ATTACHMENT G

REPORT

Honeymoon Bay Property
Environmental Overview Assessment

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INTRODUCTION

1.1 Project Description

Couverdon/TimberWest Forest Corp. is considering land development opportunities of a 116 ha property located near Honeymoon Bay, in the Cowichan Valley Regional District (Figure 1). The development site is located to the south of South Shore Road and to the east of the community of Honeymoon Bay. Adjacent land use includes residential development to the northwest and forestry to the west, south and east. Currently the land development plan has not been formalized. In order to more effectively develop a site layout plan ENKON Environmental Ltd. (ENKON) completed an environmental overview assessment of the site and provided recommendations on minimizing environmental impacts associated with the proposed development.

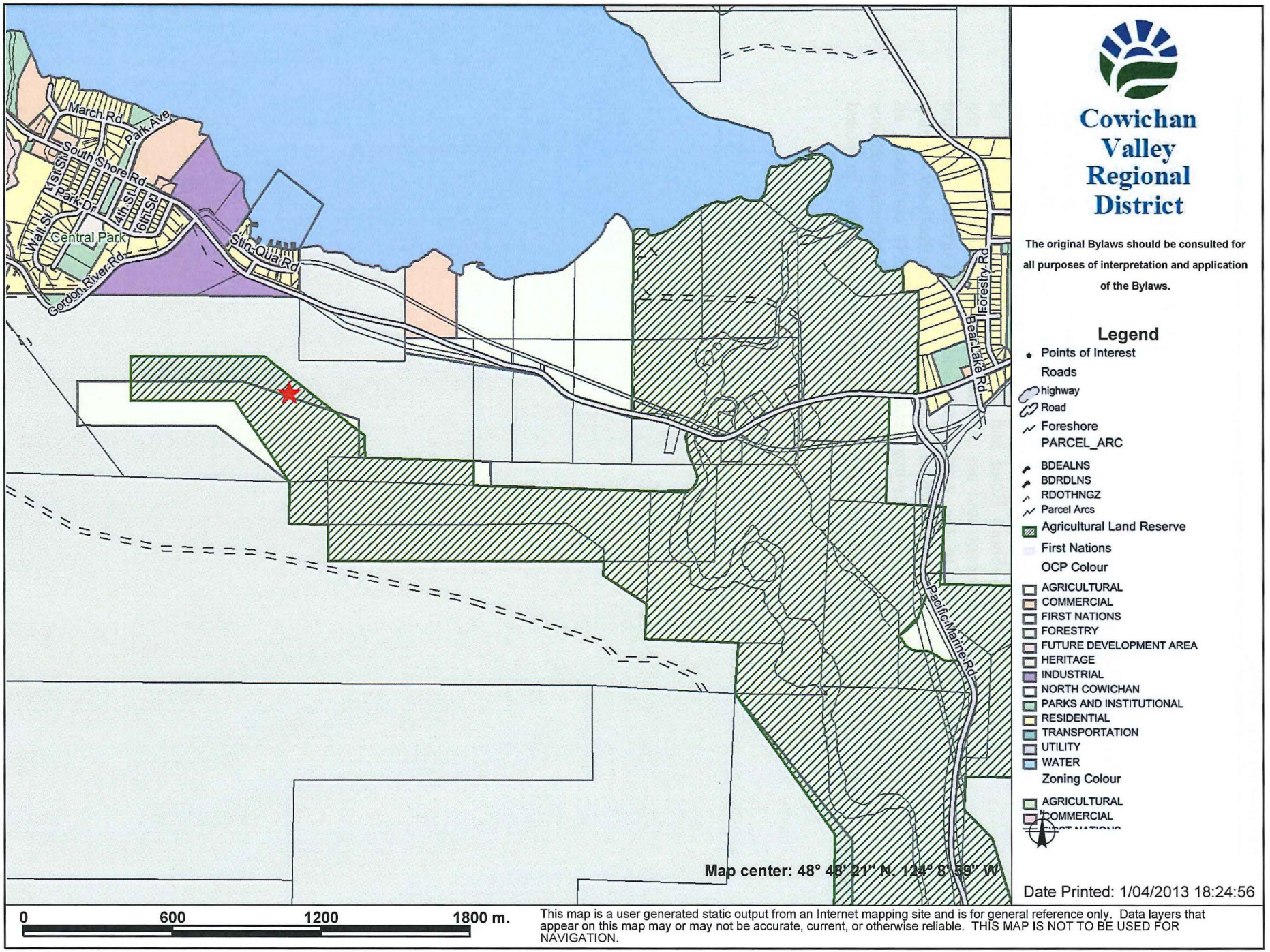


Figure 1: Timberwest / Couverdon - Honeymoon Bay Property

ENVIRONMENTAL SETTING

2.1 Terrestrial Resources

2.1.1 Vegetation

2.1.1.1 Methods

Office Study

Prior to the field program an office study was completed to review available secondary information. The following were examined:

- 1:20,000 colour orthophotos
- TRIM mapping (1:20,000 scale)
- NTS mapping (1:50,000 scale)
- SEI mapping (1:20,000 scale).

In addition, the following websites were visited to collect data on sensitive systems, record trees and rare species occurrence:

- Cowichan Valley Regional District's Interactive Web-based Mapping
  http://www.cvrd.bc.ca/index.aspx?nid=224
- Cowichan Valley Regional District Habitat Atlas
  http://www.shim.bc.ca/atlases/CVRD/Main.htm
- Ministry of Environments BC Species Explorer
  http://www.env.gov.bc.ca/cdc/
- Sensitive Ecosystem Inventory
  http://www.env.gov.bc.ca/sei/

Field Survey

The focus of the field survey inventory was to determine the potential presence of rare and endangered vascular plant communities and to confirm the location of environmentally sensitive areas. Following a review of available mapping and aerial photographs, a field survey was completed to determine vegetation composition. ENKON visited the study site on November 20, 22 and 23, 2012, at which time vegetation communities and environmental features were mapped. Figure 2 shows the location of the vegetation plots. The following information was collected for each plot:

- Dominant tree species (primary and secondary canopy)
- Dominant tall and low shrub species
- Dominant herbs (limited due to survey timing)

- Structural stage
- Aspect and gradient.

Due to the timing of the field survey it was not possible to complete a comprehensive plant species list. Similarly the rare plant and vegetation survey was restricted by seasonal limitations. For the purpose of the proposed OCP and Rezoning, the results are sufficient; however, a comprehensive survey is required prior to any site development

2.1.1.2 Results

General

The Project Area is located in the Eastern Vancouver Island Ecoregion within the Leeward Island Mountains Ecosection. The site is located within the Coastal Western Hemlock Very Dry Maritime (CWHxm2) subzone. This biogeoclimatic zone occurs at lower elevations along the east side of Vancouver Island (above the Coastal Douglas-fir Moist Maritime subzone where present) as far north as Kelsey Bay, and on the islands around southern Johnstone Strait. It also occurs inland on Vancouver Island along major valleys from Nimpkish Valley in the north to Cowichan Valley in the south. On the mainland it extends up the south side of the Fraser River as far as Chilliwack, and along the Sunshine Coast as far as Desolation Sound. Elevational limits range from sea level (or above the CDFmm where present) to approximately 700 m. Near the wetter parts of its distribution, the upper limit is lower (e.g., 150 m on Gambier and Bowen islands, and in the Fraser Valley). The CWHxm2 has warm, dry summers and moist, mild winters with relatively little snowfall. Growing seasons are long, and feature water deficits on zonal sites. Forests on zonal sites are dominated by Douglas-fir, accompanied by western hemlock and minor amounts of western redcedar. Major understorey species include salal, dull Oregon-grape, red huckleberry, step moss and Oregon beaked moss. Less common species include vanilla-leaf, sword fern, twinflower, and bracken.

A species list for vegetation typically occurring within the CWHxm2 is presented below in Table 1. Table 2 shows the plant species encountered during the 2012 field survey.

The site is composed of a second and third growth forests. Plant communities present on site include wet mixed (riparian) woodlands, mesic to moist conifer woodlands, ranging from regenerating low shrub to maturing forest. Patricia Creek, a tributary to Robertson River flows east southeast through the center of the property. This watercourse has several large wetlands associated with it. There are several remnant, large diameter, veteran Sitka spruce located in the vicinity of the riparian forest.

Soil series present on site is predominantly "Shawnigan-Sproat" and "Chemainus". Lesser amounts of "Cassidy" and "Rough Stoney Land" are also present. Shawnigan-Sproat (S-Sp) consists of gravelly sandy loam and Chemainus (Ch) is well-drained glacial till developed on medium textured

alluvium. The Cassidy (Ca) soil group consists of gravelly loamy sand and the Rough Stoney Land (Rs) consists of thinly mantled bare rock which has variable soil drainage conditions.

Table 1: Vegetation Typically Occurring within the Coastal Western Hemlock Very Dry Maritime Subzone (CWHxm)

Common Name	Latin Name
Arbutus	*Arbutus menziesii*
bigleaf maple	*Acer macrophyllum*
Douglas-fir	*Pseudotsuga menziesii ssp. menziesii*
grand fir	*Abies grandis*
red alder	*Alnus rubra*
shore/lodgepole pine	*Pinus contorta*
Western hemlock	*Tsuga heterophylla*
Western redcedar	*Thuja plicata*
Baldhip rose	*Rosa gymnocarpa*
devil's club	*Oplopanax horridus*
dull Oregon-grape	*Mahonia nervosa*
false azalea	*Menziesia ferruginea*
Labrador tea	*Ledum groenlandicum*
Oceanspray	*Holodiscus discolor*
red huckleberry	*Vaccinium parvifolium*
Salal	*Gaultheria shallon*
Salmonberry	*Rubus spectabilis*
Bracken fern	*Pteridium aquilinum*
deer fern	*Blechnum spicant*
hairy cat's ear	*Hypochoeris radicata*
lady fern	*Athyrium filix-femina*
oak fern	*Gymnocarpium dryopteris*
skunk cabbage	*Lysichiton americanum*
sweet-scented bedstraw	*Galium triflorum*
sword fern	*Polystichum munitum*
three-leaved foamflower	*Tiarella trifoliata*
Twinflower	*Linnaea borealis*
vanilla leaf	*Achlys triphylla*
wall-lettuce	*Lactuca muralis*
coastal leafy moss	*Plagiomnium insigne*
electrified cat's tail moss	*Rhytidiadelphus triquetrus*
juniper haircap moss	*Polytrichum juniperinum*
lanky moss	*Rhytidiadelphus loreus*
Lichen	*Cladina spp.*
Oregon-beaked moss	*Kinbergia oregana*
palm tree moss	*Leucolepis menziesii*
red-stemmed feathermoss	*Pleurozium schreberi*
sphagnum moss	*Sphagnum spp.*
step moss	*Hylocomium splendens*

Table 2: Vegetation Occurring at Couverdon Honeymoon Bay Site (November 2012)

