 18. A similar small patch is located on the southern portion of the ecological community. The bulk of the ecological community appears to have been logged and cleared for agriculture several decades ago. The lower slope portions are slightly drier, with more coverage of grasses (velvet grass, colonial bentgrass) and less coverage of common rush.

Note: Ecological Community 20, which designated a small wetland depression, has been incorporated into Ecological Community 19.

Ecological Community 19, Site 1 **Date Surveyed:** 8 August, 2012

Location

Location	References	Bearing	Description
N 5419978 E 464987	Ref. 1	21m @ 158°	Stark root mass with root jutting upward 2-3m
	Ref. 2	20.8m @ 282°	Mature hawthorn, about 5m tall

Site Description

The site is located between a small patch of alder/Douglas–fir forest. The site is in the portion of the ecological community to the south of Polgyon 19. It is representative of the common rush dominated clearing, but includes a small portion of the alder/Douglas–fir patch and a small portion of a slough sedge marsh patch.

Site ID:	19-1	**Aspect:**	120°	**Exposure:**	Sun*
		Mesoslope Position:	DP	**Slope:**	2%

Surface Substrate:					
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***
0	0	0	3	97%	0

Structural Stage:	2b	**SMR:**	5-7	**SNR:**	C-D	**Crown Closure:**	2%

Percent Cover					
A	B	C	D	**Site Series:**	CDF/06/11
2%	3%	98%	2%		
Succession:	N/A				

Restoration Recommendations

Riparian Features: N/A

Disturbances:

Anthropogenic: Logged and cleared (stumps removed).

Natural: N/A

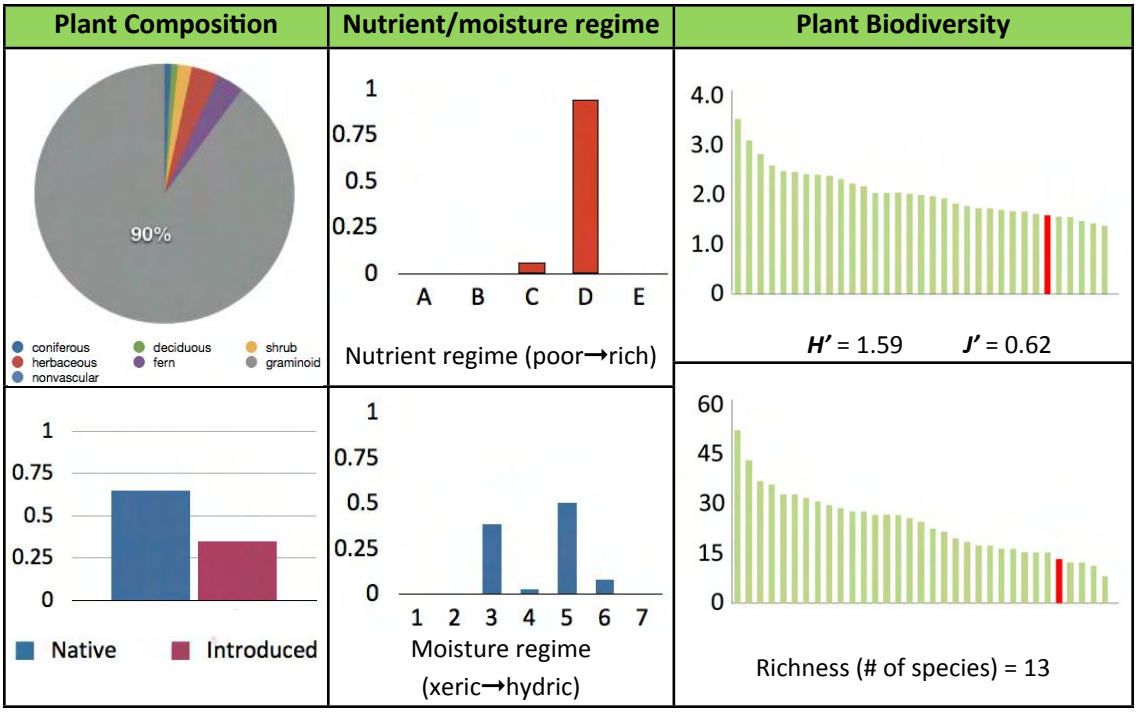
Vegetation

Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Alnus rubra (red alder)	1							1	1
Carex obnupta (slough sedge)						8		5	4
Cirsium sp.						3		2	3
Galium sp.						T		2	3
Gaultheria shallon (salal)					2			5	2
grass sp.1						15		5	4
Holcus lanatus (common velvet-grass)						35		8	4
Juncus effusus (common rush)						50		8	4
Polystichum munitum (western sword fern)						1		2	2
Pseudotsuga menziesii (Douglas-fir)	1							1	2
Pteridium aquilinum (bracken fern)						3		2	2
Rubus ursinus (trailing blackberry)					T			2	3
Urtica dioica (stinging nettle)						1		2	3

Wildlife

Species	Life Stage	Evidence
Blue-eyed darner (*Rhionaeschna multicolor)*	A	V
Turkey vulture (*Cathartes aura*)	A	V

Metrics

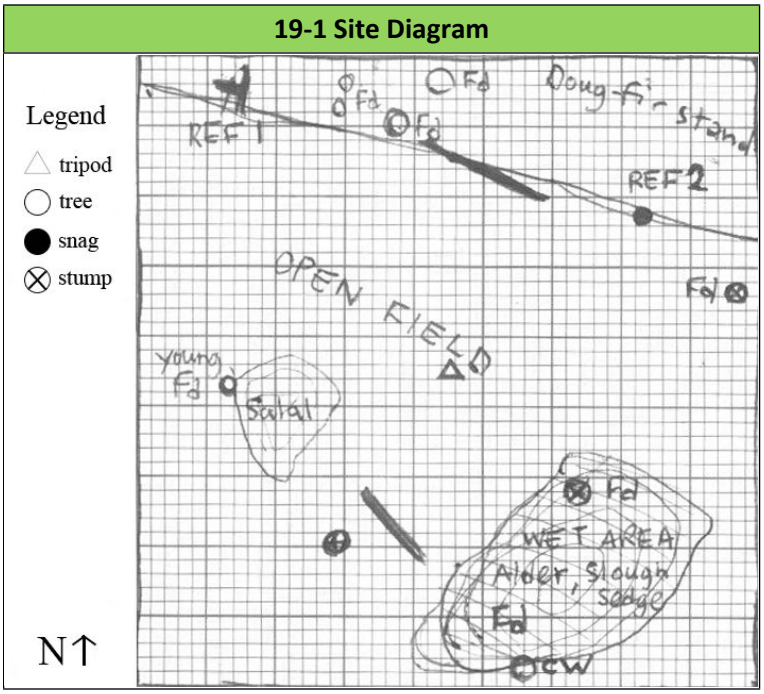


Metrics for Site 19-1 describe the site's rural character as dominated by graminoids, with forbs, ferns and shrubs, as well as coniferous (*Pesudotsuga*) and deciduous trees (*Alnus*), scattered throughout (listed in rank order of abundance). Plant composition reflects moderate to rich, submesic-hygric communities, with plant indicators falling into a bimodal distribution, suggestive of topographic variation across submesic (39%) and subhygric (50%) moisture regimes. Among the subset of plant indicators considered, 94% of plant cover is associated with a rich soil nutrient regime. Of the 33 sites surveyed the site places in the lower quartile, ranking 29th in species richness with 13 species observed. When evenness in the proportional abundances of species is considered, site diversity is augmented to the rank of 28th. The majority of flora observed are native species, with 35% of estimated plant cover classified as exotic.

Photographs

19-1 Photographs

19-1 Site Diagram



Ecological Community 20

Description

Ecological Community 20 has been incorporated into the description of Ecological Community 19 (see above).

Ecological Community 21

Description

Ecological Community 21 is a highly modified area used as the primary residence on the property and includes a house, a dug well, a number of open and walled-in sheds as well as a garden site formerly used for production of ornamental flowers. The ecological community also includes a variety of roads including the main access driveway and turnaround. Hydrology within this area has been significantly modified through road construction and ditching, most notably the creek that empties into the cove has been diverted from its natural course through Ecological Community 22 by a roadside ditch. A fragmented patch of young Douglas-fir–salal (CDFmm/01) occurs in the western portion of this ecological community extending in from neighbouring Ecological Community 1. A patch of Douglas-fir and western redcedar occurs within the northern 'arm' of the ecological community around an old derelict chicken coup with an understory comprised of native shrubs and invasive grasses. There are also a few scattered individual Douglas-fir trees and several cultivated fruit trees (quince, apple) in the ecological community. Soil conditions within the ecological community are similar to those found in Ecological Community 19 and would likely support a fringe of Douglas-fir–salal (CDFmm01) on the slopes transitioning into a moister CDFmm/06 forested site and into a CDFmm/11 site in the 'central' depression area currently being drained by a ditch.

Ecological Community 21 Photographs

PP12. Main house and storage sheds, parked car and trailer

PP13. Central house location, road, sheds and storage

Ecological Community 21 Photographs

PP14. Structures along the road crossing through Ecological Community 21, looking toward the central house

PP15. Structures along the road running west from the central house location, including one large workshop with an uncovered roof and the shed below in Ecological Community 19 (foreground)

Ecological Community 22

Description

Ecological Community 22 is a partially fenced old garden and orchard site. The area was logged, cleared of stumps, and cultivated. It is currently dominated by graminoids, including common velvet-grass, colonial bentgrass, *Bromus* sp. and common rush. Other invasive exotic grasses such as sweet vernal grass are also plentiful. A network of drainage ditches and a variety of old, degrading garden related infrastructure such as fencing and a chicken coup building remain on the site. The clay/loam soils are very moist with the water table reaching within 30cm of the surface during winter months. This ecological community would likely develop into a CDFmm/06 ecosystem over time if restored. The ditched stream that runs down to the cove may have run through this ecological community at one time, prior to the construction of the main access driveway and associated ditches.

Ecological Community 23

Description

Ecological Community 23 is a cleared field dominated by graminoids, including common velvet-grass, colonial bentgrass, *Bromus* sp. and common rush. Other invasive exotic grasses such as sweet vernal grass are also plentiful. The ecological community appears to have been cultivated at one time but has more recently been used as a pasture for grazing. Soils appear somewhat compacted, possibly from long-term grazing. There is a small east–west running ditch in the southern portion of the ecological community, draining water from the valley out into the cove. The ditch is characterized by a strip of moister soils, saturated well into the summer and dominated by common rush with patches of Bolander's rush (*Juncus bolanderi*).

Ecological Community 23, Site 1 **Date Surveyed:** 20 August 2012

Location

Location	References	Bearing	Description
N 5419836 E 465286	Ref. 1	13.5m @ 318°	0.3m diametre western redcedar with blue flagging in one of its boughs; located east of an opening in the tree-line on the southern edge of the field.
	Ref. 2	21.4m @ 16°	Double-stemmed western redcedar with snagged top—one short, thin stem, the other taller; flagged with white/red-striped ribbon; located west of an opening in the tree-line on the southern edge of the field.

Site Description

The site is located just uphill from the fenced garden area and is representative of the ecological community, including a small portion of the drainage ditch.

Site ID:	23-1	**Aspect:**	285°	**Exposure:**	N/A
		Mesoslope Position:	LW	**Slope:**	2%

Surface Substrate:					
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***
0	0	0	0	100%	0

Structural Stage:	2b	**SMR:**	6-7	**SNR:**	D	**Crown Closure:**	0

Percent Cover				**Site Series:**	CDF/06(90%)/ 11(10%)
A	B	C	D		
0	0	100%	0		
Succession:	N/A				

Restoration Recommendations:

Considerations for restoration of this ecological community would include tree planting, with a mix of alder and appropriate conifers, as well as distribution of coarse woody debris.

Riparian Features: N/A

Disturbances

Anthropogenic: Cleared and grazed. Possible cultivation in the past. Soils somewhat compacted.

Natural: N/A

Vegetation

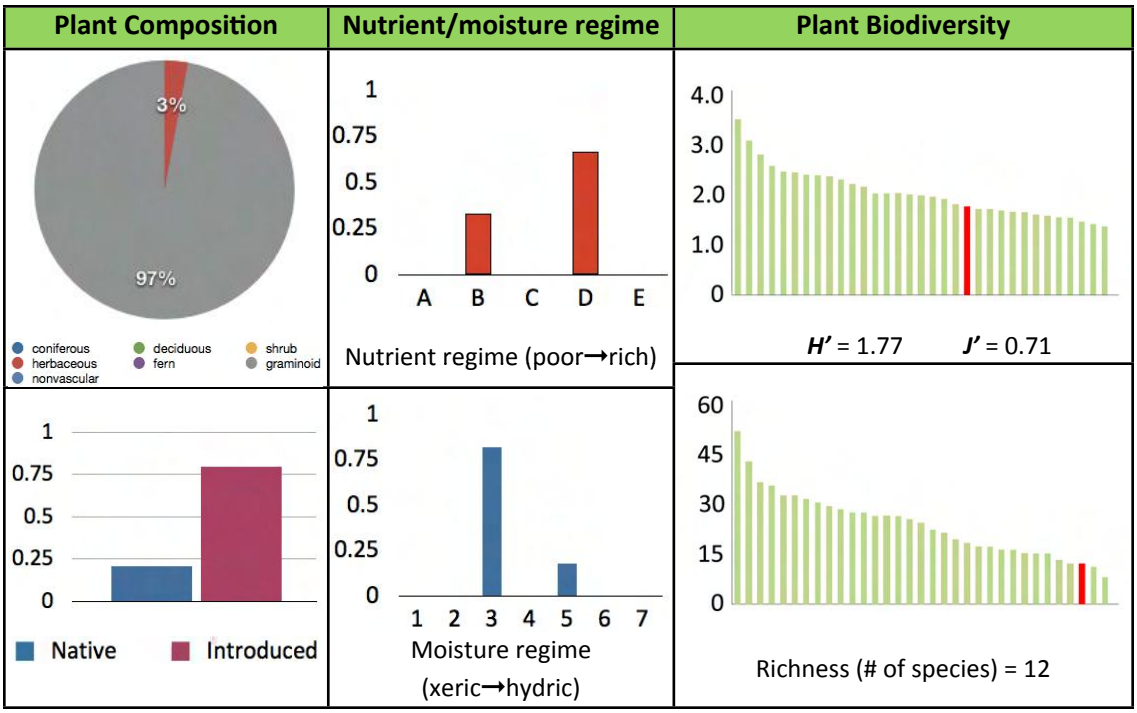
Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Agrostis exarata (spike bentgrass)						8		4	3
Agrostis capillaris (colonial bentgrass)						35		8	3
Anthoxanthum odoratum (sweet vernal grass)						15		5	3

Bromus sp.						25		7	3
Holcus lanatus (common velvet-grass)						20		5	3
Hypochaeris radicata (hairy cat's-ear)						T		2	3
Juncus bolanderi (Bolander's rush)						T		5	3
Juncus effusus (common rush)						8		5	3
Mentha arvensis (field mint)						T		3	4
Prunella vulgaris (self-heal)						T		2	3
Ranunculus occidentalis (western buttercup)						2		2	3
Ranunculus repens (creeping buttercup)						20		8	3
Vicia sp. (vetch)						1		2	3

Wildlife

Species	Life Stage	Evidence
Crickets (*Gryllinae* spp.)	N/A	H
Blue-eyed darner (*Rhionaeschna multicolor)*	A	V

Metrics

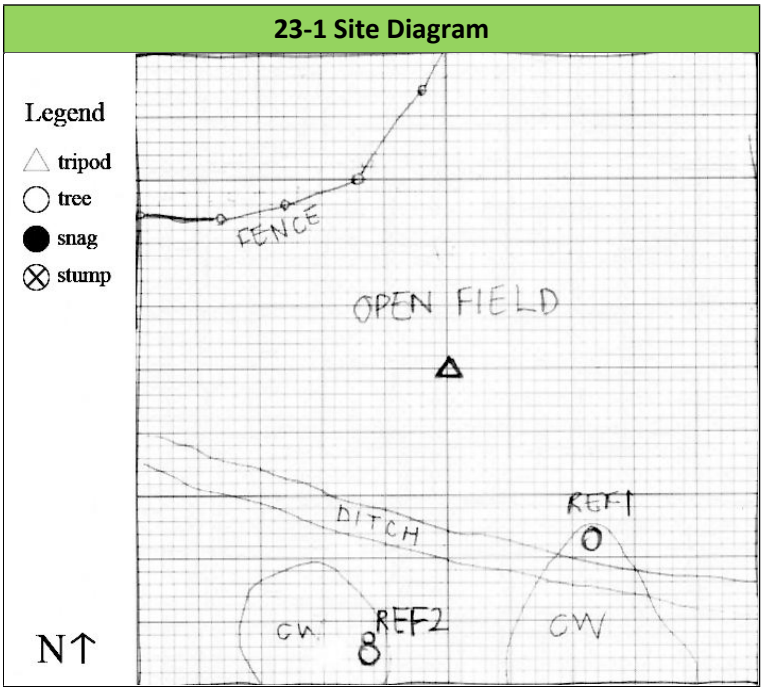


Metrics for Site 23-1 describe the site's rural character as one utterly dominated by graminoids, with forbs marginally scattered throughout (listed in rank order of abundance). Plant composition is indicative of poor to rich, submesic-subhygric communities, with plant indicators falling into a bimodal distribution, suggesting topographic variation across submesic (82%) and subhygric (18%) moisture regimes, with bimodal distribution also seen across poor (33%) to rich (66%) soil nutrient regimes. Of the 33 sites surveyed the site places in the lower quartile, ranking 30th in species richness with 12 species observed. When evenness in the proportional abundances of species is considered, site diversity is augmented to the rank of 21st. The majority of flora observed are exotic species, with 21% of estimated plant cover classified as native.

Photographs

23-1 Photographs

23-1 Site Diagram



Ecological Community 23 Photographs

PP16. East of Ecological Community 23 lies an open field (Ecological Community 33b) containing a paddock area, a small shed/doghouse, and a tarped greenhouse

PP17. Above the open field, a road runs past a stable toward the east end of the valley

Ecological Community 24

Description

Ecological Community 24 is described by a mosaic of patchy, young Douglas-fir, red alder, western redcedar and sword fern in a matrix of recently logged (within the last decade) graminoid-dominated open areas. The ecological community includes lower slopes and some minor depression areas with a vegetation community indicative of a CDFmm/06 site series. Also included are small pockets of moister soils where common rush, horsetail and a variety of sedges are prevalent. Several slightly raised micro-sites are found within the ecological community which are more characteristic of a mid-slope Douglas-fir/salal CDFmm/01 site. Several skid roads criss-cross from one side of the ecological community to the other. These areas show signs of soil compaction and are dominated by exotic grasses and common rush.

Ecological Community 24, Site 1 **Date Surveyed:** 13 August, 2012

Location

Location	References	Bearing	Description
N 5419750 E 465436	Ref. 1	6.1m @ 359˚	0.4m diametre, tall Douglas-fir stump
	Ref. 2	2.9m @ 152˚	1m diametre cedar stump

Site Description

The site is located on the lower slope, on the north side of the valley, and is characteristic of a CDFmm/06 community. However, having been recently logged it is now dominated by graminoids. A couple patches of intact, young forest have also been included on the periphery of the plot.

Site ID:	24-1	**Aspect:**	274°	**Exposure:**	Sun
		Mesoslope Position:	LW	**Slope:**	5%
Surface Substrate:					
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***
0	0	1%	8%	91%	0

Structural Stage:	2b/5	**SMR:**	5	**SNR:**	D	**Crown Closure:**	15%
Percent Cover				**Site Series:**		CDF/06	
A	B	C	D				
15%	3%	95%	91%				
Succession:	Sunny exposure results in drier winters and wetter winter in cleared areas, affecting succession.						

Restoration Recommendations: N/A

Riparian Features: N/A

Disturbances

Anthropogenic: Recently logged, with small patch retention. Skid trail skirts the edges of the ecological community.

Natural: N/A

Vegetation

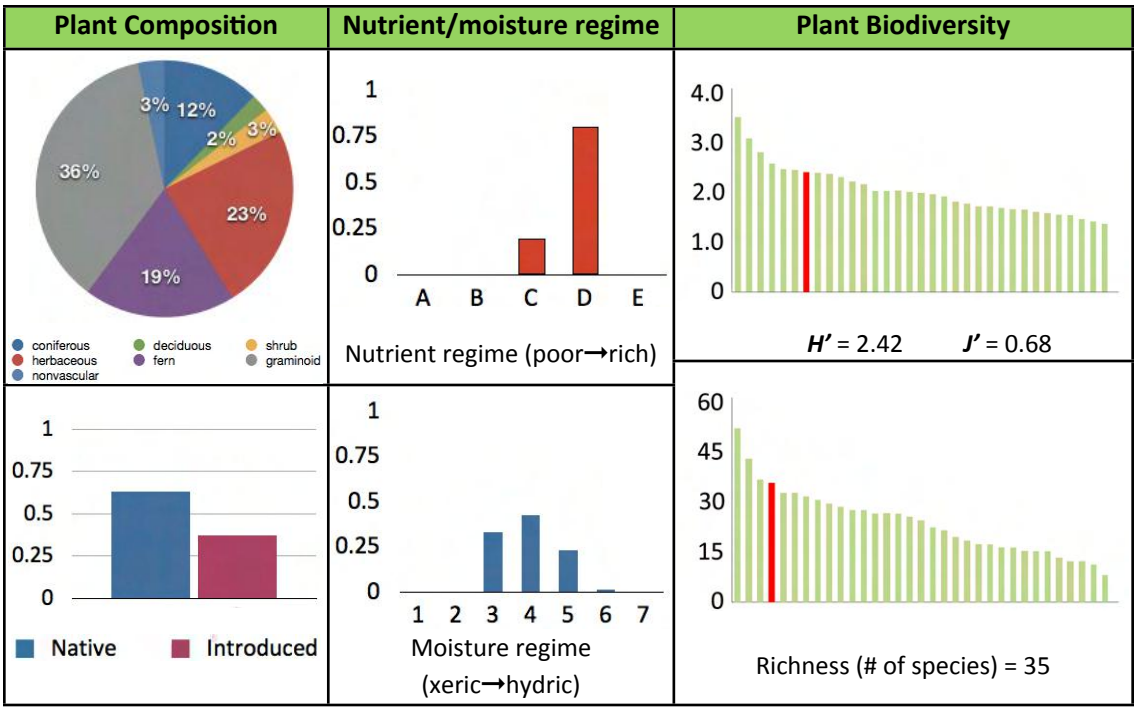
Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Achlys triphylla (vanilla leaf)						T		3	3
Agrostis capillaris (colonial bentgrass)						7		5	4
Alnus rubra (red alder)		3						2	1
Bromus sp.						2		5	4
Carex sp. (sedge)						T		3	3
Cirsium sp. (thistle)						10		6	4
Digitalis purpurea (common foxglove)						T		2	4
Equisetum arvense (common horsetail)						15		6	4
Galium sp.						T		4	4
Gaultheria shallon (salal)					3			5	3
grass sp.1 (spike; tawney)						5		5	4
Hieracium sp.						T		2	3
Holcus lanatus (common velvet-grass)						30		8	4
Hylocomium splendens (stair-step moss)							T	5	4
Hypochaeris radicata (hairy cat's-ear)						T		4	3
Isothecium stoloniferum							1	5	3

Juncus effusus (common rush)						3		5	3
Kindbergia oregana (Oregon beaked moss)							3	5	4
Kindbergia praelonga (common feather moss)							T	5	3
Lactuca muralis (wall lettuce)						T		2	4
Lonicera hispidula (hairy honeysuckle)					T			2	3
Myosotis discolor (common forget-me-not)						T			
Polystichum munitum (western sword fern)						25		6	3
Pseudotsuga menziesii (Douglas-fir)	2							1	3
Pteridium aquilinum (bracken fern)						T		4	2
Rhytidiadelphus loreus (lanky moss)							T	5	3
Rhytidiadelphus triquetrus (electrified cat's tail)						T		5	3
Rubus ursinus (trailing blackberry)					1			4	3
Scirpus microcarpus (small-flowered bullrush)						1		3	4
Stachys mexicana (mexican hedge-nettle)						T		4	3
Thuja plicata (western redcedar)	6	7		1				2	3
Tsuga heterophylla (western hemlock)				T				1	3
Urtica dioica (stinging nettle)						5		6	3
Vaccinium parvifolium (red huckleberry)					T			1	1
Vicia sp. (vetch)						T		4	3

Wildlife

Species	Life Stage	Evidence
Anna's hummingbird (*Calypte anna*)	A	V
Hairy woodpecker (*Picoides villosus)*	A	V
Pacific chorus frog (*Pseudacris regilla*)	N/A	H
Woodpecker	N/A	F
Red-tailed hawk (*Buteo jamaicensis)*	A	V
Sparrow	A	V

Metrics

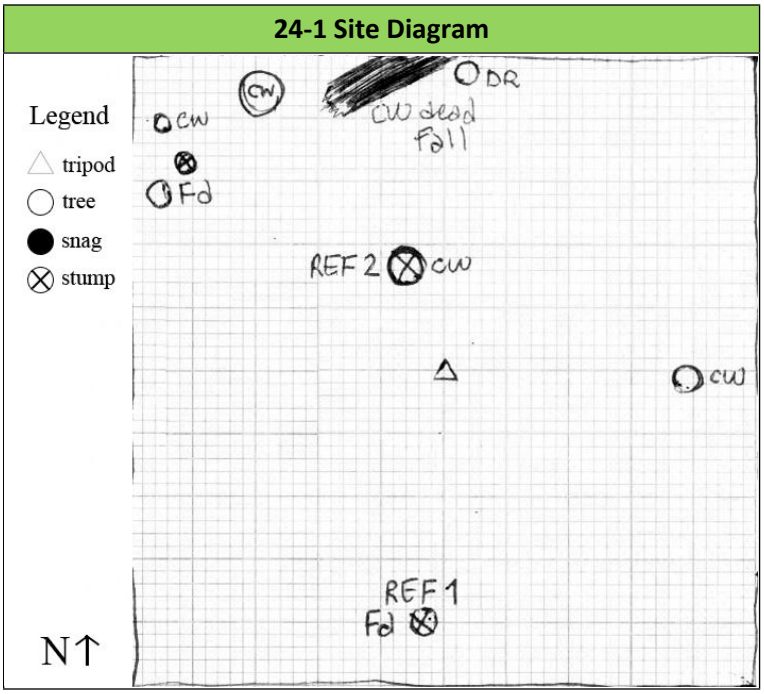


Metrics for Site 24-1 describe the site's rural character as dominated largely by graminoids, with patches of forbs, ferns and coniferous trees (*Thuja, Pseudotsuga*) among scattered bryophytes, shrubs and deciduous trees (*Alnus*) (listed in rank order of abundance). Plant composition reflects a moderately rich to rich, submesic-subhygric community, with the majority of plant indicators (76%) falling into submesic-mesic soil moisture regimes, and 80% of plant cover associated with a rich soil nutrient regime. Of the 33 sites surveyed the site places in the upper quartile, ranking 4th in species richness with 35 species observed. When evenness in the proportional abundances of species is considered, site diversity is diminished to the rank of 7th. The majority of flora observed are native species, with 37% of estimated plant cover classified as exotic.

