

Comox Valley Regional District Coal Beach Property

Baseline Inventory Assessment



Prepared for:

**Comox Valley Regional District
770 Harmston Avenue
Courtenay BC, V9N 0G8**

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Prepared by:

Ecofish Research Ltd.



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EXECUTIVE SUMMARY

In October 2018, the Comox Valley Regional District purchased land at the eastern end of Comox Lake, Vancouver Island, British Columbia, locally known as ‘Coal Beach’ (the Property), to support maintenance of water quality in the Comox Lake watershed by limiting further development, as recommended in the Comox Lake Watershed Protection Plan (Aqua-Tex 2016, Norcross-Nu’u, pers. comm. 2019). The 46-hectare (113-acre) parcel of land includes approximately two kilometres of the shoreline of Comox Lake and is one of the last remaining, relatively large and intact waterfront parcels in the most densely populated portion of the watershed. The purpose of this report is to provide a baseline inventory of the current ecological and human use, values and features of the Property, as a first step towards management planning. This was accomplished through collation of background reports and data sources, with field surveys to document ecosystems and ecological and human use features, as well as local knowledge obtained through interviews.

Ecosystems mapped on the Property include: mature forest growing on mining slag/ overburden; mature selectively logged steep-sloped riparian forest; 20-year-old pole-sapling forests; bog, fen and open water wetlands; gravel beaches; Perseverance Creek; and Comox Lake. Thirty-nine percent of the Property supports sensitive ecosystems including mature second growth coniferous forests (30.83%) and wetlands (8.26%). Seventy-six percent of the property supports regionally significant, provincially listed ecosystems at risk, including, red-listed mature second growth forest (35.7%) and pole-sapling second growth forest capable of supporting a red-listed mature forest (36.54%), and mature blue-listed ecosystems (3.39%). The Property supports suitable habitat for several federally and provincially listed at-risk wildlife species. Two bat species and three bird species at-risk were confirmed to occur on the Property, and several others were confirmed near the Property and have a high likelihood of using the Property. The Property also provides amphibian habitat in Black Lake, includes the mouth of Perseverance Creek which provides fish habitat and a gateway to the fish-bearing waters above, as well as provides aquatic and riparian habitat along the shores of Comox Lake. The ecosystem functions of the Property also benefit the water quality of Comox Lake.

The Property has a rich history of human use and holds myriad human values. First Nations people (primarily the Pentlatch) have used the eastern shores of the lake for thousands of years as a base for hunting, among other uses. Settlers from around the world started mining, logging, living and recreating in the area in the late 1800’s, and Coal Beach proved to support the longest operating mine (No. 4 mine) in the area, providing the foundation for the Village of Cumberland. Artifacts of this historic use are present around the Property. Despite its private status, the Coal Beach Property has been a popular recreational destination for over a century, particularly valued by Cumberland locals. Current public uses of the Property include walking, cycling, off-road vehicle use, swimming, boating, and holding beach fires. However, these uses may conflict with other ecological and human values and management objectives including maintenance of water quality.

The Property provides many opportunities to enhance the ecological and human values. For example, mature forest is rare in the Comox Valley and should be retained, and ecological succession of younger

forests ensured where possible. Locally significant wetland ecosystems should be protected, and are an opportunity to involve local citizen scientists and stewardship groups. Erosion of sediments in the riparian areas of Coal Beach provide important vegetation restoration opportunities that will help enhance water quality of Comox Lake. These opportunities should be evaluated in the context of an updated water quality risk assessment, with community input, and in collaboration with other organizations working towards similar objectives.

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1. INTRODUCTION

In October 2018, the Comox Valley Regional District (CVRD) purchased land at the eastern end of Comox Lake, Vancouver Island, British Columbia, locally known as ‘Coal Beach’, to support maintenance of water quality in the Comox Lake watershed by limiting further development as recommended in the Comox Lake Watershed Protection Plan (Aqua-Tex 2016, Norcross-Nu’u, pers. comm. 2019). The 46-hectare (113-acre) parcel of land (herein referred to as the Property) includes approximately two kilometres of the shoreline of Comox Lake, and is one of the last remaining, relatively large and intact waterfront parcels in the most densely populated portion of the watershed.

The Property holds many ecological and human values. Despite its status as private property, the Property is a popular, though unauthorized, recreation destination for pedestrians, swimmers, dog walkers, cyclists, off-road vehicle users and boaters. The multiple current unauthorized uses of the Property, paired with the ecological values, and the intent of purchase being the protection of water quality, highlight the need of a management plan for the property (Norcross-Nu’u, pers. comm. 2019).

1.1. Objectives

The purpose of this baseline inventory report (the Project) is to provide baseline information on the current ecological and human use, values and features of the Property, as a first step towards management planning. Further, preliminary management recommendations based on the results of this baseline inventory were provided to help inform the development of a management plan for the Property.

This was accomplished through collation of background reports and data sources, with field surveys to document ecosystems and ecological and human use features, as well as local knowledge obtained through interviews.

1.1. Study Area

The 46-hectare Coal Beach Property is located along the eastern shore of Comox Lake and is bisected by Perseverance Creek in the southern portion and includes some of Black Lake in the northeastern portion. The Property is situated approximately 2.5 km west of the developed urban core of Cumberland, BC. The Property is bounded by private land owned by Comox Timber Ltd. to the north, east and south, and by the Courtenay and District Fish and Game Protective Association. TimberWest Forest Corp. owns the bottom of Comox Lake and therefore owns the bordering property in the aquatic area of Comox Lake. In addition, a historic railway Right of Way (ROW) owned by the Village of Cumberland runs to and through the property from Comox Lake Road to Comox Lake. Two restrictive covenants exist on the portion of the Property that abuts Coal Beach, one held by Comox Lake Land Corporation and one held by Weldwood of Canada Limited, and the subsurface rights for the Property are currently held by multiple owners (Campney and Murphy 2001, title search for title number CA7044710 pulled May 19, 2020).

The Comox Lake watershed is approximately 461 square km (CVRD 2020a), and is made up of numerous smaller sub-watersheds, including that of Perseverance Creek. The Property has a rich history of indigenous, mining and recreational use. Currently Comox Lake contributes to the water supply for over 45,000 residents of the Comox Valley.

The regional context of the Project area is summarized in Table 1.

Table 1. Regional Context

Regional Context	Details
<u>Legal Description</u>	
Property Owner	Comox Valley Regional District
Property Identification Number (PID)	030-565-481
Legal Description	Lot A EPP82213 Section 28 Township 10 Land District 15
Municipality	Coorporation of the Village of Cumberland
Municipal zoning	RE-1 (Recreation and Tourism)
Regional District	Comox Valley Regional District
Forest District	South Island Forest District
<u>Ecoregional</u>	
Ecoregion	Eastern Vancouver Island
Ecoprovince	Georgia Depression
Ecosection	Nanaimo Lowlands
Biogeoclimatic Zone	Coastal Western Hemlock Zone Very dry maritime eastern variant (CWHxm1)

Coal Beach Property



Legend

 Coal Beach Property (PID 030-565-481)

 Property Boundaries (ParcelMapBC)

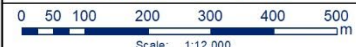
— Stream

Digital Road Atlas

— Paved Road

— Rough/Loose Road

MAP SHOULD NOT BE USED FOR LEGAL OR NAVIGATIONAL PURPOSES



NO.	DATE	REVISION	BY
1	10/15/2020	1374_CVRD_CoalBeachProperty_3784_20201015	CPA
2			
3			
4			
5			

Date Saved: 10/15/2020
Coordinate System: NAD 1983 UTM Zone 10N



Map 1

2. METHODS

The Coal Beach property supports multiple ecological and human values. These were documented by integrating background reports and data sources with current mapping of ecological units and field surveys of ecological and human use features, as well as local knowledge obtained through opportunistic and targeted interviews.

Background information collation for ecological and human values included a review of public and internal studies, local reports and knowledge, Provincial and municipal databases, and the interpretation of aerial photography. Aerial photography used to conduct a qualitative visual analysis of ecological and human changes over time, where these changes were visible at the scale of resolution available by the aerial photography, used a chronological series of photographs ranging from 1992 to 2019 (1992, 1996, 1999, 2002, 2004, 2005, 2007, 2012, 2014, 2016, 2018 and 2019). Photographs were viewed using the CVRD online iMap tool (Figure 1; CVRD 2020b) and ArcGIS, with the exception of the 2019 imagery from Google Earth (Google Earth 2020). In addition, 2018 LiDAR was obtained to view the topography of the property (Figure 2; Norcross-Nu'u, pers. comm. 2020). This method was effective for macro-scale disturbances such as logging and flooding caused by changes in reservoir levels, but not for micro-scale disturbances such as unauthorized camping and trails under the canopy.

Field studies followed standard methodologies and procedures while meeting the specific needs of the CVRD for the Project. Field surveys were guided by standard approaches including the provincial Resource Inventory Standards Committee (RISC 2006) and Develop with Care (MFLNRO 2014), as well as Village of Cumberland Bio-inventory requirements (VOC 2014).

Field surveys were completed between May 19-22, 2020. Interviews included collation of interview results from previous local projects and those collected specifically for the Project and were completed May and June 2020.

Guiding interview questions were compiled to ask the public during field surveys (Appendix A). Targeted interviews were used to address knowledge gaps and responses are cited herein. Responses for two opportunistic interviews are summarized in Appendix A.

Figure 1. Aerial photography of Coal Beach Property over time (1992, 2002, 2007, and 2016; CVRD 2020b).

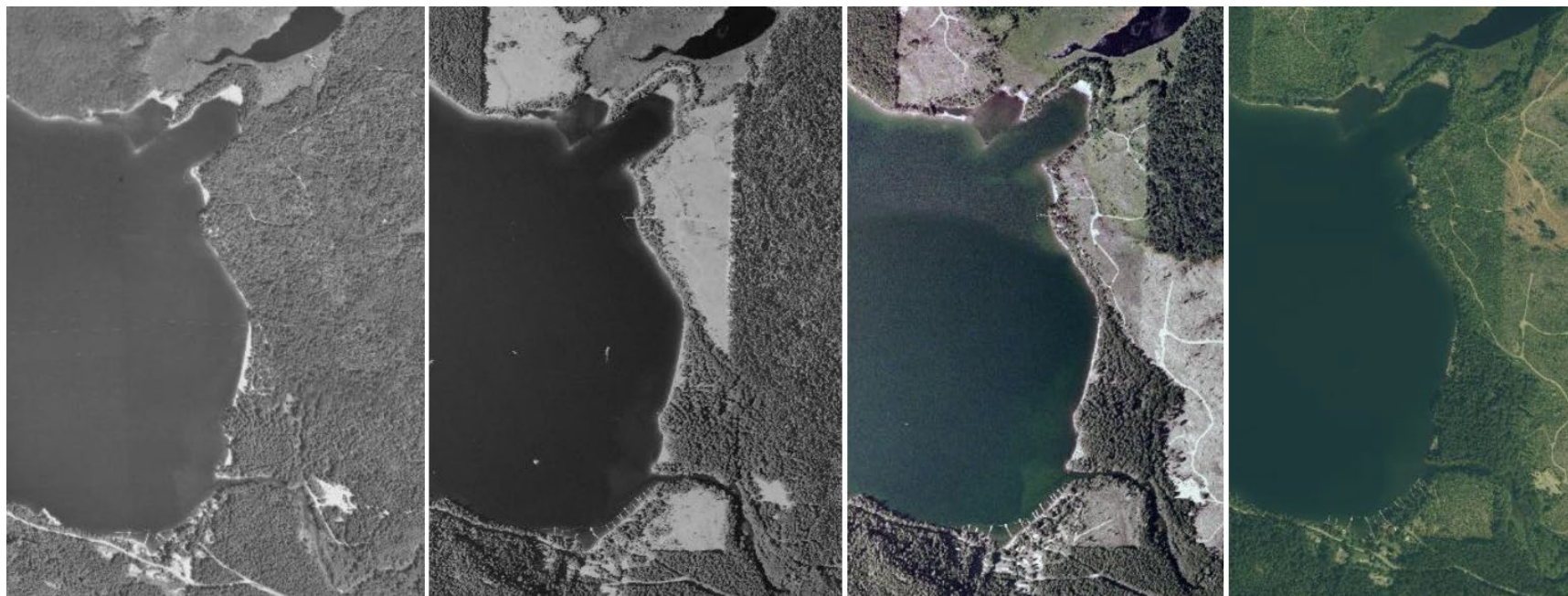
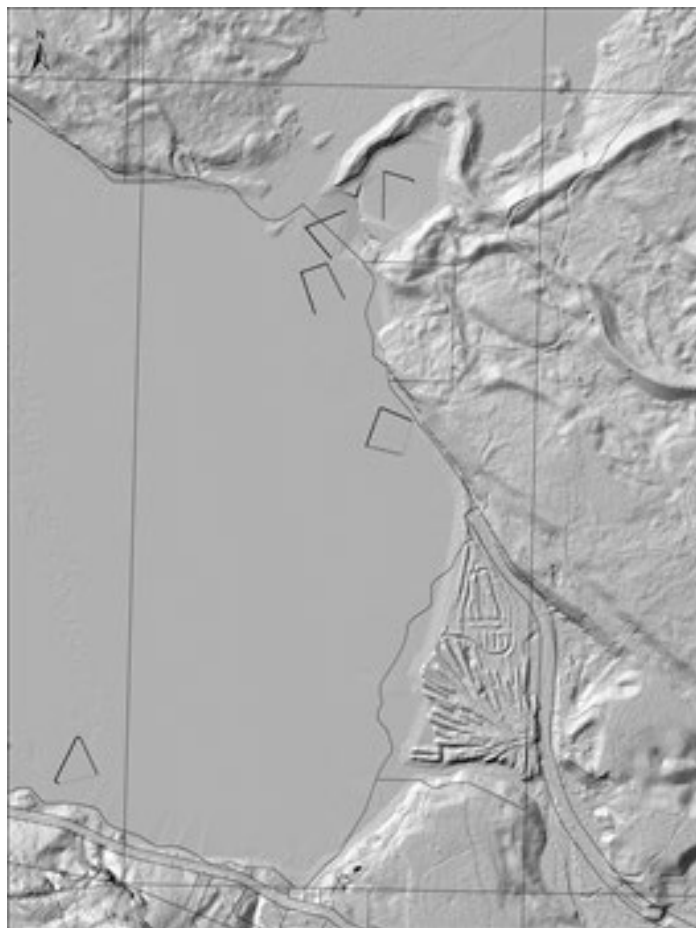


Figure 2. Image of LiDAR generated surface showing topography of property (Norcross-Nu'u, pers. comm. 2020).



2.1. Terrestrial Ecosystems and Plants

Publicly available data was reviewed to gain a background understanding of the terrestrial ecosystem and plant species likely to be found on the Property. The background review for terrestrial ecosystems and plants included a review of:

- Consultant reports including proper functioning condition and riparian mapping projects conducted for Perseverance Creek (Ballin *et al.* 2019) and the Puntledge River Watershed, including lower Perseverance Creek and Coal Beach were reviewed (Ballin *et al.* 2017).
- Historic aerial photography (CVRD 2020b) and present-day satellite imagery (Google Earth 2020) were reviewed to provide insight to the ecological and disturbance history of the Property.
- Sensitive Ecosystem Mapping for the area conducted by the Canadian Wildlife Service (1998, 2002) and updated for the Comox Valley (Mimulus 2015, CVRD 2020b) was reviewed to identify if any sensitive ecosystems are known to occur on, or within 100 m, of the Project

area. Vegetation Resource Inventory (VRI) ecosystem mapping has not been completed for the area, and any Terrestrial Ecosystem Mapping (TEM) that may have been conducted by private forest companies is not publicly available and was therefore not reviewed.

- The BC Conservation Data Center (CDC) database was searched for federally and provincially listed terrestrial and wetland ecosystems (ecological communities) and plants at risk that may occur in the Property, by searching for provincially and federally listed species and ecosystems that are known to occur in the CVRD and/ or the CWHxm1 (CDC 2020). iNaturalist was also searched for plants (iNaturalist 2020).
- Other ecological and environmental planning related spatial data received from the Comox Valley Regional District (CVRD), Comox Valley Project Watershed Society (Project Watershed) and the Comox Valley Land Trust (CVLT) was reviewed (Hardy, pers. comm. 2016, Chamberlain, pers. comm. 2016) were reviewed.

2.1.1. Ecological Unit Mapping and Ecosystem Plots

Ecosystem mapping of the Property was conducted to delineate and document ecosystem types and site conditions, as well as guide future selection of management units. Ecosystem mapping was guided by the *Standard for Terrestrial Ecosystem Mapping in British Columbia* (TEM) (RIC 1998, RIC 2000), whereas field data collection and the classification of ecological units to the site series level followed the *Field Manual for Describing Ecosystems in the Field* (MOFR 2010) and *Field Guide for Site Identification and Interpretation for the Vancouver Forest Region* (Green and Klinka 1994). Ecosystems were broadly grouped into ecological units (EU's) that have similar ecological characteristics and provide a practical means for describing, analyzing, managing and monitoring the landscape. Ecological units were delineated and ground-truthed by a professional biologist/professional forester experienced in aerial photography interpretation of ecosystems in the CWHxm1 biogeoclimatic zone at a maximum scale of 1:1,000. Ecological units were delineated according to a three-step process. First, units were delineated on orthophotographs in ArcGIS using current (2018) and historic photographs (CVRD 2020b) and Google Earth (2020). Second, the boundaries of EUs and ecosystem classifications were verified in the field. Field verification was completed using an iPad with GISPro software and cached satellite (Google) imagery. Third, EU boundaries, ecosystem classifications and other attributed were updated based on field-verification of every polygon.

Sensitive ecosystem mapping was completed concurrent with ecological unit mapping and field verification. Sensitive ecosystems were defined as those vulnerable and valuable ecosystem types with categories used by the sensitive ecosystem inventory standards (RISC 2006) and by previous projects in the Comox Valley specifically (CWS 1998, CWS 2002, AXYS 2004, Mimulus 2015).

Environmentally significant areas were considered those ecosystems that are provincially listed as at risk (i.e., as having a high conservation value; CDC 2020). It is important to note, that due to the large proportion of lands being disturbed in the CWHxm1, even ecosystems that have been recently disturbed and are in a young stage may be considered at risk, even though they do not yet have many of the characteristics or values of the mature ecosystem. For example, the most common forest type

(zonal) in the CWHxm1 (western hemlock – Douglas-fir/ Oregon beaked moss (*Tsuga heterophylla* – *Pseudotsuga menziesii*/ *Euhynchium oregonum*) is considered red-listed (the highest conservation value) because a large portion of it has been logged or lost to development. However, although it is the mature forest that is limited on the landscape, it is important to protect the younger stages of this ecosystem so that it will grow to be mature, thus younger stages are considered to be capable of developing into red-listed ecological communities. Therefore, when interpreting the ecological value of the Property it is important to consider the sensitive ecosystem type, the environmental significance and the stand age, as well as other values such as fish or wildlife habitat, in addition to at-risk status.

Ecological units were rapidly qualitatively assessed for condition and viability. The condition assignment considered the ecological condition of the EU as compared to a natural reference condition. The viability assignment considered the likelihood of the EU persisting in a similar or better condition in the medium term (~30 years) if environmental conditions persisted and no additional management (protection or disturbance) occurred. The viability assignment considered the size, landscape context and condition as compared to reference condition (Master *et al.* 2012).

Ecosystems were characterized from within 11.28 m radius ecosystem description plots (also called wildlife habitat plots [WHPs]) and from a walkthrough of the EUs (Green and Klinka 1994, RIC 2000, MOFR 2010). In total four wildlife habitat plots were established to be representative of ecological units. Each plot was center was marked by rebar with a numbered benchmark tag and capped with rebar (Figure 3). The data parameters that were collected in wildlife habitat plots are presented in Table 2. Locations of plots are presented in Table 3 and Map 2. In addition, incidental vegetation observations were recorded for species that were observed outside of the plots.

EU mapping and description data, plot data, and human use feature mapping were verified for quality assurance. A second biologist who conducted fieldwork verified mapping linework and classification of all polygons and other mapped features. All plot data were also verified by the second biologist to ensure accuracy of presented results.

Table 2. Data collected in wildlife habitat plots.