Trees	
Abies grandis	grand fir
Acer macrophyllum	bigleaf maple
Alnus rubra	red alder
Pinus monticola	western white pine
Populus balsamifera	black cottonwood
Prunus emarginata	bitter cherry
Pseudotsuga menziesii	Douglas-fir
Sorbus sitchensis	Sitka mountain-ash
Tsuga heterophylla	western hemlock
Thuja plicata	western redcedar
Picea sitchensis	Sitka spruce
Taxus brevifolia	Pacific yew
Shrubs	
Acer circinatum	vine maple
Amelanchier alnifolia	saskatoon
Cascara sagrada	cascara
Cornus stolonifera	red-osier dogwood
*Cytisus scoparius**	Scotch broom
Gaultheria shallon	salal
Holodiscus discolor	oceanspray
*Ilex aquifolium**	European holly
Lonicera involucrata	black twinberry
Malus fusca	Pacific crabapple
Mahonia nervosa	dull Oregon-grape
Oplopanax horridum	devil's club
Physocarpus capitatus	Pacific ninebark
Rosa canina	dog rose
Rosa nootkana	Nootka rose
*Rubus discolor**	Himalayan blackberry
*Rubus laciniatus**	evergreen blackberry
Rubus leucodermis	black raspberry
Rubus parviflorus	thimbleberry
Rubus spectabilis	salmonberry
Rubus ursinus	trailing blackberry
Salix lasiandra	Pacific willow
Salix hookeriana	Hooker's willow

Salix scouleriana	Scouler's willow
Sambucus racemosa	red elderberry
Spiraea douglasii	hardhack
Vaccinium parvifolium	red huckleberry
Vaccinium ovalifolium	oval-leaved blueberry
Vaccinium alaskensis	Alaska blueberry
Symphoricarpos albus	common snowberry
Forbs	
Achillea millefolium	yarrow
Achlys triphylla	vanilla leaf
Adenocaulon bicolor	pathfinder
Anaphalis margaritacea	pearly everlasting
Cardamine sp.	bittercress
Chimaphila umbellata	pipsissewa
Cirsium arvense	Canada thistle
*Cirsium vulgare**	bull thistle
Claytonia perfoliata	miner's lettuce
Corallorhiza maculata	western coralroot
*Digitalis purpurea**	common foxglove
Epilobium angustifolium	fireweed
Equisetum telmateia	giant horsetail
Equisetum hyemale	scouring rush
Fragaria vesca	woodland strawberry
Galium aparine	cleavers
*Geranium molle**	dovefoot geranium
Geum macrophyllum	large-leaved avens
Goodyera oblongifolia	rattlesnake plantain
*Lactuca muralis**	wall lettuce
Linnaea borealis	twinflower
Lysichiton americanus	skunk cabbage
Maianthemum dilatatum	false lily-of-the-valley
Oenanthe sarmentosa	Pacific water-parsley
*Plantago lanceolata**	ribwort plantain
*Prunella vulgaris**	self-heal
Ranunculus occidentalis	western buttercup
Ranunculus repens	creeping buttercup
*Rumex acetosella**	sheep sorrel
Stachys cooleyae	Cooley's hedge nettle
*Taraxacum offincinale**	dandelion
Tiarella trifoliata	three-leaved foamflower
Tolmiea menziesii	piggyback plant

Trientalis latifolia	western starflower
Urtica dioica	stinging nettle

Ferns

Adiantum pedatum	maidenhair fern
Athyrium filix-femina	lady fern
Polypodium glycyrrihza	licorice fern
Polystichum munitum	sword fern
Pteridium aquilinum	bracken
Blechnum spicant	deer fern
Dryopteris expansa	spiny wood fern
Botrychium multifidum	leathery grape fern

Grasses

Carex obnupta	slough sedge
Carex sitchensis	Sitka sedge
*Dactylis glomerata**	orchard grass
Elymus glaucus	blue wildrye
*Holcus lanatus**	velvet grass
Juncus effusus	common rush
*Poa pratensis**	Kentucky bluegrass

Mosses/Lichens

Alectoria sarmentosa	common witch's hair
Cladina rangiferina	reindeer lichen
Dicranum scoparium	broom moss
Hylcomium splendens	step moss
Hookeria lucens	clear moss
Kindbergia oregana	Oregon beaked-moss
Lobaria pulmonaria	lungwort
Lycopodium clavatum	running clubmoss
Peltigera aphthosa	freckled lichen
Polytrichum juniperinum	juniper haircap moss
Rhytidiadelphus triquetrus	electrified cat's-tail moss
Riccardia multifida	ring pelia
Rhytidiadelphus loreus	lanky moss
Plagiothecium undulatum	wavy-leaved cotton moss

* *introduced species*

Vegetation Communities

Douglas-fir/Western Hemlock – Salal (DS)

The DS association incudes moderately dry and nutrient very poor to medium water shedding sites that occur on rapidly drained coarse skeletal soil material on upper slopes. Soils are moderately deep orthic Hum-ferric podzols with hemimor humus forms. A growing season water deficit and severe nitrogen deficiency are the main constraints.

Mature stands are usually well stock with Douglas-fir western hemlock and western redcedar. The shrub layer is very well developed with salal; dull Oregon-grape and red huckleberry are scattered. The herb layer is very poorly developed with bracken as the only constant species. The moss layer is moderately developed and includes Oregon beaked moss and step moss; lichens are infrequent. This association occurs along the crest of the northern ridge on the property. The structural stage present is low shrub and is located along the northern ridge (REGEN1-C).

Western Hemlock – Flat Moss (HK)

The HK site association includes slightly dry to fresh and nutrient-very poor to medium soils that occur on well to moderately well drained middle slopes. The associated soils are sandy to loamy skeletal moderately deep to deep, orthic hum-ferric pozols with humimor hums forms. This association is the zonal representation for the subzone.

Mature stands consist of Douglas-fir, western hemlock and western redcedar. Both Douglas-fir and western hemlock can form pure stands in secondary succession. The shrub layer is typically poorly developed; there is often western hemlock regeneration; vine maple, salal, dull Oregon-grape, and red huckleberry are present depending on the amount of light present. The herb layer is also sparsley developed and consists of twinflower, sword fern, trailing blackberry, and broad-leaved starflower. The moss layer is well developed; Oregon-beaked moss is predominant in young forests and step moss and lanky moss occur in late successional stages. This association is present on site as a tall shrub community (REGEN2-C) as well as mature forest.

Western Redcedar – Foamflower (RF)

The RF site association occurs on gentle slopes in the lower slope position; in moisture receiving areas. Soils are deep and medium-textured, the moisture regime ranges from subhygric to hygric. The tree layer is comprised of a mix of coniferous and deciduous species including Douglas-fir, western hemlock, western redcedar, grand fir, red alder and bigleaf maple. The shrub layer consists of dull Oregon-grape, red huckleberry, salmonberry and devil's club. The herb layer is composed predominantly of sword fern, with lesser amounts of vanilla-leaf, three leaved foamflower, lady fern and oak fern. The moss layer consists of coastal leafy moss, step moss, Oregon beaked moss, palm tree moss and lanky moss. This association is present on site as tall shrub and pole sapling communities.

Western Redcedar/Sitka Spruce – Skunk Cabbage (RC)

The RC site association occurs in wet and nutrient-medium to very rich sites throughout lower elevation areas. These water-collecting sites occur on lower slopes or in depressions. The associated soils are poorly drained Gleysols or Humisols affected by slowly moving seepage.

Western redcedar and western hemlock dominate the tree layer. Salal, red huckleberry and salmonberry dominate the moderately well-developed shrub layer. Herbs are largely confined to depressions and consist of lady fern, skunk cabbage, twisted-stalk and three-leaved foamflower. The moss layer is dominated by step moss, lanky moss, flat-moss on acidic organic mounds and snake liverwort, slender beaked moss, pellia, large-leaf thyme moss in depressions. This association is present on site as pole sapling, young forest and mature forest communities.

Sitka spruce – Salmonberry (SS)

The SS association occurs in active floodplains, typically in the high bench position. Soils are deep and medium-textured; the soil moisture regime ranges from sub hygric to hygric.

The tree layer is diverse and can consist of western redcedar, western hemlock, Sitka spruce, bigleaf maple, red alder and black cottonwood. The shrub layer is comprised of salmonberry, devil's club, red elderberry, stink currant and common snowberry. The herb layer is diverse and consists of false Solomon's-seal, false lily-of-the-valley, sword fern, piggy-back plant, lady fern, vanilla leaf, three-leaved foamflower, spiny wood fern and Hooker's fairybells. The herb layer is limited and consists of coastal leafy moss, electrified cat's-tail moss and palm tree moss. This association is present on site as young and mature forest communities.

Black cottonwood – Red-osier dogwood (CD)

The CD association occurs in active floodplains, typically in the medium bench position. Soils are deep and medium-textured; the soil moisture regime ranges from sub hygric to hygric.

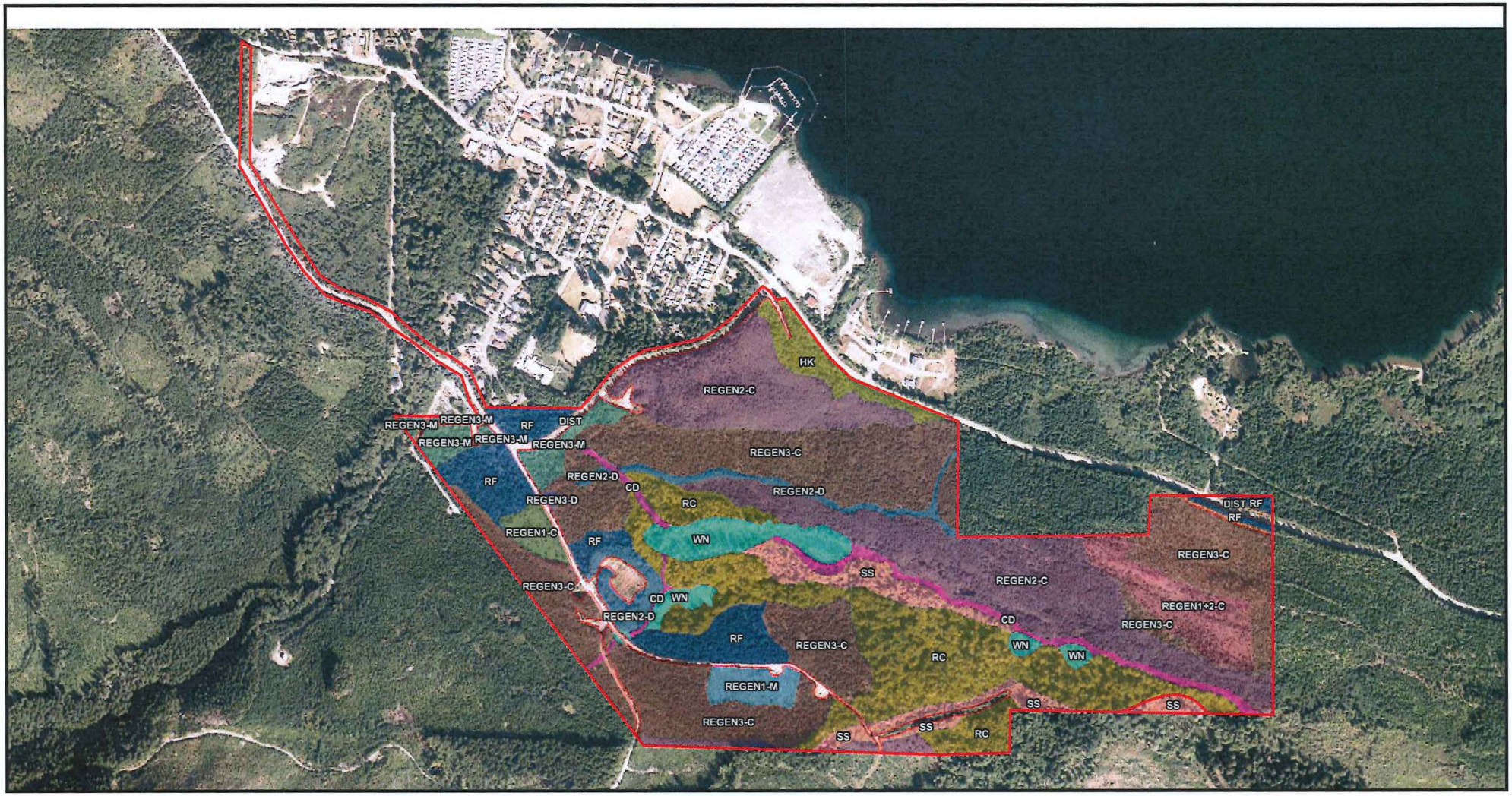
The tree layer consists primarily of red alder and black cottonwood, with lesser amounts of western redcedar and bigleaf maple. The shrub layer is comprised of salmonberry, red-osier dogwood and black twinberry. The herb layer is sparse and consists of false lily-of-the-valley, common horsetail and false Solomon's seal. The moss layer is absent. This association is present on site as young and mature forest communities.