Photographs

24-1 Photographs

24-1 Site Diagram



Ecological Community 25

Description

Ecological Communities 25 (a, b, c, d) are characterized as marsh wetland, dominated by a mosaic of smallflowered bullrush (*Scirpus microcarpus*), slough sedge, Sitka sedge and common rush, with veins of horsetail found throughout. Soils are flooded for most of the year but appear to dry out late in the summer. The ecological community occurs as a series of small patches with one larger marsh area (Ecological Community 25a) associated with a small dug pond. Logging has occurred around the edges of the wetlands and on drier micro–sites within the ecological community boundaries. Small, raised micro–sites are scattered throughout the ecological communities which are dominated by sword fern with the occasional young alder or western redcedar and grass. Several patches of reed canary grass (*Phalaris canariensis*) were also observed scattered throughout the ecological communities.

Ecological Community 25, Site 1 **Date Surveyed:** 13 August, 2012

Location

Location	References	Bearing	Description
N 5419695 E 465584	Ref. 1	21.3m @ 19°	A cluster of three closely growing alder; the specific reference point is that which has snapped.
	Ref. 2	27.4m @ 211°	0.6 diametre high-cut cedar stump

Site Description

The site is located roughly 50m east of the pond, in the middle of the depression area. Included are moister sedge dominated areas and drier rush/grass sites, as well as an even drier (CDFmm/06) alder/sword fern site. Vegetation is patchy in nature.

Site ID:	25-1	Aspect:	280°	Exposure:	N/A
		Mesoslope Position:	DP	Slope:	1%

Surface Substrate:					
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***
0	0	0	15%	85%	0

Structural Stage:	2b	SMR:	6-8	SNR:	D-E	Crown Closure:	1%

Percent Cover				Site Series:	CDF/06(10%)/Wm50 (90%)
A	B	C	D		
1%	0%	99%	T		
Succession:	N/A				

Restoration Recommendations: N/A

Riparian Features: N/A

Disturbances

Anthropogenic: Logging and piling of slash in and around site within last decade.

Natural: N/A

Vegetation

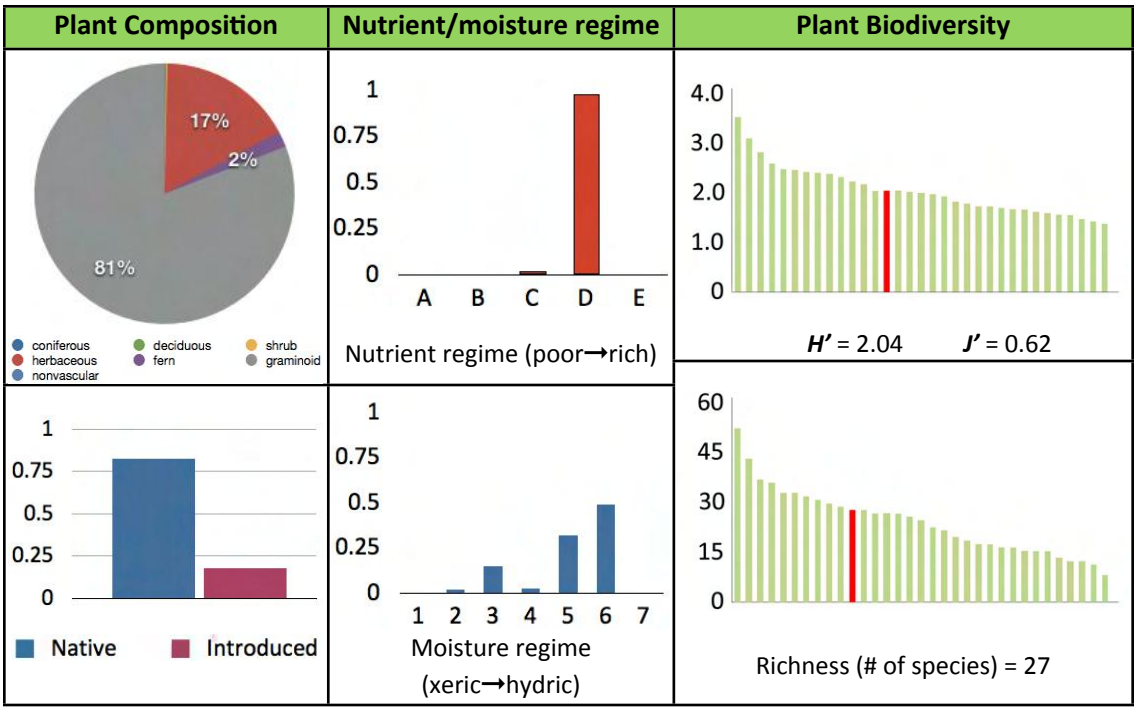
Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Agrostis capillaris (colonial bentgrass)						2		5	4
Alnus rubra (red alder)				T					
Carex obnupta (slough sedge)						3		5	4
Cirsium sp.						T		4	4
Digitalis purpurea (common foxglove)						T		2	4
Epilobium ciliatum ssp. *ciliatum* (fringed willowherb)						T		4	4
Equisetum arvense (common horsetail)						10		5	4
Evernia prunastri (oakmoss lichen)							T	3	2
grass sp.1 (spike; tawney)						2		5	4
Holcus lanatus (common velvet-grass)						15		5	4

Hypogymnia sp.							T	3	2
Juncus bolanderi (Bolander's rush)						5		5	4
Juncus effusus (common rush)						20		5	4
Luzula campestris (many-flowered woodrush)						2		5	4
Lysichiton americanum (skunk cabbage)						T		1	2
Mentha arvensis (field mint)						1		4	4
Parmelia sulcata							T	3	2
Polystichum munitum (western sword fern)						2		5	2
Pteridium aquilinum (bracken fern)						T		2	2
Rubus spectabilis (salmonberry)					T			1	3
Rubus ursinus (trailing blackberry)					T			2	3
Scirpus microcarpus (small-flowered bullrush)						40		8	4
Stachys mexicana (mexican hedge-nettle)						2		5	4
Thuja plicata (western redcedar)			T						
Usnea sp.							T	3	2
Veronica beccabunga spp. *americana*						5		5	4
Vicia sp. (vetch)						T		4	4

Wildlife

Species	Life Stage	Evidence
Bald eagle (*Haliaeetus leucocephalus*)	A	V
Birds (at least half a dozen species)	A	V
Blue-eyed darner (*Rhionaeschna multicolor)*	A	V
Blue dasher (*Pachydiplax longipennis*)	A	V
Red-tailed hawk (*Buteo jamaicensis)*	A	V
Turkey vulture (*Cathartes aura*)	A	V

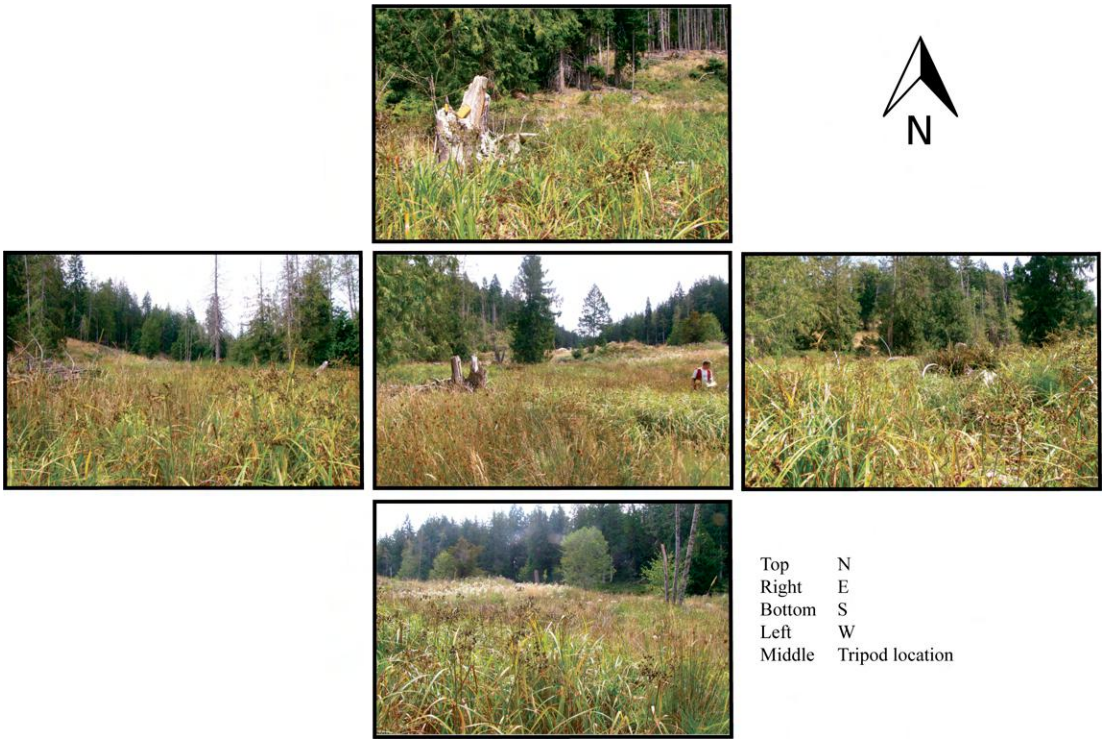
Metrics



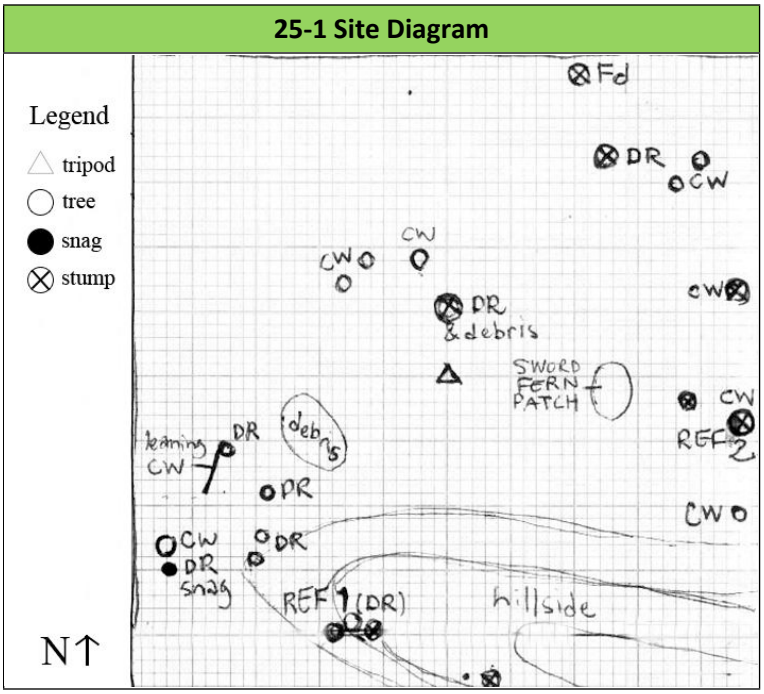
Metrics for Site 25-1 describe the site's marsh-wetland character, showing a prevalence of hydrophytic graminoids and forbs, with ferns and shrubs, as well as coniferous (*Thuja*) and deciduous trees (*Alnus*), scattered throughout (listed in rank order of abundance). Plant composition reflects a broad spectrum of overall rich, subxeric-hygric communities, with the majority (81%) of plant cover indicating a subhygric-hygric soil moisture regime, and 98% of plant cover associated with a rich soil nutrient regime. The site is the richest site evaluated according to this metric. Of the 33 sites surveyed the site ranks 12th in species richness, with 27 species observed. When evenness in the proportional abundances of species is considered, site diversity is diminished to the rank of 14th. The majority of flora observed are native, with 18% of estimated plant cover classified as exotic.

Photographs

25-1 Photographs



25-1 Site Diagram



Ecological Community 26

Description

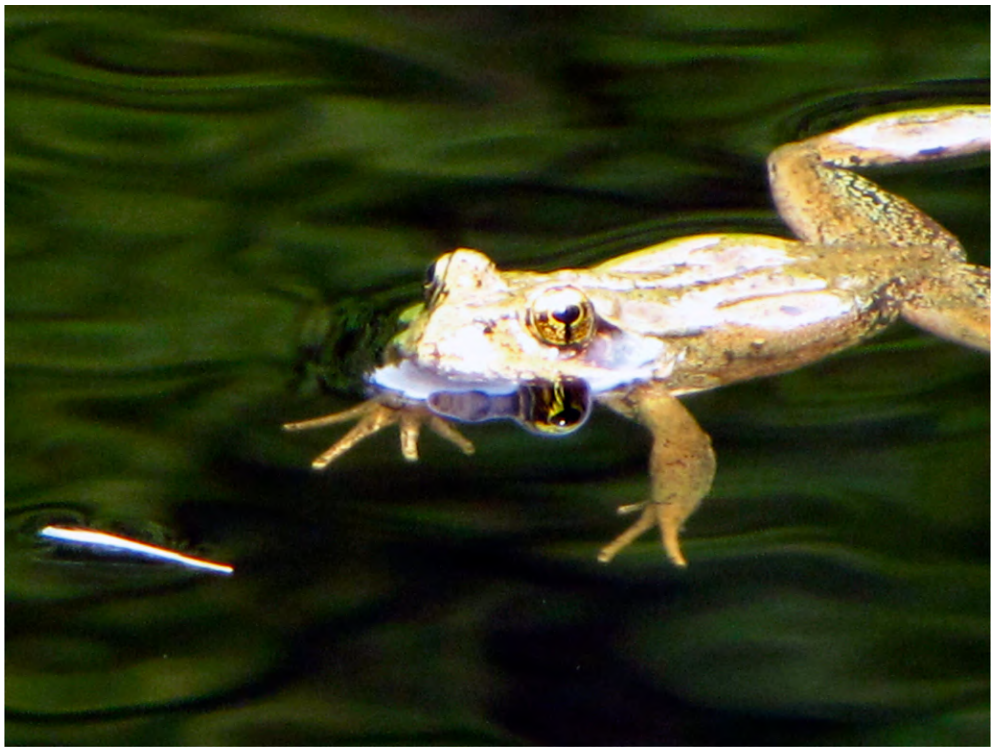
The ecological community encompasses a machine-dug pond with a built-up clay berm on the west (down-slope) side, transitioning to emergent wetland vegetation on the east side. Vegetation includes a large patch of cattail (*Typha latifolia*) and several large patches of spike rush (*Eleocharis* sp.), transitioning to the sedge/rush communities found in Ecological Community 25a. There is also a large patch of *Potamogeton* (sp.) floating in the pond. The western and southern sides of the pond have been heavily disturbed for machine access and to create the retaining berm. The pond has been used as a swimming hole. Dense western redcedar regeneration was observed along the berm. The blue-listed Northern red-legged frog (*Rana aurora*) was observed in the pond. There is also a small wooden 'ladder' anchored to the western bank.

Photographs

Ecological Community 26 Photographs

PP18. The pond and associated wetland

Ecological Community 26 Photographs



PP19. Red-legged frog (*Rana aurora*)

PP20. Machine disturbance on the southwest side of the pond

Ecological Community 27

Description

Ecological Community 27a is a graminoid and thistle-dominated, logged and cleared area. Within are a couple of lone western redcedar trees, including one large veteran. The area appears to have been logged within the last decade. Soils have been highly disturbed by excavator and skidder use during logging. Very little evidence of natural conifer regeneration is observed, likely due to the density of grasses on the site. Due to the exposure resulting from clearing, site conditions are drier in summer and moister in winter, creating slightly more difficult conditions for regeneration of site-appropriate species. Large-diameter stumps indicate relatively high site index. The ecological community includes a narrow tongue running along the northern boundary of Ecological Community 9 that broadens into a large opening towards the eastern boundary of the property. It includes a shift in aspect, from roughly west to roughly east, at the height of land near the new campsite turn-around.

Ecological Communities 27b and 'c' cover very small, recently logged (within the past 10 years) valleys between two ridgelines. While exotic grasses are dominant, the Ecological Communities include significant bracken fern and salal dominated patches (approx. 50%). A rough machine road runs the length of the ecological communities, along the valley bottoms where moisture accumulates and is reflected by the higher density of common rush. Like Ecological Community 27a, Ecological Community 27b includes gentle northwest and southeast-facing slopes with a slightly drier height of land dividing them. Rotting felled logs and slash remain scattered throughout.

Ecological Community 27, Site 1 **Date Surveyed:** 13 August, 2012

Location

Location	References	Bearing	Description
N 5419650 E 465687	Ref. 1	14.6m @ 59°	Large diameter, old-growth cedar
	Ref. 2	27.5m @ 3°	Broken arbutus, with bushy epicormic shoots

Site Description

Located near one lone, large old-growth cedar on an eastern aspect near the boundary with Ecological Community 36, the site is characteristic of the recently logged area (since 2009) and includes a small skidder access trail.

Site ID:	27-1	**Aspect:**	295°	**Exposure:**	Sun
		Mesoslope Position:	MD-LW	**Slope:**	6%

Surface Substrate:					
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***
0	0	3%	5%	92%	0

Structural Stage:	2b	**SMR:**	3-4	**SNR:**	C	**Crown Closure:**	0

Percent Cover					
A	B	C	D	**Site Series:**	CDF/01
0	3%	96%	1%		
Succession:	N/A				

Restoration Recommendations:

Restoration of this ecological community would include mixed-species tree planting, with alder on disturbed road sites and a mix of Douglas-fir, western redcedar, grand fir, arbutus and alder on the appropriate micro-sites.

Riparian Features: N/A

Disturbances

Anthropogenic: Logged 2-3 years ago. There is a very light skidder trail running through the plot and soils have been mechanically disturbed.

Natural: N/A

Vegetation

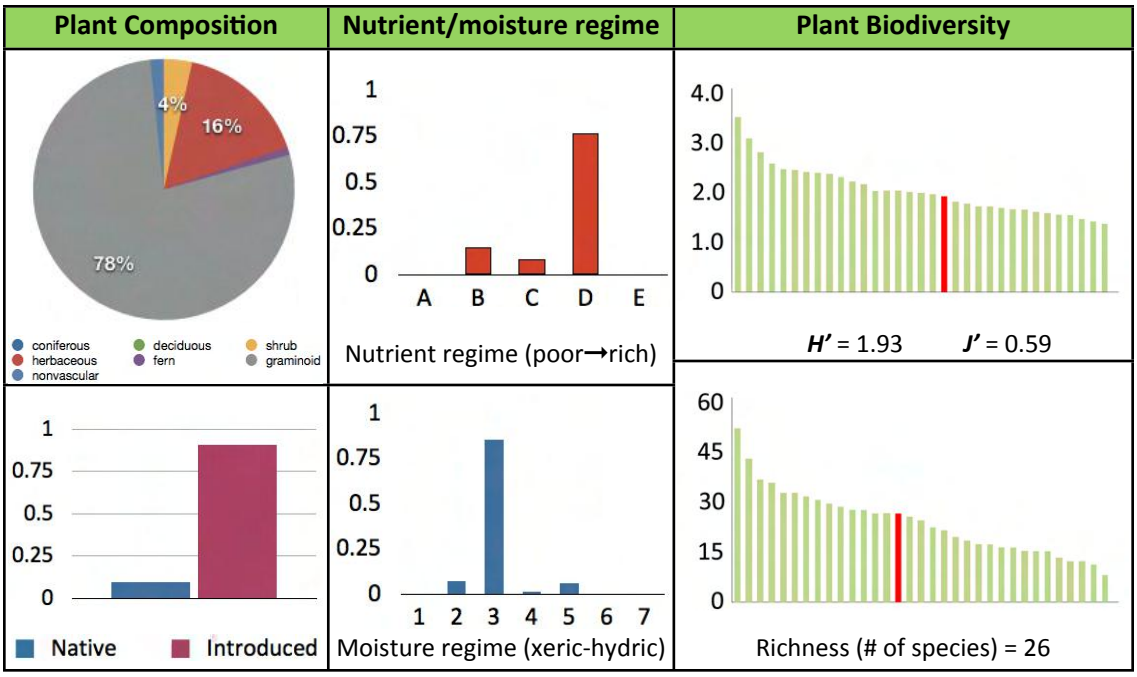
Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Agrostis capillaris (colonial bentgrass)						10		5	4
Anthoxanthum odoratum (sweet vernal grass)						10		5	4
Bromus sp.						5		5	4
Cirsium sp.						10		8	4
Crepis capillaris (smooth hawksbeard)						T		2	4

Dactylis glomerata (orchard grass)						T		2	3
Digitalis purpurea (common foxglove)						3		4	4
Gaultheria shallon (salal)					1			5	2
grass sp. (spike; tawney)						5		5	4
Holcus lanatus (common velvet-grass)						60		9	4
Hypochaeris radicata (hairy cat's-ear)						5		7	4
Isothecium sp.							1	5	2
Juncus effusus (common rush)						2		5	3
Juncus sp.						1		5	3
Kindbergia oregana (Oregon beaked moss)							1	5	2
Lactuca muralis (wall lettuce)						T		2	2
Lonicera hispidula (hairy honeysuckle)					T			2	3
Lychnis coronaria (rose campion)						T		4	4
Madia sativa (Chilean tarweed)						1		4	4
Polystichum munitum (western sword fern)						T		2	2
Pteridium aquilinum (bracken fern)						1		5	2
Rubus leucodermis (blackcap raspberry)					2			4	3
Rubus ursinus (trailing blackberry)					1			2	3
Taraxacum sp. (Ruderalia) (dandelion)						T		2	3
Urtica dioica (stinging nettle)						T		4	2
Vaccinium parvifolium (red huckleberry)					T			2	1

Wildlife

Species	Life Stage	Evidence
Blacktailed deer (*Odocoileus hemionus columbianus*)	N/A	F
Dragonflies	A	V

Metrics

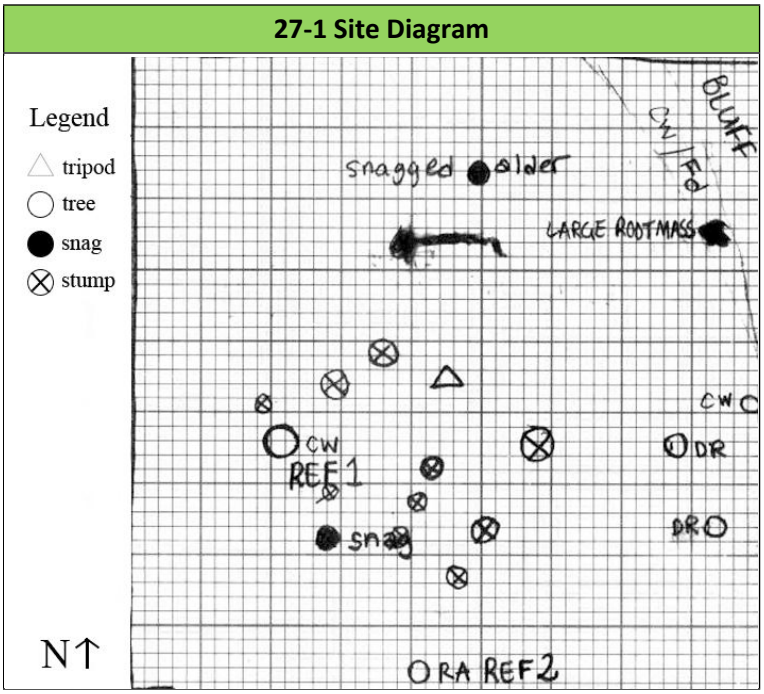


Metrics for Site 27-1 describe the site's recently disturbed condition as dominated largely by graminoids, with herbs, shrubs, bryophytes and ferns scattered throughout (listed in rank order of abundance). Plant composition reflects a rich, submesic community, with the majority of plant indicators (86%) representing a submesic moisture regime, and 77% of plant cover associated with a rich soil nutrient regime. Of the 33 sites surveyed the site ranks 13th in species richness, with 26 species observed. When evenness in the proportional abundances of species is considered, site diversity is diminished to the rank of 19th. The great majority of flora observed are exotic species, with only 9% of estimated plant cover classified as native. Site 27-1 is among the three most compromised sites surveyed in terms of introduced species.