Data type	Parameter (MOF 2010)	Measurement Unit or Categories	Measure (M) or Estimate (E)	Data class	Equipment
Site	Elevation	Meters (m)	M	Continuous - quantitative	GPS
Description	Aspect	Degrees (°)	M	Continuous - quantitative	Compass
	Slope	Percent (%)	M	Continuous - quantitative	Clinometer
	Exposure	Full sun, partial sun, full shade	E	Categorical - qualitative	-
	Mesoslope position	Crest, upper slope, middle slope, low slope, toe slope, level depression			
	Surface substrate	Rock, organic matter, mineral soil, water, bedrock, decaying wood	E	Categorical - qualitative	-
	Microtopography	Channelled, gullied, mounded, smooth, tussocked, undulating	E	Categorical - qualitative	-
	Surface shape	Concave, convex, straight	E	Categorical - qualitative	-
	Site series	01-12, edatopic grid MOFR 1998, Mackenzie and Moran 2010	E	Categorical - qualitative	Edatopic grid
	Soil moisture	Very xeric, xeric, subxeric, submesic, mesic, subhygric, hygric, subhydryc, hydric	E	Categorical - qualitative	-
	Soil nutrient	Very poor, poor, medium, rich, very rich	E	Categorical - qualitative	-
	Soil texture	Sand, loamy sand, sandy loam, loam, silt, silty loam, silty clay loam, clay loam, silty clay, clay	E	Categorical - qualitative	-
	Coarse fragments	Percent (%)	E	Categorical - quantitative	-
	Soil colour	Light, medium, dark; describe	E	Categorical - qualitative	-
	Water source	Precipitation, seep, stream sub-irrigation, flood, others	E	Categorical - qualitative	-
	Wood debris	None, low, moderate, high; describe decay classes and size.	E	Categorical - qualitative	-
Vegetation	Structural stage	Class 1-7 (sparse to old growth forest), and modifiers	E	Categorical - qualitative	-
	Successional status	Non-vegetated, pioneer seral, young seral, maturing seral, overmature seral, young climax, maturing climax, old climax, disclimax	E	Categorical - qualitative	-
	Mensuration	Height and diameter of the tallest trees or shrubs (m)	E	Continuous - quantitative	Measuring tape
	Density	Count of A layer and B1 layer trees by species	M	Continuous - quantitative	
	Canopy Closure	0, <1%, 1-5%, 5-25%, 25-50%, 50-75%, >75%	E	Categorical - qualitative	
	Total vegetation cover per layer	Percent (%) foliar cover per layer (i.e., A, B1, B2, etc.)	E	Continuous - quantitative	-
	Total cover of each species per layer	Percent (%) foliar cover of each species by layer (i.e., A, B1, B2, etc.); classify by cover class	E	Categorical - quantitative	-
	Vigour of each species by layer	Vigour class 0 - 4, dead to excellent, comment on vigour	E	Categorical - qualitative	-
Disturbance factors	Wildlife, disease or insect damage	None, low, moderate, high; describe disturbance and record species list	E	Categorical - qualitative	-
	Human disturbance	None, low, moderate, high; describe	E	Categorical - qualitative	-
	Invasive species	None, low, moderate, high; describe	E	Categorical - qualitative	-

Table 3. Wildlife Habitat Plot (WHP) location, survey date and description.

Wildlife Habitat Plot	Ecological Unit	UTM (Zone 10U)		Elevation (m)	Survey Date	EU Description
		Easting	Northing			
CXL-WHP01	1a	350422	5499421	146	2020-05-19	Mature Second Growth - On Coal Overburden
CXL-WHP02	1f	350054	5500548	140	2020-05-22	Mature Second Growth - Steep Selectively Logged Riparian
CXL-WHP03	3	350514	5500565	138	2020-05-20	Wetlands - Bog
CXL-WHP04	2a	350531	5499950	171	2020-05-22	Pole-Sapling Second Growth - East side

Figure 3. Example of Wildlife Habitat Plot center marker, May 19, 2020.

2.1.2. Rare Plants

No specific rare plant surveys were conducted; however, field surveys were timed to be appropriate for detecting rare plants. Rare plant habitat suitability was considered for all species that could potentially occur on the Property and the likelihood of occurrence determined prior to field surveys (Appendix B).

2.1.3. Invasive Species

Provincial (i.e., Invasive Alien Plant Program, DataBC 2020) and municipal (CVRD 2020b) databases were searched for nearby occurrences of invasive plant species prior to field surveys to identify plants that have a high current or future likelihood of occurring on the Property (Appendix B).

An invasive plant inventory was conducted for the Property guided by the provincial Invasive Alien Plant Program methodology (IAPP 2020). Invasive plants recorded included those identified as Noxious by the BC *Weed Control Act* (1996) and *Weed Control Regulation* (2011), species listed in the *Invasive Plants Regulation* (2004) of the *Forest and Range Practices Act* (2002), the Coastal Invasive Species Committee (CISC 2016), the Invasive Species Council of BC (2019) and as ‘exotic’ by the BC Conservation Data Center (CDC 2020). Of the above invasive species lists, only species on the *Weed Control Regulation* (2011) list are legally required to be managed by the landowner.

2.2. Wildlife and Wildlife Habitat

A list of wildlife species that are provincially or federally designated as at risk and potentially occur within the CWHxm1 biogeoclimatic zone and Comox Valley Regional District (with the exception of marine and fully aquatic species) was compiled from the BC Species and Ecosystem Explorer (CDC 2020). Wildlife species at risk and of regional importance were ranked for likelihood of occurrence in the Project area, as per defined criteria below. The likelihood of occurrence ranking reflects publicly available wildlife occurrence data (i.e., CDC 2020, DataBC 2020, eBird 2020, iNaturalist 2020), personal communications, professional knowledge of the authors acquired from working and living near the Property, and species-specific wildlife habitat suitability as assessed during the field surveys (Appendix B). Criteria are as follows:

- Confirmed. The species has been detected within the assessment area. Species presence information was observed during the field surveys and/or recorded from the background review.
- High. The current range and distribution of the species overlaps the assessment area. Highly suitable habitat is present within the assessment area; however, the species was not detected during field visits or through the background review.
- Moderate. The current range and distribution of the species overlaps the assessment area. Sufficiently suitable habitat is present within the assessment area; however, the species was not detected during field visits or through the background review.
- Low. The current range and distribution of the species overlaps or borders the assessment area; however, sufficiently suitable habitat is not present. The species was not detected during field visits or through the background review.
- Negligible. The current range, distribution, or habitat requirements of the species do not overlap or border the assessment area. It is unlikely that the species is ever present within the assessment area.

Provincial and federal wildlife habitat designations that have the potential to overlap with the property (e.g., Critical Habitat for Federally-Listed Species at Risk, important bird area) were also reviewed for potential overlap with the Project area (CDC 2020).

No species-specific wildlife surveys were conducted. However, field surveys coincided with the active breeding bird period and at times when other wildlife, such as amphibians and many mammals are active. High value habitats, such as wetlands, large trees and wildlife trees were assessed for wildlife habitat value and signs of use. Occurrences of wildlife species or high value habitat features were recorded for each EU.

Wildlife habitat suitability was considered for all species at-risk and informed the likelihood of occurrence rankings.

2.3. Fish and Fish Habitat

Background information about fish and fish habitat occurring on and adjacent to the Property was collected through a review of the Fisheries Information Summary System (FISS) (MOE 2020), interviews, and through review of the information collated, collected and reported on for the Perseverance Creek Proper Functioning Condition and Fish Habitat Assessment (Ballin *et al.* 2019).

No fish or fish habitat surveys were conducted specifically for this Project.

Information collated for the Perseverance Creek Proper Functioning Condition and Fish Habitat Assessment (Ballin *et al.* 2019) that is incorporated into the results of this report includes:

- A review of Provincial databases and internet sources including: the BC Ministry of Environment Habitat Wizard (MOE 2017a), FISS (MOE 2017b), Ecological Reports Catalogue (ECOCAT) (MOE 2017c) and NuSeds (DFO 2017);
- A general internet search for information relating to Perseverance Creek associated with the CVRD's Watershed Protection Plan, the Village of Cumberland water supply, recreation, and fish and wildlife. Data was acquired from the Comox Valley Project Watershed Society's digital files dating back to 2003 (Sutherst, pers. comm. 2017) and the Perseverance Creek Streamkeepers (Murray, pers. comm. 2018);
- Local knowledge documented during a site visit with the Perseverance Creek Streamkeepers (Mathers, pers. comm. 2017), the Comox Valley Land Trust (Tim Ennis) and Cumberland Community Forest Society (Meaghan Cursons) on October 13, 2017, and subsequent meetings and communications with the Streamkeepers (Perseverance Creek Streamkeepers, pers. comm. 2018), the Department of Fisheries and Oceans (Davies, pers. comm. 2018) and K'omoks First Nation technicians during field work (August 2018); and
- Results of a Reconnaissance 1:20,000 Fish and Fish Habitat Inventory (RISC 2001) that was conducted to collect quantitative information and qualitative observations of fish habitat at a mesohabitat scale along the entire length of Perseverance Creek from Comox Lake to the Allen Lake reservoir for the FHAP and PFC project.

2.4. Human Use, Values, and Anthropogenic Features

To assess the human use, values, and features associated with the Coal Beach Property, several sources of background information were reviewed, including:

- Orthophoto and satellite imagery chronology (CVRD 2020, Google Earth 2020);
- Opportunistic interviews with public users during field surveys (May 2020; Appendix A) and targeted interviews with local knowledge holders (Billie, pers. comm. 2020, Cursons, pers. Comm. 2020, Curtain, pers. comm. 2020, Ennis, pers. comm. 2020, LaRonde, pers. comm. 2020);
- Review of background reports (e.g., Theissen 2019, Morin 2020) and the Cumberland Museum and Archives (2020) website and online photograph gallery; and
- Spatial data provided by the CVRD, which included LiDAR, mine entrances and historic buildings (Norcross-Nu'u, pers. comm. 2020).

Human use features, both authorized and unauthorized, such as property access points, motorized and unmotorized trails and roads, dump sites, bridges, fire pits, tank traps/ barricades/ go arounds, swimming beaches, boating areas and moorage, as well as historic buildings and infrastructure, were documented on the Property during field visits on May 19-22, 2020 (Table 4). These features were mapped, photographed and their current use and condition described.

Table 4. Human use features identified during field surveys.

Feature Type	Category	Description
Roads and Trails	Gravel road	Single lane gravel resource road ~6 m wide, useable by 4x4 trucks
	Gravel double-track	Grown over or decommissioned resource road 2-3 m wide, useable by ATVs
	Unsurfaced single track	Dirt trail < 1 m wide, useable by dirt bikes
	Footpath	Single track <0.5 m wide trail, useable by foot traffic
	Off-road vehicle trails	Area with a high density of trails used by offroad vehicles
Property access point	-	Access point to property along authorized or unauthorized roads or trails
Tank trap/ barricade/ go arounds	-	Barrier to vehicle access or barrier to vehicle access with a route around it
Fire pit	-	Unauthorized fire ring or fire location
Dump site/ garbage	-	Single large pieces of refuse (such as vehicles) or unauthorized garbage cans or dump sites
Swimming area	-	Water access location frequently used by swimmers
Moorage	-	Location where boats frequently land on the beach or anchor in shallow waters
Historic building/ feature	Mine entrance	Entrance to mine
	APEC area	Area of Potential Environmental Concern (received from CVRD)
	Other	Remnant historic buildings, features or waste from mining and logging history

3. RESULTS

3.1. Terrestrial Ecosystems and Plants

The Property is located in the eastern variant of the very dry maritime subzone of the Coastal Western Hemlock Biogeoclimatic zone (CWHxm1) (DataBC 2020; Table 1). The ecosystems here are transitional between the temperate rainforests that characterize the majority of the coast of British Columbia, and the sub-Mediterranean “rainshadow” ecosystems of the adjacent Coastal Douglas-fir Biogeoclimatic zone that occupies the majority of the Nanaimo Lowlands Ecoregion, positioned on the southeast coast of Vancouver Island. An orographic effect from the Vancouver Island ranges and adjacency with the temperature moderating marine environment of the Salish Sea create the region’s distinct biogeoclimatic characteristics (MOF 1991). The regional climate of the Property is characterized by four distinct seasons: cool winters with abundant rainfall, warm spring and fall

seasons that experience moderate precipitation, and hot, dry summers. These summer conditions result in a soil moisture deficit for much of July and August (Swift and Ran 2012). In addition, wildfires cause infrequent, stand-initiating events during summer droughts as a part of the natural disturbance regime (NDT2) (Swift and Ran 2012). The complex geological history and current state of the area is visible in the unique pattern of glacial till and mining material present over deeper marine clay layers visible along the shoreline and road cuts.

Vegetation on the Property is typical of forested zonal habitats in the CWHxm1, and occurs in various stages of succession resulting from the natural disturbance regime and historic and current land management activities (e.g., logging, mining). Forest stands are generally comprised of large statured to shrubby regenerating coniferous trees, dominated by Douglas-fir (*Pseudotsuga menziesii*), with components of western hemlock (*Tsuga heterophylla*) and western redcedar (*Thuja plicata*), with deciduous species such as red alder (*Alnus rubra*) and black cottonwood (*Populus balsamifera*) in moist and recently disturbed areas and flowering dogwood (*Cornus nutallii*) and cascara (*Frangula purshiana*) on mesic to drier sites. Understory tree, shrub and herb occurrences vary with light, nutrient and moisture availability, and typically support high densities of deciduous shrubs and herbs including dull Oregon grape (*Mahonia nervosa*), salal (*Gaultheria shallon*), sword fern (*Polystichum munitum*) and vanilla leaf (*Achlys triphylla*). Moss species, including step moss (*Hylocomium splendens*) and Oregon beaked moss (*Euhychium oregonum*), generally blanket the forest floor. Invasive species typically occur on disturbed sites, especially in areas with high light availability.

3.1.1. Ecological Unit Mapping and Plots

A diversity of ecosystems were mapped on the Property including: mature forest growing on mining slag (EU 1a,b); mature selectively logged steep-sloped riparian forest (EU 1c-e); pole-sapling forests that were logged approximately 20 years ago (EU 2a,b); bog, fen and open water wetlands (EU 3a,b); gravel beaches (EU 4); a creek (EU 5); and large lake/ reservoir (EU 6)(Figure 4). Thirty-nine percent of the property supports sensitive ecosystems including mature second growth coniferous forests (30.83%) and wetlands (8.26%). Seventy-six percent of the property supports regionally significant, provincially listed ecosystems at risk, including, red-listed ecosystems in a mature stage (35.7%), sites that are recruiting/ developing into red-listed ecosystems (36.54%), and mature blue-listed ecosystems (3.39%). In addition, the mature forests (EU 1), wetlands (EU 3), and Perseverance Creek floodplain (EU 5) are top conservation priorities in the Comox Valley Land Trust's Land Protection Prioritization Plan (CVLT 2016).

A description of each Ecological Unit is provided in the following section and detailed EU descriptions and data from the ecosystem description plots/ wildlife habitat plots are tabulated in Appendix C and Appendix D, respectively. Additional photographs of EUs and plots are provided in Appendix E. EU mapping is depicted in depicted in Map 2, and ecosystem sensitivity and significance assignments are depicted in Map 3.

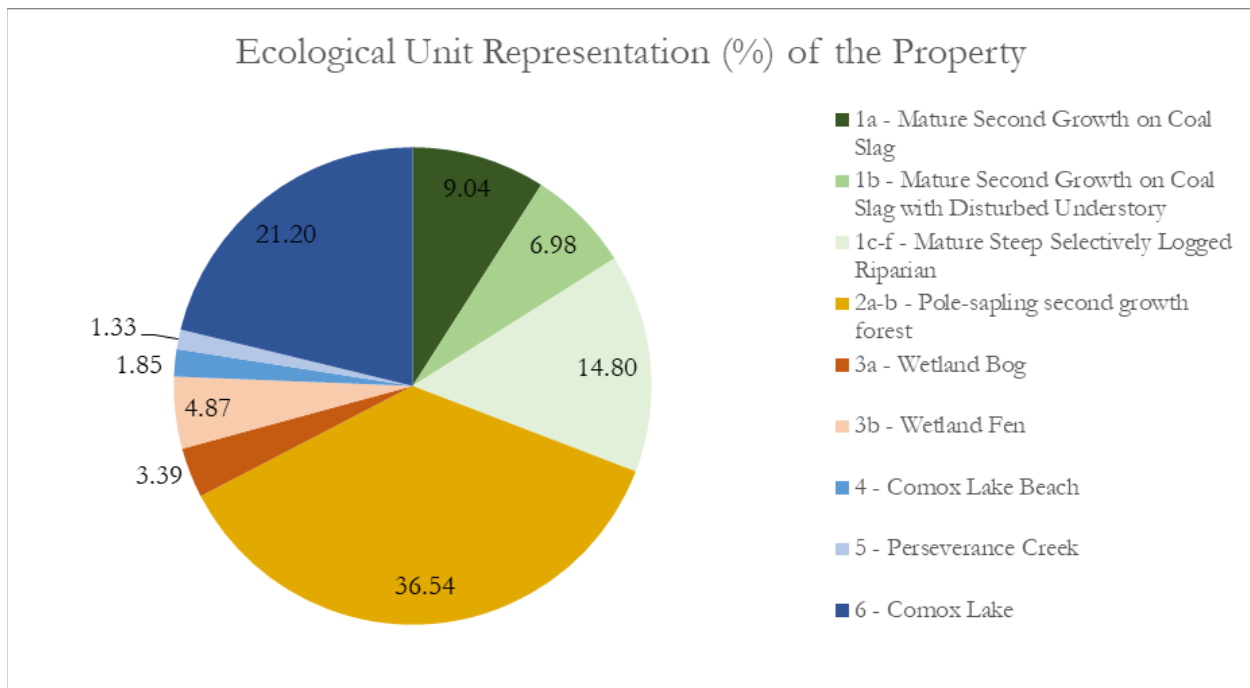
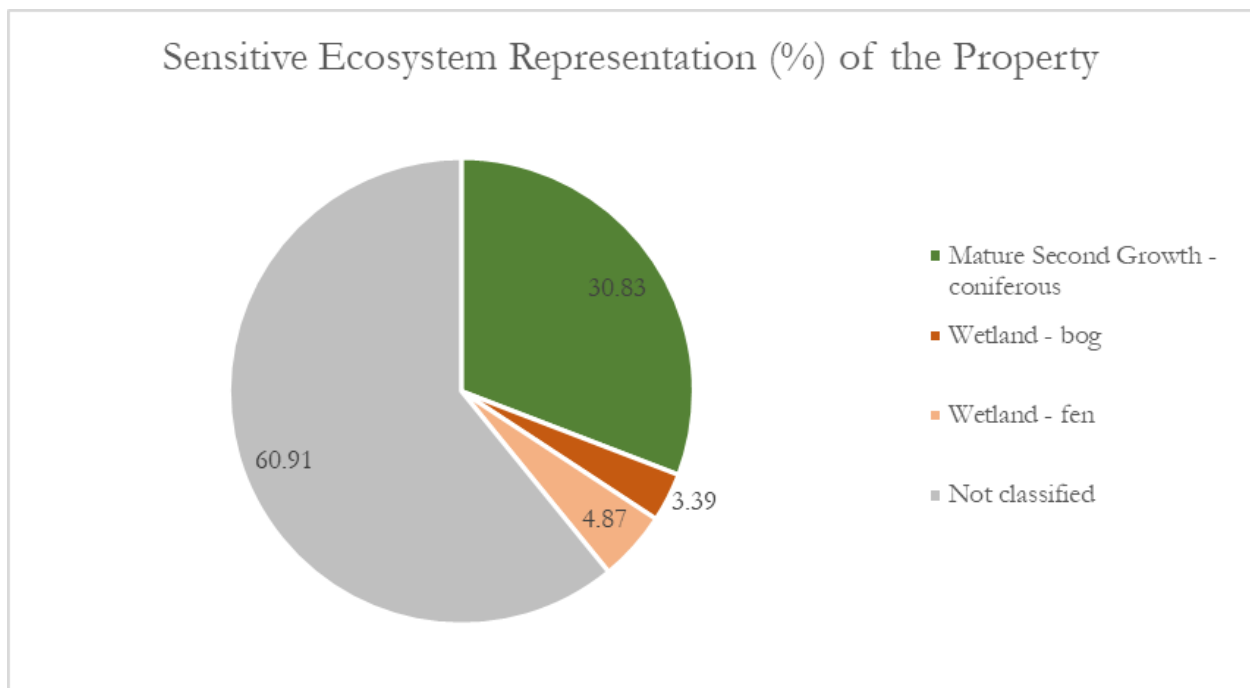
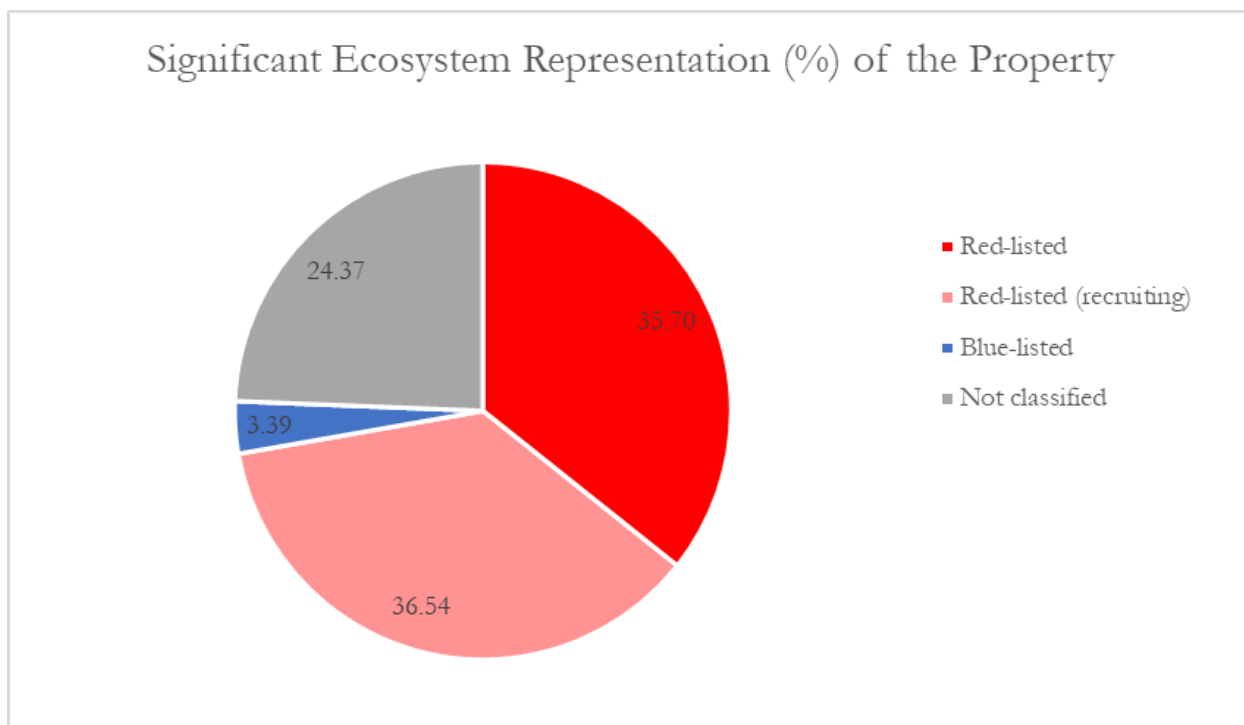
Figure 4. Ecological Unit Representation (%) of the Property.**Figure 5. Sensitive Ecosystem Representation (%) of the Property.**

Figure 6. Provincially Listed Significant Ecosystem Representation (%) of the Property.