Regenerating Forest

The site is predominated by regenerating forest ranging from low shrub (structural stage 2a, REGEN1) to pole sapling (structural stage 4, REGEN3) and as conifer-dominated (C), deciduous (D) and mixed (M).

Disturbed and Developed (DIST/DEV)

The developed portions of the site include the access road and the road network within the property. There are several disturbed areas including two gravel extractions sites and several cleared areas likely used for stockpiling.



Boundary

Vegetation Types

- Wetland (WN)
- Sitka spruce - Salmonberry (SS)
- Western Hemlock - Flat Moss (HK)
- Western Redcedar - Foamflower (RF)
- Disturbed and Developed (DIST/DEV)
- Black cottonwood - Red-osier dogwood (CD)
- Western Redcedar/Sitka Spruce - Skunk Cabbage (RC)
- REGEN1+2-C Regenerating forest, low and tall shrub mixed,
- REGEN1-C Regenerating forest, low shrub, conifer-dominated forest
- REGEN1-M Regenerating forest, low shrub, mixed coniferous/deciduous
- REGEN2-C Regenerating forest, tall shrub, conifer-dominated forest
- REGEN2-D Regenerating forest, tall shrub, deciduous forest
- REGEN3-C Regenerating forest, pole sapling, conifer-dominated forest
- REGEN3-D Regenerating forest, pole sapling, deciduous forest
- REGEN3-M Regenerating forest, pole sapling mixed coniferous/deciduous

N

300.66 m

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Meters

Honeymoon Bay

Vegetation Communities

Fig. 2

2/11/2013

ENKON Environmental Ltd.

Map Projection: NAD 1983 UTM Zone 10N

File Name: VegMapping

In summary, the site consisted of the following:

- Western Hemlock – Flat Moss (HK) (2.36 ha)
- Western Redcedar – Foamflower (RF) (7.32 ha)
- Western Redcedar/Sitka Spruce – Skunk Cabbage (RC) (19.15 ha)
- Sitka spruce – Salmonberry (SS) (5.06 ha)
- Black cottonwood – Red-osier dogwood (CD) (2.72 ha)
- Wetland (WN) (4.26 ha)
- Regenerating forest (70.33 ha)
- Disturbed and Developed (DIST/DEV) (7.63ha)

These vegetation communities are shown on Figure 2.

Sensitive Ecosystems

According to the Sensitive Ecosystem Inventory maps from the Ministry of Environment (MoE) there are no sensitive ecosystem polygons present on the subject property. During the field survey ENKON observed both riparian (RI) and wetland (WN) ecosystems which are both considered sensitive ecosystems.

Riparian (RI) ecosystems are found on the margins of rivers, streams, lakes and marshes as well as the floodplains of large rivers and small streams and in gullies. On the subject site the Sitka spruce – Salmonberry and Blackcottonwood – Red-osier dogwood plant communities constitute the riparian plant communities.

Wetland (WN) ecosystems can consist of swamps, fens, bogs, meadows or shallow open water. Swamps are vegetated by flood-tolerant trees such as Pacific crabapple, Sitka willow and Pacific willow. Shallow water wetlands feature submerged and floating plants such as yellow pond-lily, common duckweed, verticillate water-milfoil, common bladderwort, bur-reed and Canadian waterweed. Fens develop on continuously wet peaty soils; they are fed by water enriched with minerals from upslope drainage. Wet meadows consist of flood-tolerant grasses, low sedges and rushes. Many wetlands include a mosaic of these different wetland types.

Rare and Endangered Vascular Plants and Plant Communities

Rare vascular plants occurring within the South Island Forest District in the CWHxm2 listed by the Conservation Data Center (CDC) are shown in Appendix I. As of January 2013, 58 plant species were present on the CDC list, including 21 red-listed species and 37 blue-listed species.

Rare and endangered vascular plant species are listed by the Conservation Data Center (CDC), which categorizes them as either red listed or blue listed. Red-listed species include species that are extirpated in British Columbia, in danger of becoming extirpated, or threatened. Blue-listed species are species that are sensitive or vulnerable to human activity or habitat encroachment. The CDC

now makes available from its website a search engine to determine whether there are any element occurrence polygons present on the property. These polygons indicate the expected area in which a rare plant may be found. There were no polygons found in the immediate vicinity of the property.

There were also no rare vascular plants observed during the field survey however, as noted earlier; a comprehensive survey was limited by timing of the field work. Rare vascular plants known to occur in the general area are presented in Table 3.

Table 3: Rare Plant Species Known to Occur in Close Vicinity of the Project Area

Plant Species		Status	Location and Date of Observation	Habitat
Common Name	Latin Name			
Waterwort water-milfoil	*Myriophyllum quitense*	S2, red	1978 – Honeymoon Bay	Lacustrine, shallow water
Waterwort water-milfoil	*Myriophyllum quitense*	S2, red	1978 – Marble Bay	Lacustrine, shallow water
Common bluecup	*Githopsis specularoides*	S3, blue	1986 – Hill 60 Ridge	Palustrine, temporary pool

The CDC reports the occurrence of 22 rare and endangered plant communities in the South Island Forest District within the CWHxm2; 12 are red-listed and 10 are blue-listed (Appendix I). The following rare plant communities were observed on the site:

- Sitka spruce / Salmonberry (red-listed)
- Western redcedar / Skunk cabbage (blue-listed)
- Douglas-fir – Western hemlock / Salal (blue-listed)
- Western redcedar / Three-leaved foamflower (red-listed)

The Sitka spruce / Salmonberry and western redcedar / skunk cabbage plant communities are located within the riparian zone of Patricia Creek. The Douglas-fir – western hemlock / salal and western redcedar / three-leaved foamflower plant communities are present on the site in early successional stages, ranging from low shrub to tall shrub and are therefore not considered viable rare plant communities.

Record Trees

The UBC Forestry Department does not have any records from the *B.C. Register of Big Trees* of "record" occurring within the Project Area. Several large diameter Sitka spruce and western redcedar (greater than 1.0 m DBH) were observed on the property in the vicinity of the riparian ecosystem.

2.1.2 Wildlife

2.1.2.1 Methods

Office Study

The following background information was reviewed prior to the field visits. The purpose for the review was for ENKON staff to acquaint themselves with the topography and biological resources of the property:

- Review of TRIM mapping (1:20,000 scale);

- Review of mapping for the study site and area (i.e. air photo, 1:15,000 scale and topographic mapping, 1:20,000 forest cover maps, 1:20,000 habitat or target species;
- Conservation Data Center Tracking Lists (for rare animals, rare vascular plants and rare plant communities); and
- Determination of the approximate locations of survey areas (transect locations), including stratification of study areas based on habitats.

Field Study

Fieldwork was carried out on November 20, 22 and 23, 2012. The field assessment consisted of incidental observations of birds, small and large mammals as well as herpetiles, a wildlife tree survey and a nest tree survey. Animal sign was also recorded including occurrence of scat, dens, trails, lay-down areas and browse.

The basis of the wildlife tree field assessment was opportunistic; all occurrences of potential wildlife trees observed during the traverse of the property was recorded. Wildlife trees consist of veteran trees and those that show signs of being or the potential of being important to wildlife. The co-ordinates of all nests found during the survey were recorded.

The nest survey was completed with a special emphasis on locating nest that are protected by the Wildlife Act whether active or inactive (e.g., peregrine falcon, bald eagle, osprey, great blue heron) and the Species at Risk Act (e.g. spotted owl, marbled murrelet, peregrine falcon, northern goshawk, etc.).

2.1.2.2 Results

Habitat Capability

The subject property is a broad spectrum of habitats ranging from riparian to mesic conifer woodland, and regenerating low shrub to mature forest and several old growth remnants. Soil moisture conditions range from wet to moderately dry, while forest cover ranges from non-existent to relatively closed. The extent of human influence is significant, with a major portion of the site having been logged and an unpaved road system running throughout the center of the property.

Mapped plant communities occurring on the site were organized into six generalized habitat groupings. A brief description of the habitat grouping and their associated wildlife values is provided below.

Mesic Conifer-dominated Forest (DS, HK)

This habitat grouping covers a small proportion of the site and is in regenerative state (structural stages 3 and 4). The tree layer is typically dominated by Douglas-fir trees and western hemlock interspersed with western redcedar. Characteristic understorey species include salal, dull Oregon-grape, oceanspray, baldhip rose and red huckleberry, which can form a moderately dense cover in

semi-open canopy conditions. These communities have high forage production, hiding cover, snags, woody debris and surface complexity. It has moderate to high importance for deer, small-to-medium-sized furbearers, woodpeckers and forest songbirds.

Moist Mixed Woodland (RF)

The moist mixed woodland occurs on gentle slopes in the lower receiving sites. Soils in these areas are typically deep, medium textured and have a rich nutrient regime that is good for insect production. Thus it is important foraging habitat for small mammals. The soil moisture is subhygric to hygric which is beneficial to many amphibians especially for breeding and rearing of red-legged and terrestrial amphibians. Coarse woody debris on the forest floor is used by many small mammals and amphibians for shelter, thermal cover and as foraging habitat.

The tree layer consists of Douglas-fir, grand fir, western hemlock, western redcedar, bigleaf maple and sometimes red alder. Dull Oregon-grape, red huckleberry and salmonberry constitute most of the shrub layer and the mature trees provide good nesting for all of the flycatchers. The mature forest with closed canopy provides cover and the shrub layer provides thermal cover, security and food for the larger mammals.