Photographs

27-1 Photographs

27-1 Site Diagram



Ecological Communities 27 (a & c) Photographs

PP21. The outdoor kitchen north of the campsite

PP22. The view looking southwest across Ecological Community 27c toward the treeline of Ecological Community 31a

Ecological Community 28

Description

Ecological Communities 28a and 'b' encompass a moderate, northeast-facing slope with a maturing (60–70-year-old) western redcedar-dominated main canopy and an understory dominated by sword fern and salal. The slope runs down from a small ridgeline to Porlier Pass Road and includes a slightly moister toe where the odd alder and western hemlock (*Tsuga heterophylla*) are growing. Current Douglas–fir presence is very limited, though stumps in the ecological community indicate that this was the dominant species prior to logging. The area was fairly intensively logged, primarily for Douglas–fir, 60–70 years ago. The area is also heavily influenced by the Porlier Pass Road corridor where pruning and falling for power line maintenance is a regular occurrence. The corridor also allows more light into the lower portion of the stand, resulting in more robust understory growth. A machine access road and wire fence-line also run parallel to the slope for the majority of the ecological community's length. Several old-growth Douglas-firs and western redcedar are scattered throughout the area.

Ecological Communities 28c and 'd' are similar to 'a' and 'b' but are not located along Porlier Pass Road. They are characterized by a mature Douglas–fir-dominated, northeast-facing, moderate mid-slope, with scattered western redcedar and bigleaf maple. Large-diameter, old-growth Douglas–fir are also scattered throughout. The understory is dominated by robust salal, along with patches of oceanspray, Oregon beaked moss and stair-step moss.

Ecological Community 28, Site 1 **Date Surveyed:** 30 August, 2012

Location

Location	References	Bearing	Description
N 5420077 E 465383	Ref. 1	10.4m @ 277°	Western redcedar snag near junction in machine road, by the fence
	Ref. 2	none	none

Site Description

The site is centred on the machine access road, roughly in the middle of the slope (near its northwest terminus). The site is characteristic of the ecological community, however it does not include the road edge and ditch line along Porlier Pass.

Note: average diametre Douglas-fir (cored) is approximately 60 years old.

Site ID:	28-1	Aspect:	25°	Exposure:	N/A
		Mesoslope Position:	MD	Slope:	25-35%

Surface Substrate:					
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***
0	1%	5%	3%	91%	0

Structural Stage:	5/C	SMR:	3	SNR:	C	Crown Closure:	75%

Percent Cover				Site Series:	CDF/01
A	B	C	D		
75%	20%	15%	10%		
Succession:	N/A				

Restoration Recommendations: N/A

Riparian Features: N/A

Disturbances

Anthropogenic: Intensely logged approximately 70 years ago. Machine access road and wire fencing bisect the plot.

Natural: Evidence of wind-throw.

Vegetation

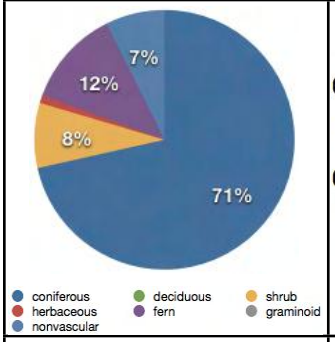
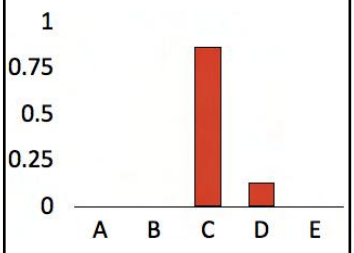
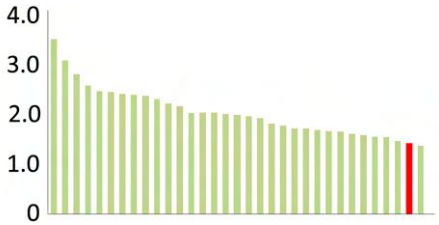
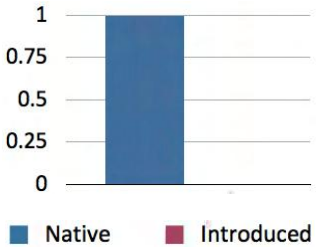
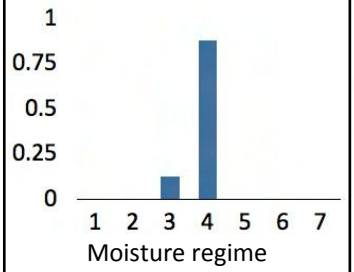
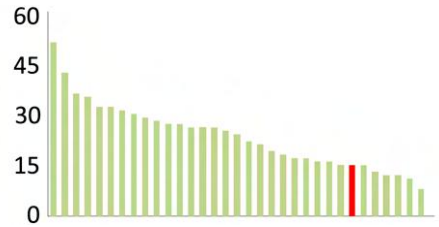
Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Achlys triphylla (vanilla leaf)						1		5	3
Berberis nervosa (dull Oregon grape)					2			5	3
Galium sp.						T		2	3
Gaultheria shallon (salal)					8			6	3
Hylocomium splendens (stair-step moss)							2	3	3
Isothecium sp.							2	5	3
Kindbergia oregana (Oregon beaked moss)							5	5	3
Leucolepis menziesii (Menzies' tree moss)							T	3	3
Polystichum munitum (western sword fern)						15		6	3
Pseudotsuga menziesii (Douglas-fir)	10	2						2	3

Rhytidiadelphus loreus (lanky moss)							T	3	3
Thuja plicata (western redcedar)		50	15	10				7	3
Trientalis latifolia (western starflower)						T		2	3
Tsuga heterophylla (western hemlock)				2				3	3
Vaccinium parvifolium (red huckleberry)					T			1	2

Wildlife

Species	Life Stage	Evidence
Pacific chorus frog (*Pseudacris regilla*)	A	V
Pileated woodpecker (*Dryocopus pileatus*)	N/A	H

Metrics

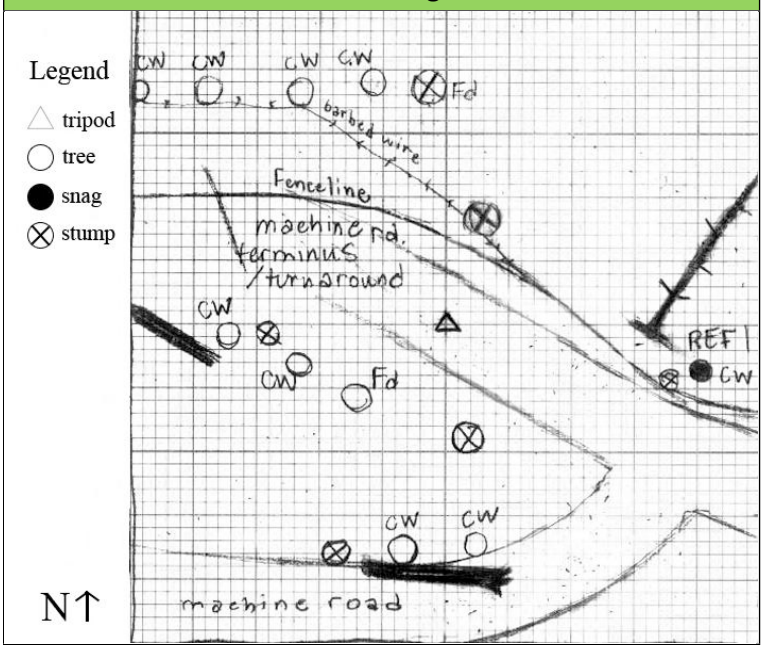
Plant Composition	Nutrient/moisture regime	Plant Biodiversity
	 Nutrient regime (poor→rich)	 ***H'*** = 1.42 ***J'*** = 0.53
	 Moisture regime (xeric→hydric)	 Richness (# of species) = 15

Metrics for Site 28-1 describe the site's forested character, including a canopy dominated by coniferous trees (*Thuja*, *Pseudotsuga*) and an understory composed of ferns, shrubs and bryophytes, with forbs sparsely distributed throughout (following rank order of abundance). Plant composition is reflective of a moderately rich, mesic community, with the majority of plant cover (88%) indicative of a mesic soil moisture regime, and 87% of plant cover associated with a moderate soil nutrient regime. Of the 33 sites surveyed the site places in the lower quartile, ranking 28th in species richness with 15 species observed. When evenness in the proportional abundances of species is considered, site diversity falls to the rank of 32nd. The site is one of nine sites surveyed where only native flora were recorded, of which it ranks 8th most diverse on the Shannon index and 6th in richness.

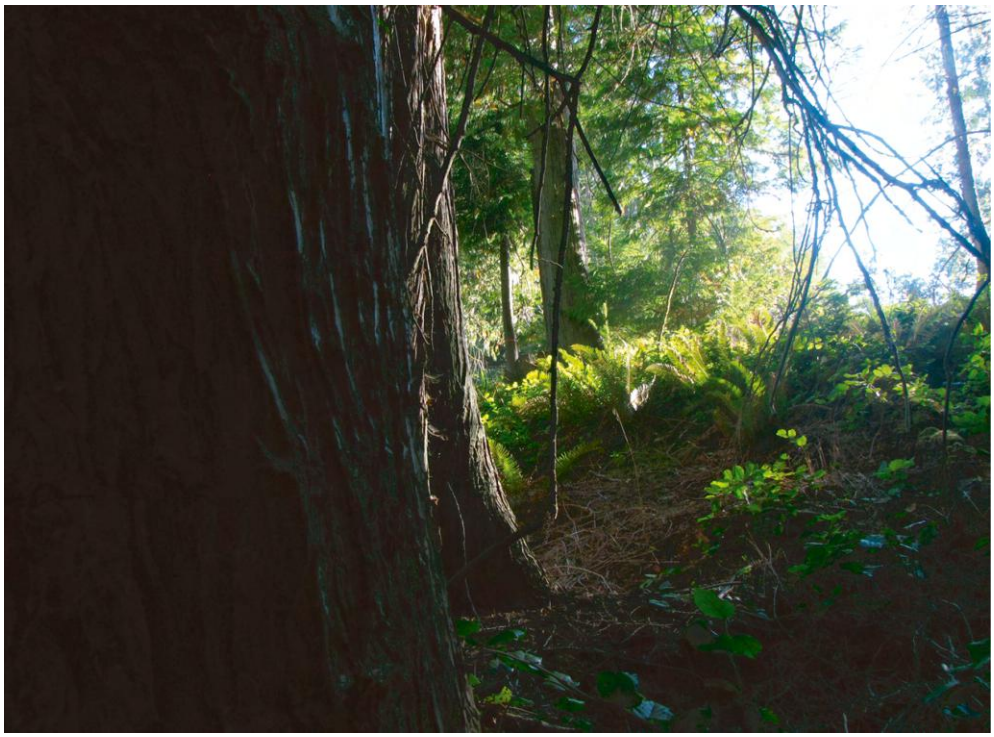
Photographs

28-1 Photographs

28-1 Site Diagram



Ecological Community 28 Photographs



PP23. Looking south from the boundary marker in Ecological Community 28b

Ecological Community 29

Description

Ecological Community 29 includes a small, variable, southeast- to northwest-running ridgeline with a mature western redcedar-dominated main canopy and Douglas-fir regularly scattered throughout. Arbutus are also scattered along the ridgeline. The area is partially protected from sun exposure by the larger ridgeline to the southwest in Ecological Community 31. The stand was logged for Douglas-fir 60–70 years ago, releasing supressed western redcedar in the sub canopy. More recent logging has occured in Ecological Community 27b, increasing exposure and light penetration in the area. The understory is patchy, with a mix of salal-dominated areas, moss-dominated areas, and relatively barren areas. Patches of dull Oregon grape are also scattered throughout. The occasional mature Douglas-fir also remains in the stand. The ridgeline broadens out in the northwestern portion of the ecological community and takes on more of a dry bench character. Douglas-fir takes over from western redcedar as the dominant tree in this area, although western redcedar maintains a significant presence. A machine access road runs along a good portion of the length of the ecological community. A portion of the ecological community near its southeast end was recently logged for western redcedar and Douglas-fir.

Sparse seed trees remain, with an exotic grass-dominated understory including patches of salal, bracken fern and thistle.

Ecological Community 29, Site 1 **Date Surveyed:** 30 August, 2012

Location

Location	References	Bearing	Description
N 5420011 E 465366	Ref. 1	17m @ 327°	0.3m diametre bigleaf maple growing on the south-facing slope below crest
	Ref. 2	2.5m @ 199°	Double-stemmed western redcedar (joined at base) on crest near site

Site Description

The site is located on the western redcedar-dominated portion of the ridge where the south-west slope becomes gentler and does not include a bluff or cliff form. Here, the clearing in Ecological Community 27b narrows significantly. The site therefore has less light exposure and a sparser understory than other sections of the ecological community.

Note: main canopy, average diameter western redcedar (cored) was approximately 140-years-old.

Site ID:	29-1		**Aspect:**		SW/NE	**Exposure:**		Light			
			Mesoslope Position:		CR	**Slope:**		5-10%			
Surface Substrate:											
Bedrock	***Boulder***		***Exp. Minerals***		***Wood Decay***	***Organic***		***Water***			
1%	25%		3%		15%	56%		0			
Structural Stage:	6/Cm	**SMR:**	2-	**SNR:**	B-C	**Crown Closure:**		75%			
Percent Cover						**Site Series:**		CDF/01x			
A	B		C		D						
90%	6%		0		20%						
Succession:	N/A										

Restoration Recommendations: N/A

Riparian Features: N/A

Disturbances

Anthropogenic: Logged 60-70 years ago. Machine access road along the northeast edge of the plot.

Natural: Evidence of wind-throw.

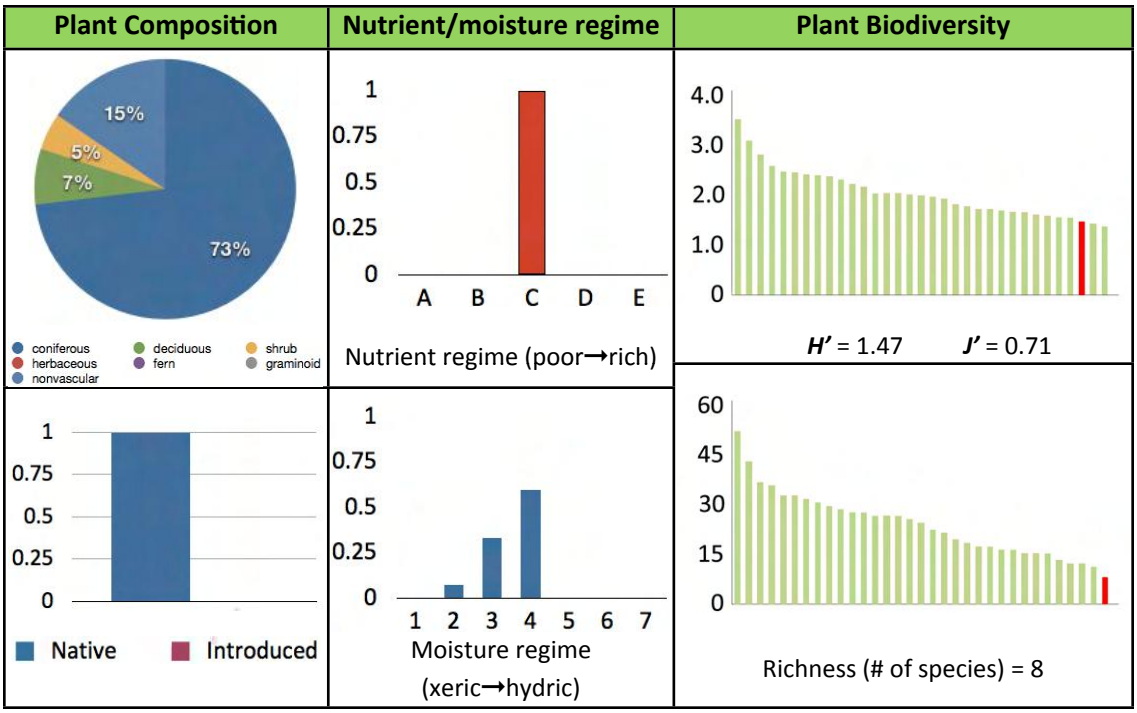
Vegetation

Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Acer macrophyllum (bigleaf maple)			1					3	1
Arbutus menziesii (arbutus)			8					2	2
Berberis nervosa (dull Oregon grape)					1			2	5
Gaultheria shallon (salal)					5			2	5
Isothecium sp.							7	3	6
Kindbergia oregana (Oregon beaked moss)							13	3	6
Pseudotsuga menziesii (Douglas-fir)	15	20						3	4
Thuja plicata (western redcedar)		50	6	4				3	7

Wildlife

Species	Life Stage	Evidence
Pileated woodpecker (*Dryocopus pileatus*)	N/A	H
Raven (*Corvus corax*)	N/A	H
Red-breasted nuthatch (*Sitta Canadensis*)	N/A	H
Red squirrel (*Tamiasciurus douglasii)*	N/A	F

Metrics

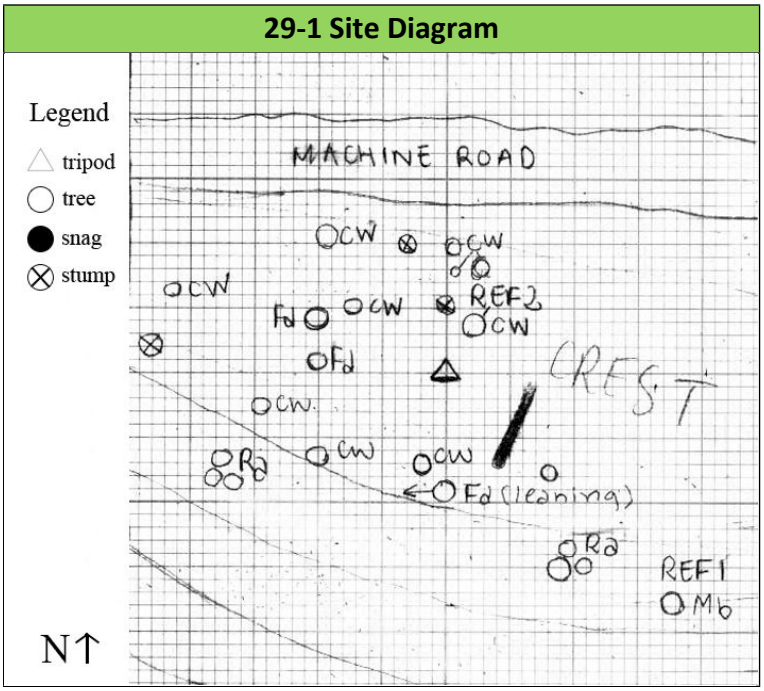


Metrics for Site 29-1 describe the site's forested character, including a canopy dominated by coniferous trees (*Thuja, Pseudotsuga*) and an understory composed of bryophytes, with deciduous trees (*Acer*) and shrubs distributed throughout (listed in rank order of abundance). Plant composition is reflective of a moderately rich, subxeric-mesic community, with the majority of plant cover (93%) indicative of a submesic-mesic soil moisture regime, and 100% of plant cover associated with a moderate soil nutrient regime. Of the 33 sites surveyed the site ranks last in species richness, with only 8 species observed. When evenness in the proportional abundances of species is considered, site diversity is augmented to the rank of 31st. The site is one of nine sites surveyed where only native flora were recorded, of which it ranks 7th most diverse on the Shannon index and 9th in richness.

Photographs

29-1 Photographs

29-1 Site Diagram



Ecological Community 30

Description

Ecological Community 30a is situated toward the eastern end of Ecological Community 40, where it broadens and shifts into a young alder-dominated depression. The ecological community is characterized by an understory of sword fern, slough sedge, Sitka sedge and small–flowered bullrush. It is flanked by a gently sloped, drier, Douglas–fir/bigleaf maple-dominated CDF/mm 04/06 young stand which runs along the road and includes salal as the dominant shrub. Regenerating bigleaf maple poles are scattered throughout the fringes and young (as well as pole) western redcedar are scattered throughout the entire ecological community. The moisture-receiving depression is located at the base of the steep slope in Ecological Community 39. The moist alder area will likely transition to western redcedar/Douglas-fir over the next 100 years.

Ecological Community 30b is smaller than 30a and has undergone more recent logging. It is an open Sitka sedge/small-flowered bullrush dominated area (Wm50)with very little tree cover. The depression is flanked by a gently sloped western redcedar-dominated area with the odd Douglas–fir and bigleaf maple, with less salal and more bracken fern in the understory. There is a large percentage of invasive exotic grasses on the recently logged fringes, including red canary grass in moist areas. It also includes some year-round wetted patches with pondweed (*Potamogeton* sp.) cover.

Ecological Community 30c is similar but slightly older and better established than 30a. Sitka sedge dominated marsh depression sites are surrounded by lower slopes characterized by a mix of maturing Douglas-fir and Western redcedar and a salal/sword fern dominated understory.

Ecological Community 30, Site 1 **Date Surveyed:** 19 September, 2012

Location

Location	References	Bearing	Description
N 5419831 E 465862	Ref. 1	15m @ 242°	Small-diameter Douglas-fir with strongly upcurved trunk and broken top @ ≈ 7m (where base of trunk meets boulder)
	Ref. 2	16.5m @ 282°	Large-diameter western redcedar on cliff-side of depression

Site Description

The site is located in Ecological Community 17a and includes both alder, sword fern/slough sedge depression and gently-sloped Douglas-fir/salal areas. The pin is in the depression area.

Site ID:	30-1	**Aspect:**	variable	**Exposure:**	N/A
		Mesoslope Position:	LW-DP	**Slope:**	0-2%

Surface Substrate:					
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***
0	0	T	3%	97%	0

Structural Stage:	5/Mm	**SMR:**	4-7	**SNR:**	C-D	**Crown Closure:**	50%

Percent Cover				**Site Series:**	CDF/02
A	B	C	D		
60%	30%	0	0		

Succession:	Western redcedar saplings will grow slowly and overtake the alder in the depression and understory cover will decrease as canopy closes. This area will likely transition to western redcedar/Douglas-fir over the next 100 years. Douglas-fir and bigleaf maple along the fringes will self-thin over the next 50 years

Restoration Recommendations: N/A

Riparian Features: N/A

Disturbances

Anthropogenic: Logged 50+ years ago with more recent single-tree removal along the roadside for hydro lines. Some soil compaction due to logging machinery and/or skidding.

Natural: Recent wind-throw with shallow root systems due to relatively high water table in depression site.