Mature Second Growth Forest (EU 1)

Almost a third of the Property supports mature second growth forest growing on a mix of overburden, tailings and other mine waste (locally referred to as coal slag; Theissen 2019, Cathyl-Huhn, pers. comm. 2020, LaRonde, pers. comm. 2020) or relatively steep riparian slopes (Figure 4). The forest growing on coal slags has not been harvested since the close of mining operations and historic logging activities around Comox Lake (~1935), whereas the steeper mature forest was selectively logged approximately 20 years ago.

On Coal Slag (EU 1a)

Mature forest covers the coal slags and APEC (areas of potential environmental concern) (Map 2, Map 4) located between Coal Beach and the eastern boundary of the property. One wildlife habitat plot (CXL-WHP01) was established within the EU to provide a detailed description of the ecosystem (Appendix D). The area is characterized by medium to rich soils and a mesic moisture regime and supports the provincially red-listed Western hemlock – Douglas-fir/ Oregon beaked moss vegetation community (site series 01). EU 1a supports a good coverage of vegetation on top of a thin (~2 cm) organic soil layer (mostly partially decomposed moss and litter) growing on top of linear coal slags that form gullies and mounds of up to ~6 m deep, as well as on relatively large coarse woody debris in advanced decay classes (up to class 4). The canopy is dominated by Douglas-fir with a developing sub-canopy of western hemlock and western redcedar. The shrub and herb layers are dominated by salal, red-huckleberry (*Vaccinium parviflorum*), dull Oregon grape, sword fern and vanilla leaf, as well as

a diversity of other shrubs and herbs. The moss layer is dominated by step moss and Oregon beaked moss. Trees in the EU reach over 50 m in height and 80 cm diameter (DBH), and have a density of approximately 675 trees/ ha including established understory and canopy trees (2+ m), which is appropriate for the site and forest age.

The coal mine waste rock dumps consist of variably-carbonaceous rock and likely have a low content of coal fines. Sites with similar substrates on Vancouver Island also seem to support good growth of plants as long as they are not eroding (Cathyl-Huhn, pers. comm. 2020).

The EU borders Perseverance Creek to the south, providing riparian habitat to the fish and wildlife species that use the creek, as well as provides good bird habitat in its multistoried tall canopy and decaying wildlife trees. Sitka Black-tailed Deer (*Odocoileus hemionus sitkensis*) sign and Red Squirrel (*Tamiasciurus hudsonicus*) were observed throughout the EU.

Historically, prior to coal slag being mounded between Coal Beach and the No. 4 mine entrance, the EU would have provided riparian floodplain habitat and functions. However, despite its coal mining history, the EU appears in High (albeit modified) condition and has a High viability of persisting in its current condition if current ecological conditions persist. A current potential threat to the EU and adjacent environment is erosion of the coal slags into Perseverance Creek which may be aggravated by trails running adjacent to the creek.

The EU is a sensitive ecosystem and has been mapped as mature riparian (i.e., RI:6) in previous SEI projects (CWS 2002, Mimulus 2015), however, for the purpose of the project it was reclassified as older second growth coniferous (i.e., SG:co), because only those areas adjacent to Perseverance Creek and Comox Lake provide riparian functions to these habitats as the area is no longer a floodplain and providing riparian function in its entirety.

Figure 7. Image characterizing EU 1a, taken from CXL-WHP01 plot centre showing large diameter trees, woodpecker use of decaying western redcedar overstory tree, development of downed coarse wood, gullied topography from historic coal mining, and development of regenerating understory forest, May 19, 2020.



Figure 8. Shallow development of organic material on coal slag.



On Coal Slag with Disturbed Understory (EU 1b)

Mature forest covers the coal slags/APEC (Map 2, Map 4) located between Coal Beach and the eastern boundary of the property. Similar in dominant vegetation community composition and age to EU 1a, EU 1b also supports the slightly richer and moister sub-dominant blue-listed western redcedar/ three-leaved foamflower (*Thuja plicata/ Tiarella trifoliata*; site series 07) community in some portions of the EU. The primary difference between EU 1a and 1b is the highly disturbed understory and exposed soils associated with extensive motorized vehicle use in EU 1b (Figure 9). The frequent off-road vehicle disturbance limits herb and moss development on trails, however, well-developed understory vegetation persists on the coal slag mounds in between the off-road vehicle trails. This understory layer is most intact and best developed in the transitional area between EU 1b and EU 1a. The relative density of trails and associated ground disturbance is mapped and presented in Map 4 and discussed further in Section 3.4.3 and Appendix F. There is limited CWD in the EU, perhaps removed by public users over time. The ecological condition and viability of the EU were scored as Moderate due to the above-mentioned ongoing disturbance.

Figure 9. Mature second growth forest on coal slag with moderately disturbed understory in EU 1b, May 19, 2020.

*Steep Selectively Logged Riparian (EU 1c-f)*

Steep riparian areas along the shores of Comox Lake, Black Lake, and south side of Perseverance Creek were selectively logged between 1999 and 2001 when the adjacent interior older second growth forest was clear-cut (CVRD 2020 historic aerial photography), as evidenced by residual stumps (Figure 10). These areas were likely last clear-cut in the 1930s coinciding with extensive logging around

Comox Lake and mining operations (Theissen 2019, Cumberland Museum and Archives 2020). The steep selectively logged riparian EU's (i.e., 1c, 1d, 1e and 1f) are typically dry to mesic or slightly moist at toe slopes, with a medium to rich nutrient regime. As such they are dominated by the western hemlock – Douglas fir/ Oregon beaked moss (site series 01) community. Subdominant communities include the drier red-listed Douglas-fir – western hemlock/ salal Dry Maritime (*Pseudotsuga menziesii* – *Tsuga heterophylla*/ *Gaultheria shallon*; site series 03) on drier and more exposed portions of the slope (e.g., Figure 11), and by the moister red-listed western hemlock - western redcedar/ deer fern (*Tsuga heterophylla* – *Thuja plicata*/ *Blechnum spicant*; site series 06) and western redcedar/ three-leaved foamflower Very Dry Maritime (site series 07) communities at low to toe slope positions adjacent to wetlands or moist draws.

One wildlife habitat plot (CXL-WHP02) was established within the steep selectively logged riparian habitat to provide a detailed description of the habitat (Appendix D). CXL-WHP02 is located in EU 1f and captures a relatively low slope and moist portion of EU 1c-e that is transitional to the drier steeper slopes of the EU. The plot is characterized by medium nutrient soils and a mesic to subhygric moisture regime, and supports the provincially red-listed Western hemlock – Douglas-fir/ Oregon beaked moss vegetation community (site series 01), with a subdominant ecosystem of Western hemlock - western redcedar/ deer fern (site series 06) community. EU 1f supports good coverage of vegetation on top of a thick (15 cm+) organic soil layer and large diameter coarse woody debris of various decay classes (up to class 5). The canopy is dominated by Douglas-fir and western redcedar. The tall shrub layer is dominated by young western hemlock, western redcedar and Sitka spruce (*Picea sitchensis*) (where the plot abuts the cutblock only). The short shrub layer is dominated by dull Oregon grape, red huckleberry, and salal. The herb layer is dominated by bracken fern and sword fern. The trees in the vicinity of the plot (i.e., the moister portions of the EU) reach over 30 m in height and 40 cm DBH, and trees in the plot had a density of approximately 1250 trees/ha including established understory and canopy trees (2+ m). The plot includes some regenerating vegetation from the adjacent pole-sapling forest, which increased the tree density estimate.

All of the mature second growth forest on the Property was mapped as an SEI polygon in 1992 mapping (CWS 1998) but was removed in 2002 mapping updates after it was logged (CWS 2002, Mimulus 2015, CVRD 2020b). Due to the important ecological functions that the mature second growth forest along the shoreline provides to the adjacent aquatic habitat, water quality and the landscape, these ecological units were reclassified as mature second growth sensitive ecosystems for the purpose of the Project. The EU was assigned a Moderate to High condition and viability because although the habitat generally appears in good condition, the larger trees have been removed, decreasing some of the ecological function (e.g., potential nest trees, shade) and some shoreline erosion is present. The portions of the shoreline of Comox Lake that are eroding and pose an erosion hazard are described in the Comox Lake Erosion Assessment (Krick *et al.* 2018). The results of this assessment indicate that areas near Scott's Slope mine entrance and a small section between Whyte's Bay and Coal Beach have a very high erosion hazard, whereas Coal Beach has a high erosion hazard,

the small peninsula at the outlet of Black Lake has a moderate erosion hazard and the remainder of the shoreline is classified as very low (Krick *et al.* 2018).

The viability is slightly downgraded due to the lack of larger trees (i.e., decreased condition) and the EU being narrow (15-40 m wide) (i.e., small size) and therefore vulnerable to edge effects (e.g., desiccation, intrusion of invasive species from adjacent areas). Edge effects will decrease as the adjacent regenerating forest develops.

Figure 10. View of EU 1f, taken north from CXL-WHP02 showing moist, relatively low-slope, mature, selectively logged riparian forest along the shore of Comox Lake with evidence of residual stumps from last two passes of logging, May 22, 2020.



Figure 11. Image of EU 1d with steep slope and relatively dry moisture regime.



Pole-Sapling Second Growth Forest (EU 2)

The majority of the Property is occupied by second growth forests that were clear-cut logged ~20 years ago and are currently in a pole-sapling stage. These forest stands occupy a relatively flat undulating topography and sites are of a medium to rich nutrient regime and mesic moisture regime and thus are recruiting into the red-listed Western hemlock – Douglas-fir/ Oregon beaked moss community. The regenerating forest appeared in good condition for a 20-year-old forest stand, however, it was assigned a condition and viability of Moderate because it currently lacks mature forest characteristics that can be expected to develop with time if current environmental conditions persist. The two geographically disconnected sections of the EU (i.e., 2a and 2b) are described in further detail below.

East Side (EU 2a)

Pole-sapling second growth forest is establishing on recently clear-cut sites (harvested c. 2000) in the eastern portion of the Property. One wildlife habitat plot (CXL-WHP04) was established within this EU to provide a detailed description of the pole-sapling second growth forest ecosystems on the property (Appendix D). The plot and EU are characterized by medium to rich soils and a mesic moisture regime capable of supporting the provincially red-listed Western hemlock – Douglas-fir/ Oregon beaked moss vegetation community (site series 01), with a subdominant ecosystem of western redcedar/ sword fern (site series 05). EU 2a has good vegetation coverage supported by relatively nutrient rich soils. Soils at the plot had relatively thick (15 cm +) organic and upper (A1) soil layers with abundant mycelium. The relatively dense canopy is dominated by young Douglas-fir with a

developing tall shrub understory consisting of Douglas-fir, cascara, western redcedar, and a few cherry (*Prunus sp.*) and sparse shore pine (*Pinus contorta*) trees. The EU supports a diverse short shrub layer dominated by dull Oregon grape, salal, and red huckleberry. The herb layer consists of sword fern, bracken fern, vanilla leaf, trailing blackberry, and small amounts of a variety of other herbaceous species. Moss coverage is low to moderate. Pole-sapling Douglas-fir trees in the EU are generally even-aged reaching a maximum of 15 m in height and 25 cm DBH, with a density of approximately 1275 trees/ ha.

Figure 12. View of typical forest stand in EU 2a and western redcedar stump from recent logging, from plot CXL-WHP04, May 22, 2020.



North Side (EU 2b)

Pole-sapling second growth forest is establishing on recently clear-cut sites (c. 2000) in the northern portion of the Property, and supports a similar vegetation community to the east side (EU 2a). The tree canopy is dominated by Douglas-fir with extensive salal and bracken fern in the shrub and herb layers. A few small groves of bigleaf maple with vanilla leaf and sword fern understory are present that were only partially harvested during the most recent clear-cut (photograph in Appendix E).

Figure 13. Douglas-fir dominated pole-sapling stand with bracken fern and salal in EU 2b, May 22, 2020.



Wetlands (EU 3)

Mature red and blue-listed bog and fen wetlands, as well as open water wetlands, that are in a good condition occupy approximately 8% of the Property.

Bog (EU 3a)

Bog occupies the eastern portion of the wetland. One wildlife habitat plot (CXL-WHP03) was established within EU 3a to provide a detailed description of the ecosystem (Appendix D). The area is characterized by soils with a very poor nutrient regime and a hydric moisture regime and supports the provincially blue-listed Labrador-tea/ western bog-laurel/ peat moss (*Ledum groenlandicum*/ *Kalmia microphylla*/ *Sphagnum* sp.) vegetation community (site association Wb50; Figure 14). EU 3a supports good wetland vegetation coverage on top of thick organic soils (25 cm+) composed of poorly decomposed peat. The tree layer (>10 m tall) is limited to snags, including western redcedar up to approximately 28 m in height and 48 cm DBH, and the tall shrub layer consists primarily of regenerating and stunted shore pine, western redcedar and Pacific crab apple (*Malus fusca*). The short shrub layer is dominated by Labrador tea (*Ledum groenlandicum*), with a component of sweet gale (*Myrica gale*), western bog laurel (*Kalmia microphylla*), hardhack (*Spiraea douglasii* ssp. *douglasii*), recruiting conifers and smaller amounts of a variety of other shrubs. The herb layer is also diverse, and is dominated by bog cranberry (*Oxycoccus oxycoccus*), false lily-of-the-valley (*Maianthemum dilatatum*), skunk cabbage (*Lysichiton americanus*), and water sedge (*Carex* sp.). *Sphagnum* moss dominates the moss layer. Total tree density is relatively low compared to other EU's of the property, at approximately

300 trees/ ha, including western redcedar snags and trees over 2 m tall. Amphibians, a diversity of birds, deer and beaver sign were observed in this habitat during field surveys.

The bog was assigned a High condition and viability rating. Despite adjacent land use practices that could negatively affect the bog's condition and viability, such as reservoir operations in Comox Lake and nearby logging, the ecosystem appears relatively stable. The dead snags indicate a past disturbance, likely flooding associated with logging 20 years ago, however it appears that the hydrological regime has since stabilized. Although the Labrador-tea/ western bog-laurel/ peat moss community is provincially blue-listed, bogs are rare in the Comox Valley, likely largely due to historic land modifications (Ballin *et al.* 2017), increasing the local ecological significance of this ecosystem.

Figure 14. View towards the center of plot CXL-WHP03, showing the blue-listed treed Labrador tea/ bog laurel/ sphagnum bog in good condition, May 20, 2020.



Fen and Open Water (EU 3b)

The west portion of the wetland on the Property supports a mosaic of provincially red-listed sweet gale/ Sitka sedge (*Myrica gale/ Carex aquatilis*) fen wetland ecosystem (site association Wb52) and subdominant provincially yellow-listed open-water yellow pond-lily ecosystem (Figure 15). The EU was assigned a High condition and viability for the same reasons as EU 3a. However, American bullfrog (*Lithobates catesbeianus*) are present in the wetland which decreases the habitat value for other species including aquatic breeding amphibians and turtles.

Figure 15. Sweet gale - water sedge fen and open water wetland, May 20, 2020.



Comox Lake Beach (EU 4)

The Comox Lake Beach Ecological Unit (EU 4), also known as Coal Beach, is a popular unauthorized recreational area used by the public. The vegetation of the EU is characterized primarily by young Douglas-fir and red alder saplings (Figure 16). Log accumulations are present along some sections of the beach (Figure 16), and eroding coal slag piles are evident along the beach sections adjacent to EU 1a (see erosion assessment (Krick *et al.* 2018) and EU 1c-f description) and in 1b where they are repeatedly disturbed by off-road vehicle use. Recent and ongoing disturbances include reservoir operations and public access (Figure 17), with public recreational activities including swimming, beach fires, and off-road vehicle use. The EU is in Moderate to Poor condition, with Moderate to Poor ecological viability due to its current high public use.

Figure 16. Image of Comox Lake Beach (EU 4) showing log accumulations and red alder saplings, May 19, 2020.



Figure 17. High use area of Comox Lake Beach (EU 4) showing fire pits and garbage, May 19, 2020.



Perseverance Creek (EU 5)

The reach of Perseverance Creek that bisects the Property (Figure 18) is characterized by steep banks with mature coniferous forest, as well as a reed canary grass (*Phalaris arundinacea*) dominated islet. The river right bank is comprised of coal slag that is currently eroding into the creek. The shrubs, mature, decaying and downed mature trees located along the banks and in the creek provide a diversity of valuable habitat features for fish and wildlife including anadromous and resident salmonids, as well as many wildlife species, including those who feed on fish such as Belted Kingfisher (*Maegacyrle alcyon*), Great Blue Heron (*Ardea herodias*), and American Mink (*Neovision vison*).

Results of the fish habitat (FHAP) and proper functioning condition (PFC) assessment (Ballin *et al.* 2019) for Perseverance Creek indicate that the overall current PFC for Perseverance Creek is 'Functional-at-Risk', and that there is a downward trend in fish habitat quality and the PFC of the creek. However, the main issues with the portion that bisects the Property are the eroding coal slags and warm summer water temperatures and associated water quality issues (e.g., low dissolved oxygen).

See Section 3.3 for more information on the fish and fish habitat values and the condition of Perseverance Creek where it bisects the property.

Figure 18. Perseverance Creek, showing the reach of the creek that bisects the Property, as well as eroding banks on old coal slag piles and habitat features, August 21, 2018 (Ballin *et al.* 2019).



Comox Lake (EU 6)

The portion of Comox Lake that occurs on the Property (EU 6) is mostly characterized by gravel and coal mining overburden substrates with residual standing and downed wood associated with reservoir inundation, the remnants of the old trestle that connected No. 4 mine to the Scott's Slope entrance, past logging and other natural processes and human use. Specifically, the lake bottom in front of Coal Beach is largely composed of gravel, sand and coal overburden and has abundant old stumps and washed up logs. The portion of lake that locally known as Whyte's Bay over to Scott's Slope likely has relatively finer sediments in the center of the bay where it is flat, but also has a high amount of log accumulations at the outlet of Black Lake, as well as scattered below the waters surface. This portion of the lake also includes remnants of the trestle. Historic, recent and ongoing disturbances to the EU include boating, swimming, reservoir footprint impacts and operations, logging, and impacts associated with shoreline cabin use. The current condition and ecological viability were not assessed.

3.1.2. Rare Plants

There is a low to negligible likelihood that rare plants occur on the Property (Appendix B). Rare plant surveys were not conducted during field work, but no rare plants were detected as incidental observations.

3.1.3. Invasive Species

Several invasive species occur on the Property (Table 5), almost all of which were located on roadsides, along the railway ROW, and along the disturbed backshore of Coal Beach. Small amounts of wall lettuce and cutleaf blackberry were sparsely distributed in forested areas. A list of cumulative list of species that have been observed within 3 km of the property and therefore have the potential to spread to the property, especially by motorized vehicles, is provided in Appendix B.

Management recommendations for observed species are provided in Section 4.1.1.

Table 5. Invasive species observed on the Property.