Wet Conifer-dominated Forest (RC)

This habitat type is found where the soil moisture regime is wet and the soil nutrients are rich to very rich. Trees tend to be restricted to elevated microsites, largely because of the increased availability of oxygen for root respiration thus, the tree canopy is not continuous on this site association. Western redcedar and red alder are the major tree species; occasionally, bigleaf maple and western hemlock are also present. These small microclimates provide excellent habitat for amphibians and some of the small mammals. Water present in these areas all year round allow for opportune hibernating sites for many of the salamanders and they also provide good food for foraging small mammals in the course woody debris.

The moderately well-developed shrub layer is dominated by salmonberry and it also contains red huckleberry and salal which provide food for bears and deer. This habitat provides very good nesting for many passerines and passerine-like birds.

Wet Mixed Coniferous-Deciduous Forest (SS, CD)

These habitat types occur in the vicinity of watercourses and wetlands. Soils in these areas are typically deep, medium textured and have a rich nutrient regime that is good for insect production. Thus it is important foraging habitat for small mammals. The soil moisture is subhygric to hygric which is beneficial to many amphibians especially for breeding and rearing of red-legged and Pacific tree frogs. Coarse woody debris on the forest floor is used by many small mammals and amphibians for shelter, thermal cover and as foraging habitat.

The tree layer consists of a mix of western redcedar, western hemlock, Sitka spruce, bigleaf maple, red alder and black cottonwood. This kind of habitat provides optimal shelter for raptors and the small mammals are a good food source for them.

Salmonberry, red elderberry and devil's club constitute most of the shrub layer and the mature trees provide good nesting for all of the flycatchers.The mature forest with closed canopy provides cover and the shrub layer provides thermal cover, security and food for the larger mammals.

Open Shallow Water

Wetlands on site have an emergent herbaceous community that includes sedges, rushes, and cattails. There is a large amount of woody debris present in various stages of decomposition which provides protection for the amphibian community and creates a safe foraging environment for small mammals and amphibians. A variety of sedges, rushes, and herbs are often interspersed among the dense shrub cover at the edges of the wetland. They are valuable habitats for amphibians, shrews, and their predators. They are also used by a variety of songbirds and aerial insectivores. Deer are attracted to wetlands for their cover and forage values. Wetlands such as this one are important to lentic-breeding amphibians such as the red-legged frog, northwestern salamander, Pacific treefrog, long-toed salamander, and rough-skinned newt. They are also attractive to furbearers and many forest-associated birds.

Disturbed

A large portion of the site has been previously logged. Regenerating forest ranges from sparsely vegetated to pole sapling. There are numerous unpaved roads located throughout the property as well as several gravel extraction pits and stockpile areas. They are generally low quality habitats, although they possess fairly high herbage values. Invasive shrubs such as Scotch broom and Himalayan blackberry provide some food and cover values for small wildlife.

Birds

No nests of species continuously protected under Section 34 of the B.C. *Wildlife Act* (e.g. bald eagle; great blue heron) were found on or near the property. No active bird nests were located during the visits to the site due to the timing of the survey. Territorial songs of many of the resident birds were heard on the property. Passerine breeding season typically commences in early April.

Based on observations during the survey songbirds form the largest part of the area's bird assemblage and are most abundant in the riparian forests which are more mature. Open and above canopy areas typically attract use by sparrows, swallows, and other aerial insectivores. Commonly mixed forest (such as riparian) habitats provide the highest levels of structural diversity, and therefore are expected to possess the highest songbird densities.

In order to comply with Section 34 of the Wildlife Act which states that it is illegal to disturb or destroy the nest of any breeding bird, tree falling should only

occur before the beginning of April or after the middle of August when the majority of birds have finished nesting and their young successfully fledged. The window for falling trees typically occurs after the middle of August and before February when some of the larger owls can initiate breeding. If there is an intention of tree clearing after mid-January an owl survey should be conducted prior to ensure that there are no nesting owls in the areas of tree falling.

Table 5 summarizes bird species recorded during the field survey. Due to the timing of the survey only resident bird species were detected; a total of 16 bird species were observed on the site.

Incidental Observations

Black-tailed deer (*Odocoileus hemonionus* ssp. c*olumbiana*) sign was observed throughout the property. Roosevelt elk (*Cervus canadensis roosevelti)* sign was abundant and concentrated in the lowland areas. Eastern cottontail (*Sylvilagus floridanus*) droppings were encountered in the upland portions of the site. Cottontails frequent shrubby habitats where forage and hiding cover are abundant, and are important prey items for larger raptors. Raccoon scat was observed in the mesic conifer forest. A red squirrel was observed on the upper road but no nests or middens were seen. Black bear scat and foraging sign were observed in the lowland forest. There were several areas observed that would be suitable denning habitat.

Other mammal species that have some potential of occurring on the property include cougar (*Puma concolor*), grey wolf (*Canis lupus*), mink (*Neovison vison*), marten (*Martes americana),* ermine *(Mustela ermine anguinae)*(blue-listed), Townsend's vole (*Microtus* townsendii), beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), Keen's mouse (*Peromyscus keeni*), deer mouse (*Peromyscus maniculatus,* vagrant shrew (*Sorex vagrans),* dusky shrew (*Sorex montcolus*), Vancouver Island water shrew (*Sorex palustris*) (red-listed), little brown bat (*Myotis lucifugus*) and silver-haired bat (*Lasionycteris noctivagans*).

Pacific tree frogs were heard in the lowland forest adjacent to the creek. Although not observed during the site assessment, there is some potential for the wetlands on site to be used as breeding habitat by amphibians such as red-legged frog (*Rana* aurora) (blue-listed), western toad (*Anaxyrus borealis*) (blue-listed), rough-skinned newt (*Taricha granulosa*), northwestern salamander (*Abystoma gracile*), redback salamander (*Plethodon vehiculum*), long-toed salamander (*Ambystoma macrodactylum*), clouded salamander (*Aneides ferreus*) and ensatina (*Ensatina eschscholtzii).* Although not detected during the survey, the site very likely supports at least one species of garter snake.

Table 4: Wildlife Species Observed During the November 2012 Survey

	Type of Observation	Comments
Mammals (4 species)		
Black bear	Scat	Sign observed in lowland areas
Roosevelt Elk	Browse, droppings, trails, lay-down areas	Blue-listed species, sign observed throughout the site, the highest density in vicinity of older forest in riparian zone
Columbian Black-tailed Deer	Browse, droppings, trails, lay-down areas	high densities common in rural areas on South Vancouver Island
Eastern Cottontail	Droppings	Observed in upland mixed forest
Red Squirrel	Visual	Observed on upper road
Raccoon	Scat	common in region, scat noted in conifer woodland
Birds (16 species)		
American Robin	Visual	common and widespread
Varied Thrush	Auditory	Resident species
Chestnut-backed Chickadee	Visual, auditory	resident, hole nester
Common Raven	Auditory	common resident
Dark-eyed Junco	Visual	common resident
Golden-crowned Kinglet	Auditory	feeding high in conifers
Northern Flicker	Auditory	most common woodpecker in region, hole nester
Bald Eagle	Auditory	Likely not on site
Red-breasted Nuthatch	Auditory	resident bark-gleaner
Spotted Towhee	Visual , Auditory	resident species
Pacific Wren	Visual	observed in riparian area
Northwestern crow	Auditory	Resident species
Pacific wren	Visual, Auditory	Heard and observed in riparian forest
Stellar's jay	Visual	Observed in lowland area
Pileated woodpecker	Visual	Observed in lowland area
Bushtit	Auditory	Large flocks observed in lowland area
Amphibians/Reptiles (1 species)		
Pacific Treefrog	Auditory	heard in riparian area

Table 5: Habitat Values for Selected Vertebrate Species/Species Groups

Habitat Grouping	Relative Importance to Species / Species Group							Overall Wildlife Rating
	Deer	Furbearers[1]	Small Mammals[2]	Herptiles[3]	Woodpeckers	Songbirds	Raptors	
Mesic conifer-dominated forest	Moderate to High	Moderate	Moderate	Low	Low	Moderate	Low	Low to Moderate
Moist mixed forest	High	Moderate to High	High	Moderate to High	Moderate	High	Moderate	Moderate to High
Wet mixed forest	High	High	High	High	High	High	High	High
Wet conifer-dominated forest	Moderate to High	High	Moderate to High	High	High	High	High	High
Shallow open water	Moderate	Moderate to High	High	High	Moderate to High	Moderate to High	Moderate	Moderate to High
Disturbed (sparsely vegetated)	Moderate	Low	Low to Moderate	Low to Moderate	Nil	Moderate to High	Nil	Low to Moderate

Notes:

1 "Furbearers" is a generalized term, which includes raccoons, mustelids, Eastern cottontails, red squirrels

2 "Small Mammals" include shrews, mice and voles native to Vancouver Island.

[3] "Herptiles" is a term given to the combined grouping of amphibians with reptiles.

Table 6: Summary of Values in Habitat Types

Habitat Grouping	Forage Production			Snag Abundance	Coarse Woody Debris	Surface Complexity	Hiding Cover	Travel Corridor Potential
	Browse	Herbage	Berries					
Mesic conifer-dominated woodland	High	Moderate	Moderate	Low	High	Moderate	Moderate to High	Moderate
Moist mixed forest	Low	Low	Moderate	Low	Moderate to High	Moderate	Moderate	Low to Moderate
Wet Mixed Forest	High	High	High	Moderate	Moderate	High	Low to Moderate	Moderate to High
Wet conifer-dominated forest	High	High	High	Moderate	Moderate to High	Moderate	Moderate	Moderate
Shallow open water	Moderate	Low	Low	Low	Low	Moderate	Moderate to Low	Low
Disturbed /Developed	Low	High	Low	Nil	Nil	Low	Low	Moderate

2.1.3 Accounts of Red and Blue-Listed Species

The Conservation Data Centre (CDC) maintains tracking lists of rare vertebrates, for each Forest District in British Columbia. Species, subspecies, populations, or communities at high risk of extinction or extirpation are placed on the red list, while those considered vulnerable are placed on the Blue List. Those vertebrate species for which potentially suitable habitats occur in the Project Area are summarized below in Table 7.

2.1.3.1 Roosevelt Elk

The red or blue-listed species noted to occur on the site during the survey was the Roosevelt Elk (blue-listed). Although no individuals were observed abundant sign was recorded in the lowland portion of the property. The Roosevelt or Olympic Elk (*Cervus elaphus roosevelti* Merriam) is one of four subspecies of Elk that have occurred in Canada. *C.e. roosevelti* is larger and has darker pelage and more massive, rugged antlers than other members of the species. They currently range in a discontinuous pattern along the Pacific coast from San Francisco, California, north to Vancouver Island, extending as far inland as the summit of the Cascade mountain range. Most of the province's Roosevelt Elk, some 3300 animals, occur on Vancouver Island where they form two metapopulations. Elk focus their habitat use on edges between relatively open areas that provide forage and densely forested areas that provide cover (Skovlin 1982). Elk occur in coniferous forests of all ages, as well as deciduous stands and nonforested habitats such as wetlands, vegetated slides, and rock outcrops. The understorey type, successional stage, and forest history influence the quantity and quality of food available in forested habitats. On Vancouver Island, habitats for optimal feeding can generally be characterized by moist, rich soils that ensure an abundance of preferred food species. These habitats include open conifer stands (<70% canopy closure), stands dominated by deciduous trees (>50% deciduous), non-forested wetlands (seepages, estuaries, wetlands), riparian areas, vegetated slides on summer ranges, and borders of south-facing rock outcrops on winter and spring ranges. Sign of this species was observed on site in the lowland forest.