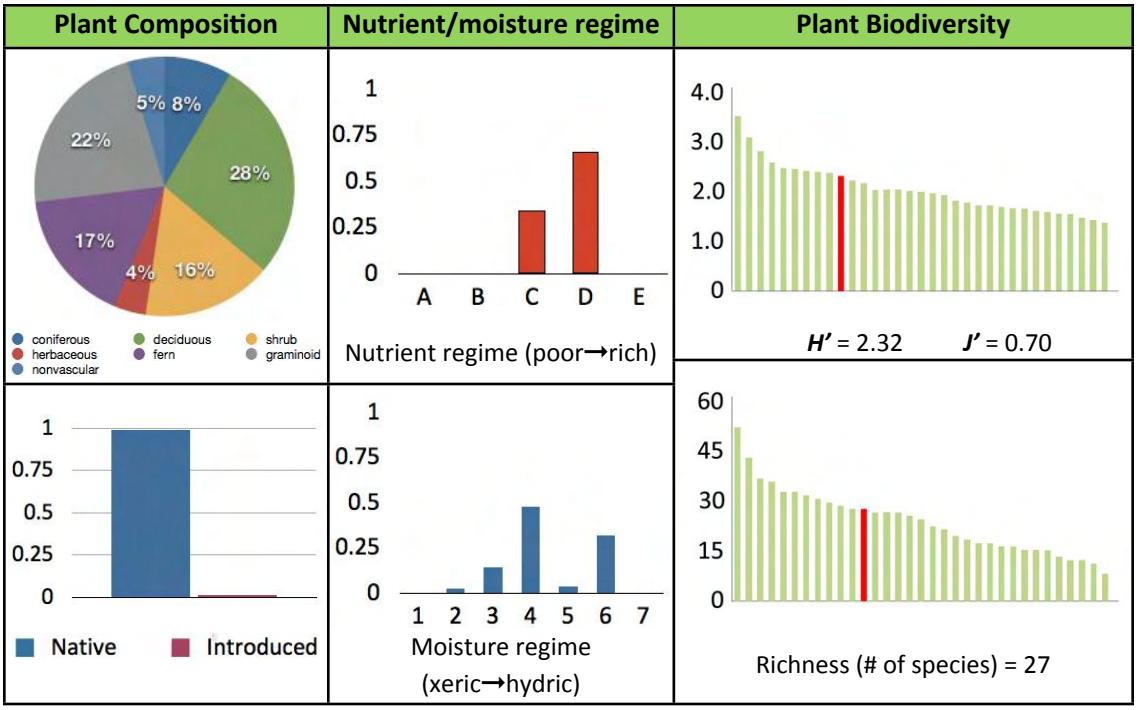
Vegetation

Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Abies grandis (grand fir)				T				2	3
Alnus rubra (red alder)			50					7	2
Carex obnupta (slough sedge)						5		5	3
Carex sitchensis (Sitka sedge)						25		6	3
Elymus glaucus (blue wild rye)						T		3	3
Galium sp.						T		2	3
Gaultheria shallon (salal)					20			6	4
grass sp.						5		5	3
Holodiscus discolor (ocean spray)				3				2	4
Isothecium sp.							5	5	3
Juncus sp.						T		1	3
Kindbergia oregana (Oregon beaked moss)							3	5	3
Kindbergia praelonga (common feather moss)							T	3	3
Leucolepis menziesii (Menzies' tree moss)							T	3	3
Lonicera ciliosa (orange honeysuckle)				1				2	3
Lysichiton americanum (skunk cabbage)						2		2	3
Neckera douglasii (Douglas' neckera moss)							T	5	3
Oenanthe sarmentosa (Pacific water parsley)						3		4	3
Polystichum munitum (western sword fern)						30		6	4
Pseudotsuga menziesii (Douglas-fir)		8	2					4	4
Pteridium aquilinum (bracken fern)						T		2	3
Ranunculus occidentalis (western buttercup)						T		2	3
Ranunculus repens (creeping buttercup)						2		4	3
Rubus spectabilis (salmon berry)					T			5	3
Rubus ursinus (trailing blackberry)					5			6	4
Scirpus microcarpus (small-flowered bullrush)						4		3	3
Thuja plicata (western redcedar)		1		3	1			4	4

Wildlife

Species	Life Stage	Evidence
Barred owl (*Strix varia*)	A	V
Blacktailed deer (*Odocoileus hemionus columbianus*)	A	V
Pacific chorus frog (*Pseudacris regilla*)	N/A	H
Red-breasted nuthatch (*Sitta Canadensis*)	N/A	H
Turkey vulture (*Cathartes aura*)	A	V

Metrics

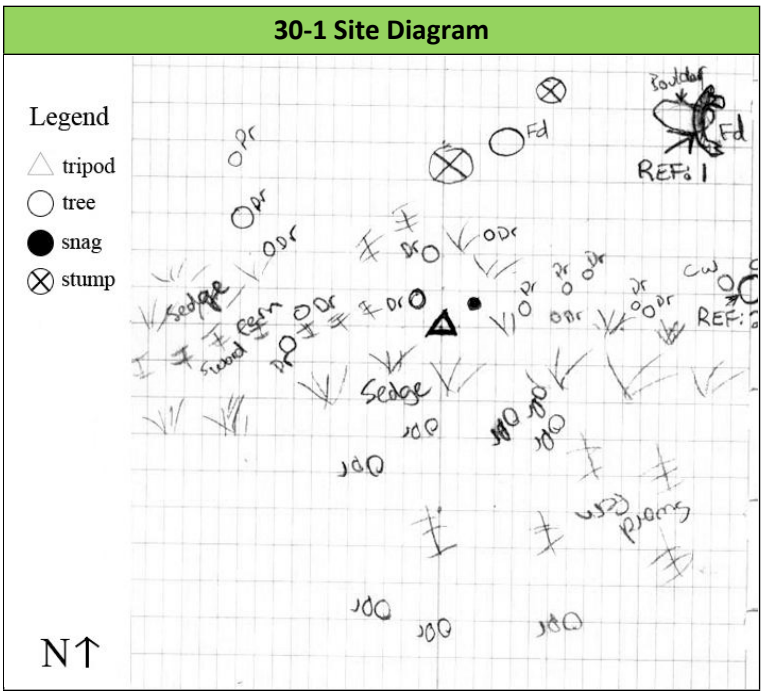


Metrics for Site 30-1 describe the site's transitional moisture-receiving character, with a mixed canopy of deciduous (*Alnus*) and coniferous (*Pseudotsuga, Thuja, Abies*) trees, and an understory dominated by hydrophytic graminoids, ferns and shrubs, with bryophytes and forbs distributed throughout (listed in rank order of abundance). Bimodal distribution in plant indicator species reflect a transitional, moderately rich to rich, subxeric-hygric community, with the majority of plant cover punctuating mesic (48%) and hygric (32%) soil moisture regimes, and 66% of plant cover associated with a rich soil nutrient regime. Of the 33 sites surveyed the site ranks 11th in species richness, with 27 species observed. When evenness in the proportional abundances of species is considered, site diversity is augmented to the rank of 10th. The vast majority of flora observed are native species, with only 1% of estimated plant cover classified as exotic.

Photographs

30-1 Photographs

30-1 Site Diagram



Ecological Community 30c Photographs

PP24. Mixed forest edge alongside a slough-sedge dominated depression

Ecological Community 31

Description

Ecological Community 31 is characterized by a, 70–100+year-old Douglas-fir dominated forest on a very dry, nutrient-poor, shallow-soiled crest and upper slope. The ecological community includes the southwest–facing upper slope and the moister northeast-facing upper slope on either side of the crest. The stand is characterized by scattered, dominant, old-growth Douglas-firs over-top of a dense 70–100-year-old main canopy of Douglas-fir, with scattered arbutus and young Douglas-fir in the sub-canopy. The understory is generally moss-dominated (*Rhytidiadelphus triquetris*, *Kindbergia oregana*, *Isothecium* sp.) with patches of salal and dull Oregon grape and scattered oceanspray found throughout. Stumps indicate selective logging from the early 20th century, with roads cutting across the slope, similar to Ecological Community 32. Clearcut patches feather into the area on the southeast end of the northeast-facing upper slope and the northwest end of the southwest-facing upper slope.

Ecological Community 31, Site 1 **Date Surveyed:** 29 August, 2012

Location

Location	References	Bearing	Description
N 5420128 E 465030	Ref. 1	9.4m @ 153°	Western redcedar on the crest in the northwest where it joins another northwest tending bench
	Ref. 2	9.2m @ 254°	Oldgrowth Douglas-fir (1m diametre) on the north edge of the bench

Site Description

Located in a mature Douglas-fir stand, the site is situated on the crest and includes positions of both the southwest and northeast-facing upper slopes characteristic of the ecological community.

Site ID:	31-1	**Aspect:**	SW&NE	**Exposure:**	N/A		
		Mesoslope Position:	CR/UP	**Slope:**	5-30%		
Surface Substrate:							
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***		
2%	30%	1%	5%	62%	0		
Structural Stage:	6/Cm	**SMR:**	1	**SNR:**	B	**Crown Closure:**	70%
Percent Cover				**Site Series:**	CDF/02		
A	B	C	D				
75%	15%	3%	75%				
Succession:	N/A						

Restoration Recommendations: N/A

Riparian Features: N/A

Disturbances

Anthropogenic: Selectively logged several decades ago; there is an old skid road just southwest of the site.

Natural: Evidence of natural wind-throw.

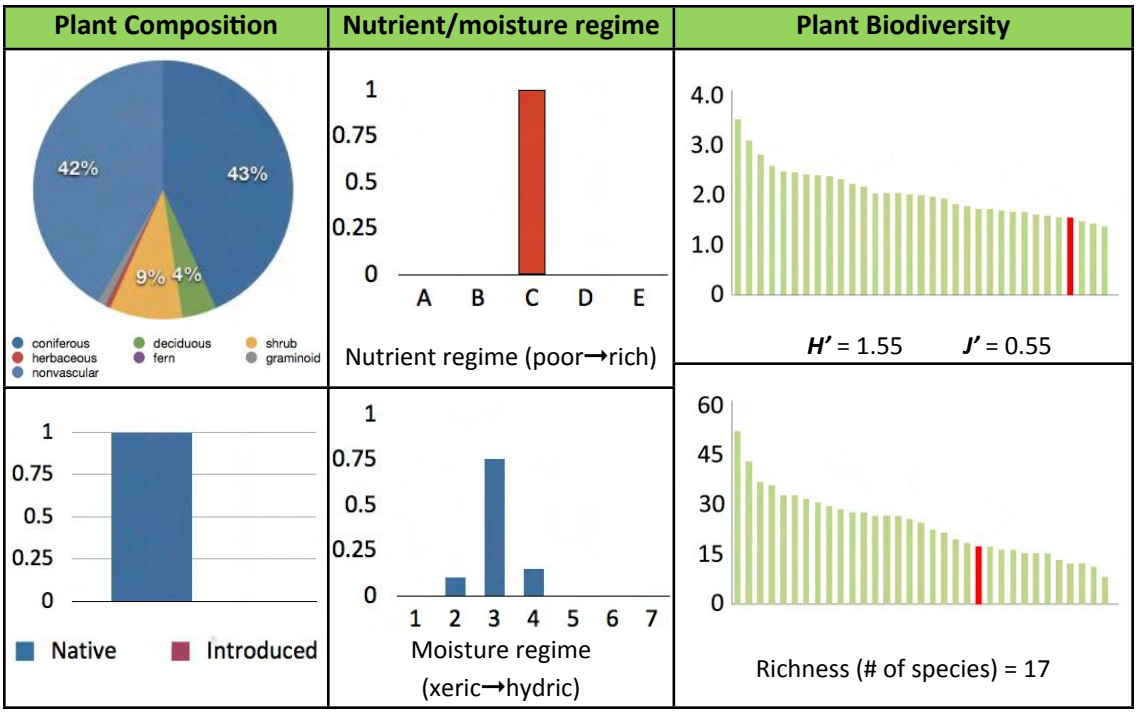
Vegetation

Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Abies grandis (grand fir)				T				2	3
Arbutus menziesii (arbutus)			8					4	3
Berberis nervosa (dull Oregon grape)					4			5	3
Corallorhiza maculata (western coralroot orchid)						1		3	3
Festuca sp.						2		4	3
Gaultheria shallon (salal)					10			5	3
Holodiscus discolor (ocean spray)				3				4	3
Hylocomium splendens (stair-step moss)							5	5	3
Isothecium sp.							2	5	3
Kindbergia oregana (Oregon beaked moss)							70	9	4
Peltigera sp.							T	2	3
Polystichum munitum (western sword fern)						T		2	2
Pseudotsuga menziesii (Douglas-fir)	15	45	15	T				7	2
Pteridium aquilinum (bracken fern)						T		1	2
Rhytidiadelphus triquetrus (electrified cat's tail)							1	3	3
Thuja plicata (western redcedar)		5	1					2	3
Usnea sp.							T	2	3

Wildlife

Species	Life Stage	Evidence
Blacktailed deer (*Odocoileus hemionus columbianus*)	N/A	S
Raven (*Corvus corax*)	N/A	H
Red squirrel (*Tamiasciurus douglasii)*	N/A	F

Metrics

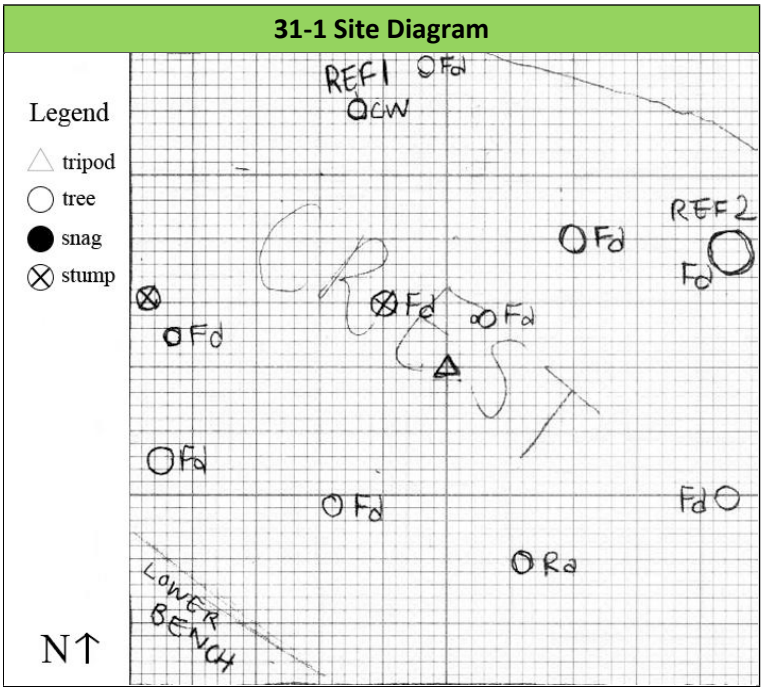


Metrics for Site 31-1 describe the site's mature forested character, including a canopy dominated by coniferous trees (*Pseudotsuga, Thuja, Abies*) and an understory composed primarily of bryophytes, alongside shrubs and deciduous trees (*Arbutus*), with graminoids, forbs and ferns sparsely distributed throughout (listed in rank order of abundance). Plant composition is reflective of a moderately rich, subxeric-mesic community, with the majority of plant cover (75%) indicative of a submesic soil moisture regime, and 99.9% of plant cover associated with a moderate soil nutrient regime. Of the 33 sites surveyed the site ranks 23rd in species richness, with 17 species observed. When evenness in the proportional abundances of species is considered, site diversity is diminished to the rank of 30th. The site is one of nine sites surveyed where only native flora were recorded, of which it ranks 6th most diverse on the Shannon index and 3rd in richness.

Photographs

31-1 Photographs

31-1 Site Diagram



Ecological Community 32

Description

Ecological Community 32 encompasses a steep south to southwest-facing slope with a mature Douglas-fir-dominated canopy, including scattered arbutus and western redcedar throughout. Several bigleaf maple are located along the toe of the slope where soil moisture increases. The understory is characterized by large patches of salal with the odd patch of dull Oregon grape and scattered oceanspray. Oregon beaked moss is the dominant moss species. Rot and vegetative growth on stumps indicate that logging occured several decades to a century ago. Trees constituting the main canopy are roughly 90 years old (according to average-diametre tree core), though there are many older veterans scattered throughout. The ecological community includes some variation in slope with a few steep boulder/bluff areas with drier soils and a strip of slightly moister soils along the toe of the slope. The drier bluff sites have less salal, more dull Oregon grape, and higher grass cover. The moister toe slope includes a number of bigleaf maple along with dense salal cover and a couple of mature western redcedar. Several old roads cut across the slope in this ecological community where the topography flattens into narrow benches. More recent selective logging was observed at points along the roads and around the edges of the ecological community.

Ecological Community 32, Site 1 **Date Surveyed:** 29 August, 2012

Location

Location	References	Bearing	Description
N 5420044 E 465018	Ref. 1	2.1m @ 41°	Oldgrowth arbutus above (and leaning over) road
	Ref. 1	6m @ 78°	Nearby Douglas-fir (0.6m diametre) with copious pitch covering its west side above the base

Site Description

The site is located towards the upper portion of the ecological community in a fairly characteristic area that may be considered slightly drier if anything. There is a canopy gap above the site that appears natural, though stumps from older logging were observed.

Site ID:	32-1	**Aspect:**	205°	**Exposure:**	N/A
		Mesoslope Position:	MD-UP	**Slope:**	45%

Surface Substrate:					
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***
2%	10%	1%	4%	85%	0

Structural Stage:	1b/Cm	**SMR:**	2	**SNR:**	B-C	**Crown Closure:**	70

Percent Cover					
A	B	C	D	**Site Series:**	CDF/01x
70%	50%	1%	60%		
Succession:	N/A				

Restoration Recommendations: N/A

Riparian Features: N/A

Disturbances

Anthropogenic: Area has been selectively logged though no stumps are within plot.

Natural: There is evidence of deer browse and some of the veteran Douglas-fir show burn scars on lower bark.

Vegetation

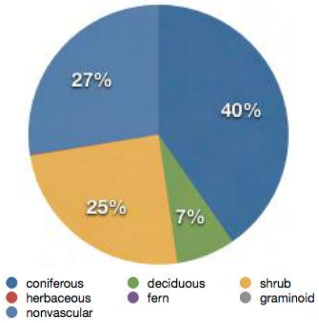
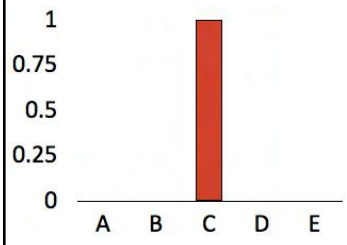
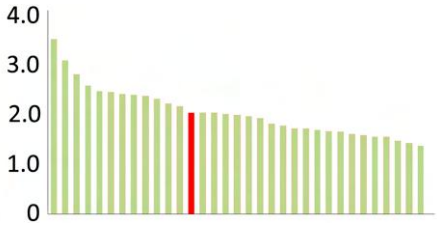
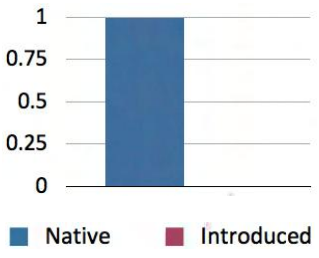
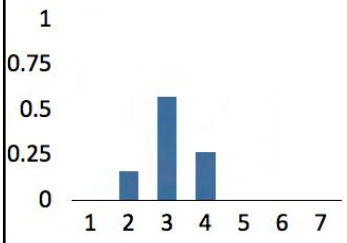
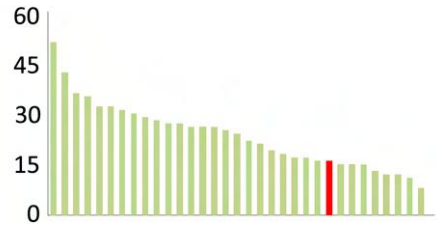
Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Abies grandis (grand fir)			10	5				4	2
Arbutus menziesii (arbutus)			15	1				2	3
Berberis nervosa (dull Oregon grape)					4			5	3
Elymus glaucus (blue wild rye)						T		2	3
Gaultheria shallon (salal)					30			8	3
Holodiscus discolor (ocean spray)				4				4	3
Isothecium sp.							20	6	3
Kindbergia oregana (Oregon beaked moss)							40	6	3
Lonicera ciliosa (orange honeysuckle)				1				2	3
Lonicera hispidula (hairy honeysuckle)					3			5	3
Polystichum munitum (western sword fern)						T		2	3
Pseudotsuga menziesii (Douglas-fir)	25	30	5	5	T			7	3
Rosa gymnocarpa (baldhip rose)					1			4	3

Thuja plicata (western redcedar)			5	3	T			5	3
Trientalis latifolia (western starflower)						T		2	3
Vaccinium ovatum (evergreen huckleberry)					T			1	3

Wildlife

Species	Life Stage	Evidence
Blacktailed deer (*Odocoileus hemionus columbianus*)	N/A	S
Woodpecker	N/A	F

Metrics

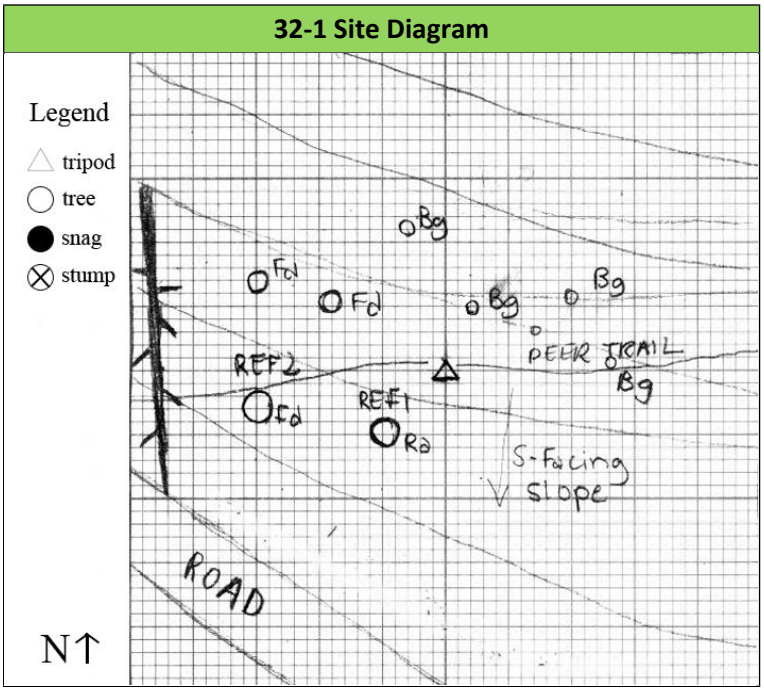
Plant Composition	Nutrient/moisture regime	Plant Biodiversity
	 Nutrient regime (poor→rich)	 ***H'*** = 2.04 ***J'*** = 0.74
	 Moisture regime (xeric→hydric)	 Richness (# of species) = 16

Metrics for Site 32-1 describe the site's open, mixed forested character, including a canopy composed of coniferous (*Pseudotsuga, Abies, Thuja*) and deciduous (*Arbutus*) trees, and an understory dominated by shrubs, with a sparsely distributed assemblage of herbaceous, fern and graminoid species (listed in rank order of abundance). Plant composition is reflective of a moderately rich, subxeric-mesic community, with the majority of plant cover (57%) indicative of a submesic soil moisture regime, and 99.9% of plant cover associated with a moderate soil nutrient regime. Of the 33 sites surveyed the site ranks 24th in species richness, with 16 species observed. When evenness in the proportional abundances of species is considered, site diversity is augmented to the rank of 13th. The site is one of nine sites surveyed where only native flora were recorded, of which it ranks 1st most diverse on the Shannon index and 4th in richness.

Photographs

32-1 Photographs

32-1 Site Diagram



Ecological Community 33

Description

Ecological Community 33a describes a recent clear-cut. There are scattered individual and small patches of seed trees on the site. Dominated by exotic grasses, with large bracken fern and salal-dominated patches scattered throughout, the ecological community has a gradual south-facing slope and exhibits the character of an early successional CDFmm/01 zonal community. The ecological community is a bowl shape between two steeper-sloped ridge areas. Scattered micro-sites appear to be slightly moisture-receiving and richer, and show more vigorous plant growth and somewhat more diverse species assemblages, including: vanilla leaf, red elderberry (*Sambucus racemosa*), common rush, and a concentration of western redcedar stumps.

Ecological Community 33b is similar in composition and is characterized as a logged, south to southwest-facing fringe along the lower portion of a mature forest mid-slope (Ecological Community 32b).

.

Ecological Community 33, Site 1 **Date Surveyed:** 29 August, 2012

Location

Location	References	Bearing	Description
N 5420052 E 465228	Ref. 1	7.1m @ 44°	0.2m diametre yew
	Ref. 2	16.5m @ 302°	0.3m diametre Douglas-fir snag with snapped top

Site Description

Located towards the narrow top of the 'bowl', the site includes a Pacific yew and is characteristic of the ecological community.

Site ID:	33-1	**Aspect:**	170°	**Exposure:**	
		Mesoslope Position:	MD	**Slope:**	25%
Surface Substrate:					
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***
1%	5%	3%	10%	81%	0

Structural Stage:	3a/2b	**SMR:**	2	**SNR:**	C	**Crown Closure:**	5%

Percent Cover				Site Series:	CDF/01
A	B	C	D		
5%	35%	55%	4%		
Succession:	N/A				

Restoration Recommendations: N/A

Riparian Features: N/A

Disturbances

Anthropogenic: Recently clear-cut with Douglas-fir seed tree retention. Machine work was extensive with several trails and the odd dug hole scattered throughout. The grazing of sheep is also evident.

Natural: Broken top of a Douglas-fir seed tree indicates that remaining stems are susceptible to wind-throw.