English Name	Scientific Name	Source ¹	Distribution ²	Location Description
Bull thistle	<i>Cirsium vulgare</i>	ERL 2020	2	Along roadsides only
Dock	<i>Rumex sp.</i>	ERL 2020	2	Along upper road and rail right of way
Common tansy	<i>Tanacetum vulgare</i>	ERL 2020	5	Along upper road and rail right of way
Cutleaf blackberry/ Himalayan Blackberry	<i>Rubus laciniatus/</i> <i>armeniacus</i>	ERL 2020	2	Mostly on roads, a sporadically occurring suppressed stems in forested areas
Dalmatian/ yellow toadflax	<i>Linaria sp.</i>	iNaturalist (July 2018)	1	On road, not observed in 2020
Foxglove	<i>Digitalis purpurea</i>	ERL 2020	2	Distributed around property in disturbed areas
Hairy cat's ear	<i>Hypochaeris radicata</i>	ERL 2020	4	Distributed around property in disturbed areas
Oxeye daisy	<i>Leucanthemum vulgare</i>	ERL 2020	6	Frequent, but appears limited to roadsides
Reed canary grass	<i>Phalaris arundinacea</i>	ERL 2020	3	In open disturbed areas and in Perseverance Creek
Scotch broom	<i>Cytisus scoparius</i>	ERL 2020	5	Patches along roads and Coal Beach
Sulphur cinquefoil	<i>Potentilla recta</i>	ERL 2020	5	Patches just off property on east access road
St. John's wort	<i>Hypericum perforatum</i>	ERL 2020	6	Patches along roads and exposed gravel
Wall lettuce	<i>Lactuca muralis</i>	ERL 2020	5	Sparsely distributed in understory and in canopy

¹ ERL 2020 = observed during project specific surveys (May 19-22, 2020)

² Distribution codes 1-9, as per MOF (2010): 1 = rare individual, a single occurrence; 2 = few sporadically occurring individuals; 3 = Single patch or clump of a species; 4 = Several sporadically occurring individuals; 5 = A few patches of a species; 6 = Several well-spaced patches or clumps of a species; 7 = Continuous uniform occurrence of well-spaced individuals; 8 = Continuous occurrence of a species with a few gaps in the distribution; 9 = Continuous dense occurrence of a species.

3.2. Wildlife and Wildlife Habitat

Several wildlife species are known to occur or have the potential to occur on the Property. Species at risk and their likelihood of occurrence on the Property, as well as a cumulative list of species observations from background sources and field observations are provided in Appendix B

Herpetofauna

Herpetofauna occur on the Property. Aquatic breeding amphibians may use Black Lake for breeding, and other terrestrial habitats may be used by amphibians for migration and living, as well as breeding for terrestrial breeding amphibians.

No native herpetofauna species at risk have been confirmed to use the Property. However, the blue-listed, terrestrial breeding, Wandering Salamander (*Aneides vagrans*) has been observed in similar mature forested habitats along the shoreline of Comox Lake within 1.5 km of the Property and is likely to occur on the Property (Petch, pers. comm. 2020).

The blue-listed Northern Red-legged Frog (*Rana aurora*) and yellow-listed (federally special concern) Western Toad (*Anaxyrus boreas*) have both been detected within 3 km of the Property and may use the

Property for migration or complementary habitat (community and author observations). Black Lake may also provide breeding habitat for these species.

Pacific Tree Frog (*Pseudacris regilla*) have been detected breeding in Black Lake (iNaturalist 2020 [2019 observation]), as have the invasive American Bullfrog (*Lithobates catesbeianus*; Ballin *et al.* 2017, ERL 2020).

Black Lake is also within the vicinity of federally mapped critical habitat for the red-listed Western Painted Turtle (*Chrysemis picta*) Pacific Population. However local population numbers are very low and the closest observation of this species is Maple Lake, less than 3 km away (ECCC 2018, DataBC 2020, author observation).

Garter snakes (*Thamnophis sp.*) commonly occur throughout the Property.

Most native aquatic breeding amphibians occupy breeding ponds from March through September, after which they migrate to terrestrial overwintering habitat.

Avian

The Property supports a diversity of valuable habitats for birds to breed, forage and live, including tall canopied mature forest, large diameter wildlife trees with cavities, spatially heterogenous multi-canopied riparian habitats, a fish-bearing creek, protected open water wetland, as well as moss and shrub dominated wetland types, a lake, among others.

A total of 87 species of bird have been reported on or near the Property. Three bird species at risk are confirmed to occur on the Property, the blue-listed Northern Pygmy-owl (*Glaucidium gnoma swarthi*), Olive-sided Flycatcher (*Contopus cooperi*) and Great Blue Heron (*Ardea herodias fannini*). Several other bird-species at risk have been recently reported from the eBird Comox Lake point located 100 m south of the property by credible contributors, however there is uncertainty around if and how the birds were using the Property. These bird species include the blue-listed: Band-tailed Pigeon (*Columba fasciata*), Barn Swallow (*Hirundo rustica*), Purple Martin (*Progne subis*), Black Swift (*Cypseloides niger*), Marbled Murrelet (*Brachyramphus marmoratus*), and Western Screech-owl (*Megascops kennicottii kennicottii*); and yellow-listed (federally special concern) Common Nighthawk (*Chordeiles minor*). Federally designated critical nesting habitat for Marbled Murrelet is mapped 2 km from the property in mature forested drainages (DataBC 2020).

The above bird species at risk may use habitats that are present on the Property. For example, nesting habitats may include: mature riparian forest (e.g., Western Screech-owl, Band-tailed Pigeon), mature forests (e.g., Northern Pygmy Owl), edge forests (e.g., Olive-sided Flycatcher), or old buildings (e.g., Barn Swallow). Feeding and living habitats may include: protected fish-bearing waters (e.g., Great Blue Heron), lake (e.g., Marbled Murrelet), insect-rich air space (e.g., Common Nighthawk, Barn Swallow, Black Swift).

The most active breeding bird window for the area is April 1 through July 1, however owls often breed earlier than this (BSC 2020).

Mammal

Several mammal species may occur on the property. Mammal species at risk that have been confirmed to be feeding on the Property include the yellow-listed (federally endangered) Little Brown Myotis (*Myotis lucifugus*) and the blue-listed Townsend's Big-eared Bat (*Corynorhinus townsendii*) (Ennis, pers. comm. 2020). These species are also likely to roost under the bark of larger trees during the summer months. Blue-listed Roosevelt Elk (*Cervus elaphus roosevelti*) may use the Property as a migration corridor around Comox Lake. Blue-listed American Water Shrew (*Sorex palustris brooksi*) may use the natural waterways of the Property.

Several other mammal species were confirmed to or are likely to use the property. Sitka Black-tailed Deer (*Odocoileus hemionus sitkensis*) frequent all terrestrial habitats on the Property, as observed during field surveys. Cougar (*Puma concolor*) frequent the area and have been sighted on the railway ROW that enters the Property (English, pers. comm. 2020) and American Black Bear (*Ursus americanus*) also likely roam through the Property. American Beaver (*Castor canadensis*) sign was noted in Black Lake and American Mink (*Neovision vision*) have been observed slightly upstream of the Property boundary feeding on fish in Perseverance Creek (author observation). Red squirrel (*Tamiasciurus hudsonicus*) are common throughout the forested areas of the Property.

3.3. Fish and Fish Habitat

Comox Lake and the mouth of Perseverance Creek supports Kokanee Salmon, Chum Salmon, Coho Salmon, Cutthroat and Rainbow Trout, Dolly Varden and Sculpin (Griffith 1995, Ellefson 2003, Streamkeepers, pers. comm. 2018, DataBC 2020). The distribution of these species along the upper reaches of Perseverance Creek, beyond the Property boundary, varies dependent on the season and associated access to suitable habitats. However, at a minimum, Coho and resident trout are known to migrate from Comox Lake to reaches beyond the Property boundary (Ballin *et al.* 2019). In November 2018, several pairs of spawning Coho were observed in the creek as far upstream as the bridge at Comox Lake Road, the most on record for any given year (Davies, pers. comm. 2018, Mathers, pers. comm. 2018). Although there have been a few observations of adult Coho in the creek over the years (Perseverance Streamkeepers, pers. comm. 2018), it is suspected that the majority of the Coho fry found in the lower reaches originate from Comox Lake (hatchery and wild fish) (Davies, pers. comm. 2018, DataBC 2020). Current fish use of Black Lake is unknown. A search of Black Lake in the FISS database (MOE 2020) rendered no results, nor had many people interviewed heard of anybody fishing in Black Lake, however, a local resident recalls catching black-coloured trout in the lake when he was a child (~1950; Curtain, pers. comm. 2020).

The presence of salmonids in Comox Lake and Perseverance Creek over the past 150 years has been influenced by land use and development. The dam at the outlet of Comox Lake was first built in 1912, blocking access to fish. In 1958, the dam height increased. A fishway was built in 1991, however it wasn't until well after construction that fish were able to pass, meaning that anadromous fish access to Comox Lake and Perseverance Creek was restricted for approximately 80 years (DFO 1958, FWCP 2011). Currently, the hatchery releases salmonids into Comox Lake each year including:

400-1,000,000 juvenile Coho; 100-200 adult Coho; 0-200 adult summer Chinook; and, ~50 Chinook jacks (Davies, pers. comm. 2018, Rotenburg, pers. comm. 2018). Several of the juvenile Coho that are released are thought to use Perseverance Creek (Davies, pers. comm. 2018, Perseverance Creek Streamkeepers, pers. comm. 2018).

Fish habitat in Perseverance Creek adjacent to the Property is a relatively deep reach that connects Comox Lake to the floodplain habitats just beyond the Property boundary (Figure 18). The reaches banks are characterized by steep eroding coal slag on river right and a steep and maturely vegetated and consolidated bank and a reed canary grass dominated islet on river left. Standing and downed large coarse woody debris occur along the reach providing cover and food (i.e., nutrient and litter drop) for fish, as well as wildlife habitat. In the summer months, the water quality in this lowest reach is primarily influenced by Comox Lake. At this time the water quality deteriorates, becoming too warm and potentially deoxygenated for some fish in some years. In the winter months the oxygenated flows from Perseverance Creek likely contribute to this area providing high-value habitat (Ballin *et al.* 2019). The reach is unlikely to provide valuable spawning habitat.

3.4. Human Use, Values and Anthropogenic Features

The Comox Lake watershed, including the Property, has been used by people since time immemorial. However, over the past century and a half the land and water have experienced a change in the type and intensity of use, altering the ecology and ecological function of the area. Land and water use that currently and/or historically affects the watershed includes: drinking water supply and hydroelectric development and associated infrastructure on Comox Lake and connected waterways; forestry and mining activities; human settlement and water extraction, railway, road and trail development, among others (Ellefson 2003, Tetra Tech EBA 2015, Aqua-Tex 2016, Ballin *et al.* 2017, Cursons, pers. comm. 2017, Theissen 2019, Cumberland Museum and Archives 2020).

The expected impacts of these modifications to the watershed and to the Property vary in character and severity. For example: water supply and control infrastructure and use alter the timing and severity of flows of tributary creeks; forest harvesting, railways and roads also alter the timing and magnitude of flows to creeks, lakes and wetlands, as well as bank stability, water temperature, sedimentation and erosion, nutrient inputs and large woody debris delivery; mining activities divert water and may contribute pollutants to the terrestrial and aquatic environment, potentially even years after mines have shut down; human settlement in general is associated with water extraction, diversion, diking and liquid and solid waste production and disposal; trails and roads may contribute sediments to waterways, as well as facilitate invasion of exotic species; hydroelectric development on the Puntledge River and Comox Lake interrupted salmon migration routes and the supply of fish to the upstream systems and affect water levels and shoreline stability adjacent to Comox Lake and in the lower reaches of the creeks.

3.4.1. Cultural Context

The Property is located within or very near to the asserted traditional territories of the K'ómoks, Wei-wai-kum, We-wei-kai, Sliammon (Tla'amin), and Homalco (Xwemalkwu) First Nations

(FWCP 2011, Morin 2020). Pre-contact, the Property fell within the core territory of the Pentlatch people, who's main villages were located along the Puntledge (i.e., anglicized word for Pentlatch) and Courtenay Rivers and K'omoks estuary. In ~the 1800's the K'omoks people relocated from the north and joined the Pentlatch people in the area now known as the Comox Valley. Comox Lake and the Comox Valley were previously known as Pentlatch Lake and Pentlatch, respectively (Morin 2020).

Early written accounts from settlers to the area document that the east end of Comox Lake near the mouth of the Puntledge River was used by First Nations for hunting elk, deer, and beaver, as well as collecting cedar bark. People would have set up camps to support these activities and used to sink their canoes to preserve them in their absence (Cursons, pers. comm. 2020, Morin 2020). Recent traditional use studies support these records and demonstrate the area was also used for hunting grouse, fishing for trout, kokanee and salmon, and some gathering of berries. In particular, historical records discuss a swamp area adjacent to the mouth of the Puntledge River that was an important beaver hunting area (Morin 2020). This was likely Black Lake, which would have been connected to a more extensive network of wetlands prior to the gradual inundation of Comox Lake by up to 6 m in elevation starting in 1912.

The portions of the Property that would have received the highest intensity of historic use and where artifacts are most likely to be present is within the inundation zone near the historic shoreline. Artifacts may include culturally modified trees, lithic, and rock art sites. Field investigations of the Property in February 2020 during relatively low waters resulted in the finding of a single stone 'flake' tool near the outlet of Black Lake (Morin 2020).

Traditional use studies indicate that the east end of Comox Lake, on which the Property lies, continues to be used for hunting, fishing and gathering activities by local First Nations people (Morin 2020).

3.4.2. Historic Use

As per its name, Coal Beach has a prominent history of mining, in addition to myriad other uses including settlement, recreation, logging and water use. A few meters off the Property was No. 4 mine, a slope mine that was one of the most productive and longest operating mines in Cumberland (Theissen 2019, Cumberland Museum and Archives 2020, Cursons, pers. comm. 2020, LaRonde, pers. comm. 2020,). No. 4 mine operated between 1890 and 1935, when it was shut down by extensive flooding. Over the course of its 45 years of operation it produced 6,500,000 tons of coal spanning 1,600 acres (647 ha). The mine employed immigrants from around the world, resulting in the establishment of the Village of Cumberland and much of the rich and conflicted social history of the area. In 1930, the Scott's Slope entrance, located in the northern portion of the Property, was opened and operated for the last five years of No. 4 mines operations. A rail line connected Scott's Slope to No. 4 mine over Whyte's Bay, and off the Property east through Cumberland to Royston, and south to the shipping site at Union Bay.

Comox Lake has been the recreational hub of Cumberland since the 1880's (Cursons, pers. comm. 2020). Coal Beach specifically has been used as a public swimming beach and

local destination since the closure of the mine. At one time it was also the site of a local ski club, whose signs still hang high on the mature Douglas-fir trees lining the railway ROW (Theissen 2019).

Weldwood of Canada purchased the Property in 1960 and collapsed and or buried the mine entrances in 1974 (Theissen 2019). Comox Lake Land Corporation purchased the Property from Weldwood of Canada in 2001 (Campney and Murphy 2001), at the time the majority of the Property was logged for the second time (CVRD 2020).

Logging of the old growth forests surrounding Comox Lake by barge, ox/ horse and rail, started in the 1880's, and grew in scale in the 1930's, thus the portions of the Property not disturbed by mining were likely first logged at this time as well (Cumberland Museum and Archives 2020, Cursons, pers. comm. 2020). The majority of the property was again clear-cut logged c. 2000, as evidenced by aerial photographs (CVRD 2020), with the exception of riparian habitat adjacent to Comox Lake, Black Lake and Perseverance Creek, and on top of the APEC area and Weldwood held covenant that intersects the coal slags behind Coal Beach. Land adjacent to the Property continued to be logged between 2007-2014.

Water levels in Comox Lake were incrementally increased over time, sequentially inundating the shoreline of the lake and portions of the Property. Water levels likely first increased with the construction of the Comox Lake dam in 1912, then again to support lake-based logging c. 1929, and again with dam upgrades to support hydroelectric power generation and the advent of Comox Lake as the drinking water supply for the Comox Valley in 1958-9 (FWCP 2011, Cursons, pers. comm. 2020, LaRonde, pers. comm. 2020). In total the water level of Comox Lake has likely risen up to six meters since the beginning of the 20th century (Morin 2020).

Privately owned recreational property borders the Property to the south as well as is enclaved within the Property. The property nestled within the Property was held by William Whyte, the namesake for Whyte's Bay (LaRonde, pers. comm. 2020). Starting near the turn of the 20th century, the family was one of the first to live at the lake year-round. Whyte's Bay is also where striking mine workers camped out whilst evicted from their lodgings (Cursons, pers. comm. 2020, Curtain, pers. comm. 2020).

Figure 19. No. 4 mine overview (Cumberland Museum and Archives 2020).



Historic Buildings and Features

Historic buildings and other historic features that occur on the Property are mapped, depicted and described in Appendix F and Map 4. These features include the northern mine entrance (“Scott’s Slope”, labelled HBF1) and associated buildings (HBF2 and HBF3), as well as the historic railway trestle that connects the Scott’s Slope entrance to the main mine at Coal Beach (HBF4).

Several additional important historical features occur just beyond the Property boundary that can be viewed when accessing the Property such as the No. 4 mine entrance and fan house, remnant associated buildings and other historic artifacts (Theissen 2019, Cumberland Museum and Archives 2020). Remnants of the rail line are partially visible along the Village of Cumberland ROW (HBF6), which is currently a single lane road used by off-road vehicles. Accumulations of large diameter logs and metal cabling, which may be the possible remnants of a dock, trestle, or log booms occupy a bay along Coal Beach (HBF7). An old transmission line pole (possibly telegraph) was documented at HBF8 at the Property line (Map 4).

Coal slag was detected within, and just beyond, the two APEC areas on the Property. Small amounts of coal slag are visible along the eroding shoreline near the Scott’s Slope mine entrance (HBF5; Figure 20), while extensive amounts are present in EU 1 (Figure 8) where linear coal slag features (HBF9;) are present extending from the southern mine entrance (Map 4). These coal slags offer attractive features for recreational off-road vehicle use. The coal slag extends along the lakeshore into

EU 1d (HBF10; Map 4). The potential toxicity of these mine waste rock dumps is unknown, however they are expected to have a low content of coal fines (Cathyl-Huhn, pers. comm. 2020).

Figure 20. Coal slag visible along eroding shoreline of APEC area on north portion of property along rail line route to Scott's Slope, May 22, 2020.



3.4.3. Current Use

The Coal Beach Property was managed for timber harvest until 2018, but the recent purchase of the Property has shifted management objectives to focus on protecting the water quality of the Comox Lake reservoir. Current use and management of the Property itself, and of the adjacent land and water, influence the condition of the Property and the potential of the Property to protect water quality.

Currently the Property is a popular, though unauthorized, recreation destination for pedestrians, swimmers, dog walkers, cyclists, off-road vehicle users and boaters. Field surveys conducted in May 2020 identified human use features throughout the Property, and were used in combination with local knowledge gained from the public, interviewees and authors, to support descriptions of the current use of the Property. Features identified during field surveys are presented in Map 4, as well as presented with representative photographs in Appendix F.

Roads, trails, and property access

Off-road vehicle use was identified as posing a very high risk to water quality in the watershed protection plan risk assessment (Aqua-Tex 2016). Roads and trails occur throughout the Property and provide a means of accessing and travelling around the Property. Roads and trails consist of gravel roads, gravel double-track roads, unsurfaced single-track trails, and footpaths (Map 4). Most motorized vehicle use on the Property is by unauthorized recreational off-road vehicles. However, two sections

of road provide gated property access to landowners. These are the sections of road accessed by AP1 and AP6. The section of road adjacent to AP6 is in good condition, but the section between the enclaved private waterfront cabin access and AP4 is unpassable without a high-clearance four-wheel drive vehicle. The road on the northern portion of the Property that is accessed by AP1 is a double-track unsurfaced road that leads to the lakeshore (Figure 21). In addition, off-road vehicles access the Property from the Rod and Gun club (WAGS 2017), however no trails were located indicating that access is likely via the beach at low water. All access points are blocked to unauthorized vehicle traffic by gates located beyond the Property boundary or barricades.

EU 1b is an attractive recreational use area for off-road vehicles because of the mounded coal mining slag features, and a network of off-road vehicle trails (OVT) of varying densities has been established and are regularly used (Theissen 2019; Map 4). The off-road vehicle use, and potentially other factors, has impeded forest understory regeneration adjacent to the beach and may present a risk to water quality from erosion associated with disturbance of the mine waste.

Off-road vehicle users are also reported to drive on Coal Beach and the north beach during low water.

Figure 21. Gated double-track gravel road that accesses north portion of property, also showing largest patch of invasive Scotch Broom detected on the Property, May 22, 2020.



Fire Pits

Forest fires, along with camping and off-road vehicle use, were also identified as posing a very high risk to water quality in the watershed protection plan (Aqua-Tex 2016). Fire pits are present and frequently used along Coal Beach and on the shore of the northern portion of the property

(Ennis, pers. comm. 2020, Norcross-Nu'u, pers. comm. 2020); Map 4; FP1, FP2, and FP3). Fire pits near Coal Beach appeared to have been recently used (FP1 and FP2), whereas FP3, located on the northern shoreline, did not appear to have been recently used. Trees in both of these areas have 'no fires' written on them in blue paint.