Table 7: Selected Red and Blue-listed Vertebrates of the South Island Forest District

English Name	Scientific Name	Provincial Status	Federal Status*
Band-tailed pigeon	*Columba fasciata*	Blue	Special Concern (COSEWIC, SARA)
Great blue heron	*Ardea herodia fannini*	Blue	Special concern (COSEWIC, SARA)
Green heron	*Butorides virescens*	Blue	n/a
Keen's myotis	*Myotis keenii*	Red	n/a
Northern goshawk	*Accipiter gentilis laingi*	Red	Threatened (COSEWIC, SARA)
Northern pygmy owl	*Glaucidium gnoma swarthi*	Blue	n/a
Olive-sided flycatcher	*Contopus cooperi*	Blue	Threatened (COSEWIC, SARA)
Red-legged frog	*Rana aurora*	Blue	Special Concern (COSEWIC, SARA)
Roosevelt Elk	*Cervus canadensis roosevelti*	Blue	n/a
Sooty grouse	*Dendragapus fuliginosus*	Blue	n/a
Vancouver Island ermine	*Mustela ermine anguinae*	Blue	n/a
Vancouver Island water shrew	*Sorex palustris brooksi*	Red	n/a
Wandering salamander	*Aneidees vagrans*	Blue	n/a
Western toad	*Anaxyrus boreas*	Blue	Special concern (COSEWIC, SARA)

*COSEWIC = Committee on the Status of Wildlife in Canada, SARA = Species at Risk Act

2.2 Aquatic Resources

Patricia Creek, a tributary to Robertson River, is located on the subject property. The creek is forked, the northern stream originates on the property, and the southern one originates approximately 3 km to the south of the subject property. Once the two streams confluence it flows east, exiting the property and confluencing with Robertson River. There are a series of wetlands located instream of the watercourse, creating a large undefined channel with a significant variability in channel width. According to the BC Ministry of Fisheries' Fish Wizard Database the Patricia Creek watershed sustains coho salmon (*Oncorhynchus kisutch*), chum salmon (*Oncorhynchus keta*), cutthroat trout (*Oncorhynchus clarki*) (blue-listed), and rainbow trout/steelhead (*Oncorhynchus mykiss*). An obstacle to fish passage, a four metre high falls, is located approximately 1 km south of the property boundary.

Channels present on site are unconfined in many areas. The southern channel flows across the lower logging road in four separate locations before flowing north to confluence with the northern channel.

Riparian vegetation consists of second growth mixed coniferous / deciduous woodland comprised of bigleaf maple, western hemlock, Sitka spruce, western redcedar, black cottonwood and red alder. Understorey species include salmonberry, red elderberry, devil's club, red-osier dogwood, sword fern, lady fern, stinging nettle, false lily-of-the-valley and skunk cabbage.

The Riparian Areas Regulations (RAR) requires a 30m Stream Side Protection and Enhancement Area (SPEA) along all watercourses. A reduced setback may be permitted subject to completion of a detailed RAR assessment. A riparian areas assessment was not completed as part of this survey, accordingly a 30 m Streamside Protection and Enhancement Areas (SPEA) is applicable to Patricia Creek and all wetlands present on-site.

REFERENCES

Alsop, F. 2002. *Birds of Canada.* Dorling Kindersley Publishing. 687pp.

Baron. N and J. Acorn. 1997. *Birds of Coastal British Columbia and the Pacific Northwest*. Lone Pine Publishing, Vancouver, B.C. 240pp.

Campbell. R., Cooper, J.M., Dawe, N.K., McTaggart-Cowan, I. and G.W. Kaiser. 1997. *The Birds of British Columbia.* Vol: 1-3 Royal B.C. Museum, Victoria, B.C.

Department of Fisheries and Oceans. 1993. *Land Development Guidelines for the Protection of Aquatic Habitat*.

Farmer, A. M., 1993. The effects of dust on vegetation--A review. *Environmental Pollution*, v. 79, p. 63-75.

Green, R.N. and K. Klinka, 1994. *A Field Guide to Site Identification and Interpretation for the Vancouver Forest Region.* Province of British Columbia, Research Branch, Ministry of Forests, Victoria, B.C.

Ministry of Environment, Lands and Parks (Vancouver Island Region, 2001. *Environmental Objectives, Best Management Practices and Requirements for Land Developments* (http://wlapwww.gov.bc.ca/vir/pa/bmp_dev2.htm

Meidinger, D. and J. Pojar. 1991. *Ecosystems of British Columbia*. Ministry of Forests, Victoria, BC.

Orchard, S.A. 1984. *Amphibians and Reptiles of B.C.: An Ecological Review*. Research Branch, Ministry of Forests. WHR-15. Victoria, BC.

Pojar, J. and A. Mackinnon (Ed.), 1994. *Plants of Coastal British Columbia.* B.C. Ministry of Forests and Lone Pine Publishing, Vancouver, B.C.

RISC. 1999. *Inventory Methods for Forest and Grassland Songbirds: Standards for Components of British Columbia's Biodiversity No. 15* (Version 2.0).

RISC. 1998a. *Inventory Methods for Small Mammals: Shrews, Voles, Mice and Rats: Standards for Components of British Columbia's Biodiversity, No. 31* (Version 2.0).

RISC. 1998b. *Species Inventory Fundamentals: Standards for Components of British Columbia's Biodiversity No. 1* (Version 2.0).

RISC. 1997. *Live Animal Capture and Handling Guidelines For Wild Mammals, Birds, Amphibians and Reptiles: Standards for Components of British Columbia's Biodiversity No. 3* (Version 2.0).

Stebbins, R.C. 1985. *A Field Guide to Western Reptiles and Amphibians*. Houghton Mifflin Company, New York.

Zuleta, G.A. and C. Galindo-Leal, 1994, *Distribution and Abundance of four species of small mammals at risk in a fragmented landscape*, WWR 64. Ministry of Environment, Lands and Parks, Wildlife Branch, Victoria, B.C. 34

Appendices

Appendix I: Conservation Data Centre Information
Appendix II: Photoplates

Appendix I: Conservation Data Centre Information

BC Species and Ecosystems Explorer Search Results

Scientific Name	English Name	Status					
		Provincial	BC List	COSEWIC	SARA	Global	CF Priority
Abronia latifolia	yellow sand-verbena	S2S3 (2011)	Blue			G5 (1988)	1
Abronia umbellata var. *breviflora*	pink sand-verbena	S1 (2005)	Red	E (2004)	1-E (2005)	G4G5TNR	2
Allium amplectens	slimleaf onion	S3 (2001)	Blue			G4 (1988)	2
Allium crenulatum	Olympic onion	S2 (2000)	Red			G4 (1988)	3
Anemone drummondii var. *drummondii*	alpine anemone	S2S3 (2000)	Blue			G4T4 (1997)	3
Balsamorhiza deltoidea	deltoid balsamroot	S1 (2009)	Red	E (2009)	1-E (2003)	G5 (1988)	1
Bidens amplissima	Vancouver Island beggarticks	S3 (2008)	Blue	SC (2001)	1-SC (2003)	G3 (1988)	1
Bryum capillare ssp. *erythroloma*		S2S3 (2011)	Blue			G4? (1999)	2
Bryum stenotrichum		S2S3 (2011)	Blue			GNR	3
Calystegia soldanella	beach bindweed	S3 (2008)	Blue			G5 (1988)	2
Carex feta	green-sheathed sedge	S2S3 (2012)	Blue			G5 (1990)	2
Carex interrupta	green-fruited sedge	S2 (2004)	Red			G4 (2006)	2
Ceratophyllum echinatum	spring hornwort	S3 (2002)	Blue			G4? (1995)	4
Clarkia purpurea ssp. *quadrivulnera*	small-flowered godetia	S1 (2009)	Red	C (2011)		G5T5 (1999)	1
Claytonia washingtoniana	Washington springbeauty	S2 (2000)	Red			G2G4 (2001)	3
Corydalis scouleri	Scouler's corydalis	S3S4 (2006)	Yellow	NAR (2006)		G4 (1991)	3
Cyperus squarrosus	awned cyperus	S3 (2001)	Blue			G5 (1993)	2
Ditrichum schimperi		S2S3 (2011)	Blue			G3G5 (2000)	3
Entosthodon fascicularis	banded cord-moss	S2S3 (2011)	Blue	SC (2005)	1-SC (2006)	G4G5 (2001)	2
Eucephalus paucicapitatus	Olympic mountain aster	S3 (2006)	Blue			G3? (2000)	2
Fraxinus latifolia	Oregon ash	S1 (2000)	Red			G5 (1990)	1
Funaria muhlenbergii		S3? (2011)	Blue			G4 (1995)	2
Githopsis specularioides	common bluecup	S2S3 (2000)	Blue			G5 (1994)	2
Glehnia littoralis ssp. *leiocarpa*	American glehnia	S3 (2003)	Blue			G5T5 (1991)	2
Glyceria leptostachya	slender-spiked mannagrass	S2S3 (2000)	Blue			G3 (1991)	2
Heterocodon rariflorum	heterocodon	S3 (2012)	Blue			G5 (1988)	2
Hosackia pinnata	bog bird's-foot lotus	S1 (2000)	Red	E (2004)	1-E (2005)	G4G5 (2001)	1
Idahoa scapigera	scalepod	S2 (2000)	Red			G5 (1987)	2
Isoetes nuttallii	Nuttall's quillwort	S3 (2001)	Blue			G4? (2011)	2
Limnanthes macounii	Macoun's meadow-foam	S2 (2007)	Red	T (2004)	1-T (2006)	G2 (2006)	1