Vegetation

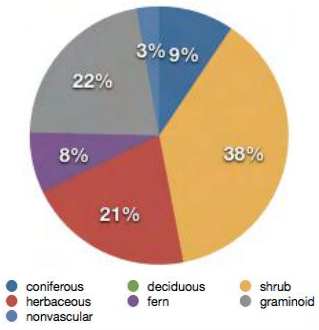
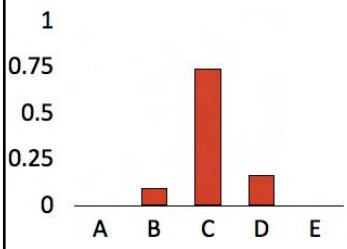
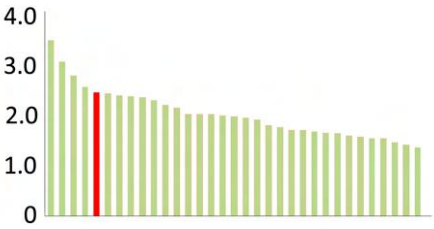
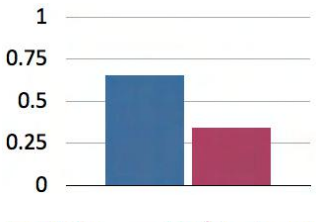
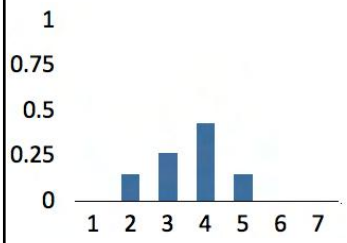
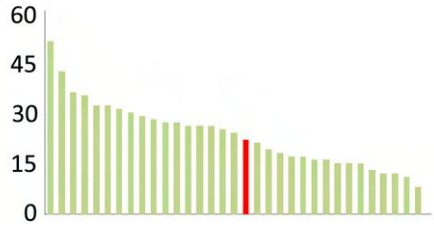
Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Achlys triphylla (vanilla leaf)						1		3	2
Agrostis capillaris (colonial bentgrass)						15		6	3
Berberis nervosa (dull Oregon grape)					1			3	4
Bromus sp. 1						1		5	3
Bromus sp. 2						T		3	3
Digitalis purpurea (common foxglove)						10		6	4
Elymus glaucus (blue wild rye)						5		5	4
Fragaria vesca (woodland strawberry)						T		3	3
Gaultheria shallon (salal)					25			6	3
grass sp.1						T		3	3
Hypochaeris radicata (hairy cat's-ear)						10		6	3
Juncus effusus (common rush)						2		4	3
Kindbergia oregana (Oregon beaked moss)							3	5	2
Lonicera hispidula (hairy honeysuckle)					3			6	3
Polystichum munitum (western sword fern)						T		2	2
Pseudotsuga menziesii (Douglas-fir)			3	1	T		T	4	2

Pteridium aquilinum (bracken fern)						8		6	3
Rubus leucodermis (blackcap raspberry)				3	5			6	4
Rubus ursinus (trailing blackberry)					1			4	3
Taxus brevifolia (Pacific yew)				2				1	3
Thuja plicata (western redcedar)			3	1	T		T	3	3
Urtica dioica (stinging nettle)						1		3	2

Wildlife

Species	Life Stage	Evidence
Blacktailed deer (*Odocoileus hemionus columbianus*)	N/A	S
Sheep	N/A	S

Metrics

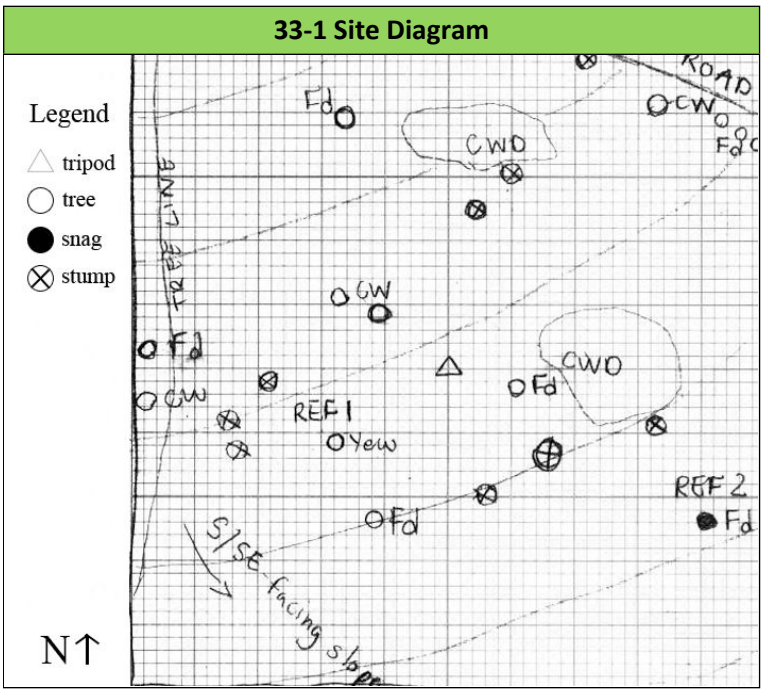
Plant Composition	Nutrient/moisture regime	Plant Biodiversity
	 Nutrient regime (poor→rich)	 ***H'*** = 2.48 ***J'*** = 0.80
	 Moisture regime (xeric→hydric)	 Richness (# of species) = 22

Metrics for Site 33-1 describe the site's heavily disturbed condition, dominated by shrubs, graminoids and forbs, with a sparse distribution of coniferous trees (*Pseudotsuga, Thuja, Taxus*) remaining among patches of ferns and bryophytes (listed in rank order of abundance). Plant composition reflects a moderately rich, subxeric-subhygric community, with the majority of plant cover (70%) indicating a submesic-mesic soil moisture regime, and 74% of plant cover associated with a moderate soil nutrient regime. Of the 33 sites surveyed the site ranks 18th in species richness, with 22 species observed. When evenness in the proportional abundances of species is considered, site diversity is augmented to the rank of 5th. The majority of flora observed are native species, with 34% of estimated plant cover classified as exotic.

Photographs

33-1 Photographs

33-1 Site Diagram



Ecological Community 33 Photographs

PP25. The cabin north of the bend in the main road leading down to the central house site in the valley (Ecological Community 33b)

Ecological Community 34

Description

Ecological Community 34 is characterized by a small scale log sort and portable milling site with heavily compacted soils and large piles of mill off-cuts and woody debris. The ecological community also includes the entrance driveway. This heavily degraded site is devoid of vegetation with small communities of invasive alien grasses and thistles around its fringe where soils are less compacted. The site is moisture receiving with small micro-sites that would likely be prone to wet soils (if compaction was not present) mixed with moist and drier soiled sites. The site transitions to a small, disturbed common rush/slough sedge dominated wetland to the east (Ecological Community 30b). This site requires major restoration including, removal of wood piles, soil decompaction, soil amendment and vegetation establishment.

Ecological Community 34 Photographs

PP26. The old staging area, including wood piles on the heavily impacted concourse

PP27. Heavily eroded north-facing slope adjacent to the staging area

Ecological Community 34 Photographs

PP28. A cleared area with woodpiles on the upper level woodlot of the property

Ecological Community 35

Description

Ecological Community 35 includes a recent clearcut, dated within the past decade, which is dominated by graminoids and thistles. Due to its slope position on the broad shoulder of a small ridge, it is both moisture-receiving and moisture-shedding, giving it more of a mid-slope zonal character. The presence of stumps indicate that the previous forest consisted of a mix of Douglas-fir and western redcedar, with western redcedar perhaps slightly more dominate prior to logging. The current dominance of thistles and exotic grasses, and the network of skid/ machine trails, indicate that soil disturbance from machinery was extensive. Several remnant western redcedar are scattered around the ecological community, many with broken tops or machine damage on stems. The ecological community includes a variety of micro-sites, including slightly drier, shallow-soiled, ridge-like areas and a slightly moister bowl or mild depression area.

Ecological Community 35, Site 1 **Date Surveyed:** 22 August, 2012

Location

Location	References	Bearing	Description
N E	Ref. 1	18m @ 56°	Leaning cedar (0.2m diametre) coming out of the base of a mature, 0.6m diametre cedar with a snagged top.
	Ref. 2	13.7m @ 143°	Two prominently exposed cedars, in the centre of the level clearing at the base of a gradual, north-facing slope; one relatively mature, 0.4m diametre; the other young, 0.2m diametre, growing curvaceously; the reference point is that which is the more mature of the two.

Site Description

The site is roughly central within the ecological community and includes slightly moister and drier micro-sites. It does not include any of the remnant western redcedar stems.

Site ID:	35-1	**Aspect:**	320°	**Exposure:**	N/A		
		Mesoslope Position:	MD	**Slope:**	10%		
Surface Substrate:							
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***		
0	1%	1%	5%	93%	0		
Structural Stage:	2b	**SMR:**	2-3	**SNR:**	B-C	**Crown Closure:**	0
Percent Cover				**Site Series:**	CDF/01		
A	B	C	D				
0	7%	95%	2%				
Succession:	N/A						

Restoration Recommendations: N/A

Riparian Features: N/A

Disturbances

Anthropogenic: Recently clear cut, with extensive machine use leading to disturbance and compaction of soils.

Natural: N/A

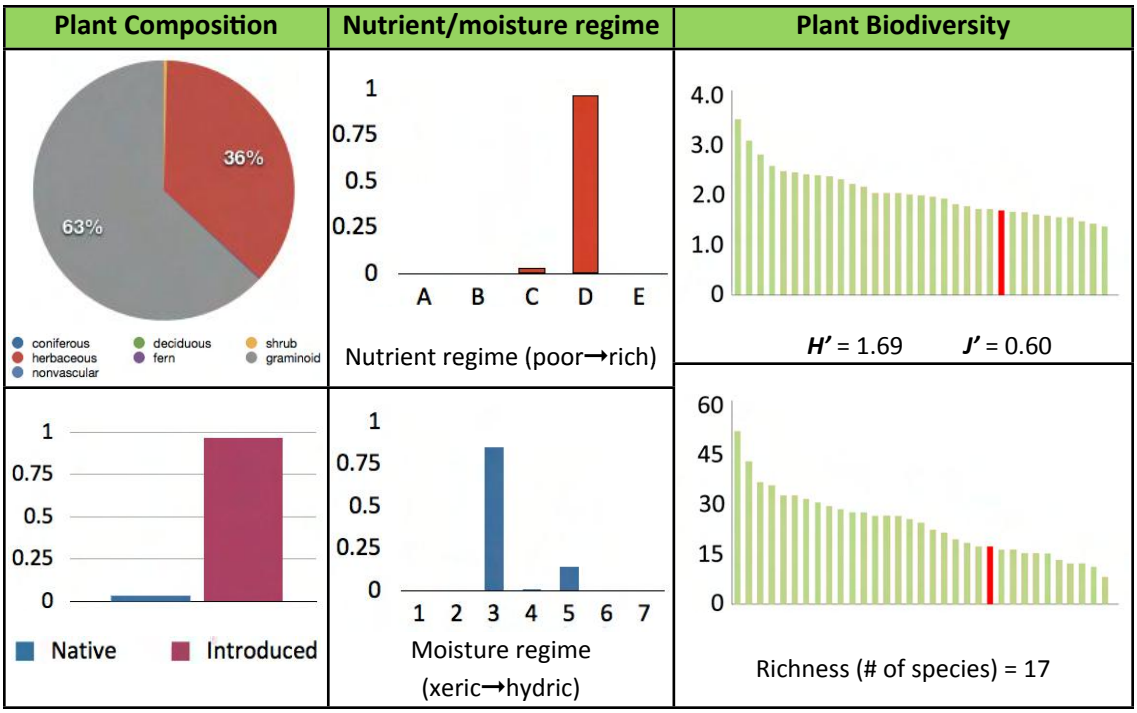
Vegetation

Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Agrostis capillaris (colonial bentgrass)						10			
Berberis nervosa (dull Oregon grape)	T								
Cirsium sp. (thistle)						30			
Dactylis glomerata (orchard grass)						1			
Digitalis purpureus (foxglove)						5			
Galium sp.	T								
Gaultheria shallon (salal)	T								
grass sp.1						2			
grass sp.2						7			
grass sp.3						5			
Holcus lanatus (common velvet-grass)						35			
Juncus effusus (common rush)						1			
Lactuca muralis (wall lettuce)	T								
Polystichum munitum (western sword-fern)	T								
Pteridium aquilinum (bracken fern)	T								
Rubus leucodermis (blackcap raspberry)	T								
Rubus ursinus (trailing blackberry)	T								

Wildlife

Species	Life Stage	Evidence
Raven (*Corvus corax*)	A	V
West coast garter snake (*Thamnophis valida*)	A	V

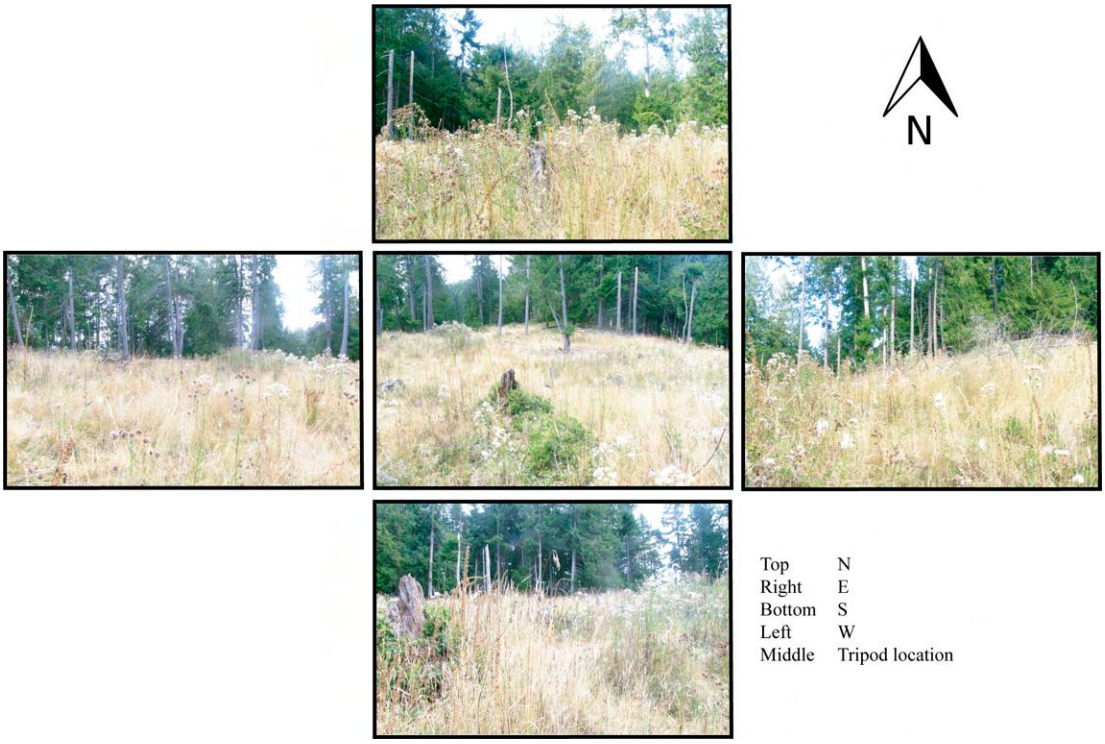
Metrics



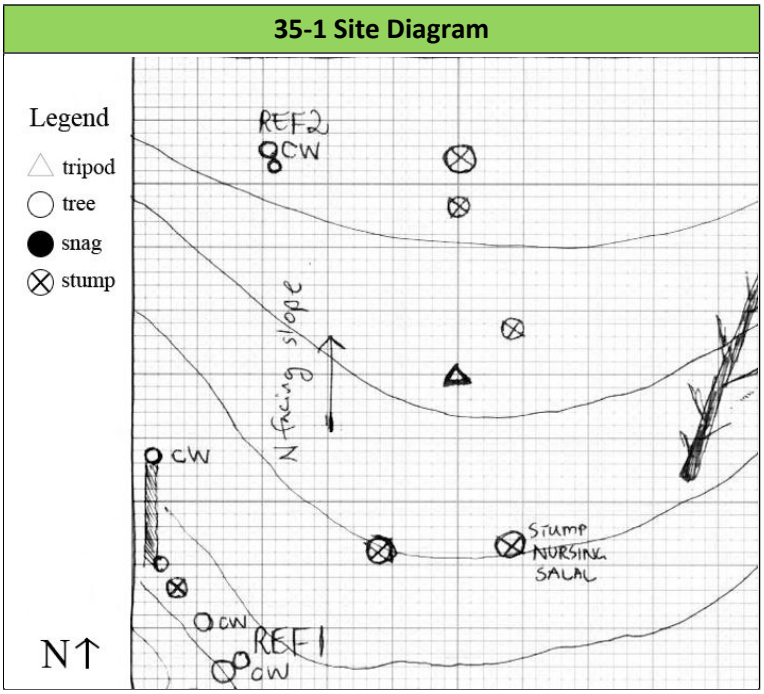
Metrics for Site 35-1 describe the site's badly disturbed condition, dominated by invasive graminoids and forbs, alongside a very sparse distribution of shrubs and ferns (listed in rank order of abundance). Plant composition reflect communities divided between overall rich submesic and subhygric microsites, with the majority of plant cover (85%) indicating a submesic soil moisture regime and 97% of plant cover associated with a rich soil nutrient regime. Of the 33 sites surveyed the site ranks 22nd in species richness, with 17 species observed. When evenness in the proportional abundances of species is considered, site diversity is diminished to the rank of 24th. The overwhelming majority of flora observed are exotic species, with only 3% of estimated plant cover classified as native. The site is the most compromised site surveyed according to this assessment.

Photographs

35-1 Photographs



35-1 Site Diagram



Ecological Community 36

Description

The ecological community encompasses a steep, southwest-facing slope that has been recently high-grade logged. A number of young western redcedar and the odd Douglas-fir have been retained. The ecological community also includes several bigleaf maple towards the toe of the slope and a few arbutus on the mid to upper slope. Terrain in the ecological community is somewhat varied with slightly deeper-soiled, shallow-grade sites mixed with dry, steep boulder/bedrock outcrops. The understory is graminoid-dominated (common velvet-grass) with a significant amount of thistle (*Cirsium* sp.) and foxglove (*Digitalis purpurea*). Patches of salal are also scattered throughout. Natural tree regeneration is sparse despite the partial canopy. The ecological community is bisected by an active road accessing the camping area and also includes machine roads running across the slope. Regeneration in this ecological community would benefit from the planting of appropriate tree species.

Ecological Community 36, Site 1 **Date Surveyed:** 30 August, 2012

Location

Location	References	Bearing	Description
N 5419617 E 465754	Ref. 1	12.1m @ 267˚	0.2m diametre bigleaf maple growing on bluffs
	Ref. 2	4m @ 350˚	0.8m diametre stump (nursing salal)

Site Description

Site ID:	36-1		**Aspect:**	230˚	**Exposure:**	N/A	
			Mesoslope Position:	MD	**Slope:**	35-55%	
Surface Substrate:							
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***		
5%	25%	2%	2%	66%	0		
Structural Stage:	2b/5c	**SMR:**	2	**SNR:**	B-C	**Crown Closure:**	15%
Percent Cover				**Site Series:**	CDF/01x		
A	B	C	D				
17%	30%	50%	15%				
Succession:	N/A						

Restoration Recommendations:

Regeneration in this ecological community would benefit from the planting of appropriate tree species.

Riparian Features: N/A

Disturbances

Anthropogenic: Logged within the last decade--mostly western redcedar and some Douglas-fir are retained. Several decade-old Douglas-fir stumps indicate older selective entry as well.

Natural: N/A

Vegetation

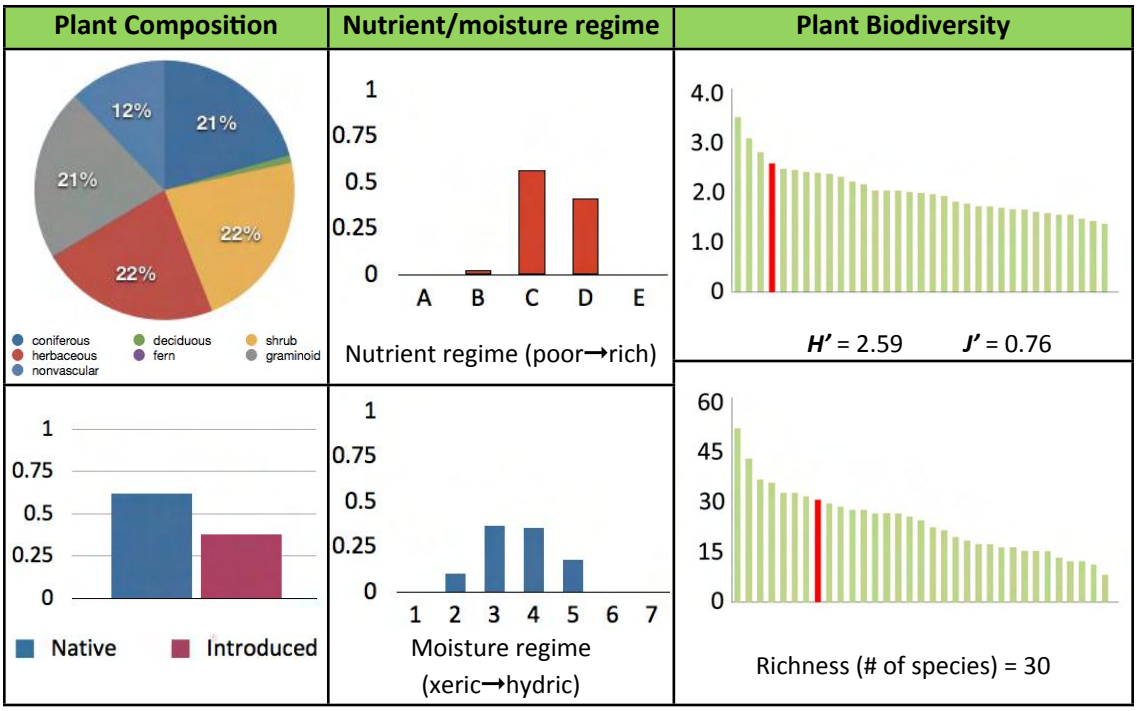
Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Acer macrophyllum (bigleaf maple)				1				1	2
Agrostis capillaris (colonial bentgrass)						2		5	3
Anthoxanthum odoratum (sweet vernal grass)						2		5	3
Arbutus menziesii (arbutus)							T	2	3
Berberis nervosa (dull Oregon grape)					5			5	3
Bromus sp.1						T		5	3
Cirsium sp. (thistle)						7		6	4
Digitalis purpurea (common foxglove)						15		8	4
Evernia prunastri (oakmoss lichen)							T	3	3
Galium sp.						2		6	3
Gaultheria shallon (salal)					12			6	3
Grimmia sp.							1	5	3
Holcus lanatus (common velvet-grass)						20		8	3
Holodiscus discolor (ocean spray)				5	T			5	3
Hypochaeris radicata (hairy cat's-ear)						1		4	3
Isothecium sp.							8	6	3
Juncus effusus (common rush)						1		3	7
Kindbergia oregana (Oregon beaked moss)							5	5	3
Lactuca muralis (wall lettuce)						1		4	3

Lonicera hispidula (hairy honeysuckle)					3			6	3
moss sp.1							T	3	3
Orthotrichum sp.							T	3	3
Polystichum munitum (western sword fern)						T		2	2
Prunus emarginata (bitter cherry)					T		T	2	3
Pseudotsuga menziesii (Douglas-fir)			5				T	2	2
Rubus leucodermis (blackcap raspberry)					T			2	3
Rubus ursinus (trailing blackberry)					T			4	3
Taraxacum sp. (Ruderalia) (dandelion)						T		2	3
Thuja plicata (western redcedar)			12	7			T	4	3
Urtica dioica (stinging nettle)						T		2	3

Wildlife

Species	Life Stage	Evidence
Blacktailed deer (*Odocoileus hemionus columbianus*)	N/A	S
Red squirrel (*Tamiasciurus douglasii)*	N/A	H

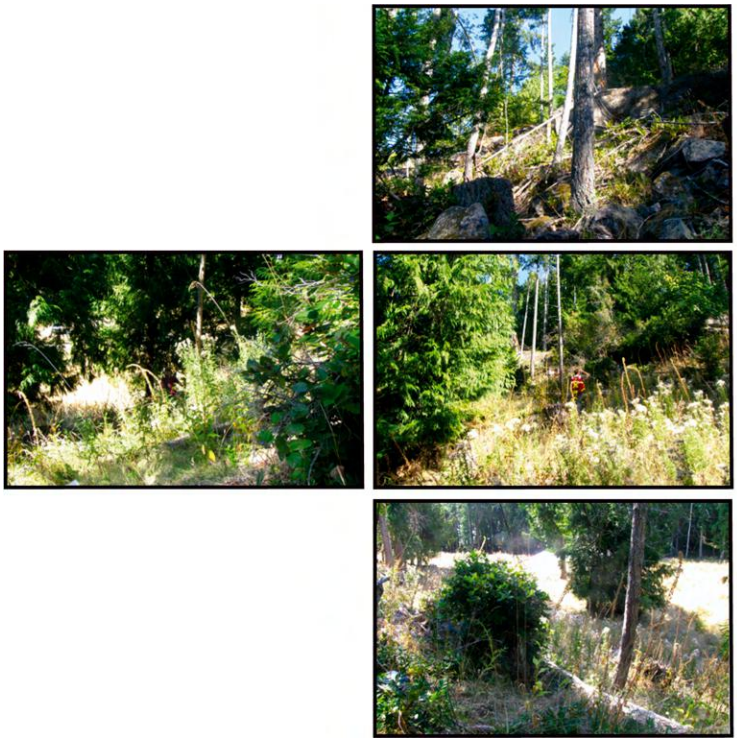
Metrics



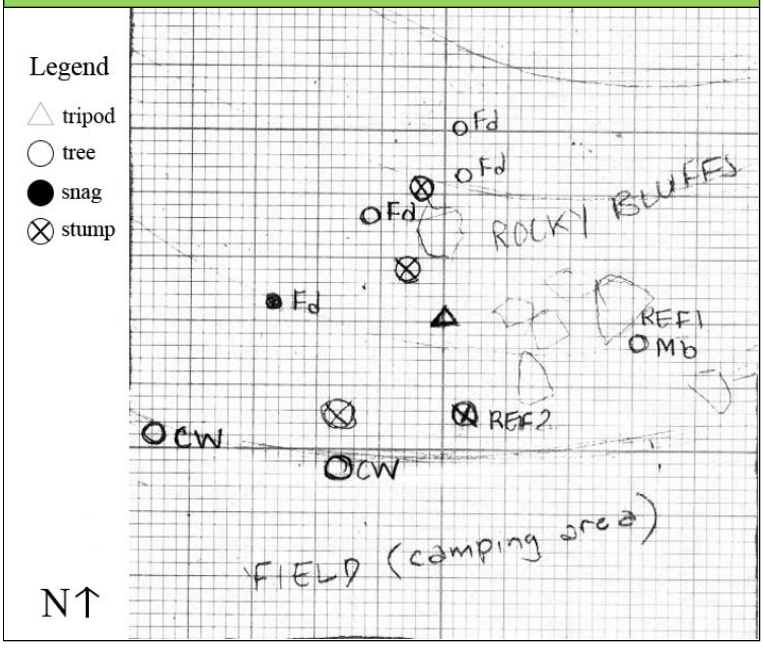
Metrics for Site 36-1 describe the site's diverse, highly disturbed condition, dominated by graminoids, shrubs and forbs, beneath a partial canopy of coniferous trees (*Thuja, Pseudotsuga*), with bryophytes and scattered deciduous trees (*Acer, Arbutus*) distributed throughout (listed in rank order of abundance). Plant composition reflects a moderately rich to rich, subxeric-subhygric community, with the majority of plant cover (72%) indicating a submesic-mesic soil moisture regime and 98% of plant cover associated with a moderately rich to rich soil nutrient regime. Of the 33 sites surveyed the site places in the upper quartile, ranking 8th in species richness with 30 species observed. When evenness in the proportional abundances of species is considered, site diversity is augmented to the rank of 4th. The majority of flora observed are native species, with 38% of estimated plant cover classified as introduced.