Dump sites/ garbage

Garbage dumping and scattered garbage is rare on the Property, and no dump sites for household garbage were detected during field work. Only two locations were documented during field surveys (Map 4): the garbage can located on the Village of Cumberland ROW (DSG2, Figure 22), and the abandoned car located in the high disturbance OVT zone (DSG1). Currently people appear to mostly pack out their garbage. Where there are places to put refuse, people use them and may shift their perspective away from 'pack it in pack it out'. Public surveys suggest that the perception is that if garbage cans are installed, it will encourage users to leave garbage behind instead of packing it out. In addition, garbage cans provide wildlife attractants (Figure 22).

Figure 22. Garbage can located on Village of Cumberland ROW that progressively became messier over the course of the field work week and that had been disturbed by wildlife, May 22, 2020.



Swimming Beaches and Moorage

The primary swimming beach and mooring area on the property is Coal Beach (SW1 and SW2), as evidenced by public surveys, evidence of use and local knowledge (Map 4). The mouth of Perseverance Creek also supports a few secluded swimming beaches that are primarily accessed by boat or paddleboard. A rope swing along the narrow footpath on Perseverance Creek was identified (SW3),

providing a draw to this swimming location. The beach by Scott's Slope is also likely used occasionally by boaters and motorized vehicle users for swimming.

4. MANAGEMENT CONSIDERATIONS

The Coal Beach Property supports myriad ecological and human values and uses. The following section highlights high-level management considerations for maintaining and balancing these values in consideration of potential threats.

4.1. Ecological Values

The Property supports many ecological values, including sensitive and significant ecosystems, wildlife and fish and their habitats. In addition, intact and properly functioning ecosystems protect water quality. Therefore, where possible, these ecosystems should be protected from human disturbance.

Specific ecological values and functions, threats to these values, and potential mitigations or considerations are listed by Ecological Unit below. However, many of the considerations span ecological units and should be considered in overall Property management.

Ecological Unit 1

Mature forest is rare in the Comox Valley and should be retained, and succession, ensured where possible. Mature forests provide valuable fish and wildlife habitat and support water quality protection, as well as other ecological and human values. In particular, mature forests stabilize the ground, mitigating sediment and erosion inputs into waterways, and moderate quantities of water runoff throughout the year. As such, Property management should consider:

- Maintenance and restoration of mature forests, with particular attention to the riparian areas adjacent to Comox Lake and Perseverance Creek. This may include:
 - Stabilization of eroding shorelines with bioengineering or other techniques or by limiting use above eroding banks; focus areas should consider the Comox Lake erosion assessment (Krick *et al.* 2018) and the Perseverance Creek PFC (Ballin *et al.* 2017);
 - Restoration of disturbed soils to promote revegetation and forest regeneration, especially in riparian areas (± 30 m from high water) and on slopes that runoff into waterways; specifically, this may include restoring the riparian area adjacent to Coal Beach that is composed of coal mine waste and is continually disturbed by off-road vehicles;
 - Mitigating wildfire risk by managing fuels (i.e., small dead woody debris that would easily catch fire) and sources of fire (e.g., fires, motorized vehicles).

Ecological Unit 2

As mature forests are rare in the Comox Valley, protection of younger age classes is important to ensure adequate amounts of forest habitat for overall ecosystem function persist. In addition, the

younger forests on the Property border narrow bands of mature riparian forest and support the persistence of these riparian habitats. As such, Property management should consider:

- Maintenance of the integrity of pole-sapling aged forest stands. This may include:
 - Management of invasive species along roads and trails which are the primary vectors for distribution on the property (efforts should focus on those high priority species that may expand into the adjacent forests and wetlands; see Section 4.1.1);
 - Limiting off-road vehicle use to existing roads and trails.

Ecological Unit 3

Wetlands provide a large number of ecological functions, including fish and wildlife habitat, as well as water quality protection, and intact and well-functioning wetlands, especially bogs, are rare on the landscape. As such, Property management should consider:

- Protection and maintenance of the integrity of wetland habitats. This may include:
 - Maintenance of low human use unless managed (i.e., currently human use of the wetlands is low, if this use increases management of use and visitors should be considered);
 - Maintenance of the hydrological regime of the wetlands (i.e., wetland condition largely relies on hydrology, thus changes to hydrology from disturbance to the surrounding landscape such as logging may negatively impact the integrity of the ecosystem).
- There is a strong and growing network of citizen scientists and stewards that monitor the Cumberland wetlands, as well as other local stewardship groups that may have interest in monitoring the integrity of the Black Lake wetlands.

Ecological Unit 4

The location and composition of beaches on the Property have changed over the past two centuries in response to water level changes and mining and logging use. Currently beaches provide attractive locations for human use including swimming, mooring, occasional motor vehicle use (at low water levels). Beaches also provide water access to wildlife and habitat for aquatic life. They are also the interface where shoreline erosion occurs. Shoreline erosion is discussed in EU 1.

Ecological Unit 5

Perseverance Creek provides fish and wildlife habitat both where it bisects the Property as well as provides a migration corridor to the water and land upstream. As such, Property management should consider:

- Protection and maintenance of fish and wildlife habitat, including water quality protection measures such as:

- Erosion control of the coal slags on the right (north) bank to mitigate erosion and sedimentation and tree fall into the creek by bioengineering or other methods;
- Ensuring continued fish passage by monitoring the stream for blockages by reed canary grass, debris jams or other obstructions;
- Promoting shade in the creek to moderate high summer water temperature by retaining shoreline vegetation and appropriate amounts of large downed wood.
- Collaboration opportunities likely exist with the Cumberland Community Forest Society and the Village of Cumberland on management of Perseverance Creek.
- The Perseverance Creek Streamkeepers are long-term stewards of the creek that could be engaged on management activities. The Perseverance Creek Streamkeepers group has stewarded the creek for over a decade and cumulatively have an immense amount of knowledge about the creek. Their main activity is salvaging fry stranded in residual pools isolated during the dry summer months, however they also collect data on stream water levels, and more recently, water quality (Murray, pers. comm. 2018, Mathers, pers. comm 2017). Currently the Streamkeepers have annual salvage records dating from 2018 back over a decade.

Ecological Unit 6

Comox Lake provides habitat to many fish and wildlife species where it intersects the Property and in downstream areas. Thus, maintenance of water quality on the Property is important to both those ecological values present on the Property and downstream. Water quality can be indirectly maintained by management of the land and directly maintained through management of the water. Direct disturbance to fish and wildlife can be managed by maintaining zones with various intensities of use. The intensity of use currently naturally varies based on the distribution of features around the Property but could be monitored, and relative impacts re-assessed, as it is likely to change with changes in the demographic and population growth of the Comox Valley.

4.1.1. Invasive species

A summary of invasive species detected on the property and legal management requirements (i.e., *BC Weed Control Act*) and invasive species committee recommendations (e.g., Coastal Invasive Species Committee, Invasive Species Council of BC), as well as project specific priorities and recommendations are provided by species in Table 6. Priority recommendations are:

- Eradicate any Dalmation toadflax (required by *BC Weed Control Act Regulation*) and Sulphur cinquefoil that is detected on the property (recommended by Coastal Invasive Species Committee). Consider engaging Coastal Invasive Species Committee for support with management. As these invasive species were detected on roads that cross property boundaries it will be important to collaborate with adjacent landowners on management
- Monitor potential invasive species encroachment into sensitive and significant ecosystems. In particular:

- monitor perimeter of Black Lake wetland for encroachment of invasive species, and
- Perseverance Creek for obstruction of water flow and fish passage by reed canary grass
- Consider engaging local stewardship group to monitor invasive species biannually and manage key species near sensitive and significant habitats or where they have an opportunity to spread, such as the Scotch Broom growing along Coal Beach where motorized and non-motorized traffic may move seeds.

Table 6. Invasive species management recommendations.

English Name	Scientific Name	Invasive Species Lists ²	Highest Management Priority from Invasive Species Lists	Management Priority ³	Project Specific Treatment Recommendation ³
Bull thistle	<i>Cirsium vulgare</i>	IPR	Contain	2	Monitor wetland and riparian habitats to ensure no encroachment, if so manually remove
Dock	<i>Rumex sp.</i>	CDC	-	5	Monitor wetland and riparian habitats to ensure no encroachment, if so manually remove
Common tansy	<i>Tanacetum vulgare</i>	CISC, ISC	Control	3	Monitor wetland and riparian habitats to ensure no encroachment, if so manually remove
Cutleaf blackberry/ Himalayan Blackberry	<i>Rubus laciniatus/</i> <i>armeniacus</i>	CISC, ICS	Control	3	Monitor wetland and riparian habitats to ensure no encroachment, if so manually remove
Dalmatian/ yellow toadflax	<i>Linaria sp.</i>	IPR, WCR (noxious), CISC, ISC	Eradicate	1	Manually remove if detected
Foxglove	<i>Digitalis purpurea</i>	CDC	-	5	Leave
Hairy cat's ear	<i>Hypochaeris radicata</i>	CISC, ICS	Control	3	Leave
Oxeye daisy	<i>Leucanthemum vulgare</i>	IPR, ISC	Contain	4	Leave if remains on roadsides
Reed canary grass	<i>Phalaris arundinacea</i>	CDC	-	5	Consider removal if builds up and blocks water flow in creek or encroaches in wetland
Scotch broom	<i>Cytisus scoparius</i>	IPR, CISC, ISC	Contain	4	Remove if stewardship group wants to take on in the long term, prioritize removal from Coal Beach or if detected in open mature forested habitats
Sulphur cinquefoil	<i>Potentilla recta</i>	CISC, ISC	Eradicate	2	Manually remove if detected; confirm removal of root crown; source is road entering south east property boundary therefore collaboration with adjacent landowner recommended
St. John's wort	<i>Hypericum perforatum</i>	IPR, CISC, ISC	Contain	4	Leave unless spread into natural areas noted
Wall lettuce	<i>Lactuca muralis</i>	CDC	-	5	Leave

¹ ERL 2020 = observed during project specific surveys (May 19-22, 2020)² WCR (*Weed Control Regulation* 2011 under the *Weed Control Act* 1996), IPR (*Invasive Plants Regulation* under the *Forest and Range Practices Act* 2002)(IPR only legally applies to forestry or range practices and thus is not legally binding regarding management of the Property), ISC (Invasive Species Council of BC 2019), CISC (Coastal Invasive Species Committee 2016), CDC (BC Conservation Data Center 2020)(listed as 'exotic')³ Ecofish recommendation

4.2. Human Values

Water quality

Comox Lake is the water source for over 45,000 people in the Comox Valley (CVRD 2020a). The Watershed Protection Plan (Aqua-Tex 2016) provides a hierarchical risk assessment of activities in the watershed that may impact water quality and mitigations for these risks, as well as lists the effect pathways for these risks including by sediment, nutrients, pathogens and other contaminants. This will be important to consider when setting management priorities for the Property, however, the water treatment infrastructure is currently in the process of being upgraded which will change the relative risk of human uses and natural factors to water quality. Thus, updates to the risk assessment in consideration of infrastructure upgrades is underway (Ennis, pers. comm. 2020).

The purchase of the Property by the CVRD mitigated many of the potential threats of future development of the land to the water quality of Comox Lake. However, additional sources of potential contaminants may originate from the Property. Currently sediment may originate from the eroding shoreline of Comox Lake and Perseverance Creek, including areas that are eroding due to reservoir operations and motorized vehicle use. Nutrients and pathogens may originate from human waste from boats and swimming and from wildlife. Other contaminants may originate from fuels from land and water-based motorized vehicles, old mining and logging waste, and unauthorized dumping. And threats to water quality may exist from fires originating from recreational fires or motorized vehicles, and other uses of the Property.

Education can support people to make decisions to help protect water quality and the other values of the Property. If people are aware of where they are, and how their actions may influence their drinking water, or fish and wildlife, they may be more likely to make behavioral changes than if they are simply told not to do something.

Recreation

Local settlers have used the Coal Beach Property for recreating for over 100 years, and First Nations for an indefinite time before that, thus the Property has a long history of occupation and many local stewards. Some of the recreational values and considerations are:

Walking/ Mountain Biking/ Dog Walking

- People enjoy having a quite local place to enjoy nature.

Off-road Vehicles

- Many motorized off-road vehicle users enjoy the freedom of the area.
- It may be easier to limit the extent of use if tied to strong conservation rationales such as restoration of the riparian area to limit erosion into the water source than to stop motorized use.

Swimming

- Coal Beach provides a valuable alternative swimming beach to locals from the busier Cumberland Lake Park.

Boating

- Motorized and non-motorized boat access to swimming areas is available in the moorage area, up Perseverance Creek, and Scott's Slope.
- The moorage area has become increasingly busy in recent years and boaters demonstrate varying degrees of responsibility in how they drive close to shore, potentially posing risks to swimmers.

Fires

- Evidence of fire was mostly restricted to established fire pits, and there was no evidence of fires having escaped.
- 'No fires' has been spray painted on several trees but there continues to be fires.
- Rules pertaining to fires may have a higher likelihood of being followed if in line with restrictions for other local areas or if accompanied by education enabling people to feel like they are making their own good decisions.

Amenities

The Property has been used by the public for many years without amenities that are common in public parks such as washrooms, garbage cans or signage. Many of these amenities are available at the nearby Cumberland Lake Park for lake visitors that value them as part of their beach experience. Some considerations pertaining to these amenities follow:

- Garbage cans - Currently people seem to mostly pack out their garbage, additions of garbage cans may result in more garbage around and the need to manage wildlife attractants (public survey results suggest public user perception is that if garbage cans are added, it may encourage users to not pack out their waste).
- Public washrooms – Similar to garbage cans, the presence of washrooms may result in increased waste being left behind. A small amount of toilet paper was observed in heavy use areas during field surveys and public did not note a prevalence of toilet paper or feces as a prevalent issue, however, it has become an issue at more accessible areas nearby such as Comox Lake Bluffs Ecological Reserve.
- Signage - Public users provided support for some polite and educational signage to inform them that Comox Lake is the drinking water source for the Comox Valley and how various human use impacts water quality.

Culture and History

The lakeshore of the Property has a high likelihood of having archaeological potential, thus any ground disturbance or development activities should be preceded by an Archaeological Impact Assessment (Morin 2020).

The Property has a rich history and many historical features that would be of value to highlight. There may be opportunities to partner with local historians and/or the Cumberland Museum and archives to provide educational signage, tours or other educational opportunities.

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Hull, Leah. 2020. Local resident (~37 years), dog walker, beach user

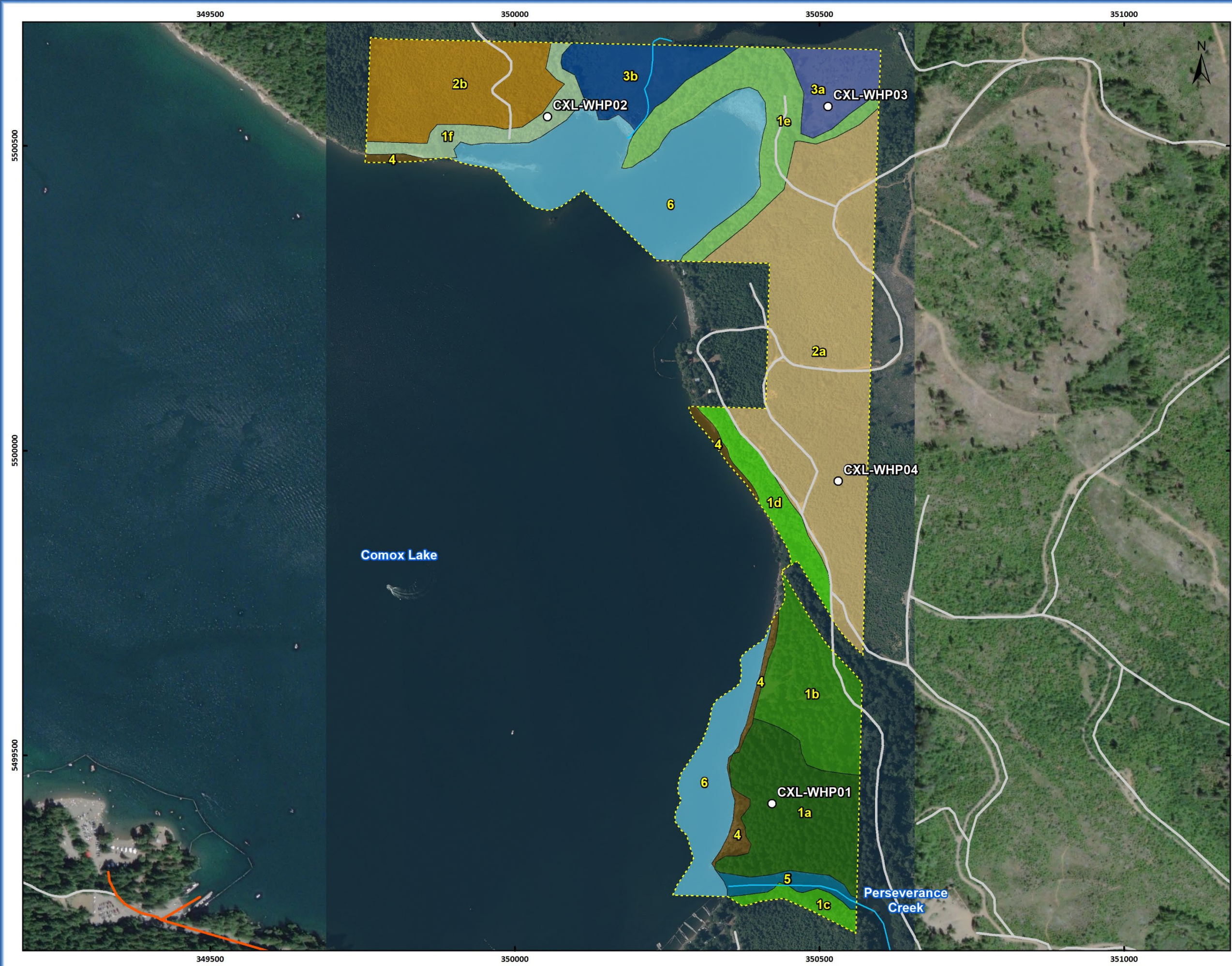
Moncrieff, Tyler. 2020. Local resident (~37 years), cabin owner and non-motorized boater.

Spizawka, Erica. 2020. Local resident (~20 years) dirt biker, mountain biker, dog walker.