Lupinus lepidus	prairie lupine	S1 (2008)	Red	E (2009)	1-E (2003)	G5 (1989)	1
Meconella oregana	white meconella	S1 (2005)	Red	E (2005)	1-E (2006)	G2G3 (2004)	1
Mimulus dentatus	tooth-leaved monkey-flower	S2S3 (2012)	Blue			G5 (1990)	3
Mitella caulescens	leafy mitrewort	S2S3 (2001)	Blue			G5 (1990)	2
Myriophyllum quitense	waterwort water-milfoil	S2S3 (2000)	Blue			G4? (1995)	3
Navarretia intertexta	needle-leaved navarretia	S2 (2000)	Red			GNR	2
Orobanche pinorum	pine broomrape	S1 (2001)	Red			G4 (1987)	1
Packera macounii	Macoun's groundsel	S3 (2001)	Blue			G5 (1993)	2
Piperia candida	white-lip rein orchid	S2 (2001)	Red			G3 (2007)	2
Platyhypnidium riparioides		S3? (2011)	Blue			G4 (2004)	2
Pleuropogon refractus	nodding semaphoregrass	S3 (2001)	Blue			G4 (1997)	2
Pleuroziopsis ruthenica		S2S3 (2011)	Blue			G3 (2001)	2
Polygonum paronychia	black knotweed	S3 (2005)	Blue			G5 (1990)	2
Prosartes smithii	Smith's fairybells	S3 (2000)	Blue			G5 (1990)	2
Psilocarphus elatior	tall woolly-heads	S1 (2000)	Red	E (2001)	1-E (2003)	G4Q (2001)	1
Psilocarphus tenellus	slender woolly-heads	S3 (2006)	Blue	NAR (1996)		G4 (1997)	4
Ptychomitrium gardneri		S3 (2011)	Blue			G4 (1994)	2
Rubus lasiococcus	dwarf bramble	S2S3 (2000)	Blue			G5 (1990)	2
Rubus nivalis	snow bramble	S3? (2008)	Blue			G4? (1990)	2
Rupertia physodes	California-tea	S3 (2001)	Blue			G4 (1985)	2
Sanicula bipinnatifida	purple sanicle	S2 (2009)	Red	T (2001)	1-T (2003)	G5 (1990)	2
Sericocarpus rigidus	white-top aster	S2 (2008)	Red	SC (2009)	1-SC (2003)	G3 (2007)	1
Sidalcea hendersonii	Henderson's checker-mallow	S3 (2001)	Blue			G3 (2004)	2
Toxicodendron diversilobum	poison oak	S2S3 (2000)	Blue			G5 (1999)	2
Trifolium cyathiferum	cup clover	S1 (2000)	Red			G4 (1990)	2
Viola howellii	Howell's violet	S2S3 (2000)	Blue			G4 (1988)	2
Viola praemorsa ssp. *praemorsa*	yellow montane violet	S2 (2005)	Red	E (2007)	1-E (2003)	G5T3T5 (2000)	1
Woodwardia fimbriata	giant chain fern	S3 (2011)	Blue			G5 (1994)	2
Yabea microcarpa	California hedge-parsley	S1S2 (2008)	Red			G5? (1990)	1

Search Summary

Time Performed Wed Jan 09 16:14:28 PST 2013

Results 59 records.

Search Criteria Search Type: Plant
AND Forest Districts:South Island Forest District (DSI) (Restricted to Red, Blue, and Legally designated species)
AND Regional Districts: Cowichan Valley (CVRD) (Restricted to Red, Blue, and Legally designated species)

BC Species and Ecosystems Explorer Search Results

Scientific Name	English Name	Status					
		Provincial	BC List	COSEWIC	SARA	Global	CF Priority
Accipiter gentilis laingi	Northern Goshawk, *laingi* subspecies	S2B (2010)	Red	T (2000)	1-T (2003)	G5T2 (2008)	1
Allogona townsendiana	Oregon Forestsnail	S1S2 (2008)	Red	E (2002)	1-E (2005)	G3G4 (2010)	1
Ambystoma gracile	Northwestern Salamander	S4S5 (2010)	Yellow	NAR (1999)		G5 (2008)	1
Anaxyrus boreas	Western Toad	S3S4 (2010)	Blue	SC (2012)	1-SC (2005)	G4 (2008)	2
Aneides vagrans	Wandering Salamander	S3S4 (2010)	Blue			G4 (2005)	2
Ardea herodias fannini	Great Blue Heron, *fannini* subspecies	S2S3B,S4N (2009)	Blue	SC (2008)	1-SC (2010)	G5T4 (1997)	1
Asio flammeus	Short-eared Owl	S3B,S2N (2009)	Blue	SC (2008)	1-SC (2012)	G5 (2008)	2
Brachyramphus marmoratus	Marbled Murrelet	S3B,S3N (2010)	Blue	T (2012)	1-T (2003)	G3G4 (2008)	1
Butorides virescens	Green Heron	S3S4B (2009)	Blue			G5 (1996)	4
Callophrys eryphon sheltonensis	Western Pine Elfin, *sheltonensis* subspecies	S3 (2006)	Blue			G5TNR	4
Callophrys johnsoni	Johnson's Hairstreak	S1S2 (2006)	Red			G3G4 (2004)	2
Callophrys mossii mossii	Moss' Elfin, *mossii* subspecies	S2S3 (2006)	Blue			G4T4 (2001)	2
Carychium occidentale	Western Thorn	S2S3 (2008)	Blue			G3G4 (2002)	2
Cercyonis pegala incana	Common Wood-nymph, *incana* subspecies	S2 (2006)	Red			G5T4T5 (2003)	2
Cervus canadensis roosevelti	Roosevelt Elk	S3S4 (2010)	Blue			G5T4 (1997)	2
Chordeiles minor	Common Nighthawk	S4B (2010)	Yellow	T (2007)	1-T (2010)	G5 (2009)	2
Chrysemys picta	Painted Turtle	S3 (2012)	No Status	E/SC (2006)	1	G5 (2005)	2
Chrysemys picta pop. 1	Painted Turtle - Pacific Coast Population	S2 (2012)	Red	E (2006)	1-E (2007)	G5T2 (2007)	2
Coenonympha tullia insulana	Common Ringlet, *insulana* subspecies	S1 (2006)	Red			G5T3T4 (1998)	1
Contia tenuis	Sharp-tailed Snake	S1S2 (2012)	Red	E (2009)	1-E (2003)	G5 (2010)	1
Contopus cooperi	Olive-sided Flycatcher	S3S4B (2009)	Blue	T (2007)	1-T (2010)	G4 (2008)	2
Corynorhinus townsendii	Townsend's Big-eared Bat	S3 (2006)	Blue			G4 (1996)	2
Cypseloides niger	Black Swift	S4B (2009)	Yellow	C (2011)		G4 (1996)	2
Danaus plexippus	Monarch	S3B (2006)	Blue	SC (2010)	1-SC (2003)	G5 (2011)	2
Dendragapus fuliginosus	Sooty Grouse	S3S4 (2009)	Blue			G5 (2007)	2
Elgaria coerulea	Northern Alligator Lizard	S4 (2012)	Yellow	NAR (2002)		G5 (2005)	3

Epitheca canis	Beaverpond Baskettail	S3 (2004)	Blue			G5 (2004)	4
Erynnis propertius	Propertius Duskywing	S2S3 (2006)	Blue			G5 (2009)	2
Erythemis collocata	Western Pondhawk	S3 (2004)	Blue			G5 (2000)	2
Eumetopias jubatus	Steller Sea Lion	S2S3B,S3N (2006)	Blue	SC (2003)	1-SC (2005)	G3 (2011)	2
Euphydryas editha taylori	Edith's Checkerspot, *taylori* subspecies	S1 (2006)	Red	E (2011)	1-E (2003)	G5T1 (2008)	1
Euphyes vestris	Dun Skipper	S3 (2006)	Blue	T (2000)	1-T (2003)	G5 (2006)	2
Falco peregrinus	Peregrine Falcon	S3B (2011)	No Status	SC (2007)		G4 (2000)	2
Falco peregrinus anatum	Peregrine Falcon, *anatum* subspecies	S2?B (2010)	Red	SC (2007)	1-T (2003)	G4T4 (2006)	2
Falco peregrinus pealei	Peregrine Falcon, *pealei* subspecies	S3B (2010)	Blue	SC (2007)	1-SC (2003)	G4T3 (1997)	1
Fratercula cirrhata	Tufted Puffin	S3B,S4N (2011)	Blue			G5 (2003)	2
Glaucidium gnoma swarthi	Northern Pygmy-Owl, *swarthi* subspecies	S3 (2009)	Blue			G4G5T3Q (1996)	1
Gulo gulo	Wolverine	S3 (2010)	No Status	SC (2003)		G4 (2005)	2
Gulo gulo vancouverensis	Wolverine, *vancouverensis* subspecies	SH (2010)	Red	SC (1989)		G4T1Q (1997)	2
Haliaeetus leucocephalus	Bald Eagle	S5B,S5N (2009)	Yellow	NAR (1984)		G5 (2005)	6
Haliotis kamtschatkana	Northern Abalone	S2 (2002)	Red	T (2000)	1-T (2003)	G3G4 (2010)	2
Hemphillia dromedarius	Dromedary Jumping-slug	S2 (2008)	Red	T (2003)	1-T (2005)	G3G4 (2005)	2
Hemphillia glandulosa	Warty Jumping-slug	S2S3 (2008)	Blue	SC (2003)	1-SC (2005)	G3G4 (2005)	2
Hesperia colorado oregonia	Western Branded Skipper, *oregonia* subspecies	S2S3 (2006)	Blue	C (2011)		G5T3T4 (2000)	2
Hirundo rustica	Barn Swallow	S3S4B (2009)	Blue	T (2011)		G5 (1996)	2
Lampetra macrostoma	Cowichan Lake Lamprey	S1S2 (2010)	Red	T (2008)	1-T (2003)	G1 (2007)	1
Megascops kennicottii	Western Screech-Owl	S4 (2009)	No Status	T (2012)	1	G5 (2003)	2
Megascops kennicottii kennicottii	Western Screech-Owl, *kennicottii* subspecies	S3 (2009)	Blue	T (2012)	1-SC (2005)	G5T4 (2003)	1
Monadenia fidelis	Pacific Sideband	S3S4 (2008)	Blue			G4G5 (2002)	2
Mustela erminea anguinae	Ermine, *anguinae* subspecies	S3 (2010)	Blue			G5T3 (1996)	2
Myotis keenii	Keen's Myotis	S1S3 (2006)	Red	DD (2003)	3 (2005)	G2G3 (2006)	1
Myotis lucifugus	Little Brown Myotis	S5 (2006)	Yellow	E (2012)		G5 (2008)	5
Nearctula sp. 1	Threaded Vertigo	S2 (2008)	Red	SC (2010)	1-SC (2012)	G3G5 (2006)	2
Oncorhynchus clarkii clarkii	Cutthroat Trout, *clarkii* subspecies	S3S4 (2004)	Blue			G4T4 (1997)	2
Oncorhynchus kisutch	Coho Salmon	S4 (2000)	Yellow	E (2002)		G4 (2001)	2