Photographs

36-1 Photographs



36-1 Site Diagram



Ecological Community 37

Description

Ecological Community 37 is characterized by a moderately-sloped, south-facing, maturing, Douglas-fir-dominated stand, with patches and individual mature western redcedar and western hemlock regularly scattered throughout, as well as a number of Douglas-fir veterans that escaped logging. The stand was logged approximately 60 years ago with a focus on Douglas-fir. This zonal, CDFmm/01 site exhibits a patchy understory due to variations in tree density and commonly occurring gaps. Shrub growth in gaps is robust, dominated by salal with a good component of oceanspray. Under denser canopy, shrubs are sparse with the odd patch of salal and dull Oregon grape and the odd sword fern. Moss-cover is dominated by Oregon beaked moss and is mainly restricted to coarse woody debris. Natural wind-throw is abundant and the pathogen *Phellinus weirii* is suspected of maintaining gaps. The ecological community also includes gently sloped bench areas characterized by large gaps and the growth of robust understory vegetation. While similar in canopy composition to the rest of the ecological community, these areas also include the odd alder and bitter cherry (*Prunus emarginata*). They have slightly moister and richer soil conditions but remain zonal sites. Salal and oceanspray remain the dominant shrubs with 75% and 20% cover respectively.

Note: smaller-diameter Douglas-fir, near old stump (cored) ≈ 55 years old

Ecological Community 37, Site 1 **Date Surveyed:** 14 September, 2012

Location

Location	References	Bearing	Description
N 5420023 E 465843	Ref. 1	14.3m @ 196°	1.75m diameter Douglas-fir snag with burn scars
	Ref. 2	4.18m @ 43°	1.5m diameter western redcedar (larger of the two near the pin)

Site Description

The site is characteristic of the ecological community with a slope towards the steeper end of the spectrum. Includes a dense canopy portion with a very sparse understory and the edge of a gap with higher shrub and moss cover.

Site ID:	37-1	**Aspect:**	210°	**Exposure:**	N/A
		Mesoslope Position:	MD	**Slope:**	45%

Surface Substrate:					
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***
0	0	2%	8%	90%	0

Structural Stage:	5/Cs	**SMR:**	2	**SNR:**	C	**Crown Closure:**	70%

Percent Cover				**Site Series:**	CDF/01
A	B	C	D		
75%	30%	1%	20%		
Succession:	Douglas-fir will continue to self-thin and will slowly develop a multi-storied canopy as gaps fill in and new ones are created.				

Restoration Recommendations: N/A

Riparian Features: N/A

Disturbances

Anthropogenic: Logged for Douglas-fir approximately 60 years ago.

Natural: Natural wind-throw; *P. weirii*-caused gaps and self-thinning

Vegetation

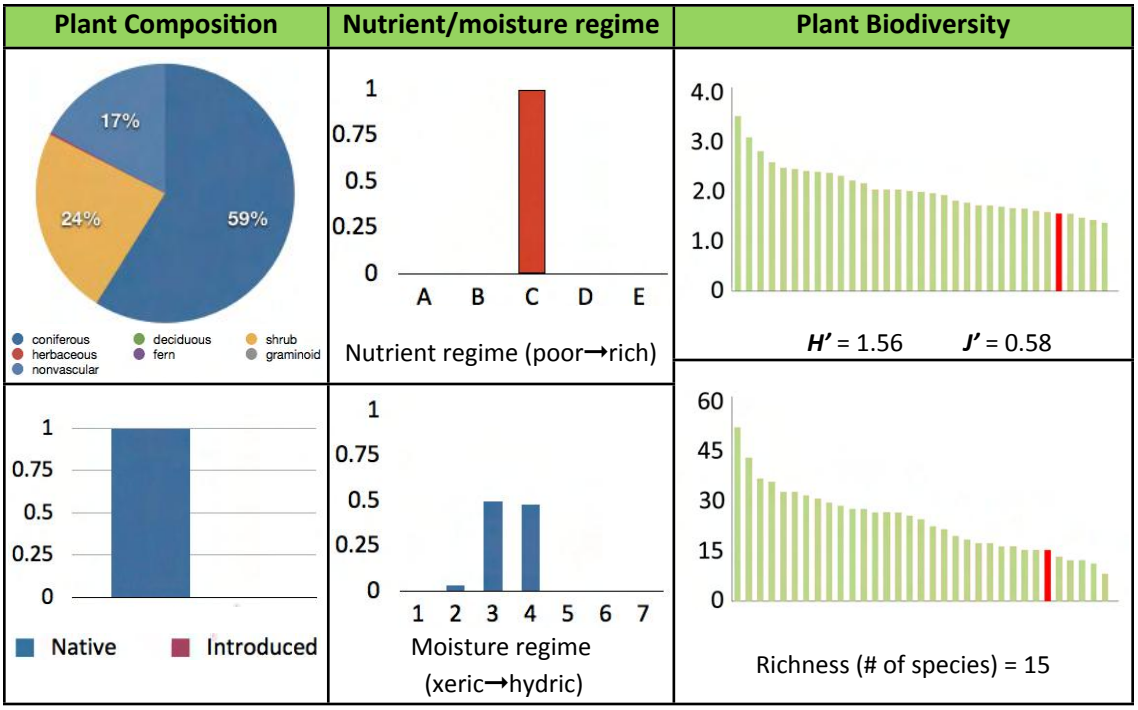
Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Abies grandis (grand fir)				T				2	2
Berberis nervosa (dull Oregon grape)					1			5	3
Galium aparine (cleavers)						T		2	3
Gaultheria shallon (salal)					25			6	3
Holodiscus discolor (ocean spray)				3				5	3
Ilex aquifolium (holly)					T			1	3
Isothecium sp.							2	5	3
Kindbergia oregana (Oregon beaked moss)							20	6	3
Lonicera ciliosa (orange honeysuckle)				1				4	3
Lonicera hispidula (hairy honeysuckle)					T			2	3
Polystichum munitum (western sword fern)						T		2	3
Pseudotsuga menziesii (Douglas-fir)		50	T	T				7	3
Pteridium aquilinum (bracken fern)						T		2	3

Thuja plicata (western redcedar)		25		T				4	4
Trientalis latifolia (western starflower)						T		4	3

Wildlife

Species	Life Stage	Evidence
Bark beetle (*Dendroctonus pseudotsugae*)	N/A	F
Blacktailed deer (*Odocoileus hemionus columbianus*)	N/A	S
Woodpecker	N/A	F

Metrics

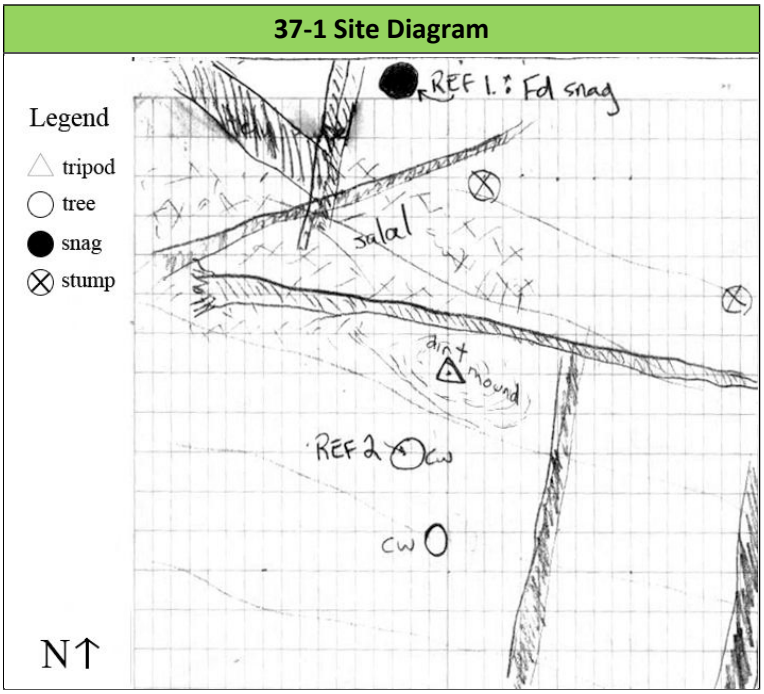


Metrics for Site 37-1 describe the site's forested character, with a canopy dominated by coniferous trees (*Pseudotsuga, Thuja, Abies*) and an understory composed primarily of shrubs and bryophytes, with forbs and ferns sparsely distributed throughout (listed in rank order of abundance). Plant composition is reflective of a moderately rich, submesic-mesic community, with the majority of plant cover (98%) indicative of a submesic-mesic moisture regime, and 99.8% of plant cover associated with a moderate soil nutrient regime. Of the 33 sites surveyed the site places in the lower quartile, ranking 28th in species richness with 15 species observed. When evenness in the proportional abundances of species is considered, site diversity is diminished to the rank of 29th. Virtually all flora observed are native, with a fraction of one percent of plant cover classified as exotic.

Photographs

37-1 Photographs

37-1 Site Diagram



Ecological Community 37 Photographs

PP29. Looking east along an old, naturally regenerating skidder road

PP30. Looking north into a large, salal-dominated gap on a gently sloped bench

Ecological Community 37 Photographs

PP31. View looking south from the Northeast Monument

PP32. View looking west from the Northeast Monument

Ecological Community 37 Photographs

PP33. Northeast Monument

Ecological Community 38

Description

Ecological Community 38 delineates a steep, south-to-southwest-facing, Douglas-fir-dominated slope. The northwestern portion is very steep (≈90%) and is dominated by old-growth Douglas-fir, with the odd arbutus scattered throughout. The area does not appear to have been logged. The understory is grass-dominated and exhibits a continuous ground cover of hairy honeysuckle, as well as patches of dull Oregon grape and moss (dominated by *Isothecium* sp.) growing on exposed rock. This area also includes cliff/exposed rock-bluff areas along the transition to Ecological Community 39 where bigleaf maple are scattered in moister seapages and cracks.

Ecological Community 39

Description

Ecological Community 39 encompasses a south-to-southwest-facing slope with a mature western redcedar-dominated canopy. Maturing Douglas-fir are found as individuals and in patches throughout the stand. Several large diameter, old-growth Douglas-fir are also sparsely scatte-

red throughout with a higher concentration towards the northwest end of the ecological community. The dense western redcedar canopy results in a sparse understory with well-spaced patches of salal, sword fern, and Oregon beaked moss. The odd arbutus and bigleaf maple are also scattered throughout the sub-canopy. Bigleaf maples are generally found towards the moisture-receiving toe of the slope. The ecological community was logged for Douglas-fir approximately 60–70 years ago, releasing the now-dominant western redcedar from the sub-canopy. Remnant old-growth Douglas-fir show fire scars, though they are likely not from within the past 150 years, otherwise western redcedar would not be so dominant. The steep slope shows signs of occasional soil-slumping as well as the accumulation of small, exposed boulders from the ridge/upper slope above. Large boulders litter the lower toe slope where the grade shallows. Steep rock bluff and cliff areas are scattered throughout the upper portions of this community. Below these areas the accumulation of boulders and the associated dominance of *Isothecium* moss species extends from the toe into the mid slope.

Ecological Community 39, Site 1 **Date Surveyed:** 31 August, 2012

Location

Location	References	Bearing	Description
N E	Ref. 1	7.4m @ 42°	0.3m diametre bigleaf maple downslope from the site
	Ref. 2	12.3m @ 158°	Large-diamater (0.8m) Douglas-fir stump, well decayed, slumping bark; 1m tall (nursing salal)

Site Description

The site is located at the far northwest end of the ecological community, roughly midway up the slope. While the understory composition is fairly typical of the ecological community, the tree layer includes a number of old growth Douglas-fir veterans which are unique to this portion.

Site ID:	39-1	**Aspect:**	205°	**Exposure:**	N/A
		Mesoslope Position:	MD	**Slope:**	75%
Surface Substrate:					
Bedrock	***Boulder***	***Exp. Minerals***	***Wood Decay***	***Organic***	***Water***
0	4%	5%	10%	81%	0

Structural Stage:	6/Cm	**SMR:**	2	**SNR:**	B-C	**Crown Closure:**	75%

Percent Cover				Site Series:	CDF/01
A	B	C	D		
80%	8%	2%	5%		
Succession:	N/A				

Restoration Recommendations: N/A

Riparian Features: N/A

Disturbances

Anthropogenic: Logging of Douglas-fir happened about 60-70 years ago. This ecological community also parallels Porlier Pass Road and so is influenced by noise and light of regular traffic.

Natural: Wind-throw and rockfall from above.

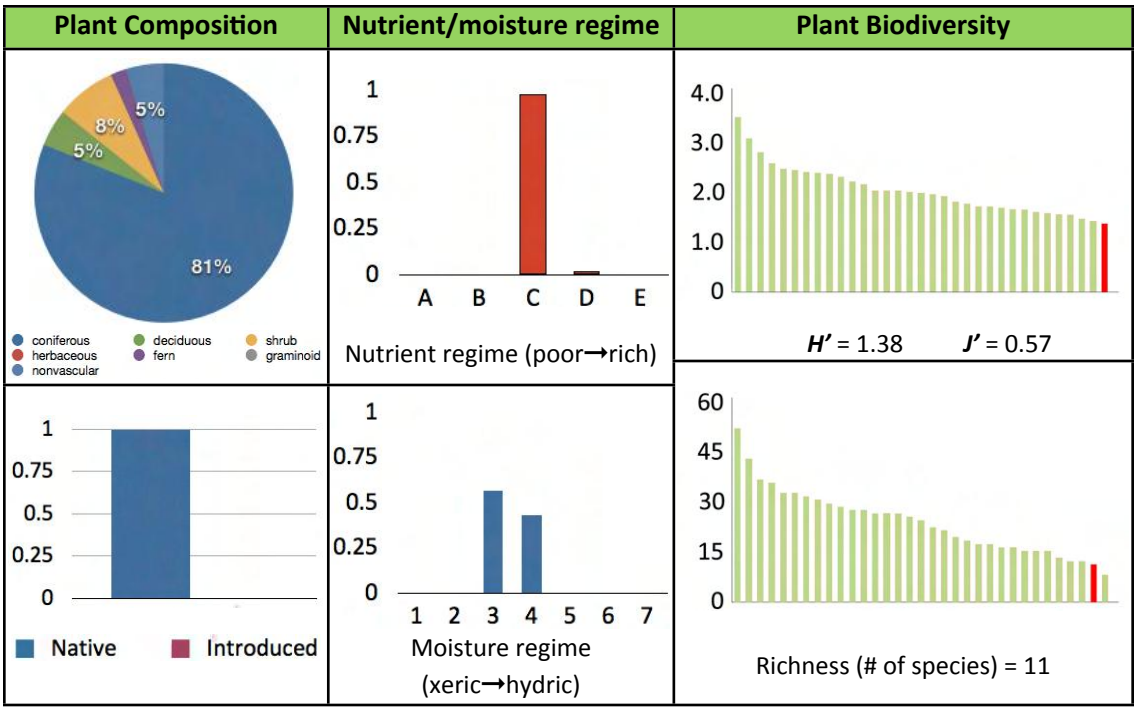
Vegetation

Species	A1	A2	A3	B1	B2	C	D	Dist.	Vig.
Acer macrophyllum (bigleaf maple)			5					2	3
Berberis nervosa (dull Oregon grape)					5			5	3
Gaultheria shallon (salal)					3			4	3
Isothecium sp.							2	6	3
Kindbergia oregana (Oregon beaked moss)							3	6	3
Polystichum munitum (western sword fern)						2		5	3
Pseudotsuga menziesii (Douglas-fir)	50							7	3
Pteridium aquilinum (bracken fern)						T		1	3
Rhytidiadelphus loreus (lanky moss)							T	5	2
Rubus ursinus (trailing blackberry)					T			2	3
Thuja plicata (western redcedar)		30	5	2				7	3

Wildlife

Species	Life Stage	Evidence
Pacific Sideband Snail (*Monadenia fidelis*)	A	V
Raven (*Corvus corax*)	N/A	H
Red squirrel (*Tamiasciurus douglasii)*	N/A	H

Metrics

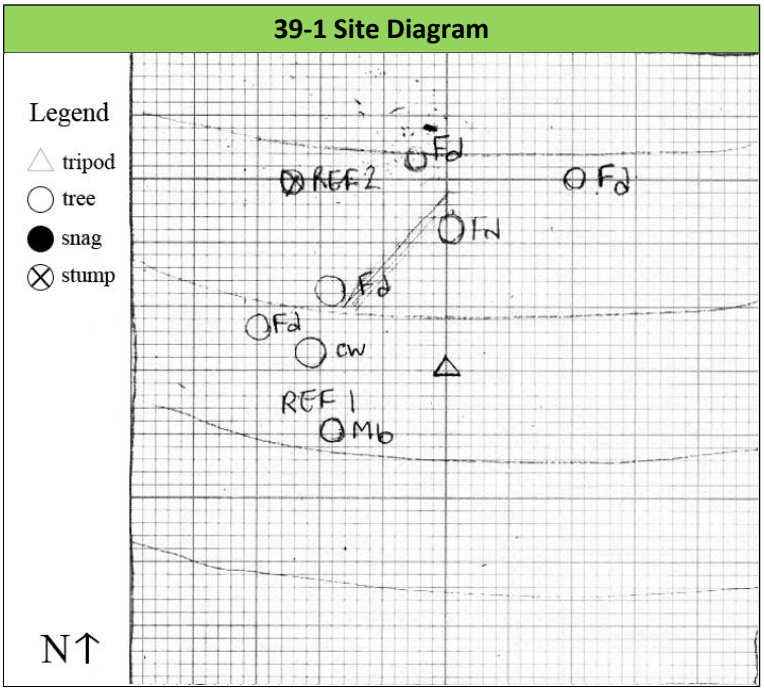


Metrics for Site 39-1 describe the site's mature forested character, with a canopy dominated by coniferous trees (*Pseudotsuga, Thuja*) and a sparse understory composed primarily of shrubs, among scattered bryophytes, deciduous trees (*Acer*) and ferns (listed in rank order of abundance). Plant composition reflects a moderately rich, submesic-mesic community, with one hundred percent of plant indicators suggesting a submesic-mesic moisture regime, and 98% of plant cover associated with a moderate soil nutrient regime. Of the 33 sites surveyed the site places in the lower quartile, ranking 32nd in species richness with only 11 species observed. When evenness in the proportional abundances of species is considered, site diversity falls to the rank of 33rd. The site is one of nine sites surveyed where only native flora were recorded, of which it ranks last on the Shannon index and 8th in richness.

Photographs

39-1 Photographs

39-1 Site Diagram



Ecological Community 40

Description

Ecological Community 40 covers a moist roadside depression exhibiting various stages of succession, disturbance, and soil moisture regime. The western end of the ecological community includes large diameter mature alder and western redcedar, as well as a sword fern-dominated understory with salmonberry (*Rubus spectabilis*) mixed in, indicative of a CDFmm/06-11 ecological community. There are also a number of bigleaf maples scattered throughout. Moving east toward the middle of the ecological community, there is a transition to a generally open salmonberry/small-flowered bullrush/common horsetail-dominated, early-successional CDFmm/11 & Ws53 community. This area has partial western redcedar canopy cover with scattered bigleaf maples on the upslope edge but remains clear along the roadside/hydro corridor. The odd western redcedar, bigleaf maple, alder, willow and bitter cherry are scattered throughout the ecological community's depression area.

Visual Descriptors

Photograph Locations Map

Photo Points and Descriptions

PPs	Date	Ecological communities	Coordinates	Description
PP01	15.08.12	4	N 5419781 E 464987	Documents the east side of the cabin on cliff edge, overlooking the Trincomali channel; taken standing next to the fence-line – an arbutus used as fence post – bearing 307°.
PP02	15.08.12	4	N 5419814 E 464968	Documents a nearby shed, on the west side of the cabin; taken sitting on the steps of the front porch, bearing 302°.
PP03	20.08.12	3	—	Turkey vultures documented perched in a snag on south-facing oceanfront cliffside.
PP04 (a,b)	20.08.12	6	N 5419666 E 465225	Documents the northeast slope of large bedrock/boulder outcrop along the shoreline in Ecological Community 06; includes vegetation: stonecrop, moss, and gumweed at several focal lengths and angles.
PP05	15.08.12	8	N 5419778 E 465202	Documents an outhouse and bridge over an ephemeral stream, located in Ecological Community 08; taken on a nearby path which joins the trail heading toward the cove; taken standing, looking directly across the bridge to the outhouse, bearing 127°.
PP06	20.08.12	8	N 5419718 E 465166	Documents the 'bowled' seepage dropping into the cove (Ecological Community 08); includes beach in foreground and the vegetation of the seepage (featuring a particularly abundant and robust patch of Pacific ninebark). Taken on the eastern flank of the sandstone shoreline near the mouth of the cove, at the high-tide line, as demarcated by the growth of seaweed; bearing 15°, standing, camera aimed mid-slope in line with an arbutus growing above.

PPs	Date	Ecological communities	Coordinates	Description
PP07	15.08.12	9	N 5419679 E 465386	Documents a barn-like structure with a flat roof in a fairly sheltered area of the western region of Ecological Community 9; off the road connecting the central house area and the campsites; taken from a seated position in the middle of a pile of timbre, bearing 100°.
PP08	23.08.12	9	—	Feral turkey
PP09	15.08.12	17/14b	N 5420040 E 464826	Taken along the road running east-west through Polygon 17, documenting two structures in a partially forested clearing, gradually sloping upward to the North; standing, bearing 42°.
PP10	15.08.12	17	N 5420158 E 464873	Two stables (for sheep?) and a paddock, upslope from PP9, Poly 17; taken from a large diameter, tall cedar stump, bearing 252°, on the northern perimeter of the polygon.
PP11	23.08.12	17	—	Feral sheep
PP12	15.08.12	21	N 5419868 E 465188	Taken at central house location, documenting structures to the south of the parking area, including the main house and storage sheds, parked car and trailer. Taken near PP13, just south; bearing 234°, standing.
PP13	15.08.12	21	N 5419889 E 465180	Taken at central house location, documenting structures to the north of the parking area, including road, sheds and storage (also capturing distant shed in Ecological Community 19); fairly level clearing; heavily impacted area. Taken from south end of a log, adjacent to the road and parking area, bearing 326°, standing.

PPs	Date	Ecological communities	Coordinates	Description
PP14	15.08.12	21	N 5419922 E 465022	Second angle on the landscape shown in PP14, documenting structures along the road running west through Polygon 21, including the workshop structure, a box-like windowless structure, and a trailer in the distance to the East, toward the house. Taken standing at the fork in the road, bearing 112°.
PP15	15.08.12	19/21	N 5419944 E 465073	Documents structures along road running west from the central house location, including one large workshop with an uncovered roof and the shed below in Ecological Community 19. Taken from the depression/field below road, delineated by Ecological Community 19, nearby a tall cut Douglas-fir stump, in vicinity of the east-side of Ecological Community 19, standing, bearing 199°.
PP16	15.08.12	22/23/21/24	N 5419863 E 465196	Taken near central house location, looking into deforested valley, open field; documenting a paddock area, small shed/doghouse, and a tarped greenhouse-like structure in the distance (Poly 38). Taken from east corner of Polygon 37, sitting on a large stump, bearing 89°.
PP17	15.08.12	21/22/23	N 5419933 E 465259	Documents lumber piles (Poly 37) and a stable downhill from PS-10, looking into the field and paddock area (Poly 35) documented from PS-03; includes the road heading off to the south-east, through polygons 37, 38, 42 and beyond. Same photo point as above, but bearing 186° instead.
PP18	13.08.12	26	N 5419681 E 465519	Documents pond and associated wetland; taken from the southwest edge of pond, sitting on the west end of a fallen oldgrowth cedar, bearing 26°, facing a mature cedar off in the distance.

PPs	Date	Ecological communities	Coordinates	Description
PP19	13.08.12	26	N/A	Reg-legged frog documented swimming in the pond (casual photo)
PP20	13.08.12	26	N 5419700 E 465531	Documents the disturbance of the southwest side of the pond by machine; taken on the western edge of the pond, standing west of a young Douglas-fir and north of a large white boulder; bearing 190°, facing the western end of the fallen cedar used as a photo-stop for PP18.
PP21	15.08.12	27	N 5419597 E 465700	Documents the outdoor kitchen at the campsite, situated in the eastern region of Ecological Community 27; also includes a temporary shelter located on level ground, in a field beneath the bluffs to the north, which drops into a lower depression where the tent platforms, etc. will be located; taken from a stump in the centre of the roundabout, bearing 118°.
PP22	?	27	—	The view looking southwest across Ecological Community 27c toward the treeline of Ecological Community 31a
PP23	?	28	—	Looking south from the boundary marker in Ecological Community 28b
PP24	?	30	—	Mixed forest edge alongside a slough-sedge dominated depression
PP25	15.08.12	33	N 5419933 E 465259	Documents the cabin north of the bend in the main road leading down to the central house site in the valley; taken from a log at the corner of the intersection where another road heads off to the south-east; bearing 28°.
PP26	15.08.12	34	N 5419756 E 465760	Documents the upper level woodlot, including the heavily impacted concourse, including wood piles; taken from PP28, bearing 32°.

PPs	Date	Ecological communities	Coordinates	Description
PP27	15.08.12	41	N 5419756 E 465760	Documents the heavily impacted and eroded north-facing slope adjacent to the woodlot; taken from PP28, bearing 110°. Note entrance to property indicated by a car to the left in the background.
PP28	15.08.12	41	N 5419756 E 465760	Documents a cleared area and woodpiles on the upper level woodlot of the property; taken seated on a large diameter stump, bearing 221°.
PP29	?	37	—	Looking east along an old, naturally regenerating skidder road
PP30	?	37	—	Looking north into a large, salal-dominated gap on a gently sloped bench
PP31	?	37	—	View looking south from the Northeast Monument
PP32	?	37	—	View looking west from the Northeast Monument
PP33	?	37	—	Northeast Monument

References

Carter, Jack Melton. 1977. The Stratigraphy, Structure, and Sedimentology of the Cretaceous Nanaimo Group, Galiano Island, B.C. Masters Thesis. Unpublished Oregon State University. 202p.