Dirt bikers (unknown/ unnamed) x 2

Walkers, beach users (unknown/ unnamed) x 10

PROJECT MAPS



CVRD COAL BEACH BASELINE INVENTORY

**Ecological Unit and
Ecosystem Map**

- Legend**
- Ecological Unit**
- 1a, Mature Second Growth Forest
 - 1b, Mature Second Growth Forest: On coal overburden
 - 1c, Mature Second Growth Forest: Steep selectively logged riparian
 - 1d, Mature Second Growth Forest: Steep selectively logged riparian
 - 1e, Mature Second Growth Forest: Steep selectively logged riparian
 - 1f, Mature Second Growth Forest: Steep selectively logged riparian
 - 2a, Pole-Sapling/ Young Second Growth Forest: East side
 - 2b, Pole-Sapling/ Young Second Growth Forest: North side
 - 3a, Wetland: Bog
 - 3b, Wetland: Fen and open water
 - 4, Comox Lake Beach
 - 5, Perseverance Creek
 - 6, Comox Lake
- Ecosystem Description Plot (WHP)
- Paved Road
- Rough/Loose Road
- Stream
- Coal Beach Property (PID 030-565-481)



MAP SHOULD NOT BE USED FOR LEGAL OR NAVIGATIONAL PURPOSES

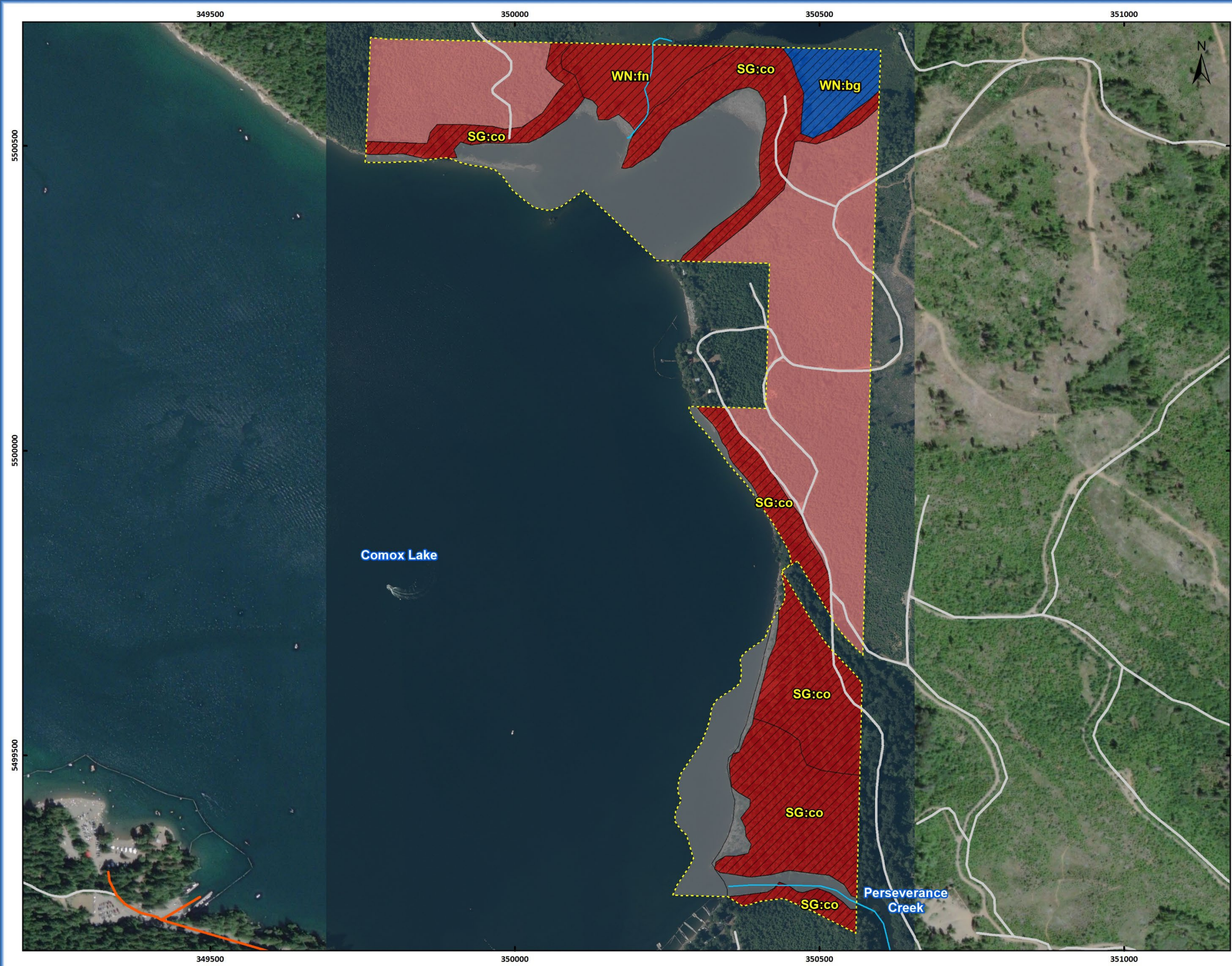
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2			
3			
4			
5			

Date Saved: 10/15/2020
Coordinate System: NAD 1983 UTM Zone 10N

Map 2



CVRD COAL BEACH BASELINE INVENTORY

Sensitive and Significant Ecosystem Map

- Legend**
- Sensitive Ecosystems
 - Provincial Ecosystem At Risk**
 - Red-list
 - Blue-list
 - Red-list (recruiting)
 - Not provincially at risk or not listed
 - Paved Road
 - Rough/Loose Road
 - Stream
 - Coal Beach Property (PID 030-565-481)

Code	Description
SG:co	Mature second growth: coniferous
WN:bg	Wetland: bog
WN:fn	Wetland: fen



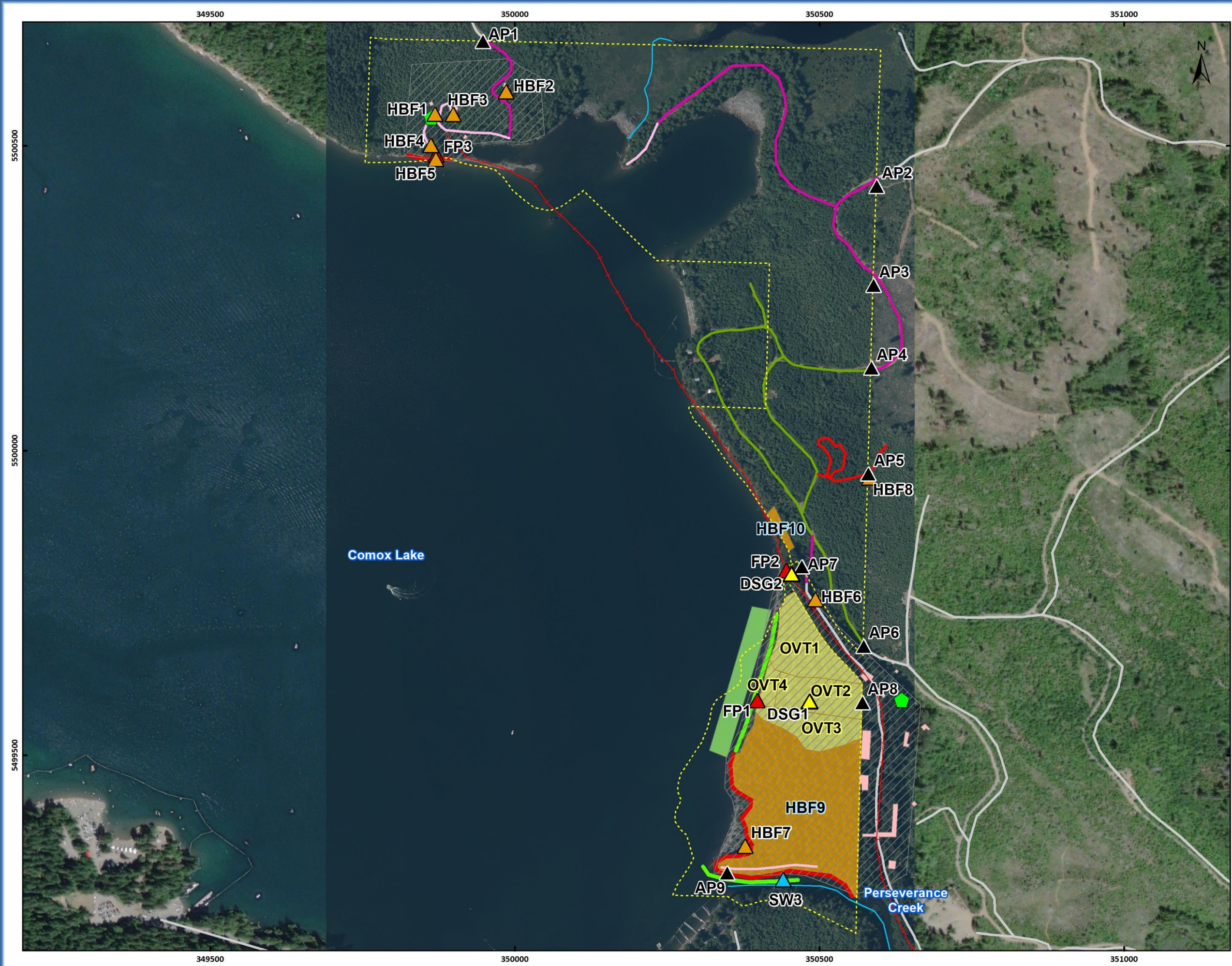
MAP SHOULD NOT BE USED FOR LEGAL OR NAVIGATIONAL PURPOSES



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2			
3			
4			
5			

Date Saved: 10/15/2020
Coordinate System: NAD 1983 UTM Zone 10N

Map 3



CVRD COAL BEACH BASELINE INVENTORY

**Human Use
Features Map**

- Legend**
- Coal Beach Property (PID 030-565-481)
 - Stream
 - Mine Entrance
 - Historical Building
 - Areas of Potential Environmental Concern (APEC)
 - Offroad Vehicle Trails (OVT) Network
 - Linear Coal Waste Features
 - Eroding Coal Waste
 - Swimming Beach
 - Moorage
- Human Use/ Features**
- Property access point (AP)
 - Dump site/ garbage (DSG)
 - Fire pit (FP)
 - Historic building/ feature (HBF)
 - Swimming (SW)
 - Historic Railway Route
- Roads and Trails**
- Footpath
 - Unsurfaced single-track
 - Gravel double-track
 - Gravel road
 - Road (BC digital road atlas)



MAP SHOULD NOT BE USED FOR LEGAL OR NAVIGATIONAL PURPOSES

0 50 100 200 300 m
Scale: 1:6,000

NO.	DATE	REVISION	BY
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Date Saved: 10/15/2020
Coordinate System: NAD 1983 UTM Zone 10N

Map 4

APPENDICES

Appendix A. Interview Guidance Questionnaire and Opportunistic Interview Responses

Table 1. Guidance questions for gathering information from public.

Interview Topic	Guidance Question
Values	What are the highest values of the property (e.g., wildlife, fish, non-motorized recreation, swimming etc.)?
Biodiversity	What types of wildlife to you see here? Have you observed breeding/ nesting activity ? Any rare or endangered plants? Unique features on the property (e.g., wildlife trees, caves, big trees)? Have you noticed any change in the forest, wetlands, beach or creek over time? Or change in wildlife use? Are there any particularly problematic invasive species (e.g., bullfrog, knotweed)?
Culture	What important cultural features exist on site (e.g., mining, settlement history, First Nations use)? What are names for the site (other than Coal Beach, Whytes Bay)? Why?
Human use	How do people use the site? What are the most important uses for people? Is human use changing in amount and/ or type? What are the most important access points for people? Where is use concentrated? Where are people coming from? Ie who are the users? Do users help to steward the site (e.g., pick up garbage, peer pressure to be respectful, put out fires, pick up after dogs, minimize camping etc.)?
Threats	Are there any threats to the property (e.g., to biodiversity or cultural values or water quality)?
Management	What are the most important management considerations (e.g., signage, closures at certain times, non-motorized access, fires, people out of riparian, dogs on leash, services)? Any user groups that should be involved in management planning in particular?

1. OPPORTUNISTIC INTERVIEW #1

May 22, 2020

Two dirt bikers, male and female, middle-aged.

- Living in Courtenay near Stotan Falls
- Dirt bike and trail run through the Coal Beach Property often
- Greenspace of the Property is highly valued to them
- They love the trail system here, but have noticed dirt bikers have been cutting new trails. Observed it has been the younger “crowd” cutting the new trails – the older trail users are happy to ride the current trails
- There is no motorized vehicle user “group” or “club” in the area
- The Property and trail system is highly valued for activities it offers young people other than to drink alcohol and do drugs
- It is great that the Property has been purchased and that no more cabins will go in, but hope that the Property remains open to the public
- No need for active management
- They pick up garbage when trail running through the Property, but don’t see a lot of garbage out on the trails
- They feel that the area right near the dam needs active management, as there is a significant amount of garbage and pet waste there
- There would be no benefit from garbage cans and washrooms, bears would be attracted and knock them over. If there is nowhere to put their garbage, users must pack it out
- They think that a visible sign near the beach that states “this is our drinking water” would help increase public awareness for users of the Property
- They always frown on chewing up waterways/shorelines with motorized vehicle use

2. OPPORTUNISTIC INTERVIEW #2

May 22, 2020

Three young adult females (~25-30 years old), walking on railway right-of-way, heading to Coal Beach.

- Come to beach and enjoy utilizing area for swimming and beach fires
- Negative perception of motorized boats mooring at Coal Beach
- Visit the Property once per week, all three live in Cumberland
- Property is valued as a place to relax
- Want to see “drinking water supply” signage on the Property
- They always take out their garbage and feel that people will leave more garbage on site if cans are installed
- Perceive the Property to be utilized more by locals, while visitors use the beach access at the campground
- Negative perception of “rowdy bikers” who come through the Property yelling and drinking alcohol. They indicate that this is a specific group of people that causes trouble, and most dirt bikers are respectful of the Property and other users.

Appendix B. Species and Ecosystems

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Table 1. Potentially occurring provincially and federally-listed ecosystems (BC CDC 2020).

Ecosystem Type	English Name	Scientific Name	Site Series (CWHxm1)	Likelihood of Occurrence ¹	Provincial Designation		Federal Designation
					BC List	Provincial Status	Global Status
Forest - Floodplain	Sitka spruce / salmonberry Very Dry Maritime	<i>Picea sitchensis</i> / <i>Rubus spectabilis</i>	08	Low	Red	S2 (October 2004)	G3
	black cottonwood - red alder / salmonberry	<i>Populus trichocarpa</i> - <i>Alnus rubra</i> / <i>Rubus spectabilis</i>	09	Low	Blue	S3 (July 2010)	GNR
	black cottonwood / Sitka willow	<i>Populus trichocarpa</i> / <i>Salix sitchensis</i>	10	Low	Blue	S2S3 (October 2004)	GNR
Forest - Broadleaf	arbutus / hairy manzanita	<i>Arbutus menziesii</i> / <i>Arctostaphylos columbiana</i>	00	Moderate	Red	S2 (February 2013)	G2
Forest - Coniferous	Douglas-fir / sword fern	<i>Pseudotsuga menziesii</i> / <i>Polystichum munitum</i>	04	Moderate	Red	S2 (April 2019)	G2G4
	Douglas-fir - western hemlock / salal Dry Maritime	<i>Pseudotsuga menziesii</i> - <i>Tsuga heterophylla</i> / <i>Gaultheria shallon</i>	03	Confirmed (EU 1d)	Red	S2 (March 2019)	G3G4
	western redcedar / sword fern Very Dry Maritime	<i>Thuja plicata</i> / <i>Polystichum munitum</i>	05	Confirmed (EU 2a)	Blue	S2S3 (May 2009)	GNR
	western hemlock - Douglas-fir / Oregon beaked-moss	<i>Tsuga heterophylla</i> - <i>Pseudotsuga menziesii</i> / <i>Eurhynchium oregonum</i>	01	Confirmed (EU 1, 2a - CXL-WHP01, 04)	Red	S2 (April 2013)	G3G4
	western redcedar / black twinberry	<i>Thuja plicata</i> / <i>Lonicera involucrata</i>	14	Low	Red	S1 (March 2019)	GNR
	western redcedar / salmonberry	<i>Thuja plicata</i> / <i>Rubus spectabilis</i>	13	Low	Red	S1S2 (March 2019)	GNR
	western redcedar / three-leaved foamflower Very Dry Maritime	<i>Thuja plicata</i> / <i>Tiarella trifoliata</i>	07	Moderate	Blue	S2S3 (June 2013)	G3
	western hemlock - western redcedar / deer fern	<i>Tsuga heterophylla</i> - <i>Thuja plicata</i> / <i>Struthiopteris spicant</i>	06	Confirmed (EU1c, f - CXL-WHP02)	Red	S2 (April 2013)	G2G3

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Table 1. Potentially occurring provincially and federally-listed ecosystems (BC CDC 2020). Continued (2 of 2).

Ecosystem Type	English Name	Scientific Name	Site Series (CWHxm1)	Likelihood of Occurrence ¹	Provincial Designation		Federal Designation
					BC List	Provincial Status	Global Status
Wetland - Forested/ Swamp	western redcedar / slough sedge	<i>Thuja plicata</i> / <i>Carex obnupta</i>	15	Low	Red	S1S2 (March 2019)	GNR
	western redcedar - Sitka spruce / skunk cabbage	<i>Thuja plicata</i> - <i>Picea sitchensis</i> / <i>Lysichiton americanus</i>	Ws54	Moderate	Blue	S3? (October 2004)	G3?
	western redcedar / sword fern - skunk cabbage	<i>Thuja plicata</i> / <i>Polystichum munitum</i> - <i>Lysichiton americanus</i>	Ws53	Moderate	Blue	S3? (April 2012)	GNR
	trembling aspen / Pacific crab apple / slough sedge	<i>Populus tremuloides</i> / <i>Malus fusca</i> / <i>Carex obnupta</i>	00	Moderate	Red	S1 (February 2018)	G2 (April 2013)
Wetland - Marsh	Sitka sedge - Pacific water-parsley	<i>Carex sitchensis</i> - <i>Oenanthe sarmentosa</i>	Wm50	Low	Blue	S3 (July 2004)	G3
	hard-stemmed bulrush Deep Marsh	<i>Schoenoplectus acutus</i> Deep Marsh	Wm06	Low	Blue	S3 (October 2004)	G5
	common cattail Marsh	<i>Typha latifolia</i> Marsh	Wm05	Moderate	Blue	S3 (October 2004)	G5
Wetland - Bog	lodgepole pine / peat-mosses Very Dry Maritime	<i>Pinus contorta</i> / <i>Sphagnum</i> spp. Very Dry Maritime	11	Moderate	Blue	S3 (October 2004)	GNR
	Labrador-tea / western bog-laurel / peat-mosses	<i>Rhododendron groenlandicum</i> / <i>Kalmia microphylla</i> / <i>Sphagnum</i> spp.	Wb50	Confirmed (EU 3a - CXL-WHP03)	Blue	S3 (July 2004)	G4
Wetland - Fen	slender sedge - white beak-rush	<i>Carex lasiocarpa</i> - <i>Rhynchospora alba</i>	Wf53	Moderate	Red	S2 (July 2004)	G2
	sweet gale / Sitka sedge	<i>Myrica gale</i> / <i>Carex sitchensis</i>	Wf52	Confirmed (EU 3a,3b)	Red	S2 (July 2004)	G3
Grassland or Rock outcrop	Roemer's fescue - junegrass	<i>Festuca roemerii</i> - <i>Koeleria macrantha</i>	00	Negligable	Red	S1 (October 2004)	G1
	Wallace's selaginella / reindeer lichens	<i>Selaginella wallacei</i> / <i>Cladonia</i> spp.	00	Negligable	Blue	S3 (April 2012)	GNR

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Table 2. Potentially occurring provincially and federally-listed plant species (BC CDC 2020).

English Name	Scientific Name	Likelihood of Occurrence ^{1,2}	Provincial Designation	Federal Designation	
			BC List	COSEWIC	SARA
banded cord-moss	<i>Entosthodon fascicularis</i>	Negligible	Blue	SC (May 2015)	1-SC (Aug 2006)
Henderson's checker-mallow	<i>Sidakea hendersonii</i>	Negligible	Blue		
Macoun's meadow-foam	<i>Limnanthes macounii</i>	Negligible	Red	T (Nov 2004)	1-T (Aug 2006)
purple sanicle	<i>Sanicula bipinnatifida</i>	Negligible	Red	T (May 2001)	1-T (Jun 2003)
Vancouver Island beggarticks	<i>Bidens amplissima</i>	Low	Blue	SC (Nov)	1-SC (Jun 2003)
western cowbane	<i>Oxypholis occidentalis</i>	Low	Blue		
western wahoo	<i>Euonymus occidentalis</i> var.	Negligible	Red		
white-top aster	<i>Sericocarpus rigidus</i>	Negligible	Blue	SC (Apr 2009)	1-SC (Jun 2003)
yellow montane violet	<i>Viola praemorsa</i> var.	Negligible	Red	E (Nov 2007)	1-E (Jun 2003)

¹ Confirmed - The species has been detected within the Project area. Species presence information was recorded during the field surveys and/or gleaned from the background review. High - The current range and distribution of the species overlap the Project area. Highly suitable habitat is present within the Project area; however, the species has not been detected. Moderate - The current range and distribution of the species overlap the Project area. Sufficiently suitable habitat may be present within the Project area; however, the species has not been detected. Low - The current range and distribution of the species may overlap or border the Project area; however, it is unlikely that sufficiently suitable habitat is present. The species has not been detected. Negligible - The species is likely to occur within the Comox Valley Regional District; however, suitable habitat is not present and the species is very unlikely to occur within the Project area.

² The potential for occurrence was reviewed based on distribution and habitat types, and those species with no potential for occurrence were removed from the list.

Table 3. Potentially occurring provincially and federally-listed wildlife species (BC CDC 2020).

Species Group	Common Name	Scientific Name	Likelihood of Occurrence ¹	Federal Designation		Provincial		Comments
				COSEWIC Status	SARA Status	BC List	Identified Wildlife ²	
Herpetofauna	Northern Red-legged Frog	<i>Rana aurora</i>	High	SC (May 2015)	1-SC (Jan 2005)	Blue	Y (May 2004)	Confirmed within 2 km of property (L.Ballin obs - Perseverance Creek)
	Wandering Salamander	<i>Aneides vagrans</i>	High	SC (May 2014)	1-SC (Feb 2018)	Blue		Confirmed within 1.5 km of property (R. Petch obs. - Cumberland Lake Campground), habitat present on property
	Western Toad	<i>Anaxyrus boreas</i>	High	SC (Nov 2012)	1-SC (Jun 2018)	Yellow		Confirmed within 3 km of property (all over Cumberland - multiple pers. comm. reports)
	Western Painted Turtle, Pacific coast population	<i>Chrysemis picta</i>	High	T (2016)	1-E (2007)	Red		Critical habitat mapped near the property, local population density low
Mammal	American (Common) Water Shrew, <i>brooksi</i> subspecies	<i>Sorex palustris brooksi</i>	Moderate			Red	Y (Jun 2006)	
	Ermine, <i>anguinae</i> subspecies	<i>Mustela erminea anguinae</i>	Low - Moderate			Blue		
	Little Brown Myotis	<i>Myotis lucifugus</i>	Confirmed	E (Nov 2013)	1-E (Dec 2014)	Yellow		Mapped critical habitat because in grid cel, only hibernaculum considered critical habitat; maternal colonies near property, foraging on property confirmed T. Ennis 2020
	Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>	Confirmed			Blue		Foraging on property - confirmed T. Ennis 2020
	Roosevelt Elk	<i>Cervus elaphus roosevelti</i>	Moderate			Blue		Expected to pass through property
	Wolverine, <i>vanconverensis</i> subspecies	<i>Gulo gulo vanconverensis</i>	Negligible	SC (May 2014)	1-SC (Jun 2018)	Red	Y (May 2004)	

¹ **Confirmed** - The species has been detected within the Project area. Species presence information was recorded during the field surveys and/or gleaned from the background review. **High** - The current range and distribution of the species overlap the Project area. Highly suitable habitat is present within the Project area; however, the species has not been detected. **Moderate** - The current range and distribution of the species overlap the Project area. Sufficiently suitable habitat may be present within the Project area; however, the species has not been detected. **Low** - The current range and distribution of the species may overlap or border the Project area; however, it is unlikely that sufficiently suitable habitat is present. The species has not been detected. **Negligible** - The species is likely to occur within the Comox Valley Regional District; however, suitable habitat is not present and the species is very unlikely to occur within the Project area.