Pachydiplax longipennis	Blue Dasher	S3S4 (2004)	Blue			G5 (2008)	4
Patagioenas fasciata	Band-tailed Pigeon	S3S4B (2009)	Blue	SC (2008)	1-SC (2011)	G4 (2000)	2
Phalacrocorax auritus	Double-crested Cormorant	S3B (2005)	Blue	NAR (1978)		G5 (1999)	2
Plebejus icarioides blackmorei	Boisduval's Blue, *blackmorei* subspecies	S3 (2006)	Blue			G5T3 (2006)	3
Plebejus saepiolus insulanus	Greenish Blue, *insulanus* subspecies	SH (2006)	Red	E (2012)	1-E (2003)	G5TH (2003)	1
Plethodon vehiculum	Western Red-backed Salamander	S4 (2010)	Yellow	NAR (2001)		G5 (2002)	3
Pooecetes gramineus affinis	Vesper Sparrow, *affinis* subspecies	S1B (2010)	Red	E (2006)	1-E (2007)	G5T3 (1996)	1
Pristiloma johnsoni	Broadwhorl Tightcoil	S2S3 (2008)	Blue			G2G3 (2004)	2
Progne subis	Purple Martin	S2S3B (2005)	Blue			G5 (1996)	3
Prophysaon coeruleum	Blue-grey Taildropper	S1 (2008)	Red	E (2006)	1-E (2007)	G3G4 (2010)	1
Prophysaon vanattae	Scarletback Taildropper	S3S4 (2008)	Blue			G4 (2002)	4
Ptychoramphus aleuticus	Cassin's Auklet	S2S3B,S4N (2005)	Blue	C (2011)		G4 (1996)	2
Rana aurora	Northern Red-legged Frog	S3S4 (2010)	Blue	SC (2004)	1-SC (2005)	G4 (2008)	1
Sorex palustris brooksi	American Water Shrew, *brooksi* subspecies	S2 (2010)	Red			G5T2 (1996)	1
Speyeria zerene bremnerii	Zerene Fritillary, *bremnerii* subspecies	S2 (2006)	Red			G5T3T4 (1998)	2
Sympetrum vicinum	Autumn Meadowhawk	S3S4 (2004)	Blue			G5 (1985)	4
Thamnophis ordinoides	Northwestern Gartersnake	S4 (2012)	Yellow	NAR (2003)		G5 (2006)	3
Tyto alba	Barn Owl	S3 (2009)	Blue	T (2010)	1-SC (2003)	G5 (1996)	2
Zonitoides nitidus	Black Gloss	S3S4 (2008)	Blue			G5 (2003)	2

Search Summary

Time Performed Wed Jan 09 16:23:42 PST 2013

Results 74 records.

Search Criteria
Search Type: Animal
AND Forest Districts:South Island Forest District (DSI) (Restricted to Red, Blue, and Legally designated species)
AND Regional Districts: Cowichan Valley (CVRD) (Restricted to Red, Blue, and Legally designated species)
AND BGC Zone:CWH
Sort Order:Scientific Name Ascending

Notes
1. Citation: B.C. Conservation Data Centre. 2013. BC Species and Ecosystems Explorer. B.C. Minist. of Environ. Victoria, B.C. Available: http://a100.gov.bc.ca/pub/eswp/ (accessed Jan 9, 2013).

2. Forest District, MoE Region, Regional District and habitat lists are restricted to species that breed in the Forest District, MoE Region, Regional District or habitat (i.e., species will not be placed on lists where they occur only as migrants).

Modify Search | New Search | Results

Appendix Ic - Rare Plant Communities Occurring In the Vancouver Forest Region in CWHxm2 (January 2013)

Scientific Name	English Name	Element Code	Global Status	Prov Status	Prov Status Review Date	Prov Status Change Date	BC List
Carex lasiocarpa - Rhynchospora alba	slender sedge - white beak-rush	CEBC003021	G2	S2	30-Jul-04	30-Jul-04	Red
Dulichium arundinaceum Herbaceous Vegetation	three-way sedge	CEBC003029	GNR	S2	30-Jul-04	30-Jul-04	Red
Leymus mollis ssp. *mollis - Lathyrus japonicus*	dune wildrye - beach pea	CEBC003073	GNR	S1S2	19-Mar-08	19-Mar-08	Red
Myrica gale / Carex sitchensis	sweet gale / Sitka sedge	CEBC003038	G3	S2	14-Jul-04	14-Jul-04	Red
Picea sitchensis / Rubus spectabilis Very Dry Maritime	Sitka spruce / salmonberry Very Dry Maritime	C1B2CARRS2	G3	S2	31-Oct-04	26-Jun-92	Red
Pinus contorta / Sphagnum spp. *Very Dry Maritime*	lodgepole pine / peat-mosses Very Dry Maritime	C2A2APCSG3	GNR	S3	31-Oct-04	15-Jun-00	Blue
Populus trichocarpa - Alnus rubra / Rubus spectabilis	black cottonwood - red alder / salmonberry	C1B2CPBCS1	GNR	S3	14-Jul-10	29-Sep-94	Blue
Populus trichocarpa / Salix sitchensis	black cottonwood / Sitka willow	C3B4CPBSS1	GNR	S2S3	31-Oct-04	11-Jul-02	Blue
Pseudotsuga menziesii - Pinus contorta / Cladina spp.	Douglas-fir - lodgepole pine / reindeer lichens	C1A9CPMPC1	GNR	S2	31-Oct-04	15-Jun-00	Red
Pseudotsuga menziesii / Polystichum munitum	Douglas-fir / sword fern	C1A9CPMPM1	G2G4	S2	31-Oct-04	18-Jun-92	Red
Pseudotsuga menziesii - Tsuga heterophylla / Gaultheria shallon Dry Maritime	Douglas-fir - western hemlock / salal Dry Maritime	C1A9CTHGS1	G3G4	S2S3	31-Oct-04	15-Jun-92	Blue
Rhododendron groenlandicum / Kalmia microphylla / Sphagnum spp.	Labrador tea / western bog-laurel / peat-mosses	CEBC003037	G4	S3	14-Jul-04	14-Jul-04	Blue
Selaginella wallacei / Cladina spp.	Wallace's selaginella / reindeer lichens	CEBC003112	GNR	S3		13-Apr-12	Blue
Spiraea douglasii / Carex sitchensis	hardhack / Sitka sedge	CEBC003048	G4	S4	14-Jul-04	14-Jul-04	Yellow
Thuja plicata / Carex obnupta	western redcedar / slough sedge	C1B2CARCO1	GNR	S2S3	31-Oct-04	26-Jun-92	Blue
Thuja plicata / Lonicera involucrata	western redcedar / black twinberry	C2B2CARLI1	GNR	S1	7-Apr-10	22-Oct-09	Red
Thuja plicata - Picea sitchensis / Lysichiton americanus	western redcedar - Sitka spruce / skunk cabbage	C2A2BTHLA1	G3?	S3?	31-Oct-04	16-Jul-02	Blue
Thuja plicata / Polystichum munitum Very Dry Maritime	western redcedar / sword fern Very Dry Maritime	C1A9CTPTT2	GNR	S2S3	15-May-09	25-Jun-92	Blue
Thuja plicata / Rubus spectabilis	western redcedar / salmonberry	C1B2CARRS3	GNR	S1S2	15-May-09	26-Jun-92	Red
Thuja plicata / Tiarella trifoliata Very Dry Maritime	western redcedar / three-leaved foamflower Very Dry Maritime	C1A9CTPAF2	G3	S2	31-Oct-04	15-Jun-00	Red
Tsuga heterophylla - Pseudotsuga menziesii / Eurhynchium oreganum	western hemlock - Douglas-fir / Oregon beaked-moss	C1A9CTHKO1	G3G4	S2	31-Oct-04	15-Jun-00	Red
Tsuga heterophylla - Thuja plicata / Blechnum spicant	western hemlock - western redcedar / deer fern	C1A9CTHBS1	G2G3	S2	31-Oct-04	15-Jun-00	Red
Typha latifolia Marsh	common cattail Marsh	CEBC001047	G5	S3	31-Oct-04	31-Jul-02	Blue

Search Criteria

Search Type: Ecological Communities
AND Forest Districts:South Island Forest District (DSI)
AND Regional Districts: Cowichan Valley (CVRD)
AND BGC Zone, Subzone, Variant, Phase:CWHxm2
AND Ecosections:LIM
Sort Order:Scientific Name Ascending

Appendix II: Photoplates

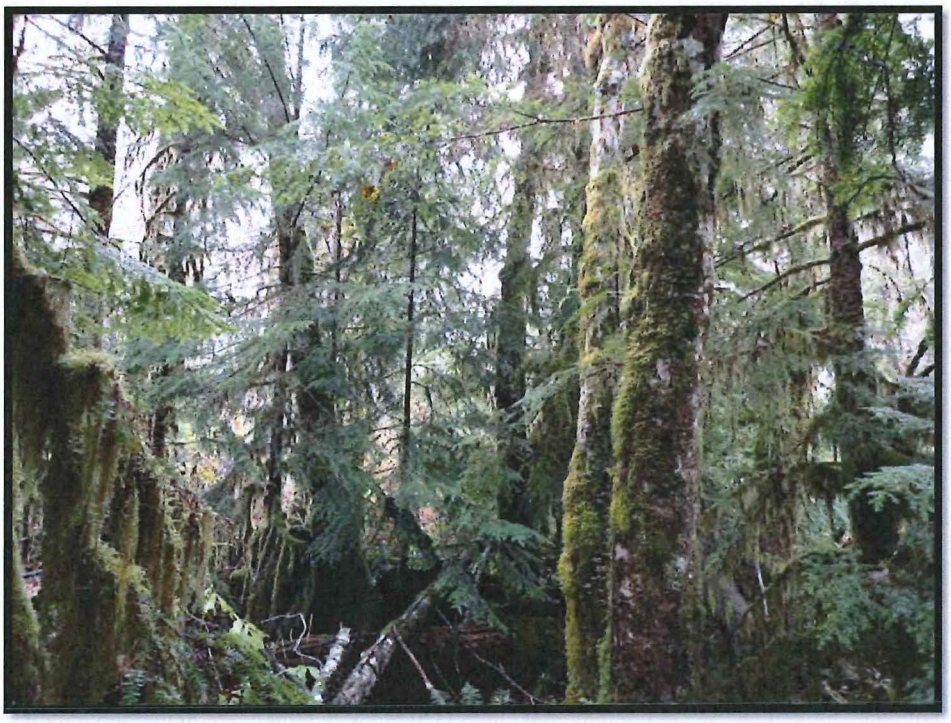

Plate 1: Sitka spruce – salmonberry (SS) plant community

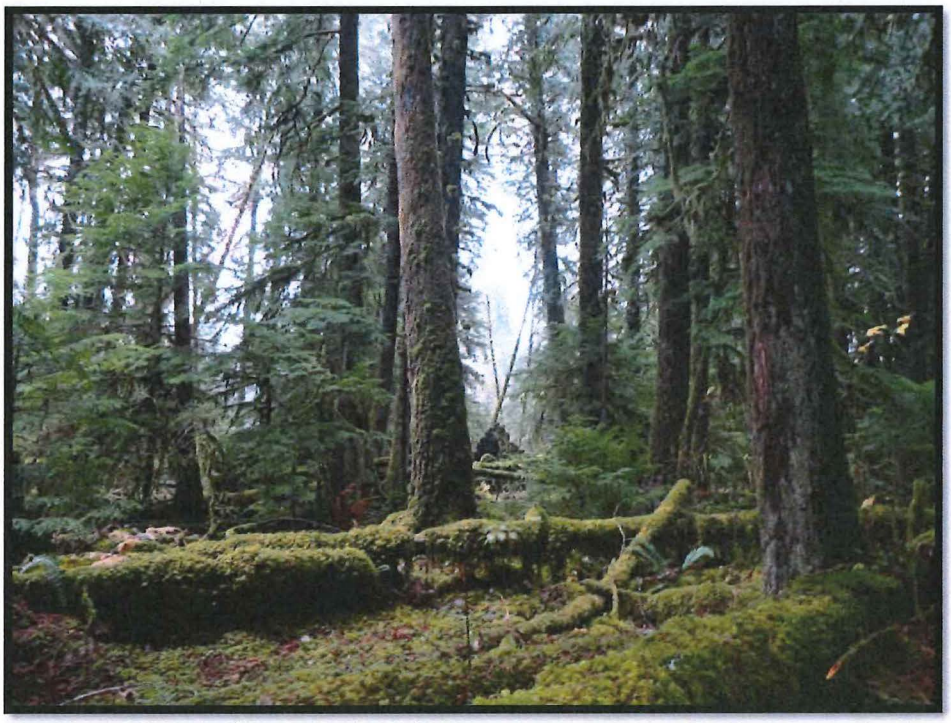

Plate 2: Western redcedar – Skunk cabbage (RC) plant community

Plate 3: Black cottonwood - Red-osier dogwood (CD) plant community

Plate 4: Western redcedar – Foamflower (RF) plant community

Plate 5: Western hemlock / Douglas-fir – Kindbergia (HK) plant community

Plate 6: Regenerating conifer forest (structural stage 2, REGEN2-C)