Eiss and D Craigdallie. 1980. Gulf Islands of British Columbia. A Landscape Analysis. Canadian Forestry Service/Pacific Forestry Centre. Victoria. B.C. 39p.

Green, A.J., Van Vliet, L.J.P., and Kenney, E.A. 1989. Soils of the Gulf Islands of British Columbia. Vol.3 Soils of Galiano, Valdes, Theitis, Kuper, and the lesser islands. Report #43. Ministry of Supplies and Services Canada

Halstead E.C. 1967. Hydrogeology of the Coastal Lowland Nanaimo to Victoria, Vancouver Island, Including the Gulf Islands, British Columbia. Inland Waters Branch Department of Energy, Mines and Resources. 44p.

Harrison, Don. 1994. Galiano Island Groundwater Study, 1994. A Review of Well Development and Groundwater Conditions on Galiano Island Gulf Islands, B.C. Post Baccalaureate Diploma Thesis. Unpublished Capilano College, B.C. 78p.

Henderson, J. D. 1997. An Ecosystem Approach to Groundwater Management in the Gulf Islands. Masters Degree Project. University of Calgary. 152p.

Henderson, G.G.L. and L.W. Vigrass. 1962. Geology of the Gulf Islands Area, British Columbia. Final Report Calgary, Alberta. 32p.

Muller, J.E. and J. A. Jeletzky. 1970. Geology of the Upper Cretaceous Nanaimo Group, Vancouver Island and the Gulf Islands, Canada. Geol. Surv. Can. Pap. 77p.

Mustard Peter. 1993. Marine Environments of the Upper Cretaceaous Nanaimo Group, Galiano and Prevost Islands, B.C. Association for Women Geoscientists Cordilleran Chapter. Spring Field Trip Guide.

Appendices

Appendix A: Complete Species Checklists [5]

FLORA:

Trees (10 species)

Species	Common name	Family	Origin
Abies grandis	grand fir	Pinaceae	native
Acer macrophyllum	big leaf maple	Sapindaceae	native
Arbutus menziesii	arbutus	Ericaceae	native
Pinus contorta	shore pine	Pinaceae	native
Populus tremuloides var. *vancouveriana*	trembling aspen	Salicaceae	native
Pseudotsuga menziesii	Douglas fir	Pinaceae	native
Quercus garryana	garry oak	Fagaceae	native
Taxus brevifolia	Pacific yew	Taxaceae	native
Thuja plicata	western redcedar	Cupressaceae	native
Tsuga heterophylla	western hemlock	Pinaceae	native

Shrubs (32 species; 8 exotic)

Species	Common name	Family	Origin
Amelanchier florida	Saskatoon berry	Rosaceae	native
Berberis aquifolium	tall Oregon grape	Berberidaceae	native
Berberis nervosa	dull Oregon grape	Berberidaceae	native
Buddleja davidii	butterfly-bush	Scrophulariaceae	exotic
Crataegus monogyna	common hawthorn	Rosaceae	exotic
Cytisus scoparius	Scotch broom	Fabaceae	exotic
Gaultheria shallon	salal	Ericaceae	native
Holodiscus discolor	oceanspray	Rosaceae	native
Ilex aquifolium	holly	Aquifoliaceae	exotic

[5] Last revised October 2016

Lonicera ciliosa	orange honeysuckle	Caprifoliaceae	native
Lonicera hispidula	hairy honeysuckle	Caprifoliaceae	native
Paxistima myrsinites	falsebox	Celastraceae	native
Philadelphus lewisii	mock orange	Hydrangeaceae	native
Physocarpus capitatus	Pacific ninebark	Rosaceae	native
Prunus emarginata	bitter cherry	Rosaceae	native
Ribes divaricatum	wild gooseberry	Grossulariaceae	native
Ribes sanguinuum	red-flowering currant	Grossulariaceae	native
Rosa gymnocarpa	baldhip rose	Rosaceae	native
Rosa nutkana	Nootka rose	Rosaceae	native
Rosa rubiginosa	sweet-brier rose	Rosaceae	exotic
Rubus discolor	Himalayan blackberry	Rosaceae	exotic
Rubus laciniatus	evergreen blackberry	Rosaceae	exotic
Rubus leucodermis	blackcap raspberry	Rosaceae	native
Rubus spectabilis	salmonberry	Rosaceae	native
Rubus ursinus	trailing blackberry	Rosaceae	native
Salix scouleriana	Scouler's willow	Salicaceae	native
Sambucus racemosa	red elderberry	Caprifoliaceae	native
Spiraea douglasii	hardhack	Rosaceae	native
Symphoricarpos albus	common snowberry	Caprifoliaceae	native
Vaccinium ovatum	evergreen huckleberry	Ericaceae	native
Vaccinium parvifolium	red huckleberry	Ericaceae	native
Viburnum tinus	laurestine	Adoxaceae	exotic

Forbs (137 species; 1 red-listed; 51 exotic)

Species	Common name	Family	Origin
Achillea millefolium	yarrow	Asteraceae	native
Achlys triphylla	vanilla leaf	Berberidaceae	native
Acmispon parviflorus	small-flowered bird's-foot trefoil	Fabaceae	native
Ajuga reptans	common bugleweed	Lamiaceae	exotic
Allium acuminatum	tapertip onion	Amaryllidaceae	native
Anaphalis margaritacea	pearly everlasting	Asteraceae	native
Arctium minus	common burdock	Asteraceae	exotic
Bellis perennis	English daisy	Asteraceae	exotic
Boshniakia hookeri	Vancouver groundcone	Orobanchaceae	native

Calypso bulbosa var. occidentalis	fairy slipper	Orchidaceae	native
Camassia leichtlinii	great camas	Asparagaceae	native
Camassia quamash	common camas	Asparagaceae	native
Cardamine hirsuta	hairy bitter-cress	Brassicaceae	exotic
Cardamine cf. *flexuosa*	wavy bitter-cress	Brassicaceae	exotic
Castilleja hispida	harsh paintbrush	Orobanchaceae	native
Castilleja miniata	common red paintbrush	Orobanchaceae	native
Centaurium erythraea	common centaury	Genitianaceae	exotic
Cerastium arvense	field chickweed	Caryophyllaceae	native
Cerastium fontanum	common chickweed	Caryophyllaceae	native
Cerastium glomeratum	sticky chickweed	Caryophyllaceae	exotic
Cicuta douglasii	Douglas' water-hemlock	Apiaceae	native
Circaea alpina	enchanter's nightshade	Onagraceae	native
Cirsium arvense	Canada thistle	Asteraceae	exotic
Cirsium vulgare	bull thistle	Asteraceae	exotic
Claytonia parviflora	springbank spring beauty	Portulaceae	native
Claytonia perfoliata	miner's lettuce	Portulacaceae	native
Claytonia sibirica	Siberian miner's lettuce	Portulacaceae	native
Clinopodium douglasii	yerba buena	Lamiaceae	native
Collinsia parviflora	small-flowered blue-eyed Mary	Plantaginaceae	native
Corallorhiza maculata var. *occidentalis*	western spotted coralroot	Orchidaceae	native
Corallorhiza maculata var. *ozettensis*	Ozette coralroot	Orchidaceae	native
Crepis capillaris	smooth hawksbeard	Asteraceae	exotic
Daucus pusillus	American wild carrot	Apiaceae	exotic
Delphinium menziesii	Menzies' larkspur	Ranunculaceae	native
Digitalis purpurea	common foxglove	Scrophulariaceae	exotic
Epilobium angustifolium	fireweed	Onagraceae	native
Epilobium ciliatum	fringed willowherb	Onagraceae	native
Epilobium densiflorum	dense-spike willowherb	Onagraceae	native
Epilobium minutum	small-flowered willowherb	Onagraceae	native
Epilobium tetragonum	square-stemmed willowherb	Onagraceae	exotic
Eriophyllum lanatum	Oregon sunshine	Asteraceae	native
Erythranthe alsinoides	chickweed monkey-flower	Phrymaceae	—
Erythranthe guttata	yellow monkey-flower	Phrymaceae	native
Erythranthe moschata	musk flower	Phrymaceae	—
Epilobium densiflorum	dense-spike primrose	Onagraceae	native
Fragaria vesca	woodland strawberry	Rosaceae	native
Galium aparine	cleavers	Rubiaceae	native
Galium triflorum	sweet-scented bedstraw	Rubiaceae	native

Gamochaeta purpurea	purple cudweed	Asteraceae	native
Geranium dissectum	cutleaf geranium	Geraniaceae	exotic
Geranium molle	dovesfoot	Geraniaceae	exotic
Geum macrophyllum	largeleaf avens	Rosaceae	native
Goodyera pubescens	rattlesnake plantain	Orchidaceae	native
Grindelia stricta	Oregon gumweed	Asteraceae	native
Hieracium albiflorum	white-flowered hawkweed	Asteraceae	native
Hypericum anagalloides	bog St. John's wort	Hypericaceae	native
Hypericum perforatum	common St. John's wort	Hypericaceae	exotic
Hypochaeris radicata	hairy cat's-ear	Asteraceae	exotic
Iris pseudacorus	yellow-flag iris	Iridaceae	exotic
Jacobaea maritima	silver ragwort	Asteraceae	exotic
Jacobaea vulgaris	tansy ragwort	Asteraceae	exotic
Lactuca muralis	wall-lettuce	Asteraceae	exotic
Lathyrus japonicus	beach pea	Fabaceae	native
Leucanthemum vulgare	oxeye daisy	Asteraceae	exotic
Linnaea borealis	twinflower	Caprifoliaceae	native
Lomatium dissectum	fern-leaved desert-parsley	Apiaceae	native
Lomatium utriculatum	spring gold	Apiaceae	native
Lotus corniculatus	common bird's-foot trefoil	Fabaceae	exotic
Lychnis coronaria	rose campion	Caryophyllaceae	exotic
Lysichiton americanus	skunk cabbage	Araceae	native
Lysimachia thyrsiflora	tufted loosestrife	Primulaceae	native
Madia sativa	Chilean tarweed	Asteraceae	exotic
Matricaria discoidea	pineapple weed	Asteraceae	exotic
Medicago lupulina	black medic	Fabaceae	exotic
Mentha arvensis	field mint	Lamiaceae	native
Micranthes integrifolia	grassland saxifrage	Saxifragaceae	native
Moehringia macrophylla	big-leaved sandwort	Caryophyllaceae	native
Monotropa uniflora	Indian pipe	Ericaceae	native
Muscari sp.	grape hyacinth	Asparagaceae	exotic
Myosotis discolor	common forget-me-not	Boraginaceae	exotic
Myosotis laxa	small forget-me-not	Boraginaceae	native
Narcissus sp.	daffodil	Amaryllidaceae	exotic
Navarretia squarrosa	skunkweed	Polemoniaceae	native
Nemophila pedunculata	meadow nemophila	Boraginaceae	native
Oenanthe sarmentosa	Pacific water parsley	Apiaceae	native
Olsynium douglasii	satin-flower	Iridaceae	native
Orobanche uniflora	one-flowered broomrape	Orobanchaceae	native
Parentucellia viscosa	yellow glandweed	Orobanchaceae	exotic
Piperia elegans subsp. *elegans*	elegant rein orchid	Orchidaceae	native
Piperia transversa	transverse rein orchid	Orchidaceae	native

Plantago lanceolata	ribwort plantain	Plantaginaceae	exotic
Plectritis congesta	seasideblush	Caprifoliaceae	native
Potamogeton sp.	pondweed	Potamogetonaceae	native
Potentilla anserina ssp. *pacifica*	Pacific silverweed	Rosaceae	native
Prunella vulgaris	self-heal	Lamiaceae	native
Pseudognaphalium microcephalum	slender cudweed	Asteraceae	—
Ranunculus flammula	lesser spearwort	Ranunculaceae	native
Ranunculus occidentalis	western buttercup	Ranunculaceae	native
Ranunculus repens	creeping buttercup	Ranunculaceae	exotic
Ranunculus uncinatus	little buttercup	Ranunculaceae	native
Rumex acetosella	sheep sorrel	Polygonaceae	exotic
Rumex crispus	curly dock	Polygonaceae	exotic
Rumex obtusifolius	bitter dock	Polygonaceae	exotic
Sanicula crassicaulis	Pacific sanicle	Apiaceae	native
Sedum spathulifolium	broad-leaved stonecrop	Crassulaceae	native
Selaginella wallacei	Wallace's selaginella	Selaginellaceae	native
Senecio sylvaticus	heath groundsel	Asteraceae	native
Silene antirrhina	sleepy catchfly	Caryophyllaceae	native
Sonchus oleraceus	common sow-thistle	Asteraceae	exotic
Spergularia rubra	red sandspurry	Caryophyllaceae	exotic
Stachys mexicana	mexican hedge-nettle	Lamiaceae	native
Stellaria calycantha	northern starwort	Caryophyllaceae	native
Stellaria graminea	grasslike starwort	Caryophyllaceae	exotic
Stellaria media	common starwort	Caryophyllaceae	exotic
Taraxacum spp.	dandelion	Asteraceae	exotic
Tellima grandiflora	fringecup	Saxifragaceae	native
Tiarella trifoliata	three-leaf foamflower	Saxifragaceae	native
Torilis japonica	upright hedge-parsley	Apiaceae	exotic
Toxicoscordion venenosum	meadow death-camas	Melanthiaceae	native
Trientalis latifolia	western starflower	Primulaceae	native
Trifolium dubium	small-hop clover	Fabaceae	exotic
Trifolium microcephalum	small-headed clover	Fabaceae	native
Trifolium oliganthum	fewflower clover	Fabaceae	native
Trifolium pratense	red clover	Fabaceae	exotic
Trifolium repens	white clover	Fabaceae	exotic
Trifolium willdenovii	tomcat clover	Fabaceae	native
Triteleia howellii	Howell's triteleia	Asparagaceae	native
Triteleia hyacinthina	white brodiaea	Asparagaceae	native
Urtica dioica	stinging nettle	Urticaceae	exotic
Verbascum thapsus	common mullein	Scrophulariaceae	exotic
Veronica arvensis	corn speedwell	Plantaginaceae	exotic

Veronica americana	American brooklime	Plantaginaceae	native
Veronica scutellata	marsh speedwell	Plantaginaceae	native
Veronica serpyllifolia	thyme-leaved speedwell	Plantaginaceae	?
Vicia americana	American deer vetch	Fabaceae	native
Vicia hirsuta	tiny vetch	Fabaceae	exotic
Vicia sativa	vetch	Fabaceae	exotic
Vinca major	greater periwinkle	Apocynaceae	native

Ferns and allies (9 species)

Species	Common name	Family	Origin
Athyrium filix-femina	lady fern	Athyriaceae	native
Blechnum spicant	deer fern	Blechnaceae	native
Equisetum arvense	common horsetail	Equisetidae	native
Equisetum hyemale ssp. *affine*	scouring rush	Equisetidae	native
Equisetum telmateia	giant horsetail	Equisetidae	native
Pentagramma triangularis	golden-back fern	Pteridaceae	native
Polypodium glycyrrhiza	licorice fern	Polypodiaceae	native
Polystichum munitum	western sword fern	Dryopteridaceae	native
Pteridium aquilinum	bracken fern	Dennstaedtiaceae	native

Grasses, sedges and rushes (45 species; 24 exotic)

Species	Common name	Family	Origin
Agropyron sp.	crested-wheat grass	Poaceae	exotic
Agrostis capillaris	common bentgrass	Poaceae	exotic
Agrostis exarata	spike bentgrass	Poaceae	native
Aira caryophyllea	silver hairgrass	Poaceae	exotic
Aira praecox	early hairgrass	Poaceae	exotic
Alopecurus geniculatis	water meadow-foxtail	Poaceae	exotic
Anthoxanthum aristatum	annual vernal grass	Poaceae	exotic
Anthoxanthum odoratum	sweet vernal grass	Poaceae	exotic
Bromus carinatus	California brome	Poaceae	native
Bromus hordeaceus	soft brome	Poaceae	exotic

Bromus rigidus	rip-gut brome	Poaceae	exotic
Bromus sterilis	barren brome	Poaceae	exotic
Carex inops	long-stolon sedge	Cyperaceae	native
Carex laxiculmis	spreading sedge	Cyperaceae	exotic
Carex obnupta	slough sedge	Cyperaceae	native
Carex pachystachya	thick-headed sedge	Cyperaceae	native
Carex pallescens	pale sedge	Cyperaceae	exotic
Carex sitchensis	Sitka sedge	Cyperaceae	native
Cynosurus cristatus	crested dogtail	Poaceae	exotic
Cynosurus echinatus	hedgehog dogtail	Poaceae	exotic
Dactylis glomerata	orchard grass	Poaceae	exotic
Danthonia californica	California oatgrass	Poaceae	native
Eleocharis sp.	spike rush	Cyperaceae	native
Elymus glaucus	blue wild rye	Poaceae	native
Festuca occidentalis	Western fescue	Poaceae	native
Festuca rubra	red fescue	Poaceae	exotic
Festuca subulata	bearded fescue	Poaceae	native
Holcus lanatus	common velvet-grass	Poaceae	exotic
Juncus articulatus	jointed rush	Juncaceae	native
Juncus bolanderi	Bolander's rush	Juncaceae	native
Juncus effusus	common rush	Juncaceae	native
Juncus mertensianus	Merten's rush	Juncaceae	native
Koeleria macrantha	junegrass	Poaceae	native
Luzula comosa	Pacific woodrush	Juncaceae	native
Luzula subcessilis	many-flowered woodrush	Juncaceae	exotic
Melica subulata	Alaska oniongrass	Poaceae	native
Phalaris canariensis	reed canarygrass	Poaceae	exotic
Phleum pratense	Timothy	Poaceae	exotic
Poa sp.	grass	Poaceae	
Poa trivialis	rough bluegrass	Poaceae	exotic
Schedonorus pratensis	meadow fescue	Poaceae	exotic
Scirpus microcarpus	small-flowered bullrush	Scirpeae	native
Typha latifolia	cattail	Typhaceae	native
Vulpia bromoides	barren fescue	Poaceae	exotic
Vulpia myuros	rat's-tail fescue	Poaceae	exotic

Mosses and liverworts (68 species; provenance not assessed)

Species	Common name	Family	Origin
Antitrichia californica	California antitrichia moss	Leucodontaceae	—
Atrichum undulatum	wavy Catharinea	Polytrichaceae	—
Aulacomnium androgynum	lover's moss	Aulacomniaceae	—
Brachythecium sp.	brachythecium moss	Brachytheciaceae	—
Bryum argenteum	silvery bryum	Bryaceae	—
Bryum capillare	bryum moss	Bryaceae	—
Bryum miniatum	glossy red bryum moss	Bryaceae	—
Bryum torquescens	—	Bryaceae	—
Bryum spp.	—	Bryaceae	—
Buckiella undulata	buckiella moss	Hypnaceae	—
Calypogeia sp.	calypogeia moss	Calypogeiaceae	—
Cephaloziella sp.	cephaloziella moss	Cephaloziaceae	—
Ceratodon purpureus	fire moss	Ditrichaceae	—
Claopodium bolanderi	Bolander's claopodium moss	Thuidiaceae	—
Claopodium crispifolium	claopodium moss	Thuidiaceae	—
Dendroalsia abietina	feather moss	Leucodontaceae	—
Dichelyma uncinata	—	Fontinaliaceae	—
Dicranoweisia cirrata	—	Dicranaceae	—
Dicranoweisia crispula	—	Dicranaceae	—
Dicranum fuscescens	—	Dicranaceae	—
Dicranum scoparium	broom fork moss	Dicranaceae	—
Dicranum tauricum	—	Dicranaceae	—
Dicranum sp.	—	Dicranaceae	—
Didymodon eckeliae	—	Pottiaceae	—
Didymodon vinealis	—	Pottiaceae	—
Dryptodon patens	spreading fringe moss	Ditrichaceae	—
Fissidens bryoides	tiny fern moss	Fissidentaceae	—
Grimmia cf. *leibergii*	—	Grimmiaceae	—
Grimmia trichophylla	hair-pointed grimmia	Grimmiaceae	—
Grimmia sp.	grimmia moss	Grimmiaceae	—
Hedwigia stellata	hedwigia moss	Hedwigiaceae	—
Homalothecium aureum	—	Brachytheciaceae	—
Homalothecium fulgescens	tree mat homalothecium moss	Brachytheciaceae	—

Homalothecium nuttallii	Nuttall's homalothecium moss	Brachytheciaceae	—
Hylocomium splendens	stair-step moss	Hylocomiaceae	—
Hypnum circinale	—	Hypnaceae	—
Hypnum subimponens	—	Hypnaceae	—
Isothecium cristatum	isothecium moss	Brachytheciaceae	—
Isothecium stoloniferum	isothecium moss	Brachytheciaceae	—
Kindbergia oregana	Oregon beaked moss	Brachytheciaceae	—
Kindbergia praelonga	slender beaked moss	Brachytheciaceae	—
Lepidozia reptans	creeping fingerwort	Lepidoziaceae	—
Leucolepsis acanthoneuron	Menzies' treemoss	Mniaceae	—
Metaneckera menziesii	Menzies' metaneckera moss	Neckeraceae	—
Neckera douglasii	Douglas' neckera moss	Neckeraceae	—
Orthotrichum lyellii	Lyell's orthotrichum moss	Orthotrichiaceae	—
Orthotrichum rupestre	rock bristle-moss	Orthotrichiaceae	—
Plagiomnium insigne	plagiomnium moss	Mniaceae	—
Plagiomnium venustum	plagiomnium moss	Mniaceae	—
Polytrichum juniperinum	juniper moss	Polytrichaceae	—
Polytrichum piliferum	hair moss	Polytrichaceae	—
Porella navicularis	tree-ruffle liverwort	Porellaceae	—
Porella sp.	porella liverwort	Porellaceae	—
Pterogonium gracile	pterogonium moss	Brachytheciaceae	—
Racomitrium elongatum	elongate rock moss	Grimmiaceae	—
Racomitrium heterosti-chum	yellow-green rock moss	Grimmiaceae	—
Racomitrium lanuginosum	woolly moss	Grimmiaceae	—
Rhizomnium glabrescens	fan moss	Mniaceae	—
Rhytidiadelphus loreus	lanky moss	Hylocomiaceae	—
Rhytidiadelphus triquetrus	electrified cat's tail moss	Hylocomiaceae	—
Scapania *sp.*	liverwort	Scapaniaceae	—
Schistidium maritimum	seaside grimmia	Grimmiaceae	—
Scleropodium obtusifolium	blunt-leaved scleropodium	Amblystegiaceae	—
Scleropodium touretii	Touret's scleropodium moss	Amblystegiaceae	—
Syntrichia princeps	syntrichia moss	Pottiaceae	—
Syntrichia ruralis	star moss	Pottiaceae	—
Timmiella crassinervis	timmiella moss	Pottiaceae	—
Weissia controversa	controverial weissia moss	Pottiaceae	—

Lichens (54 species; one blue-listed; provenance not assessed)

Species	Common name	Family	Origin
Caloplaca chrysodeta	firedot lichen	Teloschistaceae	—
Caloplaca cf. *citrina*	mealy firedot lichen	Teloschistaceae	—
Caloplaca cf. *luteominia*	red firedot lichen	Teloschistaceae	—
Chrysothrix granulosa	coastal gold dust lichen	Chrysotrichaceae	—
Cladina portentosa	maritime reindeer lichen	Cladoniaceae	—
Cladonia cf. *asahinae*	Asahina's pixie-cup	Cladoniaceae	—
Cladonia cf. *verruculosa*	nittygritty pixie	Cladoniaceae	—
Cladonia chlorophaea	granulating pixie-cup	Cladoniaceae	—
Cladonia fimbriata	trumpet pixie-cup	Cladoniaceae	—
Cladonia macilenta	lipstick pixie	Cladoniaceae	—
Cladonia ochrochlora	greater littlehorn pixie	Cladoniaceae	—
Cladonia pyxidata	pebbled pixie	Cladoniaceae	—
Cladonia scabriuscula	winged pixie	Cladoniaceae	—
Cladonia squamosa	dragon pixie	Cladoniaceae	—
Cladonia transcendens	graduated pixie lichen	Cladoniaceae	—
Cladonia umbricola	shadow pixie	Cladoniaceae	—
Evernia prunastri	antlered oakmoss	Parmeliaceae	—
Hypogymnia apinnata	beaded sleeve	Parmeliaceae	—
Hypogymnia physodes	monk's hood	Parmeliaceae	—
Hypogymnia tubulosa	powder-headed bone	Parmeliaceae	—
Lecanora contractula	rim lichen	Lecanorineae	—
Lecanora muralis sensu lato	stonewall rim-lichen	Lecanorineae	—
Lecidella asema	disk lichen	Lecanorineae	—
Lepraria spp.	dust lichen	Stereocaulaceae	—
Leptogium palmatum	antlered vinyl	Collemataceae	—
Lichenomphalia umbellifera	heath navel	Hygrophoraceae	—
Lobaria pulmonaria	lungwort lichen	Lobariaceae	—
Melanelixia fuliginosa	polished camouflage	Parmeliaceae	—
Melanelixia subaurifera	abrading camouflage	Parmeliaceae	—
Nephroma laevigatum	mustard paw	Nephromataceae	—
Ochrolechia androgyna	powdery saucer lichen	Ochroloechiaceae	—
Parmelia saxitilis	pebbled crottle	Parmeliaceae	—
Parmelia sulcata	hammered crottle	Parmeliaceae	—
Peltigera brittanica	deciduous pelt	Peltigeraceae	—