² Identified under the Identified Wildlife Management Strategy.

³ Present on Comox Lake e-Bird (2020) data point list, however use of Property unknown.

Table 4. Cumulative list of native vegetation species on the Property.

Vegetation	Scientific Name	Native/ Exotic ¹	Source ²
arbutus	<i>Arbutus menziesii</i>		I
blueberry	<i>Vaccinium sp.</i>		P
baldhip rose	<i>Rosa gymnocarpa</i>		P
big leaf maple	<i>Acer macrophylla</i>		I
black cottonwood	<i>Populus balsamifera</i> subsp. <i>trichocarpa</i>		I
bog cranberry	<i>Oxycoccus oxycoccus</i>		P
bracken fern	<i>Pteridium aquilinum</i> ssp. <i>lanuginosum</i>		P
bunchberry	<i>Cornus canadensis</i>		P
cascara	<i>Rhamnus purshiana</i>		P
cotton grass	<i>Eriophorum sp.</i>		P
cutleaf blackberry	<i>Rubus laciniatus</i>		P
Douglas-fir	<i>Pseudotsuga menziesii</i> var. <i>menziesii</i>		P
dull Oregon-grape	<i>Mabonia nervosa</i>		P
dwarf rattlesnake orchid	<i>Goodyera repens</i>		P
false azalea	<i>Menziesia ferruginea</i> ssp. <i>ferruginea</i>		P
false lily-of-the-valley	<i>Maianthemum dilatatum</i>		P
false Solomon's-seal	<i>Maianthemum racemosum</i> ssp. <i>amplexicaule</i>		P
fairy slipper	<i>Calypto bulbosa</i>		I
great burnet	<i>Sanguisorba officinalis</i>		P
hairy honeysuckle	<i>Lonicera hispidula</i>		P
hardhack	<i>Spiraea douglasii</i> ssp. <i>douglasii</i>		P
Labrador tea	<i>Rhododendron groenlandicum</i>		P
moss	<i>Bryophyta sp.</i>		P
mountain sweet-cicely	<i>Osmorhiza berteroi</i>		P
northern/ woodland starflower	<i>Trientalis latifolia</i>		P
Oregon beaked moss	<i>Eurhynchium oreganum</i>		P
Pacific crab apple	<i>Malus fusca</i>		P
pacific ninebark	<i>Physocarpus capitatus</i>		P
peavine	<i>Lathyrus sp.</i>		P
pin cherry	<i>Prunus pensylvanica</i>		P
prince's pine	<i>Chimaphila umbellata</i> ssp. <i>occidentalis</i>		P
rattlesnake-plantain	<i>Goodyera oblongifolia</i>		P
red alder	<i>Alnus rubra</i>		P
red huckleberry	<i>Vaccinium parvifolium</i>		P
reed canary grass	<i>Phalaris arundinacea</i>	E	I
salal	<i>Gaultheria shallon</i>		P
salmonberry	<i>Rubus spectabilis</i>		P
saskatoon	<i>Amelanchier alnifolia</i>		P
shore pine	<i>Pinus contorta</i> var. <i>contorta</i>		P

¹E = exotic; ²P=plot data; I=incidental survey obs.

Table 4. Cumulative list of native vegetation species on the Property. Continued (2 of 2).

Vegetation	Scientific Name	Native/ Exotic ¹	Source ²
Sitka mountain-ash	<i>Sorbus sitchensis</i> var. <i>grayi</i>		P
Sitka spruce	<i>Picea sitchensis</i>		P
skunk cabbage	<i>Lysichiton americanus</i>		P
sphagnum	<i>Sphagnum</i> sp.		P
spotted coralroot	<i>Corallorhiza maculata</i> var. <i>maculata</i>		P
starflower	<i>Trientalis</i> sp.		P
step moss	<i>Hylocomium splendens</i>		P
sundew	<i>Drosera</i> sp.		P
sweet gale	<i>Myrica gale</i>		P
sweet-scented bedstraw	<i>Galium triflorum</i>		P
sword fern	<i>Polystichum munitum</i>		P
trailing blackberry	<i>Rubus ursinus</i> ssp. <i>macroptalus</i>		P
tree moss	<i>Climacium dendroides</i>		P
western trillium	<i>Trillium ovatum</i>		P
twinberry	<i>Lonicera involucrata</i>		P
twinflower	<i>Linnaea borealis</i> ssp. <i>borealis</i>		P
vanilla leaf	<i>Achlys triphylla</i>		P
wall lettuce	<i>Mycelis muralis</i>	E	P
water lily	<i>Nymphaeaceae</i> sp.		P
water sedge	<i>Carex aquatilis</i> ssp. <i>stans</i>		P
western bog-laurel	<i>Kalmia microphylla</i> ssp. <i>microphylla</i>		P
western flowering dogwood	<i>Cornus nuttallii</i>		P
western hemlock	<i>Tsuga heterophylla</i>		P
western redcedar	<i>Thuja plicata</i>		P
western trumpet honeysuckle	<i>Lonicera ciliosa</i>		I

¹E = exotic; ²P=plot data; I=incidental survey obs.

Table 5. Cumulative list of invasive species detected within 3 km of the Property.

English Name	Scientific Name	Source
Annual sow thistle	<i>Sonchus oleraceus</i>	IAPP 2020
Bull thistle	<i>Cirsium vulgare</i>	IAPP 2020, ERL 2020
Canada thistle	<i>Cirsium arvense</i>	IAPP 2020
Dock	<i>Rumex sp.</i>	IAPP 2020, ERL 2020
Common tansy	<i>Tanacetum vulgare</i>	IAPP 2020, ERL 2020
Cutleaf blackberry/ Himalayan Blackberry	<i>Rubus laciniatus/ armeniacus</i>	IAPP 2020, ERL 2020
Dalmation/ yellow toadflax	<i>Linaria sp.</i>	iNaturalist (July 2018)
English ivy	<i>Hedera helix</i>	IAPP 2020
Field bindweed	<i>Convolvulus arvensis</i>	IAPP 2020
Foxglove	<i>Digitalis purpurea</i>	IAPP 2020, ERL 2020
Giant hogweed	<i>Heracleum mantegazzianum</i>	IAPP 2020
Hairy cat's ear	<i>Hypochaeris radicata</i>	IAPP 2020, ERL 2020
Japanese knotweed	<i>Fallopia japonica</i>	IAPP 2020
Lady's thumb	<i>Polygonum persicaria</i>	IAPP 2020
Meadow knapweed	<i>Centaurea debeauxii</i>	IAPP 2020
Oxeye daisy	<i>Leucanthemum vulgare</i>	IAPP 2020, ERL 2020
Redroot amaranth / rough pigweed	<i>Amaranthus retroflexus</i>	IAPP 2020
Reed canary grass	<i>Phalaris arundinacea</i>	ERL 2020
Scotch broom	<i>Cytisus scoparius</i>	IAPP 2020, ERL 2020
Sulphur cinquefoil	<i>Potentilla recta</i>	ERL 2020
St. John's wort	<i>Hypericum perforatum</i>	IAPP 2020, ERL 2020
Wall lettuce	<i>Lactuca muralis</i>	ERL 2020

Table 6. Cumulative list of birds detected on or near the Property.

Common Name	Source	Common Name	Source
Canada Goose	eBird 2020	diurnal raptor sp.	eBird 2020
Mallard	eBird 2020	Hammond's Flycatcher	eBird 2020
Ring-necked Duck	eBird 2020	Pacific-slope Flycatcher	eBird 2020
Greater/Lesser Scaup	eBird 2020	Warbling Vireo	eBird 2020
Bufflehead	eBird 2020	Steller's Jay	eBird 2020
Common Goldeneye	eBird 2020	Northwestern Crow	eBird 2020, ERL 2020
Barrow's Goldeneye	eBird 2020	Common Raven	eBird 2020, ERL 2020
Hooded Merganser	eBird 2020	Chestnut-backed Chickadee	eBird 2020
Common Merganser	eBird 2020	Northern Rough-winged Swallow	eBird 2020
Red-breasted Merganser	eBird 2020	Purple Martin	eBird 2020
Sooty Grouse	eBird 2020	Tree Swallow	eBird 2020
Pied-billed Grebe	eBird 2020	Violet-green Swallow	eBird 2020
Horned Grebe	eBird 2020	Barn Swallow	eBird 2020
Band-tailed Pigeon	eBird 2020	Golden-crowned Kinglet	eBird 2020
Eurasian Collared-Dove	eBird 2020	Red-breasted Nuthatch	eBird 2020, ERL 2020
Common Nighthawk	eBird 2020	Brown Creeper	eBird 2020
Black Swift	eBird 2020	Pacific Wren	eBird 2020
Vaux's Swift	eBird 2020	American Dipper	eBird 2020
Rufous Hummingbird	eBird 2020	European Starling	eBird 2020
American Coot	eBird 2020	Varied Thrush	eBird 2020
Killdeer	eBird 2020	Swainson's Thrush	eBird 2020
Spotted Sandpiper	eBird 2020	American Robin	eBird 2020, ERL 2020
Marbled Murrelet	eBird 2020	Cedar Waxwing	eBird 2020
Mew Gull	eBird 2020	House Sparrow	eBird 2020
Ring-billed Gull	eBird 2020	Pine Siskin	eBird 2020
California Gull	eBird 2020	American Goldfinch	eBird 2020
Glaucous-winged Gull	eBird 2020	Fox Sparrow	eBird 2020
gull sp.	eBird 2020	Dark-eyed Junco	eBird 2020
Common Loon	eBird 2020	White-crowned Sparrow	eBird 2020
Turkey Vulture	eBird 2020, ERL 2020	Golden-crowned Sparrow	eBird 2020
Bald Eagle	eBird 2020, ERL 2020	White-throated Sparrow	eBird 2020
Red-tailed Hawk	eBird 2020, Ballin 2020	Song Sparrow	eBird 2020
Coopers Hawk	Ballin 2020	Spotted Towhee	eBird 2020
Western Screech-Owl	eBird 2020	Brown-headed Cowbird	eBird 2020
Great Horned Owl	eBird 2020	Brewer's Blackbird	eBird 2020
Barred Owl	eBird 2020	Orange-crowned Warbler	eBird 2020
Northern Saw-whet Owl	eBird 2020	Common Yellowthroat	eBird 2020
Pygmy Owl	Ennis 2020	Yellow Warbler	eBird 2020
Belted Kingfisher	eBird 2020, ERL 2020	Yellow-rumped Warbler	eBird 2020
Red-breasted Sapsucker	eBird 2020, ERL 2020	Black-throated Gray Warbler	eBird 2020
Hairy Woodpecker	eBird 2020	Townsend's Warbler	eBird 2020
Pileated Woodpecker	eBird 2020	Western Tanager	eBird 2020
Northern Flicker	eBird 2020	Black-headed Grosbeak	eBird 2020
woodpecker sp.	eBird 2020		

eBird. 2020. Comox Lake hotspot located 100 m south of the Property boundary, data retrieved May 17, 2020.

ERL (Ecofish Research Ltd.). 2020. Observations on the Property during field surveys May 19-22, 2020.

Ennis, T. 2020. Observations on the Property May 14, 2020.

Ballin, L. 2020. Observations on the Property April 4, 2020.

Table 7. Cumulative list of non-avian wildlife species detected on the Property.

Group	Common name	Scientific name	Native/ Introduced (N/I)	Breeding (Y/N/U)	Data Source
Amphibians	Northern Pacific Tree Frog		N	Y	iNaturalist (July 2018 obs)
	American Bullfrog	<i>Lithobates catesbeianus</i>	I	Y	Ballin <i>et al.</i> 2017, ERL 2020
	Garter Snake	<i>Thamnophis sp</i>	N	U	ERL 2020
Mammals	Sitka black-tail deer	<i>Odocoileus hemionus sitkensis</i>	N	U	Ballin 2020, ERL 2020
	American beaver	<i>Castor canadensis</i>	N	U	ERL 2020
	Cougar	<i>Puma concolor</i>	N	U	English, pers. comm. 2020
	American Black Bear	<i>Ursus americanus</i>	N	U	ERL 2020
	American Mink	<i>Neovision vision</i>	N	U	Ballin <i>et al.</i> 2019
	Red Squirrel	<i>Tamiasciurus hudsonicus</i>	N	U	ERL 2020

Appendix C. Ecological Unit Descriptions

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Table 1. Ecological description of Mature Second Growth Forests (Ecological Unit 1).

Ecological Unit Label	Ecological Unit Variant	Area (ha)	Dominant Ecosystem		Sub-dominant Ecosystem		Structural Stage	Estimated Age	Sensitive Ecosystem	Conservation Significance ¹
			Site Series	Vegetation Community	Site Series	Vegetation Community				
1a	On coal overburden	4.16	01	Western hemlock - Douglas-fir/ Oregon beaked moss	-	-	Mature forest	85	Older Second Growth: coniferous	Red
1b	On coal overburden - Disturbed understory	3.21	01	Western hemlock - Douglas-fir/ Oregon beaked moss	07	Western redcedar/ three-leaved foamflower Very Dry Maritime	Mature forest	85	""	Red (blue)
1c	Steep selectively logged riparian	0.55	06	Western hemlock - western redcedar/ deer fern	01	Western hemlock - Douglas-fir/ Oregon beaked moss	Mature forest (tall shrub)	85 (20)	""	Red
1d	Steep selectively logged riparian	1.43	03	Douglas-fir - western hemlock/ salal Dry Maritime	07	Western redcedar/ three-leaved foamflower Very Dry Maritime	Mature forest	85	""	Red (blue)
1e	Steep selectively logged riparian	3.46	01	Western hemlock - Douglas-fir/ Oregon beaked moss	01	Western hemlock - Douglas-fir/ Oregon beaked moss	Mature forest (tall shrub)	85 (20)	""	Red
1f	Steep selectively logged riparian	1.37	01	Western hemlock - Douglas-fir/ Oregon beaked moss	06	Western hemlock - western redcedar/ deer fern	Mature forest	85	""	Red

¹ Provincial list (CDC 2020)

Table 2. Habitat, current use and disturbance, condition, and viability of Mature Second Growth Forests (Ecological Unit 1).

Ecological Unit Label	Key Fish and Wildlife or Habitat	Current Public Use	Disturbance		Current Condition	Viability ¹
			Recent	Historic		
1a	Borders creek and lake which provide fish habitat, as well as habitat for fish-eating birds and other water birds. Tall and heterogeneous canopy and snags for bird habitat. Deer sign observed.	Low-Moderate	Minimal, foot trail and erosion of coal slags along Perseverance Creek.	Cleared for mine, covered with coal slags in ~1935	High	High
1b	Mature trees, high tree and shrub diversity and high canopy provide habitat structure for birds and bats.	High	Currently used by offroad vehicles, understory and ground cover highly disturbed. Extensive trail systems created by recent use.	Cleared for mine, covered with coal slags in ~1935	Moderate	Moderate
1c	Mature trees and shrubby edge habitat provide riparian habitat for fish and wildlife.	None	-	Logged pre-1930, selectively logged ~2000	Moderate-High	Moderate-High
1d	""	None	-	Logged ~1930, selectively logged ~2000	Moderate-High	Moderate-High
1e	""	Low-Moderate	Minimal, footpath used to reach lakeshore lookout, no fire pits of evidence of disturbance	Logged ~1930, selectively logged ~2000	Moderate-High	Moderate-High
1f	""	Low-Moderate	Moderate, some disturbance by recreational use near Scott's Slope	Logged ~1930, selectively logged ~2000	Moderate-High	Moderate-High

¹ Rapid qualitative assessment of if the condition of the EU will persist or improve over the moderate term if the current environmental conditions persist; considers size, current condition and landscape context (Master *et al.* 2012).

Table 3. Ecological description of Pole-Sapling Second Growth Forests (Ecological Unit 2), Wetlands (Ecological Unit 3), Beaches (Ecological Unit 4), Perseverance Creek (Ecological Unit 5) and Comox Lake (Ecological Unit 6).

Ecological Unit Label	Ecological Unit Variant	Area (ha)	Dominant Ecosystem		Sub-dominant Ecosystem		Structural Stage	Estimated Age	Sensitive Ecosystem	Conservation Significance ¹
			Site Series	Vegetation Community	Site Series	Vegetation Community				
2a	East side	12.4	01	Western hemlock - Douglas-fir/ Oregon beaked moss	05	Western redcedar/ sword fern Very Dry Maritime	Pole-sapling	20	n/a	Red (Recruiting)
2b	North side	4.42	01	Western hemlock - Douglas-fir/ Oregon beaked moss	07	Western redcedar/ three-leaved foamflower Very Dry Maritime	Pole-sapling	20	n/a	Red (Recruiting)
3a	Bog	1.56	Wb50	Labrador-tea/ western bog-laurel/ peat mosses	Wf52	Sweet gale/ Sitka sedge	Tall shrub (short shrub)	140+	Wetland: bog (fen)	Blue (red)
3b	Fen and open water	2.24	Wf52	Sweet gale/ Sitka sedge	60	Yellow pond-lily	Short shrub (aquatic herb)	140+	Wetland: fen (shallow water, swamp)	Red (yellow)
4	Comox Lake Beach	0.85	-	Beach	-	-	-	-	n/a	n/a
5	Perseverance Creek	0.61	-	River	-	-	-	-	n/a	n/a
6	Comox Lake	9.74	-	Reservoir	-	-	-	-	n/a	n/a
		7.15	-	Reservoir	-	-	-	-	n/a	n/a

¹ Provincial list (CDC 2020)

Table 4. Habitat, current use and disturbance, condition and viability of Pole-Sapling Second Growth Forests (Ecological Unit 2), Wetlands (Ecological Unit 3), Beaches (Ecological Unit 4), Perseverance Creek (Ecological Unit 5) and Comox Lake (Ecological Unit 6).

Ecological Unit Label	Key Fish and Wildlife or Habitat	Current Public Use	Disturbance		Current Condition	Viability ¹
			Recent	Historic		
2a	Shrubby trees provide songbird habitat, abundant deer.	Low-Moderate	Offroad vehicle use appears to be limited to the established single track road system.	Logged ~2000	Moderate	Moderate
2b	""	Low-Moderate	Offroad vehicle use appears to be limited to the established single track road system.	Logged ~2000	Moderate	Moderate
3a	Shrubby and open bog habitats and open water with large trees provide diverse habitat for birds, amphibians, beaver.	None	None	Cedar snags suggest historic change in water levels or other environmental conditions in a distinct period of time, then return to stable conditions. Likely associated with logging ~2000.	High	High
3b		None	None		High	High
4	Cover around stumps and logs for fish, waterbirds.	High	Reservoir operations, public access	Logging, mining, reservoir operations	Moderate - Poor	Moderate - Poor
5	Anadromous and resident fish, aquatic associated wildlife.	Moderate	Logging, upstream and downstream reservoir operations.	Logging, mining, upstream and downstream reservoir.	Moderate	Moderate
6	Anadromous and resident fish, aquatic associated wildlife.	High	Boating, swimming, reservoir operations, logging, cabins, others.	Boating, swimming, reservoir operations and footprint impacts, logging, others.	?	?
					?	?

¹ Rapid qualitative assessment of if the condition of the EU will persist or improve over the moderate term if the current environmental conditions persist; considers size, current condition and landscape context (Master *et al.* 2012).

Appendix D. Wildlife Habitat Plot Survey Data

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Table 1. Site description.

Wildlife Habitat Plot	Exposure	Aspect (°)	Mesoslope Position	Microtopography	Surface Shape	Water Source	Surface Substrate ¹				
							Rock	Organic Matter	Bedrock	Mineral Soil	Decaying Wood
CXL-WHP01	full shade	290	Mid Slope	extremely gullied	concave,	precipitation	-	-	-	D	T
CXL-WHP02	parital sun	160	Lower Slope	slightly hummocked	straight	precipitation, seepage	-	T	-	D	SD
CXL-WHP03	full sun	999 ¹	Depression	smooth	concave	flood, groundwater,	-	D	-	-	T
CXL-WHP04	full shade	350	Level	smooth	straight	precipitation	-	T	-	D	T

¹ D = dominant, SD = sub-dominant, T = trace² 999=flat

Table 2. Site Series and soil characteristics.