Plate 7: Regenerating deciduous forest (structural stage 2, REGEN2-D)

Plate 8: Regenerating conifer forest (structural stage 3, REGEN3-C)

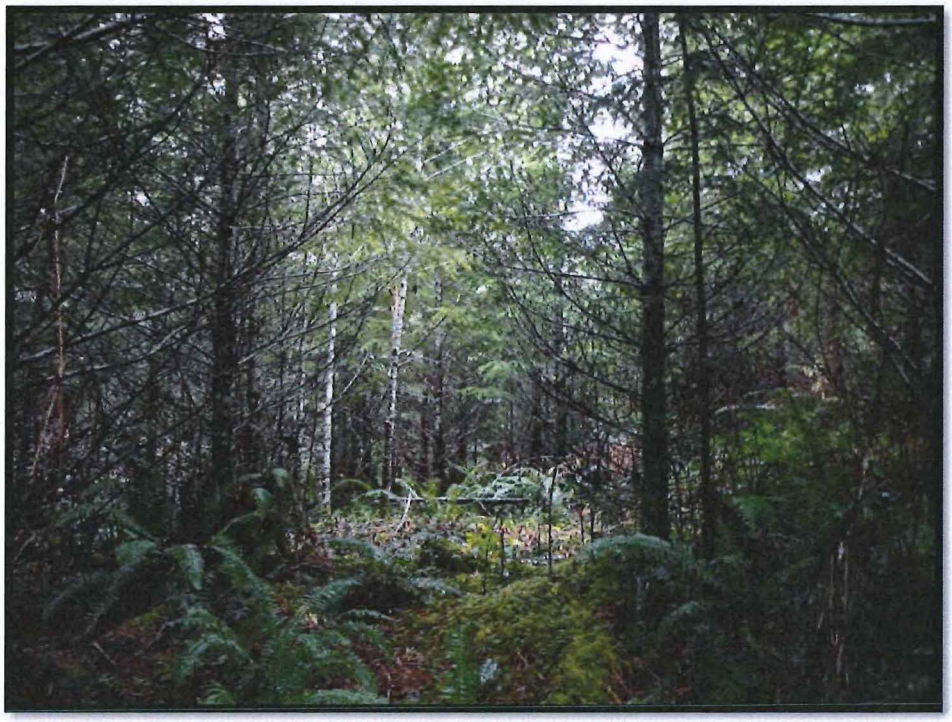

Plate 9: Regenerating mixed forest (structural stage 3, REGEN3-M)

Plate 10: Regenerating mixed forest (structural stage 1, REGEN1-M)

Plate 11: Regenerating conifer forest (structural stage 2, REGEN1-C)

Plate 12: Numerous snags located in riparian zone of mainstem

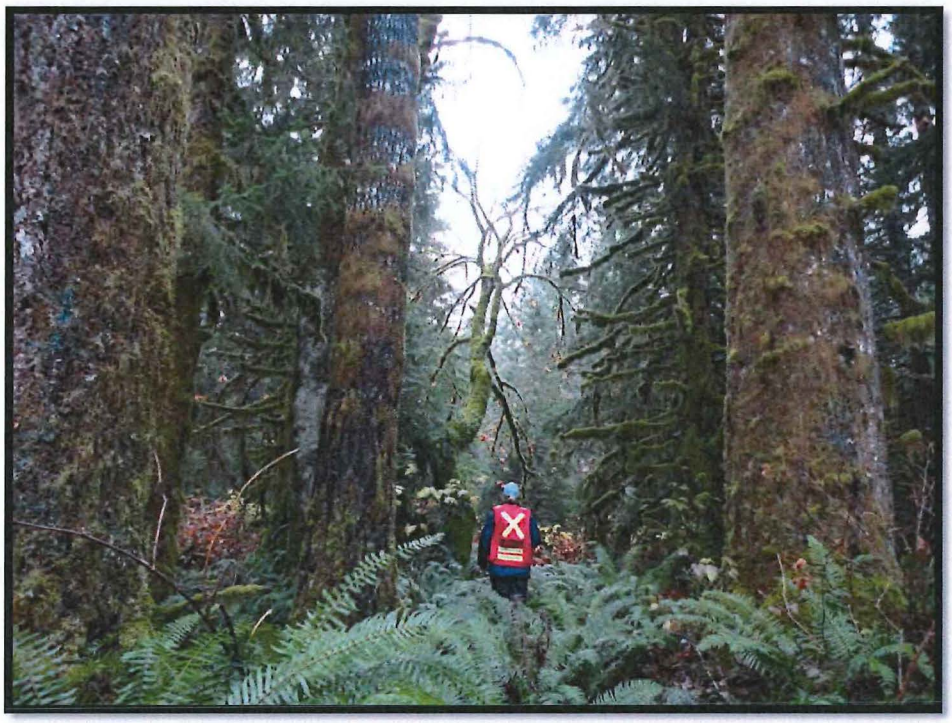

Plate 13: Large diameter Sitka spruce located in riparian zone

Plate 14: Unconfined portion of eastern tributary overflowing on road

Plate 15: Small wetland in-line with western tributary

Plate 16: Unconfined portion of western channel between upper and lower roads

Plate 17: Western tributary downstream of lower road

Plate 18: Large linear wetland located in center of valley

Plate 19: Mainstem watercourse located in center of valley

Plate 20: Unconfined portion of eastern watercourse located to the north of lower road

Plate 21: Wildlife/nest tree

Plate 22: Numerous wildlife trees

Plate 22: Large diameter Sitka spruce

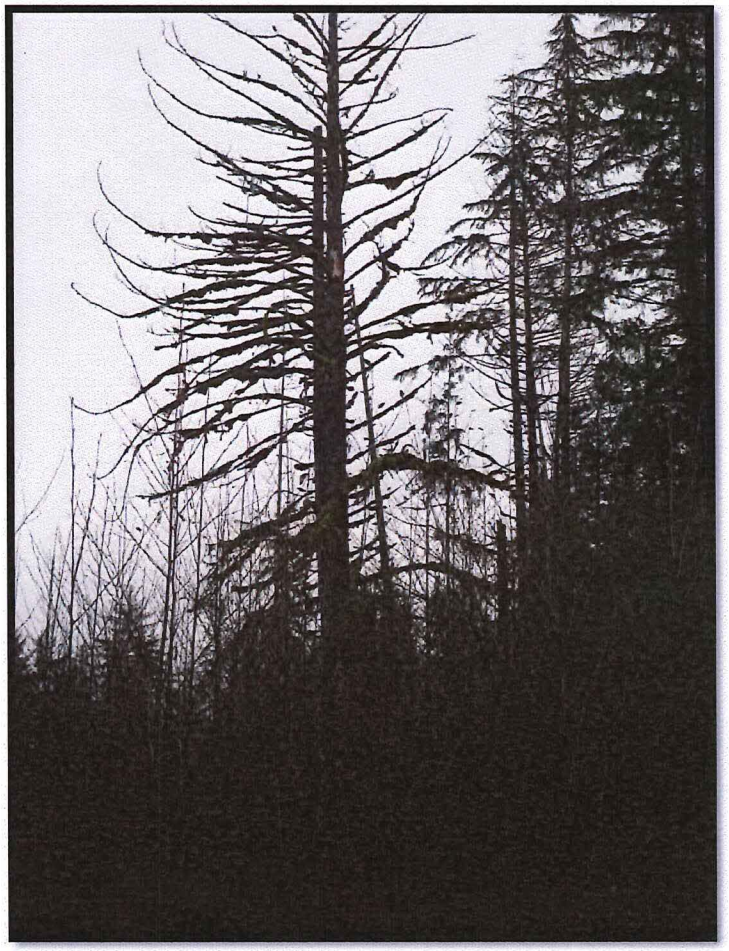

Plate 23: Large conifer snag located in riparian zone

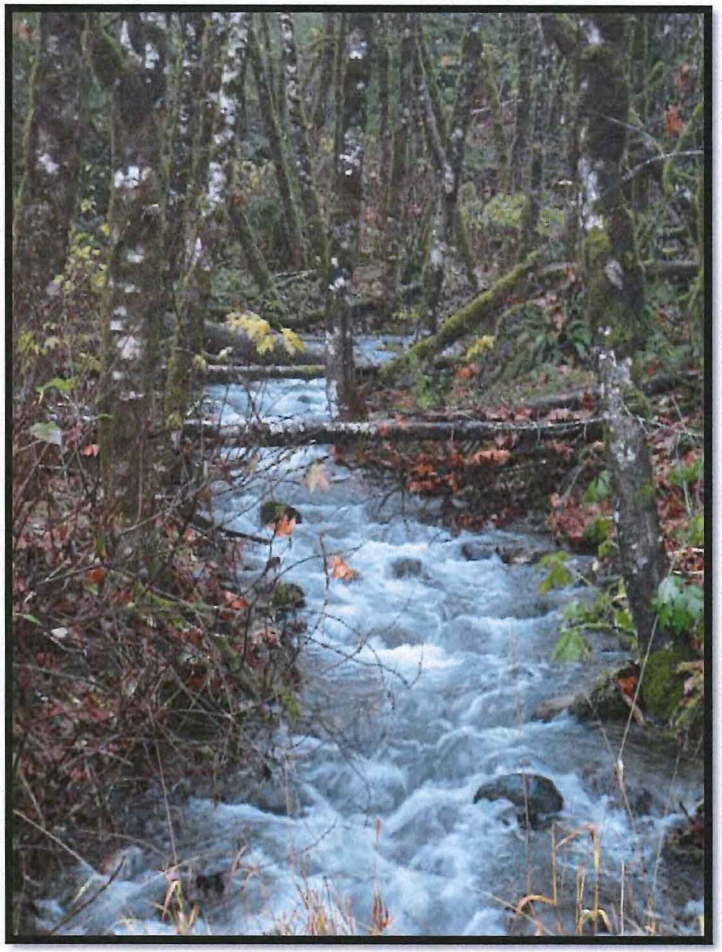

Plate 24: Western tributary upstream of upper road