Peltigera collina	tree pelt	Peltigeraceae	—
Peltigera membranacea	diamond pelt	Peltigeraceae	—
Peltigera neopolydactyla	blue carpet pelt	Peltigeraceae	—
Pertusaria amara	bitter wart lichen	Pertusariaceae	—
Pertusaria subambigens	frosted wart lichen	Pertusariaceae	—
Physcia adscendens	hooded rosette	Physciaceae	—
Physcia caesia	blue-headed rosette	Physciaceae	—
Platismatia glauca	ragbag	Parmeliaceae	—
Platismatia herrei	tattered rag	Parmeliaceae	—
Punctelia stictica	blue-shift speckleback	Parmeliaceae	—
Ramalina farinacea	hyphenated ribbon	Ramalinaceae	—
Tephromela atra	black-eye lichen	Mycoblastaceae	—
Thelomma mammosum	rock nipple lichen	Caliciaceae	—
Tuckermannopsis chlorophylla	silver-lined wrinkle	Parmeliaceae	—
Tuckermannopsis orbata	shape-shifting wrinkle	Parmeliaceae	—
Usnea dasypoga f. filipendula	fishbeard	Parmeliaceae	—
Usnea subfloridana	nit beard	Parmeliaceae	—
Xanthoparmelia cumberlandia sensu lato	questionable rockfrog	Parmeliaceae	—
Xanthoria polycarpa	pincushion sunburst	Teloschistaceae	—
Xanthoria sp. nov.		Teloschistaceae	—

Mushrooms and slime moulds (42 species; provenance not assessed)

Species	Common name	Family	Origin
Agrocybe praecox	spring agrocybe	Strophariaceae	—
Amanita gemmata	gemmed amanita	Amanitaceae	—
Amanita pantherina	panther cap	Amanitaceae	—
Antrodia malicola	polypore	Fomitopsidaceae	—
Brefeldia maxima	tapioca slime	Stemonitidae	—
Cantharellus infundibuliformis	winter chanterelle	Cantharellaceae	—
Conoybe sp.	cone head	Bolbitiaceae	—
Dacrymyces deliquescens	jelly fungus	Dacrymycetacea	—
Fomitopsis pinicola	red belted conk	Fomitopsidaceae	—
Galerina cf. *atkinsoniana*	—	Hymenogastraceae	—

Galerina cf. *vittiformis*	—	Hymenogastraceae	—
Galerina spp.	—	Hymenogastraceae	—
Geoglossum cf. *umbratile*	black earth tongue	Geoglossaceae	—
Guepiniopsis alpinus	jelly fungus	Dacrymycetaceae	—
Gyromitra esculenta	brain mushroom	Discinaceae	—
Hebeloma sp.	—	Hymenogastraceae	—
Hygrocybe flavescens	golden waxy cap	Hygrophoraceae	—
Hypholoma fasciculare	clustered wood lover	Strophariaceae	—
Inocybe geophylla	earthy inocybe	Inocybaceae	—
Inocybe lilacina	—	Inocybaceae	—
Inocybe pudica	—	Inocybaceae	—
Inocybe sp.	—	Inocybaceae	—
Laccaria laccata	the deceiver	Hydnangiaceae	—
Leocarpus fragilis	insect egg slime	Physaraceae	—
Lycoperdon cf. *pyriforme*	pear-shaped puff ball	Agaricaceae	—
Mollisia cf. *cinerea*	tiny cup fungus	Dermateaceae	—
Mycena spp.	—	Mycenaceae	—
Nidula candida	jellied bird's nest fungus	Agaricaceae	—
Nolanea holoconiota	—	Entolomataceae	—
Nolanea spp.	—	Entolomataceae	—
Phaeolus schweinitzii	dyer's polypore	Polyporaceae	—
Phellinus weirii	laminated root-rot fungus	Hymenochaetaceae	—
Pholiota cf. *malicola*	—	Strophariaceae	—
Pleurotus ostreatus	oyster mushroom	Pleurotaceae	—
Pluteus cervinus	deer mushroom	Plutaceae	—
Polyporus tuberaster	Tuckahoe	Polyporaceae	—
Rhytisma punctata	maple leaf tar-spot	Rhytismataceae	—
Stereum hirsutum	parchment bracket	Stereaceae	—
Trametes versicolor	turkey-tail	Polyporaceae	—
Tremella foliacea	witch's butter	Tremellaceae	—
Tubaria sp.	—	Tubariaceae	—
Verpa conica	smooth early morel	Morchellaceae	—

Marine algae (13 species; 2 exotic; provenance otherwise not assessed)

Species	Common name	Family	Origin
Ceramium sp.	—	Ceramiaceae	—

Chondracanthus exasperatus	Turkish towel	Gigartinaceae	—
Colpomenia peregrina	oyster thief	Scytosiphonaceae	exotic
Fucus distichus	bladder wrack brown algae	Fucaceae	—
Leathesia marina	sea cauliflower	Leathesiaceae	—
Mastocarpus papillatus	turkish washcloth	Phyllophoraceae	—
Mazzaella splendens	splendid iridescent seaweed	Gigartinaceae	—
Microcladia coulteri	delicate sea lace	Ceramiaceae	—
Nereocystis luetkeana	bull kelp	Laminariaceae	—
Porphyra sp.	red laver seaweed	Bangiaceae	—
Sargassum muticum	Japanese wireweed	Sargassaceae	exotic
Ulva lactuca	sea lettuce	Ulvaceae	—
Ulva linza	sea lettuce	Ulvaceae	—

FAUNA (Terrestrial):

Amphibians and reptiles (5 species; 1 blue-listed)

Species	Common name	Family	Origin
Elgaria coerulea	Anguidae	northern alligator lizard	native
Thamnophis sirtalis	Colubridae	common garter snake	native
Pseudacris regilla	Hylidae	Pacific chorus frog	native
Rana aurora	Ranidae	northern red-legged frog	native
Taricha granulosa	Salamandridae	rough-skinned newt	native

Arachnids and insects (26 species; 2 exotic; provenance otherwise not assessed)

Species	Common name	Family	Origin
Aceria genistae	broom gall mite	Eriophyidae	exotic
Adela septentrionella	fairy longhorn moth	Adelidae	—
Aeshna multicolor	blue-eyed darner	Aeshnidae	—
Agelenopsis sp.	funnel web spider	Agelenidae	—
Amara sp.	sun beetle	Carabidae	—

Callophrys rosneri ssp. *plicataria*	Rosner's hairstreak	Lycaenidae	—
Dolichovespula maculata	bald-faced hornet	Vespidae	—
Diplolepis rosae	mossy rose gall wasp	Cynipidae	—
Enallagma sp.	bluet damselfly	Coenagrionoidea	—
Formica obscuripes	thatching ants	Formicidae	—
Gryllinae sp.	field cricket	Gryllidae	—
Lygaeus kalmii	common milkweed bug	Lygaeidae	—
Malacosoma californicum	Western lackey moth	Lasiocampidae	—
Melanostoma sp.	hover fly	Syrphidae	—
Omus dejeani	greater night-stalking tiger bee	Cicindeliniae	—
Pachydiplax longipennis	blue dasher	Libellulidae	—
Papilio eurymedon	pale swallowtail	Papilonidae	—
Pardosa sp.	thinlegged wolf spider	Lycosidae	—
Platycryptus californicus	jumping spider	Salticidae	—
Pyrrharctia isabella	Isabella tiger moth	Arctiidae	—
Rhionaeschna multicolor	blue-eyed darner	Aeshnidae	—
Scaphinotus angusticollis	snail-killer carabid	Carabidae	—
Spilosoma virginica	Virginia tiger moth	Arctiidae	—
Tyria jacobaea	cinnabar moth	Erebidae	exotic
Vanessa cardui	cosmopolitan	Nymphalidae	—
Vespula sp.	yellow-jacket	Vespidae	—

Birds (57 species; 1 red-listed; 3 blue-listed; 1 threatened; provenance not assessed)

Species	Common name	Family	Origin
Accipiter cooperii	Cooper's hawk	Accipitridae	—
Aegolius acadicus	northern saw-whet owl	Strigidae	—
Buteo jamaicensis	red-tailed hawk	Accipitridae	—
Calypte anna	Anna's hummingbird	Trochilidae	—
Carduelis pinus	pine siskin	Fringillidae	—
Carduelis tristis	American goldfinch	Fringillidae	—
Carpodacus mexicanus	house finch	Fringillidae	—
Carpodacus purpureus	purple finch	Fringillidae	—
Cathartes aura	turkey vulture	Cathartidae	—
Catharus ustulatus	Swainson's thrush	Turdidae	—
Certhia americana	brown creeper	Certhiidae	—
Chordeiles minor	common nighthawk	Caprimulgidae	—

Colaptes auratus	northern flicker	Picidae	—
Contopus cooper	olive-sided flycatcher	Tyrranidae	—
Corvus caurinus	northwestern crow	Corvidae	—
Corvus corax	common raven	Corvidae	—
Dendroica townsendi	townsend's warbler	Parulidae	—
Dryocopus pileatus	pileated woodpeacker	Picidae	—
Empidonax difficilis	Pacific-slope flycatcher	Tyrranidae	—
Empidonax traillii	willow flycatcher	Tyrranidae	—
Falco peregrinus anatum	American peregrine falcon	Falconidae	—
Gavia pacifica	Pacific loon	Gaviidae	—
Haliaeetus leucocephalus	bald eagle	Accipitridae	—
Hirundo rustica	barn swallow	Hirundinidae	—
Ixoreus naevius	varied thrush	Turdidae	—
Junco hyemalis	dark-eyed junko	Emberizidae	—
Larus glaucescens	glaucous-winged gull	Laridae	—
Leiothlypis celata	orange-crowned warbler	Parulidae	—
Loxia curvirostra	red crossbill	Fringillidae	—
Melospiza melodia	song sparrow	Emberizidae	—
Passerella iliaca	fox sparrow	Emberizidae	—
Patagioenas fasciata	band-tailed pigeon	Columbidae	—
Pheucticus melanocephalus	black-headed grosbeak	Fringillidae	—
Picoides pubescens	downy woodpecker	Picidae	—
Picoides villosus	hairy woodpecker	Picidae	—
Pipilo maculatus	spotted towhee	Emberizidae	—
Piranga ludoviciana	western tanager	Thraupidae	—
Poecile rufescens	chestnut-backed chickadee	Paridae	—
Regulus calendula	ruby-crowned kinglet	Regulidae	—
Regulus satrapa	golden-crowned kinglet	Regulidae	—
Selasphorus rufus	rufous hummingbird	Trochilidae	—
Setophaga coronata	myrtle warbler	Parulidae	—
Sitta canadensis	red-breasted nuthatch	Sittidae	—
Sphyrapicus ruber	red-breasted sapsucker	Picidae	—
Strix varia	barred owl	Strigidae	—
Sturnus vulgaris	common starling	Sturnidae	—
Tachycineta bicolor	tree swallow	Hirundinidae	—
Tachycineta thalassina	violet-green swallow	Hirundinidae	—
Thryomanes bewickii	Bewick's wren	Troglodytidae	—
Troglodytes aedon	house wren	Troglodytidae	—
Troglodytes pacificus	Pacific wren	Troglodytidae	—
Turdus migratorius	American robin	Muscicapidae	—
Vireo cassinii	Cassin's vireo	Vireonidae	—

Vireo gilvus	warbling vireo	Vireonidae	—
Wilsonia pusilla	Wilson's warbler	Parulidae	—
Zonotrichia atricapilla	golden-crowned sparrow	Emberizidae	—
Zonotrichia leucophrys	white-crowned sparrow	Emberizidae	—

Gastropods (3 species; 1 blue-listed; 1 exotic)

Species	Common name	Family	Origin
Ariolimax columbianus	Arionidae	Pacific bananaslug	native
Arion ater	Arionidae	black arion	exotic
Monadenia fidelis	Helminthoglyptidae	Pacific sideband snail	native

Mammals (5 species; 1 exotic)

Species	Common name	Family	Origin
Enhydra lutris	northern river otter	Mustelidae	native
Odocoileus hemionus columbianus	blacktailed deer	Cervidae	native
Ovis aries	sheep	Bovidae	exotic
Phoca vitulina ssp. *richardii*	Pacific harbour seal	Phocidae	native
Tamiasciurus hudsonicus	red squirrel	Sciuridae	native

FAUNA (Marine)

Cnidarians (2 species; provenance not assessed)

Species	Common name	Family	Origin
Anthopleura elegantissima	aggregating anemone	Actiniidae	—
Urticina coriacea	stubby rose anemone	Actiniaria	—

Mollusks (16 species; provenance not assessed)

Species	Common name	Family	Origin
Aeolidia papillosa	papillate sea slug	Aeolidiidae	—
Dirona albolineata	white-lined dirona	Dironidae	—
Doris montereyensis	Monterey dorid	Dorididae	—
Doris odhneri	dorid	Dorididae	—
Littorinidae	periwinkles	Littorinidae	—
Lottia pelta	shield limpet	Lottiidae	—
Lottia persona	mask limpet	Lottiidae	—
Lottia scutum	plate limpet	Lottiidae	—
Melibe leonina	lion's mane nudibranch	Tethydidae	—
Mytilus spp.	mussels	Mytilidae	—
Neostylidum eschrichtii	cerith	Cerithiidae	—
Neverita lewisii	Lewis' moon snail	Naticidae	—
Nucella lamelosa	frilled dogwinkle	Muricidae	—
Panopea generosa	geoduck	Hiatellidae	—
Tegula sp.	turban snail	Tegulidae	—
Triopha catalinae	sea clown triopha	Polyceridae	—

Crustaceans (7 species; provenance not assessed)

Species	Common name	Family	Origin
Balanus cariosus	giant acorn barnacle	Balanidae	—
Balanus glandula	acorn barnacle	Balanidae	—
Cancer productus	red rock crab	Cancridae	—
Chthamulus sp.	barnacle	Chthamalidae	—
Hemigrapsus oregonensis	common shore crab	Varunidae	—
Pagurus sp.	hermit crab	Paguridae	—
Pugettia producta	northern kelp crab	Epialtidae	—

Echinoderms (3 species; provenance not assessed)

Species	Common name	Family	Origin
Dermasterias imbricata	leather star	Asteropseidae	—
Pisaster brevispinus	pink sea star	Asteriidae	—
Pisaster ochraceus	ochre sea star	Asteriidae	—

Vertebrates (4 species; provenance not assessed)

Species	Common name	Family	Origin
Apodichthys flavidus	penpoint gunnel	Pholidae	—
Oligocottus sp.	sculpin	Cottidae	—
Pleuronichthys coenosus	C-O sole	Pleuronectidae	—
Rhinogobiops nicholsii	blackeye goby	Gobiidae	—

Appendix B: Checklist of exotic flora

Species	Common name	Family	Group
Agropyron sp.	crested-wheat grass	Poaceae	graminoid
Agrostis capillaris	common bentgrass	Poaceae	graminoid
Aira caryophyllea	silver hairgrass	Poaceae	graminoid
Aira praecox	early hairgrass	Poaceae	graminoid
Ajuga reptans	common bugleweed	Lamiaceae	forb
Alopecurus geniculatis	water meadow-foxtail	Poaceae	graminoid
Anthoxanthum aristatum	annual vernal grass	Poaceae	graminoid
Anthoxanthum odoratum	sweet vernal grass	Poaceae	graminoid
Arctium minus	common burdock	Asteraceae	forb
Bellis perennis	English daisy	Asteraceae	forb
Bromus hordeaceus	soft brome	Poaceae	graminoid
Bromus rigidus	rip-gut brome	Poaceae	graminoid
Bromus sterilis	barren brome	Poaceae	graminoid
Buddleja davidii	butterfly-bush	Scrophulariaceae	shrub
Cardamine hirsuta	hairy bitter-cress	Brassicaceae	forb
Cardamine cf. *flexuosa*	wavy bitter-cress	Brassicaceae	forb
Carex laxiculmis	spreading sedge	Cyperaceae	graminoid
Carex pallescens	pale sedge	Cyperaceae	graminoid
Centaurium erythraea	common centaury	Genitianaceae	forb
Cerastium glomeratum	sticky chickweed	Caryophyllaceae	forb
Cirsium arvense	Canada thistle	Asteraceae	forb
Cirsium vulgare	bull thistle	Asteraceae	forb
Crataegus monogyna	common hawthorn	Rosaceae	shrub/tree
Crepis capillaris	smooth hawksbeard	Asteraceae	forb
Cynosurus cristatus	crested dogtail	Poaceae	graminoid
Cynosurus echinatus	hedgehog dogtail	Poaceae	graminoid
Cytisus scoparius	Scotch broom	Fabaceae	forb
Dactylis glomerata	orchard grass	Poaceae	graminoid
Daucus pusillus	American wild carrot	Apiaceae	forb
Digitalis purpurea	common foxglove	Scrophulariaceae	forb
Epilobium tetragonum	square-stemmed willowherb	Onagraceae	forb
Festuca rubra	red fescue	Poaceae	graminoid
Geranium dissectum	cutleaf geranium	Geraniaceae	forb

Geranium molle	dovesfoot	Geraniaceae	forb
Holcus lanatus	common velvet-grass	Poaceae	graminoid
Hypericum perforatum	common St. John's wort	Hypericaceae	forb
Hypochaeris radicata	hairy cat's-ear	Asteraceae	forb
Ilex aquifolium	holly	Aquifoliaceae	shrub
Iris pseudacorus	yellow-flag iris	Iridaceae	forb
Lactuca muralis	wall–lettuce	Asteraceae	forb
Leucanthemum vulgare	oxeye daisy	Asteraceae	forb
Lotus corniculatus	common bird's-foot tre-foil	Fabaceae	forb
Luzula subcessilis	many-flowered woodrush	Juncaceae	graminoid
Lychnis coronaria	rose campion	Caryophyllaceae	forb
Madia sativa	Chilean tarweed	Asteraceae	forb
Matricaria discoidea	pineapple weed	Asteraceae	forb
Medicago lupulina	black medic	Fabaceae	forb
Muscari sp.	grape hyacinth	Asparagaceae	forb
Myosotis discolor	common forget-me-not	Boraginaceae	forb
Narcissus sp.	daffodil	Amaryllidaceae	forb
Parentucellia viscosa	yellow glandweed	Orobanchaceae	forb
Phalaris canariensis	reed canarygrass	Poaceae	graminoid
Phleum pratense	Timothy	Poaceae	graminoid
Plantago lanceolata	ribwort plantain	Plantaginaceae	forb
Poa trivialis	rough bluegrass	Poaceae	graminoid
Prunella vulgaris	self-heal	Lamiaceae	forb
Ranunculus repens	creeping buttercup	Ranunculaceae	forb
Rosa rubiginosa	sweet-brier rose	Rosaceae	shrub
Rubus discolor	Himalayan blackberry	Rosaceae	shrub
Rubus laciniatus	evergreen blackberry	Rosaceae	shrub/vine
Rumex acetosella	sheep sorrel	Polygonaceae	forb
Rumex crispus	curly dock	Polygonaceae	forb
Schedonorus pratensis	meadow fescue	Poaceae	graminoid
Senecio jacobaea	tansy ragwort	Asteraceae	forb
Sonchus oleraceus	common sow-thistle	Asteraceae	forb
Spergularia rubra	red sandspurry	Caryophyllaceae	forb
Stellaria graminea	grasslike starwort	Caryophyllaceae	forb
Stellaria media	common starwort	Caryophyllaceae	forb

Taraxacum spp.	dandelion	Asteraceae	forb
Torilis japonica	upright hedge-parsley	Apiaceae	forb
Trifolium dubium	small-hop clover	Fabaceae	forb
Trifolium pratense	red clover	Fabaceae	forb
Trifolium repens	white clover	Fabaceae	forb
Urtica dioica	stinging nettle	Urticaceae	forb
Verbascum thapsus	common mullein	Scrophulariaceae	forb
Veronica arvensis	corn speedwell	Plantaginaceae	forb
Veronica serpyllifolia	thyme-leaved speedwell	Plantaginaceae	forb
Viburnum tinus	laurestine	Adoxaceae	shrub/tree
Vicia hirsuta	tiny vetch	Fabaceae	forb
Vicia sativa	vetch	Fabaceae	forb
Vinca major	greater periwinkle	Apocynaceae	forb
Vulpia bromoides	barren fescue	Poaceae	graminoid
Vulpia myuros	rat's-tail fescue	Poaceae	graminoid

Appendix C: Plant indicator values

Species	Common name	Average Moisture Regime	Average Nutrient Regime
Amelanchier florida	Saskatoon berry	3	C
Anthoxanthum odoratum	sweet vernal grass	1	B
Arbutus menziesii	arbutus	2	C
Berberis aquifolium	tall Oregon grape	3	C
Berberis nervosa	dull Oregon grape	3	C
Bromus hordeaceus	soft brome	2	C
Camassia leichtlinii	great camas	1	C
Carex obnupta	slough sedge	6	D
Carex sitchensis	Sitka sedge	6	D
Castilleja hispida	harsh paintbrush	2	B
Castilleja miniata	common red paintbrush	3	C
Cerastium arvense	field chickweed	2	C
Circaea alpina	enchanter's nightshade	5	D
Cirsium vulgare	bull thistle	4	C
Clinopodium douglasii	yerba buena	2	B
Corallorhiza maculata	western coralroot orchid	3	C
Crepis capillaris	smooth hawksbeard	3	D
Cynosurus echinatus	hedgehog dogtail	1	C
Cytisus scoparius	Scotch broom	1	C
Dactylis glomerata	orchard grass	3	C
Digitalis purpurea	common foxglove	5	D
Elymus glaucus	blue wild rye	4	C
Epilobium ciliatum	fringed willowherb	5	D
Equisetum arvense	common horsetail	5	D
Eriophyllum lanatum	Oregon sunshine	1	C
Erythranthe guttata	yellow monkey-flower	5	D
Festuca occidentalis	Western fescue	3	C
Fragaria vesca	woodland strawberry	3	C
Galium aparine	cleavers	3	C
Gaultheria shallon	salal	4	C
Geranium molle	dovesfoot	1	D
Goodyera pubescens	rattlesnake plantain	3	C

Grindelia stricta	Oregon gumweed	5	D
Hieracium albiflorum	white-flowered hawkweed	3	C
Holcus lanatus	common velvet-grass	3	D
Holodiscus discolor	oceanspray	2	C
Hypericum anagalloides	bog St. John's wort	6	D
Hypochaeris radicata	hairy cat's-ear	2	C
Ilex aquifolium	holly	4	D
Iris pseudacorus	yellow-flag iris	5	E
Juncus effusus	common rush	5	D
Juncus mertensianus	Merten's rush	5	D
Lactuca muralis	wall–lettuce	4	D
Lonicera ciliosa	orange honeysuckle	3	C
Lonicera hispidula	hairy honeysuckle	2	C
Luzula campestris	many-flowered woodrush	2	C
Lysichiton americanus	skunk cabbage	5	D
Lysimachia thyrsiflora	tufted loosestrife	7	C
Madia sativa	Chilean tarweed	2	B
Medicago lupulina	black medic	3	C
Mentha arvensis	field mint	6	D
Monotropa uniflora	Indian pipe	4	C
Myosotis discolor	common forget-me-not	2	B
Oenanthe sarmentosa	Pacific water parsley	6	D
Paxistima myrsinites	falsebox	3	C
Phleum pratense	Timothy	3	C
Physocarpus capitatus	Pacific ninebark	5	D
Plantago lanceolata	ribwort plantain	3	D
Polypodium glycyrrhiza	licorice fern	3	C
Polystichum munitum	western sword fern	4	D
Populus tremuloides	trembling aspen	4	D
Prunella vulgaris	self-heal	4	D
Prunus emarginata	bitter cherry	3	C
Pseudotsuga menziesii	Douglas-fir	3	C
Pteridium aquilinum	bracken fern	3	C
Quercus garryana	Garry oak	2	B
Ranunculus occidentalis	western buttercup	3	D
Ranunculus repens	creeping buttercup	5	D
Rosa gymnocarpa	baldhip rose	3	C

Rubus discolor	Himalayan blackberry	5	E
Rubus laciniatus	evergreen blackberry	5	C
Rubus leucodermis	blackcap raspberry	3	B
Rubus spectabilis	salmonberry	4	D
Rubus ursinus	trailing blackberry	3	D
Salix scouleriana	Scouler's willow	3	C
Sanicula crassicaulis	Pacific sanicle	2	B
Scirpus microcarpus	small-flowered bullrush	6	D
Sedum spathulifolium	broad-leaved stonecrop	1	A
Selaginella wallacei	Wallace's selaginella	1	B
Sisyrinchium douglasii	satin-flower	2	D
Spiraea douglasii	hardhack	5	C
Stachys mexicana	mexican hedge-nettle	5	D
Stellaria calycantha	northern starwort	5	D
Symphoricarpos albus	common snowberry	3	C
Taxus brevifolia	Pacific yew	4	C
Thuja plicata	western redcedar	4	C
Tsuga heterophylla	western hemlock	4	C
Urtica dioica	stinging nettle	5	D
Vaccinium ovatum	evergreen huckleberry	4	B
Vaccinium parvifolium	red huckleberry	4	C
Veronica americana	American brooklime	6	D

Values sourced from the Biogeoclimatic Ecosystem Classification Database, as cited on E-Flora:

http://linnet.geog.ubc.ca/