Wildlife Habitat Plot	Site Series	Soil				Coarse Fragments	Comments
		Moisture	Nutrient	Texture ²	Colour		
CXL-WHP01	01 (05)	mesic	medium-rich	LS	dark	65-85%	Coal overburden, texturing approximate, 2 cm organics (mostly litter) on overburden
CXL-WHP02	06	subhygric	medium	SL	dark	10-35%	15 cm+ organic and A layer
CXL-WHP03	Wb50	hydic	very poor	n/a	n/a	0%	Poorly decomposed peat 25 cm+
CXL-WHP04	01 (05)	mesic	medium-rich	SL	medium	35-65%	15 cm+ organic and A layer, likely richer area of EU, abundant mycelium

¹ LS = loamy sand, SL = sandy loam

Table 3. Vegetation structure.

Wildlife Habitat Plot	Structural Stage ¹	Seral Stage	Canopy Closure	Vegetation Cover by Layer (%) ²				
				A	B1	B2	C	D
CXL-WHP01	6	Transition	50-75%	50-75%	5-25%	5-25%	5-25%	50-75%
CXL-WHP02	6	Transition	50-75%	50-75%	5-25%	5-25%	5-25%	25-50%
CXL-WHP03	3a/ 3b	Shifting Mosaic	<1%	<1%	5-25%	50-75%	5-25%	>75%
CXL-WHP04	4	Establishment	>75% ³	50-75%	5-25%	25-50%	5-25%	5-25%

¹Structural Stage: 3a = low shrub, 3b = tall shrub, 4 = pole/sapling, 6 = mature forest

²Vegetation Layers: A = tree's >10 m, B1 = tall shrub 2-10 m, B2 = short shrub <2 m, C = herb, D = moss and lichen

³Canopy is ±10 m tall and comprised of short trees and tall shrubs

Table 4. Maximum tree sizes per plot.

Wildlife Habitat Plot	Tree Species	Diameter at Breast Height (m) ¹	Height (m) ²
CXL-WHP01	Douglas-fir	0.75	50
	western redcedar	0.79	45
CXL-WHP02	Douglas-fir	0.43	32
	western redcedar	0.29	24
CXL-WHP03	western redcedar	0.48	28
CXL-WHP04	Douglas-fir	0.25	15
	western redcedar	0.13	9

¹Measured

²Estimated

Table 5. Tree density.

Wildlife Habitat Plot	Tree species density (trees/ ha) ^{1, 2}									Total density ¹ (trees/ ha)
	cascara	Douglas- fir	Pacific crab apple	red alder	shore pine	Sitka spruce	western flowering dogwood	western hemlock	western redcedar	
CXL-WHP01	0	425	0	0	0	0	0	150	100	<i>675</i>
CXL-WHP02	0	350	0	25	0	75	25	100	675	<i>1250</i>
CXL-WHP03	0	0	50	0	150	0	0	0	100	<i>300</i>
CXL-WHP04	75	1075	0	0	25	0	0	0	100	<i>1275</i>
Mean (trees/ha	19	463	13	6	44	19	6	63	244	875

¹Density (trees/ ha) calculated from tree count from 11.28 m radius plot by multiplying the tree count by 25

²Tree density includes canopy (A layer) and sub-canopy (B1 layer) trees

Table 6. Vegetation composition.

Wildlife Habitat Plot	Layer	Species	Cover (%)	Wildlife Habitat Plot	Layer	Species	Cover (%)					
CXL-WHP01	A2	Douglas-fir	50	CXL-WHP03	A1	western redcedar	<1					
		western redcedar	3			B1	Pacific crab apple	1				
	A3	Douglas-fir	3		shore pine		7					
		western hemlock	5		twinberry		<1					
	B1	western hemlock	10		western redcedar		5	B2	Alaskan blueberry	<1		
		western redcedar	10		false azalea	<1						
	B2	red huckleberry	10		hardhack	5	Labrador tea		35			
		salal	15		pacific ninebark	<1	red alder		<1			
		saskatoon	<1		salal	1	shore pine		3			
		dull Oregon-grape	1		sweet gale	7	western bog-laurel		3			
	C	Sitka mountain-ash	<1		western hemlock	<1	western redcedar		1	C	bog cranberry	15
		bracken fern	1				bunchberry		<1		cotton grass	<1
		dwarf rattlesnake orchid	<1								false lily of the valley	3
		false Solomon's-seal	<1								great burnet	<1
		prince's pine	<1								northern starflower	<1
		spotted coralroot	<1								skunk cabbage	3
		sweet-scented bedstraw	<1						sundew		<1	
		sword fern	<1						trailing blackberry		<1	
		trailing blackberry	<1						water lily		1	
		twinflower	1						water sedge		3	
	vanilla-leaf	10										
	wall lettuce	<1										
D	Oregon beaked moss	20	D	moss	10	D	moss	20				
	step moss	50		sphagnum	75							
	tree moss	1										
CXL-WHP02	A2	Douglas-fir	35	CXL-WHP04	A1	Douglas-fir	75					
		western redcedar	20			B1	cascara	3				
	A3	Douglas-fir	3		Douglas-fir		3					
		red alder	<1		pin cherry	<1						
		western flowering dogwood	<1		shore pine	3						
		western redcedar	7		western redcedar	3						
	B1	Sitka spruce	5		western hemlock	1	B2	baldhip rose	1			
		western hemlock	4					dull Oregon-grape	10			
		western redcedar	10					red huckleberry	3			
	B2	Douglas-fir	1					salal	10			
		dull Oregon-grape	5					salmonberry	1			
		red huckleberry	7					saskatoon	<1			
		salal	5		C	sword fern	10					
	C	bracken fern	7			trillium	<1					
		rattlesnake-plantain	<1			vanilla leaf	3					
		starflower	<1			bracken fern	3					
		sword fern	1			woodland starflower	<1					
		vanilla-leaf	<1			cutleaf blackberry	<1					
	D	moss	35					hairy honeysuckle	<1			
		step moss	35					mountain sweet-cicely	<1			
									peavine	<1		
									sweet-scented bedstraw	<1		
							trailing blackberry	3				

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1. ECOLOGICAL UNIT 1: MATURE SECOND GROWTH FOREST

1.1. EU 1a: on coal slag

1.1.1. Plot Photographs: CXL-WHP01

Figure 1. View north from CXL-WHP01 plot centre, May 19, 2020.



Figure 2. View of canopy from CXL-WHP01 plot centre, May 19, 2020.



1.1.2. Ecological Unit Photographs

Figure 3. Narrow footpath along perseverance creek, May 19, 2020.

1.2. EU 1b: on coal slag with disturbed understory

Figure 4. Example of highly disturbed understory in high-use off-road vehicle area in EU 1b, May 19, 2020.



Figure 5. Example of moderately disturbed understory in high-use off-road vehicle area in EU 1b, May 19, 2020.



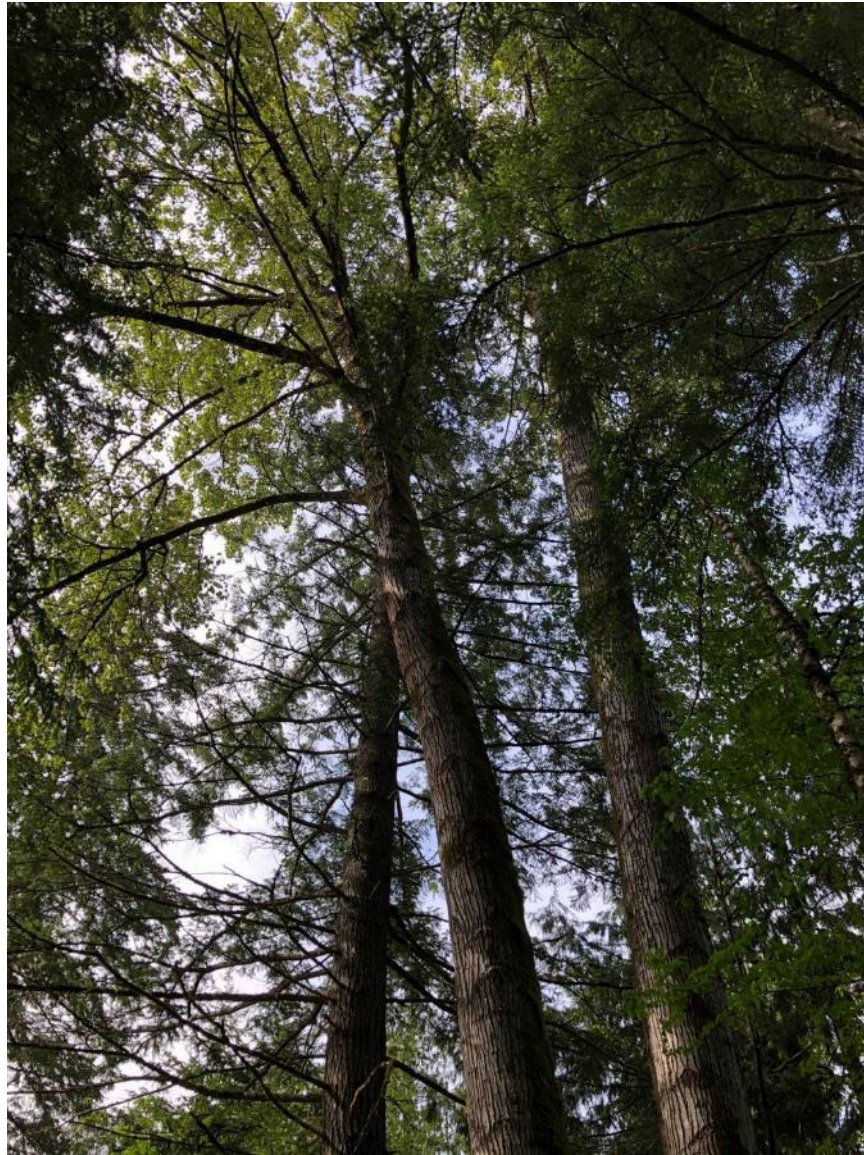
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Figure 7. Example moister richer western redcedar/ three-leaved foamflower portion of EU 1b, May 22, 2020.



Figure 8. The largest diameter black cottonwood trees observed on the Property, located in EU 1b, May 22, 2020.



1.3. EU 1c: steep selectively logged riparian

Figure 9. Mature second growth riparian forest along south bank of Perseverance Creek, May 19, 2020.

1.4. EU 1d: steep selectively logged riparian

Figure 10. Mature second growth riparian forest on steep dry slope (EU 1d) with a wildlife trail frequented by Sitka Black-tailed Deer, May 19, 2020.



Figure 11. Mature second growth riparian forest on steep dry slope (EU 1d) with arbutus trees, May 19, 2020.



1.5. EU 1e: steep selectively logged riparian

Figure 12. Mature second growth riparian forest on steep slope (EU 1e) on glacial moraine feature between wetland and lake, May 22, 2020.



Figure 13. Wildlife tree with an active Red-breasted Sapsucker nest in mature second growth riparian forest on steep slope (EU 1e) adjacent to wetland, May 22, 2020.



1.6. EU 1f: steep selectively logged riparian

1.6.1. Plot Photographs: CXL-WHP02

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Figure 15. Photograph showing ~55 cm diameter stump within the CXL-WHP02 plot remaining after selective harvest c. 2000, May 22, 2020.



1.6.2. Ecological Unit Photographs

Figure 16. Mature second growth riparian forest (EU 1f), showing moist forest type, May 22, 2020.



Figure 17. Large diameter (0.81 m DBH, 27 m height) western redcedar in mature second growth riparian forest at toe slope adjacent to wetland (EU 1f), May 22, 2020.



2. ECOLOGICAL UNIT 2: POLE-SAPLING SECOND GROWTH FOREST

2.1. EU 2a: East side

2.1.1. Plot Photographs: CXL-WHP04

Figure 18. View north from CXL-WHP04 plot centre in pole-sapling second growth forest (EU 2a), May 22, 2020.



Figure 19. View of rich organic topsoil in pole-sapling second growth forest (EU 2a), May 22, 2020.



2.1.2. Ecological Unit Photographs

Figure 20. Soils along road cut in in pole-sapling second growth forest (EU 2a), May 22, 2020.



Figure 21. Unsurfaced single track through pole-sapling second growth forest (EU 2a), May 22, 2020.



2.2. EU 2b: North side

Figure 22. Young Douglas-fir trees in pole-sapling second growth forest (EU 2b), May 22, 2020.



Figure 23. Grove of bigleaf maple bordering wetland in pole-sapling second growth forest (EU 2b), only partially cut during recent logging (c. 2000), May 22, 2020.



Figure 24. Large broom patch along double-track access road in pole-sapling second growth forest (EU 2b), May 22, 2020.



3. ECOLOGICAL UNIT 3: WETLAND

3.1. EU 3a: Bog

3.1.1. Plot Photographs: CXL-WHP03

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3.1.2. Ecological Unit Photographs

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3.2. EU 3b: Fen and open water

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4. ECOLOGICAL UNIT 4: COMOX LAKE BEACH

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Figure 32. Log accumulations along the Comox Lake Beach (EU 4) adjacent to EU 1b, May 19, 2020.



Figure 33. Eroding coal slag piles along the Comox Lake Beach (EU 4) adjacent to EU 1a, May 19, 2020.



5. ECOLOGICAL UNIT 5: PERSEVERANCE CREEK

Figure 34. View of eroding coal slag, rope swing, and reed canary grass islet on Perseverance Creek (EU 5), May 19, 2020.



Figure 35. Eroding coal slag on the bank of Perseverance Creek near Comox Lake, May 19, 2020.



6. ECOLOGICAL UNIT 6: COMOX LAKE

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Figure 37. View of Comox Lake from eastern shoreline where trestle crossed Whyte's Bay, May 21, 2020.



Figure 38. View of Comox Lake from the northern shore at end of double-track access road in EU 1f, showing remains of Scott's Slope trestle, May 22, 2020.



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1. HUMAN USE DATA

Table 1. Historic human use features located on Coal Beach Property during May 2020 field surveys.

Feature Type	Map Label	Comment
Historic Building/Feature	HBF1	Scott's Slope mine entrance cement arch; "1930", mine entrance tunnel has collapsed behind the arch
	HBF2	Cement building located on the single track road on the north access, some recent graffiti
	HBF3	Cement wall on cement platform, no clear trail leading to this feature but some crushed vegetation suggesting minor foot traffic
	HBF4	Scott's Slope north end of historic railway trestle and railway route
	HBF5	Erosion occurring along beach in APEC area near Scott's Slope mine entrance, with lesser amounts of coal slag present compared to APEC area to the south
	HBF6	Historic railway line right of way partially buried on single track access road
	HBF7	Remnants of historic dock, barge, or other large structure, iron ties and cables
	HBF8	Old transmission line pole at trail access point on east edge of property
	HBF9	Linear coal slag features dominate landscape; mature second growth CWHxm1 forest
	HBF10	Linear coal slag feature along lakeshore outside of the APEC area
	HBF11	Erosion of coal slag features along Perseverance Creek and Comox Lake shoreline

Table 2. Current human features located on Coal Beach Property during May 2020 field surveys.

Feature Type	Map Label	Comment
Off-road Vehicle Trails	OVT1	Moderately disturbed forest with some understory intact (30-50% of ground disturbed by off-road vehicle traffic)
	OVT2	Heavily disturbed forest with minimal understory intact (60-80% of ground disturbed by off-road vehicle traffic)
	OVT3	Low to moderately disturbed with understory mostly intact, mostly narrow cut dirt bike trails (20-30% of ground disturbed)
	OVT4	Heavily disturbed area with 100% cleared vegetation.
Fire Pit	FP1	Fire pits on lakeshore at main access point for Coal Beach
	FP2	Fire pit on Village of Cumberland ROW adjacent to property
	FP3	Fire pit at public use area above beach on north shore of Property near Scott's slope entrance to mine
Dump Site/Garbage	DSG1	Abandoned car within heavily disturbed OVT1 area
	DSG2	Waste receptacle and scattered trash on Village of Cumberland ROW
Swimming	SW1	Primary swimming beach at Comox Lake Beach
	SW2	Primary boat moorage location in front of Comox Lake Beach
	SW3	Rope swing into Perseverance Creek, accessed by trail along coal slag following shoreline
Property Access Point	AP1	Property access from Tayco gate to north pole-sapling second growth (EU 2b); gravel double-track
	AP2	North-east access from private forest land into east pole-sapling second growth (EU 2a), gravel double-track
	AP3	Access into east pole-sapling second growth connected to AP4, gravel double-track
	AP4	Access into east pole-sapling second growth blocked by cement barricade connected to AP3, gravel double-track connecting to gravel road on Property
	AP5	Access into east pole-sapling second growth from private forest lands, unsurfaced single-track
	AP6	Access into east pole-sapling second growth, gravel road used by land and cabin owners to access private property
	AP7	Access into EU 2a from Village of Cumberland ROW, steep gravel double-track
	AP8	Single lane road access at highly disturbed mountain bike area from Village of Cumberland ROW
	AP9	Access to EU 1a from Perseverance Creek near Comox Lake, connecting to narrow footpath along Perseverance Creek

2. HUMAN USE PHOTOGRAPHS

2.1. Historic Use and Features

Figure 1. HBF1: Scott's Slope mine entrance with collapsed tunnel behind, May 22, 2020.



Figure 2. HBF2: Building along access road near Scott's Slope mine entrance, May 22, 2020.



Figure 3. HBF3: cement building on cement platform near Scott's Slope mine entrance, May 22, 2020.



Figure 4. HBF4: Railway route to Scott's Slope mine entrance adjacent to shoreline on north side of property, May 22, 2020.



Figure 5. HBF5: Small amounts of coal slag visible in APEC area on north shoreline of property, May 22, 2020.



Figure 6. HBF6: Village of Cumberland railway right-of-way and property access (via AP08), May 19, 2020.



Figure 7. HBF7: Evidence of historic infrastructure on beach, potentially barging infrastructure from logging activities c. 1930, May 19, 2020.



Figure 8. HBS8: Transmission line pole at east edge of the property, May 19, 2020.



Figure 9. HBS9: Linear features created as a result of depositing coal slag and other mine wastes in linear piles away from mine entrance, May 19, 2020.



Figure 10. HBF10: Linear coal slag ridge located outside of the APEC area along the lakeshore, May 19, 2020.



Figure 11. HBS11: Extensive erosion of coal slag along Comox Lake shoreline near Perseverance Creek, May 19, 2020.



Figure 12. HBS11: Erosion of coal slag along Perseverance Creek, May 19, 2020.



2.2. Current Use

2.2.1. Off-road Vehicle Trails

Figure 13. OVT1: Moderately disturbed forest with some understory intact (30-50% of ground disturbed by off-road vehicle traffic on unsurfaced single-track trails), May 19, 2020.



Figure 14. OVT2: Heavily disturbed forest with minimal understory intact (60-80% of ground disturbed by off-road vehicle traffic on single-lane roads), May 19, 2020.



Figure 15. OVT3: Low to moderately disturbed area with understory mostly intact, narrow cut dirt bike trails (20-30% of ground disturbed by unsurfaced single-track trails), May 19, 2020.



Figure 16. OVT4: Heavily disturbed area with 100% cleared vegetation, May 19, 2020.



2.2.2. Fire pits

Figure 17. FP1: Fire pits on lakeshore at Coal Beach, accessed through roads/ trails in OVT zone or by water through adjacent boat mooring area, May 19, 2020.



Figure 18. FP2: Fire pit on Coal Beach on Village of Cumberland ROW (old railway line) off property, May 19, 2020.



Figure 19. FP3: Old fire pit at public use area above beach on north shore of Property near Scott's slope entrance to mine, May 22, 2019.



2.2.3. Dump sites / Garbage

Figure 20. DSG1: Abandoned car within heavily disturbed OVT1 area, May 19, 2020.



Figure 21. DSG2: Waste receptacle and scattered trash on Village of Cumberland ROW, May 22, 2020.



2.2.4. Swimming

Figure 22. SW1: Primary swimming beach at Comox Lake Beach showing boat moorage area in the background, May 19, 2020.



Figure 23. SW3: Rope swing into Perseverance Creek, accessed from water by trail along coal slag following shoreline, May 19, 2020.



2.2.5. Property Access Points

Figure 24. AP1: Property access from Tayco gate to northern property shoreline, gravel double-track, May 22, 2020.



Figure 25. AP2: Access into east portion of Property connected to AP4, gravel double-track, May 22, 2020.



Figure 26. AP4: Access into east portion of Property blocked by cement barricade connected to AP3, gravel double-track connecting to gravel road on Property, May 20, 2020.



Figure 27. AP5: Access into east pole-sapling second growth from private forest lands, unsurfaced single-track, May 19, 2020.



Figure 28. AP7: Access into EU 2a from Village of Cumberland ROW, steep gravel double-track, May 19, 2020.



Figure 29. AP8: Single lane road access at highly disturbed off-road vehicle area from Village of Cumberland ROW, May 19, 2020.



Figure 30. AP9: Access to EU 1a from Perseverance Creek near Comox Lake, connecting to narrow footpath along Perseverance Creek, May 19, 2020.

